ISSN 1831-9424

European Commission

Forest Fires in Europe, Middle East and North Africa 2023

2024

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EUR 40092

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JRC139704
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Print	ISBN 978-92-68-21566-1	ISSN 1018-5593	doi:10.2760/9029480	KJ-01-24-108-EN-C
PDF	ISBN 978-92-68-21495-4	ISSN 1831-9424	doi:10.2760/8027062	KJ-01-24-108-EN-N

Luxembourg: Publications Office of the European Union, 2024

Cover page illustration: © Daniel Santana, ICNF – Portugal.
The Carrascal fire in Portugal occurred during the most critical period of the year (from 4-13 August) and mainly affected forest stands dominated by maritime pine and eucalyptus, and also shrublands in the Centro region of the Mainland. With 6 553 hectares burnt and a loss of forest value amounting to 1.4 million euros, this was the second largest wildfire in the country in 2023.

How to cite this report: San-Miguel-Ayanz, J., Durrant, T., Boca, R., Maianti, P., Liberta`, G., Jacome Felix Oom, D., Branco, A., De Rigo, D., Suarez-Moreno, M., Ferrari, D., Roglia, E., Scionti, N., Broglia, M., Onida, M., Tistan, A. and Loffler, P., *Forest Fires in Europe, Middle East and North Africa 2023*, Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/8027062, JRC139704.

Recommended citation for country reports: e.g. Kok, E., Stoof, C., 2024. Country report for The Netherlands, in San-Miguel-Ayanz *et al.* (Eds), Forest Fires in Europe, Middle East and North Africa 2023, Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/8027062, JRC139704.

Forest Fires in Europe, Middle East and North Africa 2023

Contents

Abstract

This report contains the annual summary of the fire season of 2023 with official figures provided by 34 contributing countries for the number of fires, burnt areas and fire prevention efforts, and the analysis of fire danger and areas mapped in the European Forest Fire Information System (EFFIS).

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Preface: 'Forest Fires in Europe, Middle East and North Africa 2023'

The year 2023 was one of the worst for wildfires in the European Union since 2000. Over 500,000 hectares of land were burned, an area half the size of Cyprus.

In addition, 2023 saw 'megafires', impossible to bring under control by traditional firefighting means. One of them, near the city of Alexandroupolis in the Greek region of East Macedonia and Thrace, was the largest single wildfire recorded in the EU since 2000, when the European Forest Fire Information System (EFFIS) started tracking.

Thanks to EU's extensive preparation and upgraded response capacities, 13 firefighting planes and helicopters from the collective rescEU fleet were quickly deployed to combat the flames. This collective EU firefighting air fleet has by now become indispensable in complementing national and ad hoc solidarity emergency efforts by closest Member States.

As we publish this report, the 2024 wildfire season appears less severe than the past three years, although some countries, such as Greece and Portugal, still face devastating fires. The European Commission and the EU Member States have been improving their prevention, preparedness and firefighting capabilities, which would have helped limit damage this year.

The wildfires of the past three years show the clear impact of climate change. Due to climatic hazards , fires are more intense and affect larger as well as new areas. The fire season in Europe now also extends beyond the traditional summer period. The high frequency and intensity of wildfires during prolonged fire seasons pose a new challenge to firefighting services across Europe and globally, as aerial firefighting becomes more difficult and ground operations even more so. Beyond Europe, Canada experienced record-breaking wildfires in 2023, burning over 15 million hectares. Latin America – for example, the Amazon or Central America - faces severe fires in 2024, with some countries requesting EU support.

In 2023, 41% of the total burnt area in the EU affected Natura 2000 network, essential for biodiversity. These ecosystems, some irreplaceable, will take years to recover. Human lives were also lost, with at least 41 reported deaths due to wildfires.

Addressing wildfires requires a multitude of actions. This includes preventing ignitions and managing landscapes to reduce high-risk fuel accumulation. Around 96% of EU wildfires are caused by human actions, making education and awareness-raising essential. We will also need to take climate risks better into account and increase our preparedness and resilience to climatic hazards resulting in wildfires. Adaptation planning is of key importance for this. Prevention measures must target all sectors of the population, particularly those in high-risk areas.

Other key actions include better information on wildfire risk and improved forest management practices such as those recommended under the new EU Forest Strategy for 2030, and early warning and information systems. These elements must be accompanied by strong firefighting capabilities, such as those provided by the EU Civil Protection Mechanism. In the summer of 2023, Europe doubled the rescEU firefighting air fleet to support Member States during crises.

Effective wildfire management demands continuous collaboration between EU institutions and national services. Platforms such as the Commission's Expert Group on Forest Fires and the EFFIS foster this collaboration.

The growing wildfire threat can be only tackled through better information exchange and strong cooperation across the EU. This latest instalment in the 'Forest Fires in Europe, Middle East and North Africa' series offers crucial insights into national and EU-level actions during the 2023 fire season, supporting evidence-based policymaking to mitigate future wildfire impacts.

Iliana Ivanova

European Commissioner for Innovation, Research, Culture, Education and Youth

Wopke Hoekstra

European Commissioner for Climate Action

Janez Lenarčič

European Commissioner for Crisis Management

Executive summary

This issue of the EFFIS annual report on forest fires for the year 2023 is the 24th in the series. This report is consolidated as highly appreciated documentation of the previous year's forest fires in Europe, Middle East and North Africa. The section on national reporting gives an overview of the efforts undertaken at national and regional levels in the majority of countries in the European Forest Fire Information System (EFFIS) network. This is followed by information from EFFIS on the evolution of fire danger in the European and Mediterranean regions and the damage caused by fires in the 43 countries on the network.

The preparation and publication of the report aims at improving cooperation with the members of the Expert Group on Forest Fires (EGFF) especially with regard to fire prevention and climate change adaptation measures in relation of fires. Our common aim is to maintain and protect our landscapes and natural heritage, to avoid loss of human lives and to minimise the damage caused to property by uncontrolled forest fires.

The aim of EFFIS is to provide harmonised information on forest fires and assessment of their effects in the pan-European region. For this purpose, collaboration with EU Member States and neighbouring countries has been on-going since 1998. EFFIS started as a pilot project of collaboration between the European Countries and the European Commission in the area of fire information and fire prevention.

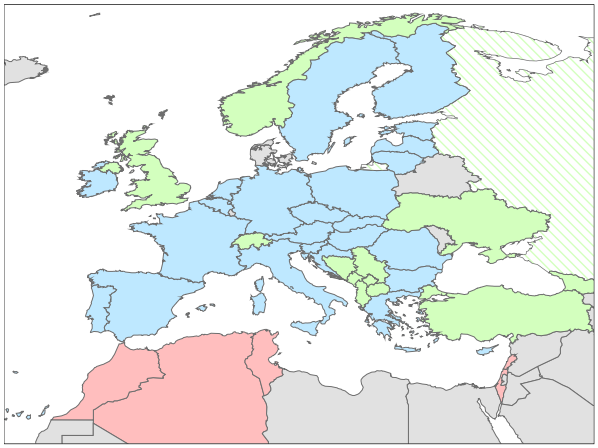


Figure 1. EFFIS network (blue: EU; green: non-EU; pink: MENA).

On the European Commission side, EFFIS was initiated by the Joint Research Centre in collaboration with the DG Environment. Due to the strong support by the Expert Group on Forest Fires, which constitutes the network of fire management experts from the countries, the system was developed to an operational level supporting national and European policies and providing the information basis for the discussion of issues related to forest fires in the European Parliament[1]. Currently, EFFIS provides operational support to DG ECHO in the area of civil protection, DG DEFIS in the implementation of the Copernicus Regulation [3] as well as to DG REGIO regarding the implementation of the EU Solidarity Fund Regulation [4] for critical fires. Data from EFFIS is used for the analysis of wildfire regimes under future climate change scenarios, in support to the DG CLIMA initiatives. In 2015, EFFIS was included as a component of the EU Copernicus Program Emergency Management Services, which provides a legal and financial basis for its operation under this framework since then.

EFFIS provides an ideal platform for countries to exchange good practices on fire prevention, firefighting, restoration practices and other activities related to fire management, and for the European Commission to update the forest fire services in the countries on relevant initiatives at the European level.

Since its first operation in the year 2000, the number of countries contributing to the information on forest fires in EFFIS and receiving data from it has increased steadily. The EFFIS system was used by government organizations and citizens, with over 758 000 users from 207 countries in 2023.

Currently, the EFFIS network constitutes 43 countries, including 25 EU Member States (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the Netherlands), 13 European non-EU countries (Albania, Bosnia & Herzegovina, Republic of North Macedonia, Georgia, Kosovo, Montenegro, Norway, Serbia, Switzerland, Türkiye, Ukraine and the United Kingdom), and 5 MENA countries (Algeria, Israel, Lebanon, Morocco and Tunisia). [Russia is temporarily excluded from the network].

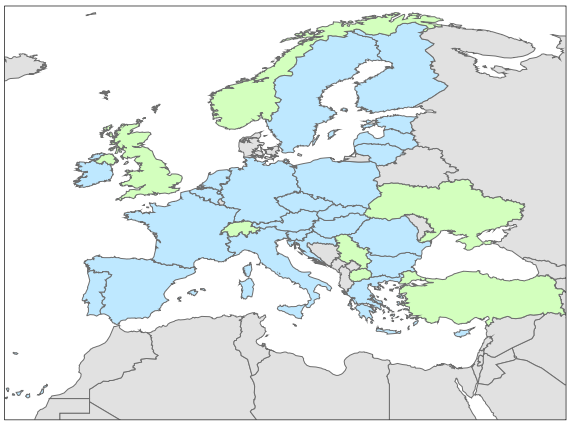
[1]http://www.europarl.europa.eu/plenary/en/parliamentary-questions.ht

1 Forest Fires in 2023: Country reports from National Fire Services

1.1 Introduction to the 2023 fire season

Table 1. Overview of the number of fires and burnt areas as reported by the contributing countries in 2023[2].

Country	Number of fires			Burnt area (ha)			Notes
	2023	2013-22 average	2023 as % of average	**2023**	2013-22 average	2023 as % of average	
Austria	**119**	208	57	**21**	112	19	
Bulgaria	**448**	434	103	**6388**	4305	148	
Croatia	**48**	152	32	**1837**	12581	15	
Cyprus	**131**	104	126	**2216**	1826	121	
Czech Republic	**1512**	1520	99	**217**	491	44	
Estonia	**33**	77	43	**75**	114	66	
Finland	**1346**	1318	102	**383**	582	66	
France[3]	**2666**	2602	102	**5361**	15179	35	
Germany	**1059**	1058	100	**1240**	1016	122	
Greece	**941**	851	111	**136499**	28069	486	
Hungary	**675**	1252	54	**911**	5075	18	
Italy	**4265**	5026	85	**88806**	66903	133	
Latvia	**571**	637	90	**622**	685	91	
Lebanon	**23**	125	18	**132**	1265	10	Average 2015-2022
Lithuania	**167**	148	113	**60**	78	77	
Morocco	**466**	447	104	**6246**	4521	138	
Netherlands	**405**	582	70	**116**	364	32	Average 2017-2022
North Macedonia	**104**	120	87	**529**	2373	22	
Norway	**1251**	450	278	**3059**	1320	232	Change in method of recording fires in 2016
Poland	**4908**	6669	74	**1129**	3040	37	
Portugal	**7523**	14057	54	**34510**	125043	28	
Romania	**170**	358	47	**554**	2969	19	
Serbia	**33**	88	38	**358**	2428	15	
Slovakia	**55**	202	27	**30**	384	8	
Slovenia	**40**	93	43	**118**	559	21	
Spain	**7748**	9979	78	**89068**	100506	89	
Sweden	**4744**	5093	93	**894**	4763	19	
Switzerland	**144**	99	146	**120**	118	102	
Türkiye	**2579**	2686	96	**15520**	22919	68	
Ukraine[4]	**593**	1475	40	**907**	12154	7	



1.2 European countries

The following chapters contain the reports from the contributing European countries. The reports are arranged in alphabetical order and comprise reports from 24 Member States and 7 other non-EU members of the EFFIS network.

The images and tables for each section are copyright or provided by the related source at the end of the section

[2] Some countries do not report precise figures for fire numbers/burnt area and are not included in this table.
[3] Forest fires only.
[4] Data on forest fires reflect statistics obtained from forest users and owners, which are coordinated by the State Forest Resources Agency of Ukraine (73% of all forests in Ukraine). Some fires probably missing.

1.2.1 Austria

Fire danger in the 2023 fire season

The year 2023, alongside 2018, marked the warmest year in Austria's recorded history. However, it was also the wettest year in over five decades. This combination of unusual weather patterns significantly influenced the occurrence of forest fires, resulting in only 119 documented incidents—the lowest number since 2005.

Several factors likely contributed to the unusually low number of wildfires this year. First, the two very wet and cool months of April and May effectively eliminated the spring fire season. Typically, April records the most forest fires, but this year, there were only four.

Although the summer brought several heatwaves and exceptionally high temperatures extending into September, the water reserves from spring, the absence of prolonged dry periods, and a very wet spell in early August resulted in an unusually low number of wildfires during the summer as well. Additionally, media campaigns by authorities and fire departments may have led to more cautious behaviour among forest visitors, reducing potential ignition sources.

The Austrian forest fire database has documented 119 forest fires in 2023. The last instance of fewer fires was in 2005, with 85 recorded incidents. In contrast, the highest numbers in the past two decades were in 2015 (281 fires) and 2017 (272 fires).

Fire occurrence and affected surfaces

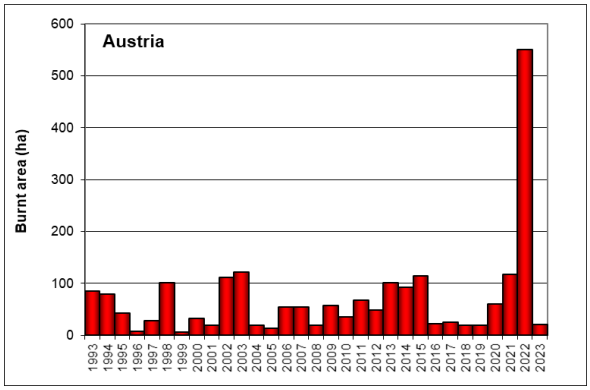
The regional distribution of forest fires in 2023 followed the long-term trend. Lower Austria had the most forest fires with 27 events, followed by Tyrol with 23, Styria with 18, and Upper Austria with 15. The fewest fires occurred in Burgenland (6) and Vienna (5). The eastern pre-alpine region and the valleys in the western Alps were regional hotspots for fire activity.

The monthly distribution of forest fires reflects the very wet and cool months of April and May (Figure 3, Figure 4). March recorded 19 fires, followed by a decrease in April and May with 5 and 6 fires respectively. The summer months of June and July, which included some heatwaves, resulted in 19 and 28 documented fires. A wet August and the hottest September on record brought only 11 and 9 fires. October had 15 fires, while no fires were recorded in November.

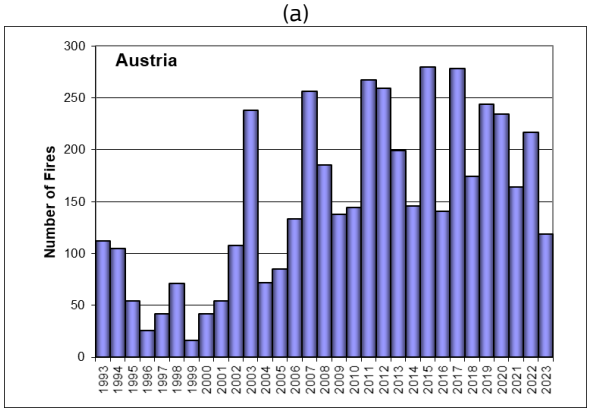
In 2023, only 21 hectares of forest were damaged by fires, compared to the record 550 hectares burned in 2022. The last time the total burned forest area was smaller was in 2019, with 19 hectares. This underscores the high variability in Austria's forest fire regime, which largely depends on seasonal weather patterns.

The largest wildfire of the year 2023 in Austria was an uncontrolled reed fire at Neusiedler lake in March, which burned more than 190 hectares of wetland. The largest forest fire occurred in July near Vienna. A large grassland fire covering over 30 hectares spread to forest areas, affecting about 8 hectares.

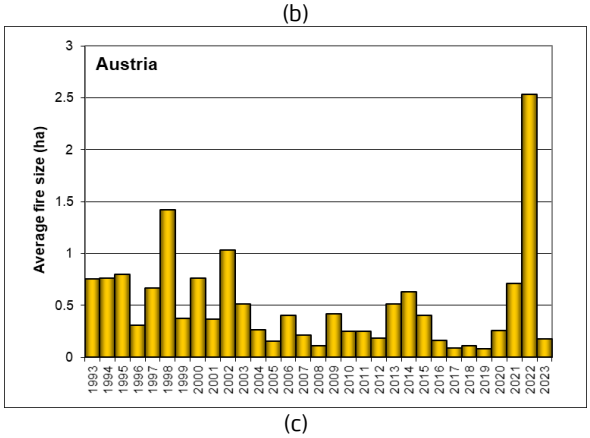
The yearly trends in terms of numbers of fires, burnt areas and average fire size since 1993 are displayed in Figure 2.



(a)



(b)



(c)

Figure 2. Burnt areas (a), number of fires (b) and average fire size (c) in Austria from 1993 to 2023.

Figure 3. Number of fires by month in Austria in 2023.

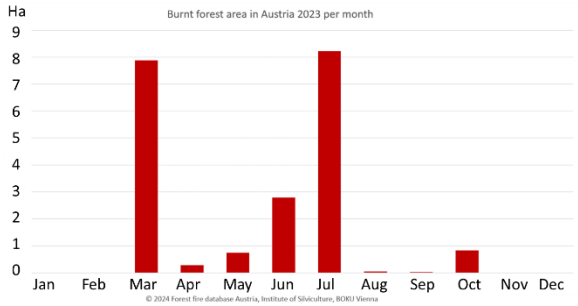


Figure 4. Burnt area in ha by month in Austria in 2023.

Fire causes

In 2023, most forest fires were attributed to human activities. Human influence was the likely cause of 83 fires, accounting for 70% of the total. Negligence, such as discarded cigarettes, hot ashes, and uncontrolled fires, caused over 50% of all anthropogenic fires. Specifically, cigarettes were suspected in about 30% of cases, and hot ashes in about 10%. Arson was suspected in 15% of all human caused forest fire incidents. Additionally, some fires were sparked by power lines, train sparks, fireworks, or other unknown human causes.

The remaining 30 fires (25%) were ignited by lightning strikes, which is above the long-term average of 17%. Most naturally caused fires were small or incipient, consistent with recent years. The causes of six forest fires are still under investigation.

Fire fighting means

About 4 500 fire departments with 260 000 active (mostly volunteer) firefighters form a dense network throughout Austria. The Austrian fire brigades continued to procure their specific equipment, including tools and clothing, as well as containers with forest firefighting equipment that can be transported either by truck or by aerial vehicles for fighting forest and wildland fires. At the Tyrolean Centre of Competence for Forest Fire Fighting (Tyrolean Fire Academy), joint training courses were held for members of all nine provincial fire brigade associations in the fields of "forest fire fighting on the ground" and "command and control for aerial forest fire fighting". Additional special training courses are in preparation. In all nine provinces, there are specially trained units for fighting forest fires, in particular as ground air support units. The teams have special training in equipment such as extinguishing containers for use in helicopters and auxiliary equipment for use in alpine areas. Some provinces are equipped with special forest fire trucks and pickup trucks. A harmonised guideline for wildfire fighting is nearly finished and will be published in 2024.

Unmanned aerial vehicles (UAV) are becoming a standard tool for fire brigades to assess wildfires and use sensory data to support decision-making.

Operations of mutual assistance

In Austria, forest fires are fought by the local fire brigades. The local fire brigades are supported by the regional structures of the fire brigade associations (e.g. disaster relief units and specialised units). Aerial resources (helicopters, planes) are provided by the Ministry of the Interior (MoI), the Ministry of Defence (MoD) and private companies. There is close cooperation between these partners, including joint trainings and exercises.

Austrian firefighters from the province of Lower Austria were deployed to France under the Union Civil Protection Mechanism (UCMP, Prepositioning).

Injuries and loss of human life

There were only minor injuries and no deaths in the ranks of the fire brigades. There were no other fatalities recorded.

Fire prevention activities and information campaigns

With the Forest Fund Act 2020, the Austrian government has approved a €350 million investment and relief package for agriculture and forestry to support Austria's forests, thus creating for the first time an economic basis for systematically addressing the issue of forest fires in Austria. The funds can now be used until 2027 to set up short- and long-term prevention measures and to implement integrated forest fire management in Austria.
https://www.parlament.gv.at/PAKT/VHG/XXVII/BNR/BNR_00092/index.shtml.
Accompanying the various media reports on devastating wildfires in Europe, a media campaign communicating five basic rules for behaviour in the case of increased wildfire risk was launched in Austria.

Climate change

Climatic conditions and how they impacted the fire season

The Austrian forest fire regime can have very different characteristics depending on the seasonal weather conditions. Due to climate change and the assumed increase in duration and intensity of droughts and heat waves in the summer months, more intense forest fire seasons are expected in the future.

National adaptation strategies / plans

With the Forest Fund Act 2020 and other project activities (e.g. AFFRI 2, CONFIRM), several measures are planned to adapt Austrian forests to climate change, e.g. by developing recommendations for forest owners and forest companies for adaptive forest management to reduce the forest fire risk or by raising public awareness. In addition, a national action plan is being implemented to better understand, prevent and suppress forest fires in Austria.

The Austrian Federal Ministry of Agriculture, Forestry, Regions and Water Management has launched a joint commitment of the national forest fire stakeholders to prepare for the challenges of increasing forest fire risk in the coming years. The "Hotspot Forest" action programme aims to develop an integrated wildfire management in Austria that is able to adapt to climatic and behavioural changes that influence the fire risk. Work on the implementation of further measures in the action programme is ongoing.

Research activities aimed at improving fire management

In 2023, several projects funded by the Austrian Forest Fund Act 2020, Measure 6 - Forest Fire Prevention, were continued under the leadership of the Institute of Silviculture, BOKU Vienna. Within the framework of IGNITE, the assessment of the ignition danger of forest fires occurring in Austria is to be improved. In an experimental setup a forest of spruce (*Picea abies* L.) trees of different sizes was simulated and burned under controlled conditions. The aim of the experiment was to collect data on fire temperature (using thermal sensors and infrared thermometers), fire spread, meteorological conditions, burnt biomass and measurable emissions (CO2 and particulate matter).

Fire behaviour in different vegetation structures could also be studied. EMERGE aims at optimizing the state of knowledge on forest fuels in Austria, and therefore improving the models on fire spread and fire intensity. Fire experiments were conducted on a military training area in Lower Austria, collecting data on fire fuels, fire temperature, and fire behaviour. FIREDATA aims to harmonize the documentation of forest fires in Austria, the archive research of fires and to ensure the establishment of case studies on burnt forest sites. In the project Austria Fire Futures (AFF), led by a research group at the International Institute for Applied Systems Analysis (IIASA), the future development of fire hazard in Austria will be assessed.

In addition, the Austrian Forest Fund Act funded several projects for awareness raising: REVEAL supports a vulnerability analysis to locate endangered buildings and infrastructures, and will support public awareness. BURN-IT develops an expert tool for pooling knowledge on forest fire danger assessment and assists public awareness via podcasts, experimental fire danger maps, and a forest fire blog.
Together.Safe.Firefighters ("*Gemeinsam.Sicher.Feuerwehr*") is an existing fire and disaster prevention initiative of the Austrian Fire Brigade Association with a new focus on forest fire risk, Children's Summer University with a focus on forest and forest fires for children aged 8-12.

(Sources: Institute of Silviculture, University of Natural Resources and Life Sciences, Vienna; Austrian Federal Ministry of Agriculture, Regions and Tourism; The Austrian Federal Fire Brigade Association, Austria).

1.2.2 Belgium

Fire Danger in 2023

Following the relatively wet meteorological conditions throughout the entire year 2023, with exception of a few weeks of more sustained drought in May – June, fire danger was overall low in 2023. More specifically, there were only about 60 days with an increased wildfire danger and none with extreme fire danger (as assessed on the basis of the EFFIS FWI, current meteorological conditions, terrain characteristics, and so on), whereas there were more than 120 and about 30 of such days, respectively, the year before in 2022. In terms of fire danger, 2023 was similar to 2021, whereas both 2020 and 2022 were years with many days with an increased wildfire danger.

Fire occurrence and affected surfaces

Since an adequate registration of wildfires in Belgium is not yet in place because the fire registration procedures have been optimized for fires in urban areas, we resort for this report to the emergency calls concerning fires in non-urban areas (of limited extent and extensive) that were made in 2023 to Belgium's public safety answering points (PSAPs). So, the numbers below should be treated with care because the same wildfire might have been reported several times by different callers to the PSAPs. Hence, they are merely indicative. Moreover, there is – in general - no information on the affected surface and wildfire cause (leaving a few exceptions aside), but the largest wildfire observed in an area managed by the Agency for Nature and Forests, of the Flemish Government, was smaller than 1 hectare, which might serve as the upper limit for most 2023 wildfires in Belgium.

In total, 1798 calls concerning fires in non-urban areas were registered by the country's PSAPs. Of those, the large majority (1 669, 93%) concerned fires of limited extent, while there were 129 (7%) calls related to more extensive fires. Of the latter, 78 (61%) were coming from Wallonia, especially the provinces of Luxembourg and Namur, 50 (39%) from Flanders, especially the provinces Antwerp and Limburg, and only 1 from Brussels Capital Region. This geographical distribution corresponds to the one reported by Depicker et al. (2020): (https://nhess.copernicus.org/articles/20/363/2020/).

For completeness, it should be mentioned that even though 1 hectare may serve as the upper limit on the extent of a typical 2023 wildfire, there were two larger wildfires that affected more than 80 and 150 hectares, respectively.

Fire fighting means and intervention campaigns

Of the 1798 calls concerning fires in non-urban areas in 2023, only in 5 cases dedicated wildfire fighting means in terms of forest trucks and water tanks were deployed from outside the intervention zone where the wildfire took place, which serves as an indication of the larger wildfire extent in those cases.

Given the fact that several governmental agencies at different administrative levels are involved in the (safety) management of public forests and parks, and hence taking adequate fire prevention measures, the relevant actions are mutually coordinated in consultation with the involved agencies.

Loss of human life

No people were injured or lives were lost as a consequence of these fires, and only once wildfire suppression assistance was requested from another state (Germany).

Currently, a workflow is being designed to optimize the registration of wildfires in Belgium. To enable a faster detection of wildfires in the field, the Agency for Nature and Forests, of the Flemish Government is currently conducting a pilot study aiming at an automatic smoke detection using dedicated cameras and AI.

(Sources: BionamiX, Ghent University; Noodcentrales 112 (PSAPs), Directorate-General Civil Security, Ministry of the Interior; Agency for Nature and Forests of the Flemish Government, Belgium).

1.2.3 Bulgaria

Fire occurrence and affected areas

According to the Executive Forest Agency database in 2023, the number of forest fires in Bulgaria was 448 and the burnt area is estimated to be 6 388 ha, with 689.6 ha of them burned by crown fires. The average size per forest fire in 2023 increased to 14.25 ha. The biggest forest fire affected 599 ha of forest territories. The largest number and area burnt by forest fires were reported in Regional Forest Directorate /RFD/ Kardzhali (51 fires and 2 414 ha) and RFD Burgas (45 fires and 1 731 ha). More than 65% of all burned forest areas in the country were concentrated in these two RFDs.

Distribution of the burnt areas in 2023 according to ownership is:

- State forest - 71%,
- Municipal forest – 16%
- Private forest – 13%.

The main causes for the forest fires during 2023 are as follows:

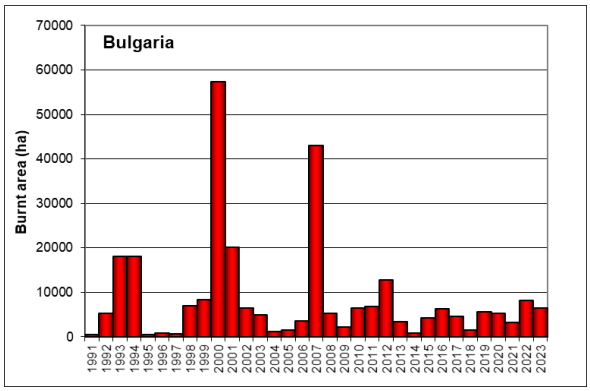
- Carelessness – 263 in number (59%);
- Arson - 16 in number (3%);
- Natural - 17 in number (4%);
- Unknown - 144 in number (32%).

The direct losses by forest fires in 2023 are estimated at 170 000 Euro, although the average losses for the last 10 years total about 1 000 000 Euro.

The total number of fires, burnt area and average fire size from 1991 to 2023 is presented in Figure 1 and forest fire statistics including causes are in Table 1.

Table 2. Forest fire statistics for Bulgaria 2014-2023.

Year	Total number of fires	Burnt area (ha)	Fire causes (number)		
			Human activities	Natural	Unknown
2014	151	916	128	3	20
2015	429	4313	335	12	82
2016	584	6340	472	22	90
2017	513	4569	433	14	66
2018	222	1453	201	7	14
2019	668	5619	550	8	110
2020	499	5258	350	13	136
2021	349	3143	238	28	83
2022	516	8126	337	21	158
2023	448	6388	280	24	144
Mean	**438**	**4613**	**333**	**15**	**90**



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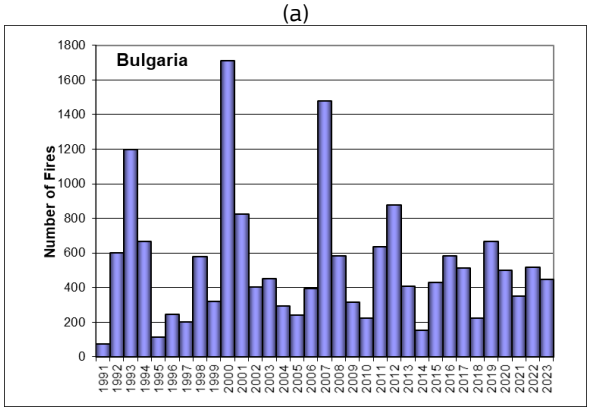

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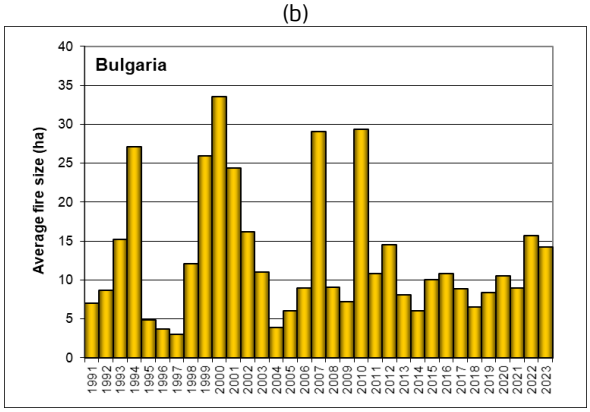

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Figure 5. Burnt areas (a), number of fires (b) and average fire size (c) in Bulgaria from 1991 to 2023.

(Source: Executive Forest Agency, Bulgaria).

1.2.4 Croatia

Fire occurrence and affected surfaces

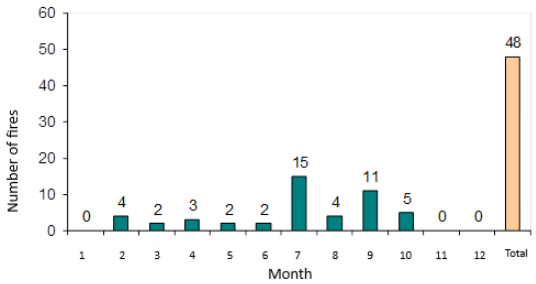
In the period from 01 January. until 31 December 2023. a total of 48 fires burned 1 837 ha of forest and other land owned by the Republic of Croatia and private forest owners (state and private forests and agricultural lands that were burned as part of forest fires).

This is a year with a below average number of fires and a below-average burnt area.

Table 3. Number of fires and burnt area by type of fire (all forests in the Republic of Croatia).

Type of fire	Number of fires	Burnt area (ha)
Ground fire (low)	34	291
Canopy fire (high)	0	0
Underground fire	0	0
Combined fire	13	1536
Unclassified	1	10
Overall	**48**	**1837**

In 2023, most fires occurred in July, a total of 15 or 31% of all fires by number. As for the burnt area, 1 527 ha or 83% of the total burnt area in 2023 burnt in July (Figure 6).



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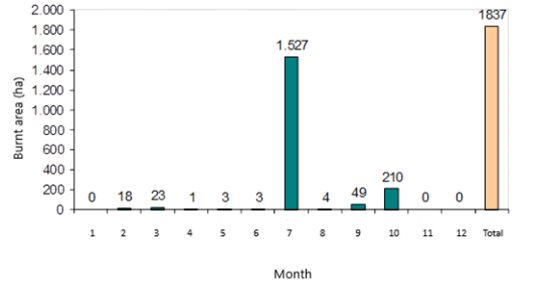

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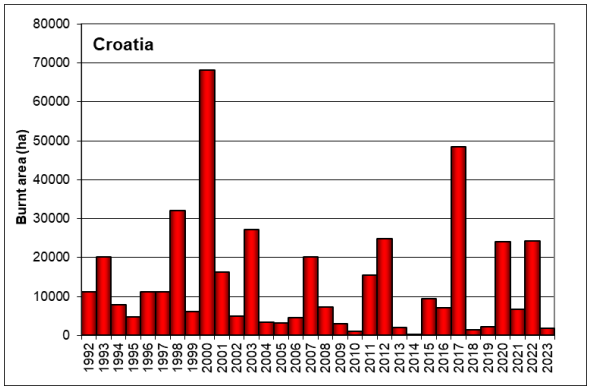
Figure 6. Number of fires (a) and burnt area (b) by month in 2023.

The trend of number of fires, burnt area and average fire size can be seen in Figure 7.



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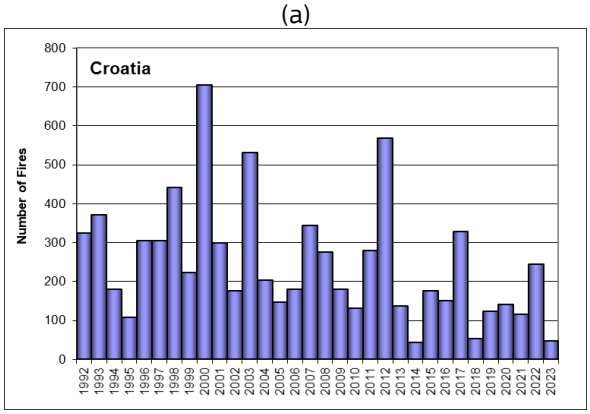

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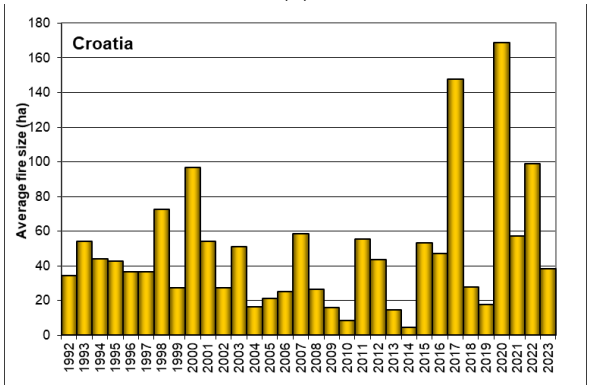

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Figure 7. Burnt areas (a), number of fires (b) and average fire size (c) in Croatia from 1992 to 2023.

(Source: Directorate for Forestry, Hunting & Wood Industry, Ministry of Agriculture, Croatia; National Protection and Rescue Directorate, Croatia).

1.2.5 Cyprus

Review of the 2023 season

The 2023 fire season in Cyprus was severe and destructive. Following a winter with below average precipitation and experiencing a hot and dry summer, the conditions were favourable for the ignition and rapid spread of forest fires. In contrast, fire statistics by the end of June 2023, showed a near average number of forest fires and a lower burned area compared to the last decade average. However, a prolonged period of heatwave conditions that lasted for almost three weeks starting in mid-July, with temperatures reaching 44°C to 46°C in some areas, worsened conditions and reflected negatively on the island's fire danger. Since then, the country had experienced aggressive fire activity, an above average number of fires and burned area, and the ignition of several large-scale fire incidents that had severe impacts on communities and the environment.

Fire danger in the 2023 fire season

In January 2023, the weather in Cyprus was dry and hot. The mean air temperature was about 2.5°C above normal and the area average precipitation was 81% of normal.

In February the weather was dry and relatively cold. The mean air temperature was 0.5°C below normal and the average precipitation was 75% of normal.

In March the weather was relatively dry and warm. The mean air temperature was 2.0°C above normal and the area average precipitation was 89% of normal.

In April the weather was wet. The mean air temperature was normal and the area average precipitation was 126% of normal.

In May the mean air temperature was normal and the area average precipitation was 91% of normal.

In June the weather was dry. The mean air temperature was normal and the area average precipitation was 55% of normal.

In July the weather was dry and hot. The mean air temperature was 2.3°C above normal and the area average precipitation was 12% of normal. Maximum daily temperatures above 40.0°C occurred during the period 13th – 31st of the month.

In August the weather was hot. The mean air temperature was about 2.0°C above normal and the area average precipitation was 197% of normal. Heatwave conditions prevailed during several days of the month, where the maximum temperatures were about 5 -10°C above normal.

August 2023 was one of the warmest Augusts in history and several record temperatures were recorded in different areas of Cyprus. Inland, the daily maximum temperature of 45.3°C recorded at Athalassa meteo station on August 14, is the 2nd highest daily maximum temperature ever recorded in this area. Record temperatures were also recorded on mountainous areas. More specifically, at Prodromos community on the 14th of August, the daily maximum and the daily minimum temperatures reached 38.4°C and 29.5°C respectively, which are considered as the highest daily maximum and highest daily minimum temperatures ever recorded in this station since its first date of operation, back in 1959.

In September, the weather was extremely wet and hot. The mean air temperature was 2.0°C above normal and the area average precipitation was 258% of normal.

In October, the weather was hot and wet. The mean air temperature was 2.0°C above normal and the area average precipitation was 105% of normal.

In November the weather was very warm and relatively dry. The mean air temperature was about 3.0°C above normal and the area average precipitation was 87% of normal.

In December the weather was extremely warm and extremely dry. The mean air temperature was about 3.0°C above normal and the area average precipitation was 48% of normal. The mean monthly temperature was 14.5°C, which makes December 2023 the second warmest December on record, since 1961.

Fire occurrence and affected surfaces

During 2023, Cyprus experienced 131 forest fires that burned 2 216 hectares, mostly forest and other wooded land. Of these, 8 fires were over 50 ha in size.

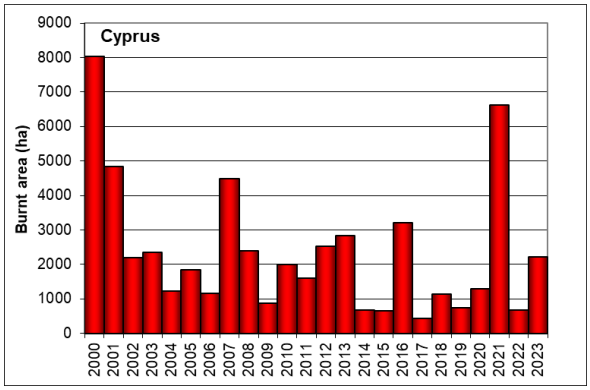
Table 4. Number of forest fires and burnt areas in Cyprus from 2018 to 2023.

Year	*Number of fires*	*Burned area (ha)*		
		Total	*Forest and other wooded land*	*Agriculture and other artificial land*
2018	131	1136	997	139
2019	99	733	494	239
2020	108	1305	1002	303
2021	111	6612	4791	1821
2022	89	685	433	252
2023	131	2216	1974	242

The trends regarding both the number of fires and burnt areas over the last 24 years (2000-2023) are shown in Figure 8.

Fire causes

Out of the 131 forest fires that occurred in Cyprus during 2023, 22% (29 fires) were of unknown origin. Most fires were intentionally set (49 fires) 38%. A percentage of 5% (7 fires) is due to natural causes (lightning), whilst the remaining amount of 35% (46 fires), is attributed to human negligence.



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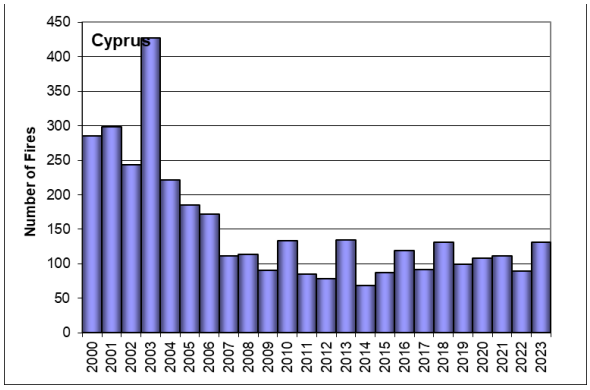

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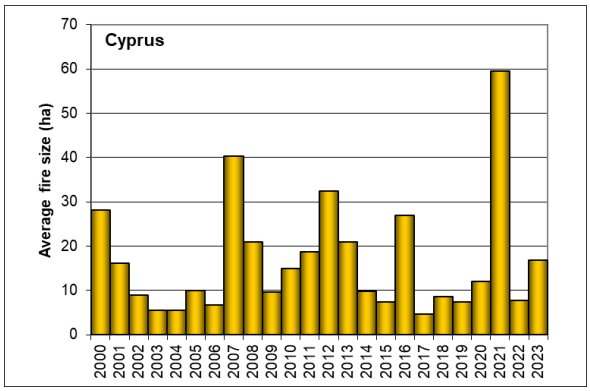

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Figure 8. Burnt areas (a), number of fires (b) and average fire size (c) in Cyprus from 2000 to 2023.

2023 major fires

Paramytha fire

The most destructive forest fire of the year started at 14:00 hrs on August 4, near Paramytha community, Limassol District. The blaze burned 882 ha, mostly of wild vegetation, shrubland and agricultural crops. The fire swept through several communities of the Limassol Province and apart from the vegetation, destroyed livestock facilities and damaged houses in the area. Residents of the affected communities were evacuated and public roads in the area were closed for traffic and safety purposes.

Akrounta fire

The fire started on September 9, 2023 and burned 466 ha covered with forest vegetation. The fire swept through Limassol State Forest. Scattered houses in the area were preventively evacuated and public roads in the area were closed for traffic and safety purposes.

Fire fighting means

The aerial firefighting means that were available during the 2023 fire season consisted of 7 primary aerial assets, of which 5 were light type firefighting airplanes and 2 were medium type firefighting helicopters. In addition, light type helicopters were available for use as secondary aerial assets and for aerial coordination purposes.

Fire prevention activities and information campaigns

The fire prevention program consisted of various activities, including fire break construction and maintenance, fuel management and law enforcement. Preparedness and emergency response capabilities of the firefighting forces remained at the highest level, throughout the fire season. For fire detection purposes, 47 lookout stations operated throughout the fire season and air and ground patrol missions were executed. Moreover, enlightenment activities, aiming to raise public awareness, were implemented.

Injuries and loss of human lives

There were no casualties during the fire suppression operations of 2023.

Operations of mutual assistance

During the 2023 fire season, Cyprus requested international assistance, in two cases:

The first was on August 6, for the fire event at the Paramytha community. The Cyprus Government requested the support of the European Union Civil Protection Mechanism (UCPM). Moreover, assistance was requested from nearby non-EU countries, based on bilateral agreements. In total, 20 aerial means were involved in the fire-fighting operation, which included 11 national assets composed of 5 aircrafts and 6 helicopters, the rescEU module from Greece composed of 2 aircraft, 2 aircraft from Israel, 2 helicopters from Lebanon and 3 helicopters from Jordan.

The second request for assistance was made on the 9th of September, for the fire event at the Akrounta community. Cyprus requested assistance through the EU Civil Protection Mechanism and Italy responded, offering 1 module of 2 Canadair aircrafts. However, due to improvement of the firefighting operation during the following day, the request for assistance was withdrawn. Moreover, Cyprus Government requested assistance from Jordan, based on bilateral agreement and Jordan responded with 2 helicopters.

During the 2023 fire season, Cyprus offered assistance to Greece through the European Union Civil Protection Mechanism, in 2 cases. The first was on the 21st of July, with two firefighting aircrafts and a crew of four and seven ground support staff. The second was on the 21st of August with two aircraft and a crew of four and five ground support staff, as well as a ground team of 31 people.

(Source: Ministry of Agriculture, Rural Development and Environment, Department of Forests, Cyprus).

1.2.6 Czech Republic

Fire danger in 2023

Forest fires occur most often between March and October. Most forest fires usually occur in April but in 2023 there were exceptionally many in July (Figure 11). Regarding the time of origin, most fires occur between two and seven o'clock in the afternoon.

Most forest fires usually occur in the Vysočina and the Central Bohemia Region. The fewest forest fires occur in the Capital City of Prague, Olomouc, Zlín and Pardubice Regions. Up to 96% of forest fires do not exceed an area of 1 ha and only fire units for the first stage of the fire alert are dispatched for 93% of forest fires. The most extensive fires tend to occur in low-lying forests or in forests where logging takes place. Such fires account for up to three quarters of the affected area. Grass, leaf litter, needles, leaves or peat make the rapid spreading easy.

Fires are very often concentrated according to the usual fire risk level over the country (Figure 9).

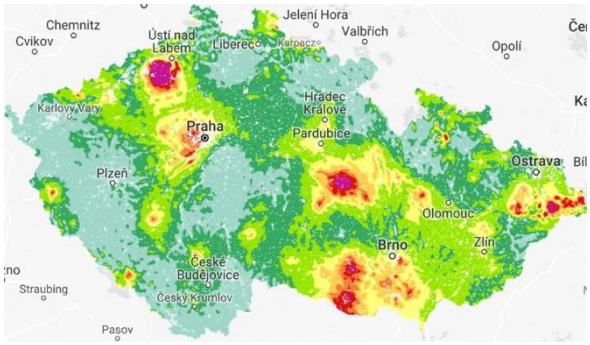


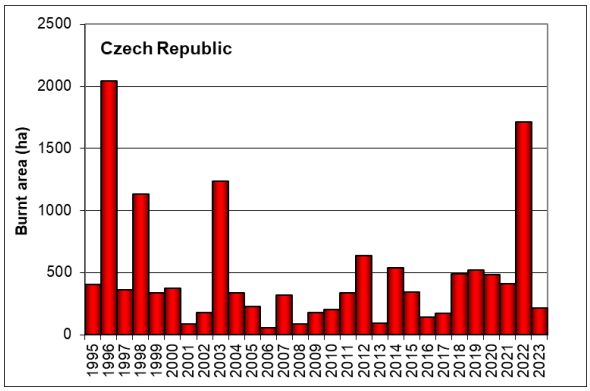
Figure 9. Forests with high risk level, usual situation (*Source: Czech Academy of Sciences, project CzechAdapt*).

Fire occurrence and affected surfaces

Forest fires fighting and prevention is covered by the Fire and Rescue Service of the Czech Republic.

In 2023 a total number of 1 512 forest fires were recorded and about 217 ha of forest areas were burned (compared with 2022 when the affected area was 1 715 ha, caused mainly by the large fire in the Czech Switzerland National Park).

The trends regarding the number of fires and burnt areas from 1995 to 2021 are shown in Figure 10.



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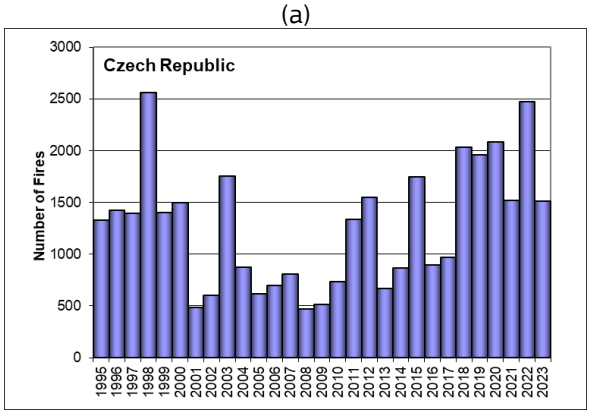

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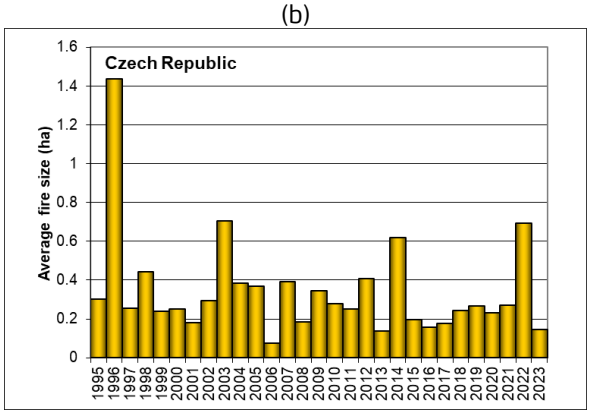

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Figure 10. Burnt areas (a), number of fires (b) and average fire size (c) in Czech Republic 1995-2023.

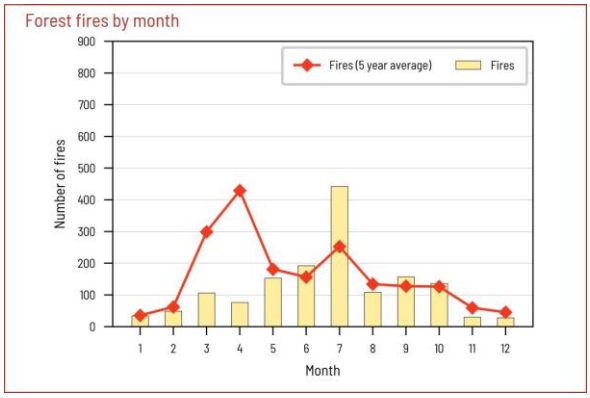


Figure 11. Forest fires by month in 2023.

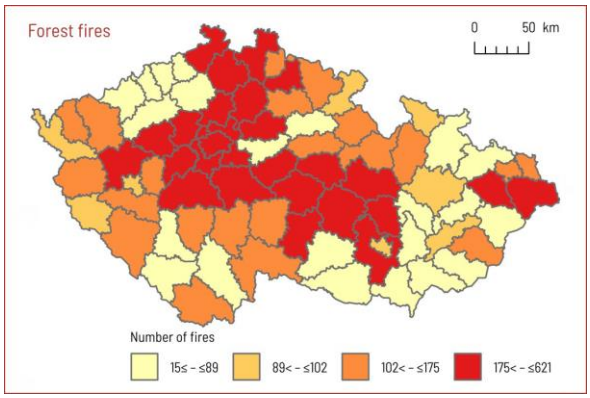


Figure 12. Distribution of number of fires across the country in 2023.

Table 5. Number of fires, burnt area, economic losses and casualties in the Czech Republic since 2005.

Year	No. of fires	Burnt area (ha)	Damage caused m.EUR	Saved values m.EUR*	People killed	People injured
2005	626	227	0.8	4.9	0	12
2006	693	405	0.3	4.0	0	16
2007	805	316	0.7	13.3	0	20
2008	470	86	0.1	4.5	3	10
2009	514	178	0.3	6.2	0	20
2010	732	205	0.2	5.0	1	12
2011	1337	337	0.3	6.5	1	27
2012	1549	634	1.8	26.2	2	30
2013	666	92	0.2	3.0	0	7
2014	865	536	0.3	3.3	2	10
2015	1748	344	0.7	24.7	1	33
2016	892	141	0.2	7.8	0	15
2017	966	170	0.3	3.4	2	9
2018	2033	492	0.6	10.5	0	35
2019	1963	520	0.7	12	0	31
2020	2081	484	0.7	10	2	21
2021	1517	411	0.3	7.1	0	15
2022	2473	1715	2.1	12	0	63
2023	1512	217	0.6	7.8	0	22

**refers to the amount that would have been lost without intervention.*

Deployment of aerial resources

The aerial extinguishing service is provided year-round by the aviation service of the PCR. The service is provided by two helicopters with an extinguishing capacity of a bambi buckets of about 800 litres each. This year, in cooperation with the Ministry of Agriculture and the Ministry of the Environment, it was possible to make a public order for ensured aerial extinguishing service using two Black Hawk helicopters with a extinguishing capacity of 3 000 litres and to provide co-financing of this service from a grant from the European Commission for 2023. This service was provided only for a period of two months from July 15 to September 15, when the risk of wildfires in the natural environment is the highest of the entire year.

Until new helicopters are purchased, the Czech Republic can use an annual subsidy from the European Commission for the rental of aerial extinguishing helicopters (the so-called Transition rescEU grant), when 75% of the funds spent on this service are provided by the European Commission in a period of two calendar months.

Since the beginning of the year, the PCR Aviation Service has been deployed 18 times, 16 of which were for forest fires. In total, they made 342 drops and flew for 59.5 hours. During the contractual period from July 15 to September 15, Black Hawk helicopters were deployed in the Czech Republic 6 times, 4 of which during forest fires. They made a total of 286 drops and flew for 32.5 hours.

Operations of mutual assistance

One helicopter was deployed to extinguish forest fires in Greece, making a total of 49 drops.

Fire causes

The main causes for the forest fires over the last eight years are:

- Negligence 50%
- Human caused 36%

Half of the cases are caused by human negligence. In such a case, it is most often a matter of disrespecting the ban on starting fires in the forest, their subsequent insufficient extinguishing, or a discarded cigarette butt. The other half of the causes remain unexplained or fall into the category of unproven culpability.

Injuries and loss of human lives

There were no casualties but 22 people were injured due to forest fires in 2023. In total, there were 254 people injured and 7 people killed in the last 10 years due to forest fires.

(Source: Fire and Rescue Service, General Directorate, Czech Republic).

1.2.7 Estonia

Fire occurrence and affected surfaces

In 2023, 33 forest fires and wildfires were recorded, burning 74.68 ha in total (Table 6).

Table 6. Forest fires in Estonia 2010-2023.

Year	Number	Area (ha)			
		Forest	Non-forest	Total	Average
2010	30	20.7	4.1	24.8	0.8
2011	24	15.5	3.8	19.3	0.8
2012	5	2.5	-	2.5	0.5
2013	15	33.4	45.1	78.5	5.2
2014	91	67.0	9.8	76.8	0.8
2015	67	82.7	0.4	83.1	1.2
2016	84	117.7	5.2	122.9	1.5
2017	61	24.6	8.4	33.0	0.5
2018	230	418.5	11.0	429.5	1.9
2019	143	56.5	12.7	69.2	0.5
2020	24	119.8	70.7	190.5	7.9
2021	32	32.3	0.02	32.5	1.0
2022	26	19.8	-	19.8	0.8
2023*	33	74.6	-	74.6	2.3

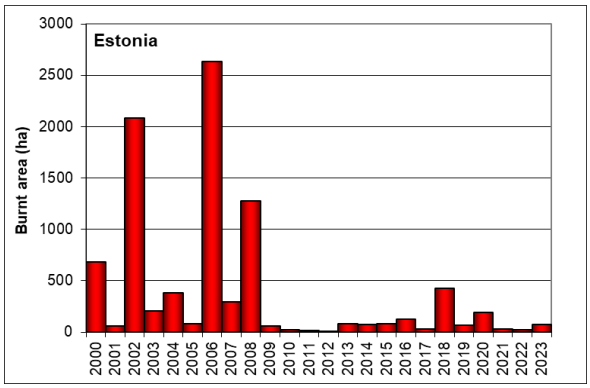
It was not possible to assess 1 forest fire area which is located in a military shooting area (it was not allowed to enter the area due to the risk of unexploded ammunition). Estimated total area of fire was around 30 ha, the share of forest area is not known.

The first forest fire in 2023 was recorded in April, the last one in August. The largest forest fire of 2023 occurred in June with an area of 30.85 ha, and was one of two fires in 2023 with an area larger than 10 ha. The burnt area, number of fires and average fire size for the years 2000-2023 are shown in Figure 13.

Comment about the data collection routine in Estonia.

The Estonian Environment Agency is involved in two ways:

- We carry out the on-site measurement of the forest fire areas (results are used in GHG reporting for LULUCF sector). We do it next spring (so this spring we measured the forest fire areas of 2022). We select for the field-work areas bigger than 0.1 ha but measure the burnt area on-site even if it happens to be less than 0.1 ha. We get the initial list of forest fires from the open data source of the Estonian Rescue Board. Until the year 2019 we had an access to the emergency call centre logs (it was possible to assess better what was burning and what was the cause). It provided the opportunity to include small-size forest fires as the result of the desktop analysis exercise. From the data you can see that this is not anymore the case for since 2020. Despite our efforts we have not been granted official access to rescue call logs until now.
- We compile national statistics on forest fires and publish those in our Forestry Statistics Yearbook.



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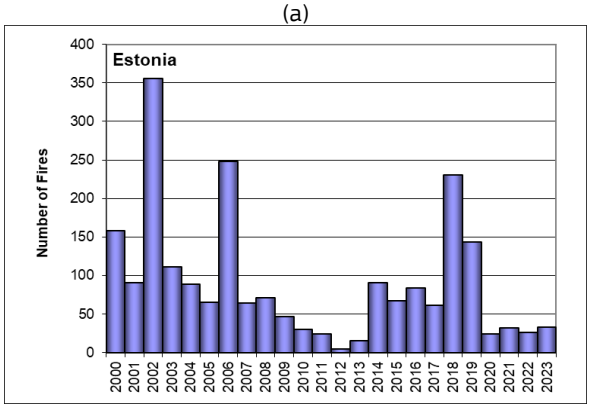

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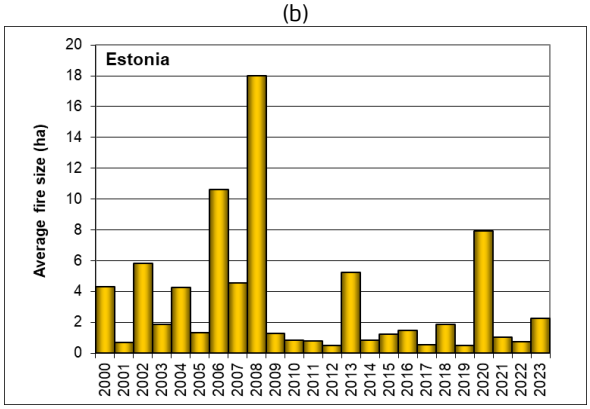

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Figure 13. Burnt areas (a), number of fires (b) and average fire size (c) in Estonia from 2000 to 2023.

Fire causes

In 2021, 18 of the 33 fires were of unknown origin and the rest were of human origin (Table 7).

Table 7. Fire causes in Estonia in 2023.

Cause code	Cause	Count
100	Unknown	18
301	Electrical power	3
303	Vehicles	2
304	Works	1
411	Vegetation management	4
414	Recreation	3
422	Cigarettes	2

(Source: The Estonian Environment Agency, Estonia).

1.2.8 Finland

Fire danger in the 2023 fire season

Based on information from the Finnish Meteorological institute, the overview from summer 2023 was quite a normal and average year in Finland. Early spring was cold, then dry and warm. June was warm and dry in the whole of Finland. July was quite a normal Finnish summer month. August was also a normal late summer month and September was rainy without warnings. Fire warnings (number of Forest fire warnings) from the year 2023 are presented below in Figure 14.

Fire occurrence and affected surfaces

The number of forest fires in 2023 in Finland was at a normal average level. There were 2 571 wildfires in Finland last year of which 1 346 of them were reported as forest fires. The total burned area was around 557 ha of which ca. 382 ha occurred in forest area. The average burned forest area per fire was 0.28 ha.

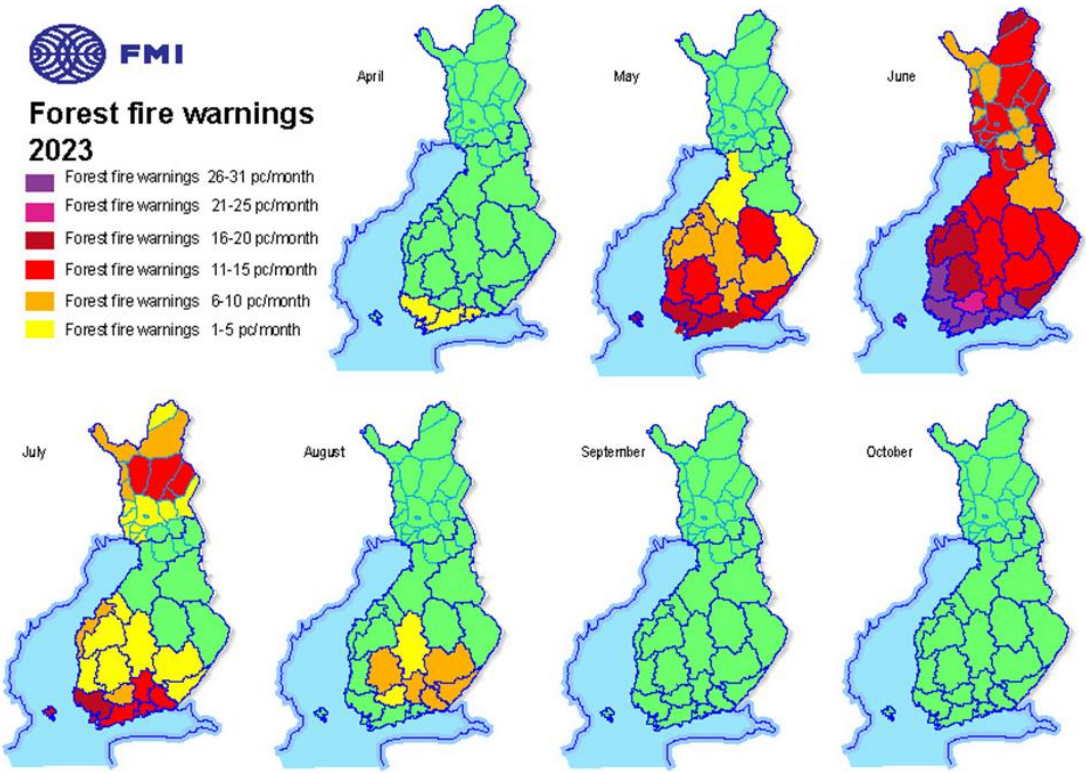
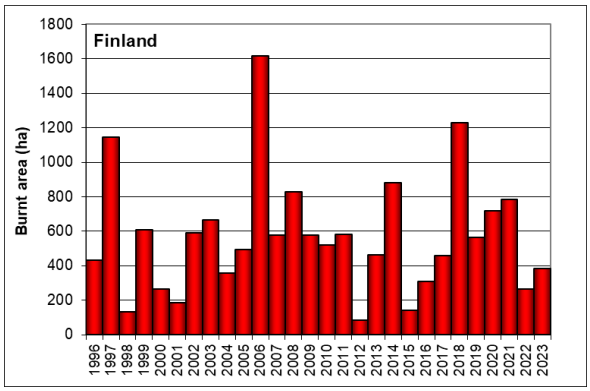


Figure 14. Forest fire warnings in Finland in 2023.

Fire fighting means

- Finnish military forces NH 90 helicopters are available to extinguish forest fires.
- More co-operation between other authorities such as the border guard.
- Continuation of forest fire aerial officer education for fire officers.
- There is a goal to improve HNS (Host Nation Support) systems for forest fires.
- Continue to improve Finnish Forest fire capacities for international assistance..
- Fire & rescue services (strong volunteer fire brigade force, 15 000 volunteers also in rural areas), co-operation between rescue services (for example Arctic Rescue Team)
- New innovative equipment (harvesting machines with water tank and hoses etc.)
- The second aerial forest fire fighting exercise with rescEU capacities (two fire bosses from Sweden) was organized in Jämijärvi in May 2023.
- Work for potential scooping areas (nationwide) started.

The yearly trends in terms of number of fires and burnt area from 1996-2023 in Finland are shown in Figure 15 and Figure 16.



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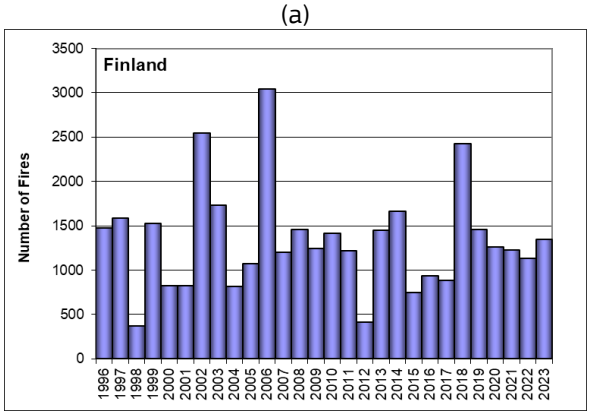

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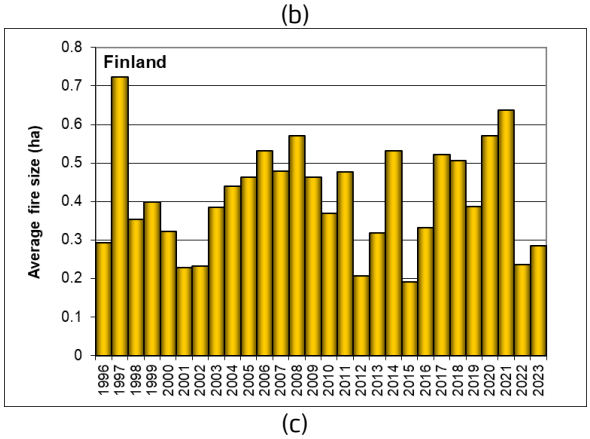

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Figure 15. Burnt areas (a), number of fires (b) and average fire size (c) in Finland from 1996 to 2023.

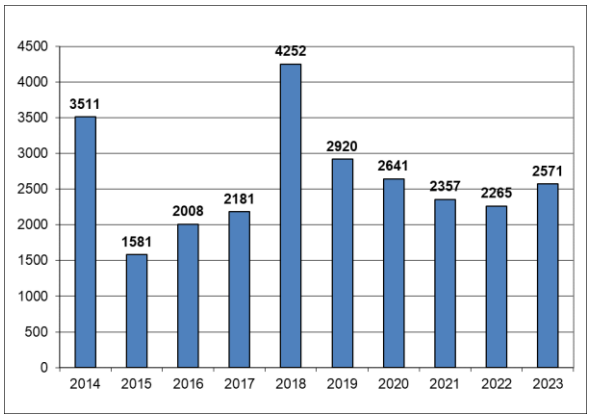


Figure 16. Total number of wildfires including forest fires from 2014-2023.

Fire prevention activities and information campaigns

- Legislation, fire index versus authorities' actions, and a ban on open fires
- Information campaigns
- More co-operation with other authorities and institutes such as the Finnish meteorological institute.

Fire causes

The most common cause of wildfires in Finland was human actions. These caused more than 70%, mainly from accidents. The second biggest reason was natural (less than 10% of fires). The reason for the fire could not be found in over 10% of the cases.

Loss of human lives

One person died in Finland in 2023 and one person was injured with burns in two different wildfires.. Some of the wildfires caused damage to the buildings and a few wildfires were caused by fires from buildings or vehicles.

Climate Change

Climatic conditions and how they impacted the fire season

In the future, the forest-fire risk is expected to increase in Finland and elsewhere in Northern Europe due to global warming. However, so far, annual burned areas in Finland have not increased noticeably.

National adaptation strategies / plans in particular regarding plans to adapt the forest sector to climate change in order to limit forest fire risks

Finland's National Forest Strategy, adopted by the Government in February 2015, specifies the main objectives for forest-based business and activities until 2025. The strategy was updated in 2019.

Research activities aimed at improving fire management

A few new research and development projects in Finland started in 2023.

Other development goals in future:

- Northern European co-operation (Aerial forest fire fighting with RescEU forces continues.);
- ensure early warning systems;
- co-operation with rescue services;
- new innovative solutions and equipment.

Operations of mutual assistance

There was information sharing between neighbouring countries and the EU.

(Source: Ministry of the Interior, Finland).

1.2.9 France

Fire danger in the 2023 fire season

For the second year running after 2022, the winter was exceptionally mild and dry, leading to a shortfall in soil water recharge and a drought that was still very marked in the southeast with a notable impact on vegetation. However, these favourable conditions for fire development were not reflected in the operational activity of the first quarter: the number of fires remained close to the average, with very few large fires. During this period, however, there was considerable activity in terms of land maintenance using fire (prescribed burning, pastoral slash-and-burn, etc.).

However, from April onwards, fire activity increased in the south-east, with several medium-sized fires, several of which displayed "summer-like" behaviour (high intensity, rising to the top, rapid spread, fire surges), culminating on 16 April with the Banyuls fire in the Pyrénées-Orientales region (see page 28 for details).

After a warm but relatively calm May, France split in two between June and early July:

- In the southern half of the country, where some preventive measures had been taken in anticipation of the dry winter, regular but patchy rainfall reduced the overall risk, and activity remained low.

- In the northern half of the country, early summer conditions were conducive to a large number of crop fires, with areas that could exceed several dozen hectares (during this period, more agricultural land was burned than in the previous year, which was already exceptional), and some spread to the forest began to be noticeable.

From mid-July onwards, the situation was reversed, with heavy rainfall in the northern half and west of France reducing the risk and marking the end of a season that had seen little activity in these areas, and a return to hot, dry and occasionally windy conditions in the south-east, triggering a resurgence of operational activity. Fortunately, there were no catastrophic fires, apart from the biggest fire of the summer, once again in the Pyrénées-Orientales, which burned 404 ha on August 14 in Argelès-sur-Mer (see page 29 for details).

A fairly widespread heatwave at the end of August led to an upsurge in fire activity in the Mediterranean hinterland, sparing the less windy coastline.

The end of the year was then marked by an exceptionally hot autumn, interspersed with rain, which was sufficient to limit the surface area burnt, despite the still significant number of fires in the south-east.

Fire occurrence and affected surfaces

The final balance (after correction of certain errors in the databases) is 17 306 ha affected by fire in France from a total of 18 936 fires (14 565 ha from 18 062 fires in mainland France alone).

This summary, close to 1.5 times the average in number of fires and slightly above the average in surface area, is characterized by a fairly heterogeneous situation:

- the number of forest fires was close to average (above average in the south-east and the rest of mainland France, but below average in the south-west and overseas territories), but these fires only burned around half the average surface area.

- Vegetation fires were well above average (around 1.5 times the average in number and around 2 times the average in surface area) particularly in the French overseas territories and the rest of mainland France. This comparison with the average needs to be put into perspective, as some of it is due to better filling of databases in 2023 (due to better involvement of services in areas not used to the risk of fire, thanks to greater awareness after the catastrophic season of 2022). However, it does reflect the reality of high activity levels, particularly for agricultural fires, linked to early summer conditions in the northern half of the country. The detailed distribution by zone and by type of fire can be found in Table 8 and Table 9 below:

In Figure 17 below, which shows trends over the last 18 years, we see, apart from the high peaks of 2022 and the low peaks of 2018, there has been a downward trend in burnt areas since 2017. It is worth noting that forest fires are contributing more to this decline than wildfires, which have gained in importance. After the exceptional year of 2022, the south-western part of the country has returned to its usual level, but for some years now the phenomenon has been present in the rest of France. The number of fires in 2023 remains very high, despite the drop in surface area, probably due to a better inclusion in the databases of small fires that were previously ignored.

Table 8. Burnt area in hectares.

	2023			Adjusted mean 2006-2021*		
	Forest fire	Other vegetation fire	Total	Forest fire	Other vegetation fire	Total
South-East	4489	1793	6282	7750	1975	9726
South-West	369	992	1361	1023	902	1925
Rest of mainland France	503	6419	6922	1075	2998	4073
Overseas territories**	53	2688	2741	579	105	684
Total France	**5414**	**11893**	**17306**	**10427**	**5981**	**16407**

Table 9. Number of fires.

	2023			Adjusted mean 2006-2021*		
	Forest fire	Other vegetation fire	Total	Forest fire	Other vegetation fire	Total
South-East	1936	6602	8538	1843	7014	8857
South-West	353	1874	2227	482	879	1361
Rest of mainland France	377	6920	7297	362	1721	2083
Overseas territories**	9	865	874	149	129	278
Total France	**2675**	**16261**	**18936**	**2835**	**9743**	**12578**

** Taking into account the unfilled year province by province*

*** Oversea territories = Réunion, Mayotte, Guyane*

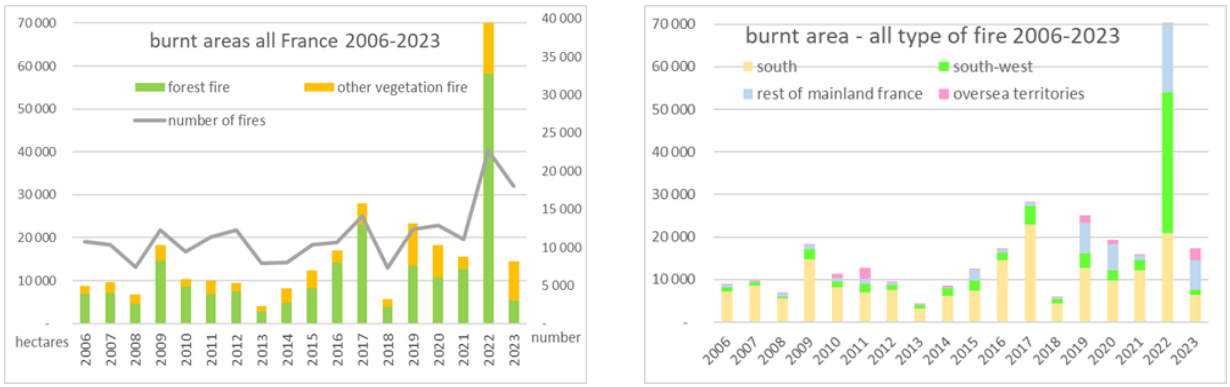


Figure 17. Burnt areas in France according to vegetation types.

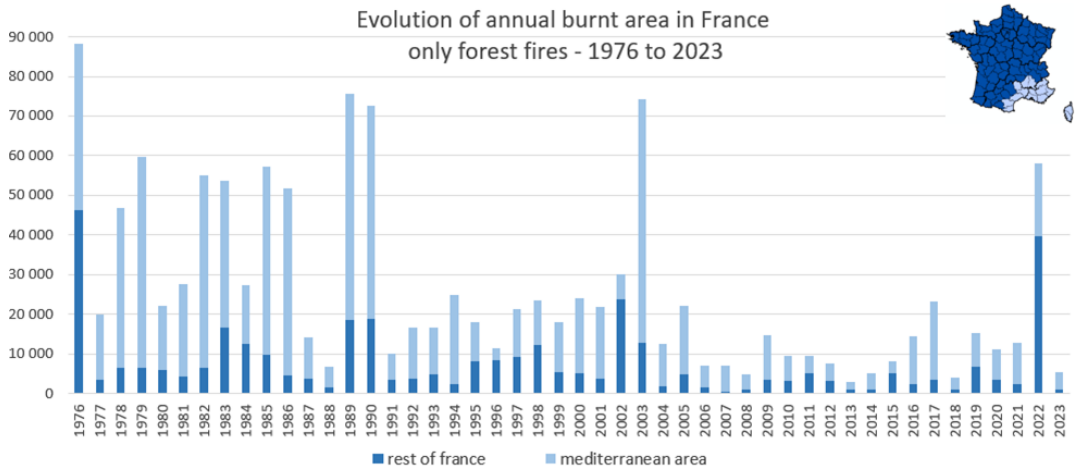


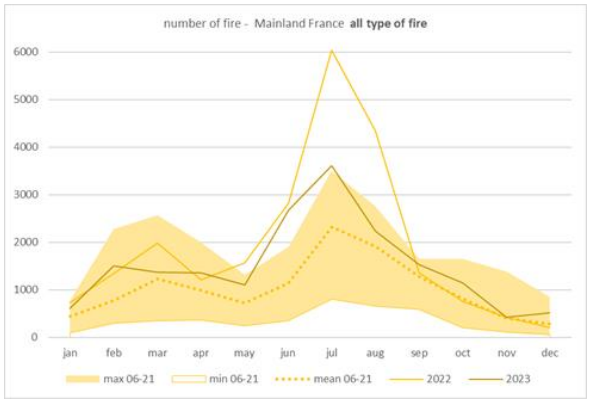
Figure 18. Burnt area evolution comparing Mediterranean area with rest of France.

If we look at Figure 18, which concerns only forest fires, taken from less detailed but older databases, we can see that after the peak in 2022, 2023 saw a return to a low level, far from what could have been reached before the early 2000s, to rank as the 5th least burnt year since 1976.

Seasonal distribution:

In 2023, the number of fires was above average throughout the year, with the usual peak in March surprisingly shortened, followed by significant activity in June and July, which ranks second since 2006 behind the records set in 2022.

Burnt area fluctuated around the average at the beginning of the year, then rose above in June and July before falling more sharply below average again until the end of the year (Figure 19).



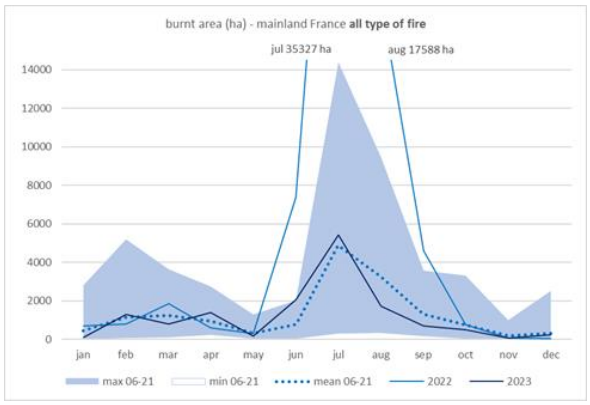
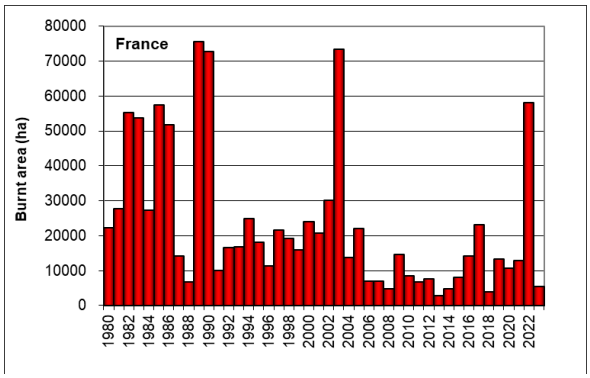


Figure 19. Monthly numbers of fires (top) and burnt area (bottom) in France in 2023.

The yearly trends in terms of numbers of fires and burnt areas in France since 1980 (forest fires only) are displayed in Figure 20.



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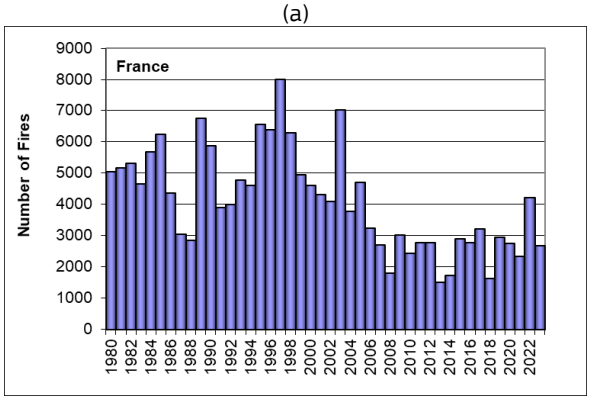

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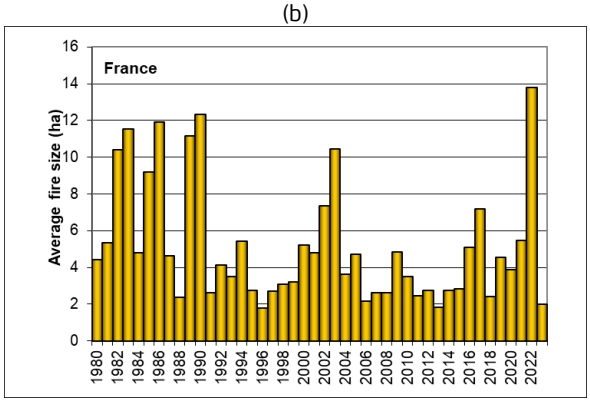

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Figure 20. Burnt areas (a), number of fires (b) and average fire size (c) in France from 1980 to 2023.

Large fires:

In 2023, no fire exceeded 1 000 ha, something that had not happened since 2015.

There were 94 fires between 20 and 100 ha and only 8 fires over 100 ha. This total of 102 fires over 20 ha is above the average (77 fires per year over 2006-2021) but the disparities mentioned above are also present: among these 102 fires, only 45 were forest fires, which is below the average (56 fires per year over 2006-2021), while the 64 vegetation fires represent almost 3 times the average (23 fires per year over 2006-2021) and place 2023 in third place among the years with the most large vegetation fires, behind 2022 and 2019.

Spatial distribution of the largest fires (greater than 10 ha) by type of fire

The map below shows an uneven distribution of fires: Forest fires are more prevalent in the south-eastern quarter of the country, particularly west of the Mediterranean, where drought conditions are most marked, and in the hinterland (linked to the heatwave at the end of August)

Vegetation fires are very high in the northern half of France (during the peak of agricultural fire activity in June and July, favoured by early summer conditions in this part of France)

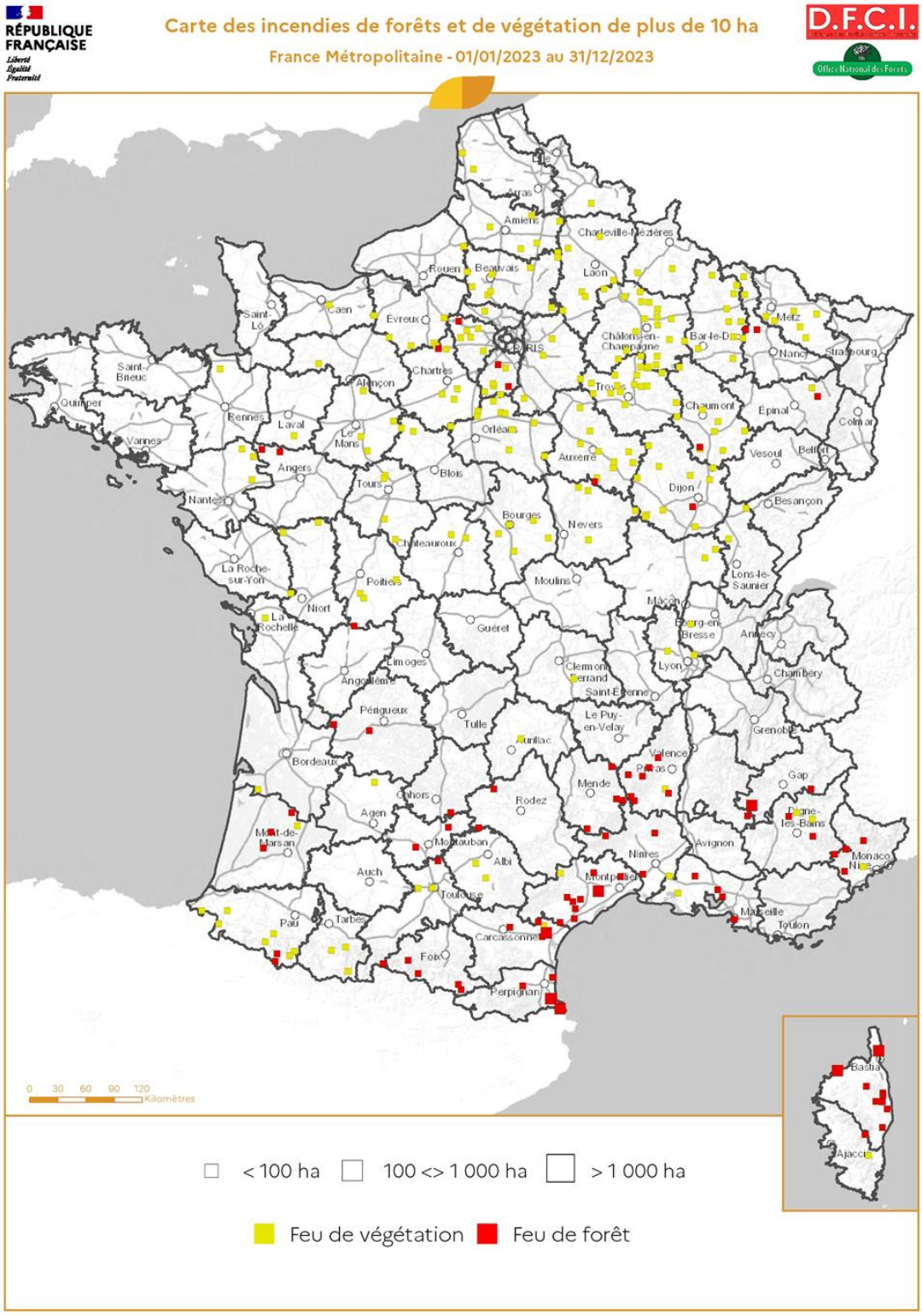


Figure 21. Spatial distribution of fires greater than 10 ha by fire type.

Southeastern France:

The south-east of France was the only zone where activity was high.

The summer of 2023 was very dry and hot overall, with contrasting situations across the Mediterranean region. A very early drought continued into September in Aude, Pyrénées-Orientales and Corsica. October 2023 saw an unprecedented number of exceedances of the 30°C threshold in the southern zone.

In 2023, there were two peaks in the number of burnt areas, in April and August. In recent years, the fire season has tended to spread out over time (March to October).

The summer results for the 15 departments in the Mediterranean region were modest, thanks in particular to the beneficial effect of the June rains. There were 1 886 forest fires covering 4 252 ha. These figures are well below the average since records began in the Mediterranean area.

The rate of extinction of incipient fires was 83%, and the average area covered by fires larger than 1 ha was 17.3 ha.

The 5 largest fires recorded were Corbara (region 2B) for 200 ha on 25/07, Aumelas (region 34) for 178 ha on 06/08, Chanouse (region 05) for 135 ha on 20/08 and two notable fires in the Pyrénées Orientales department, including the largest fire of the year in mainland France.

Banyuls/Mer fire of April 16

This fire covered 868 ha, including 725 in France and 143 in Spain. This was the largest spring fire ever recorded in 50 years in the Mediterranean area. Until now, the record had been held in the neighbouring department of Aude with 800 ha in May 1976. Outside the Mediterranean area, there was a 1 075 ha fire in April 2017 in the south-west.

The fire destroyed a state-owned forest, which helps to protect urban areas located downstream from the risk of torrential erosion. The disappearance of the plant cover, by halving an already short hydrological response time, led to an increase in the risk of flooding for several months after the fire.

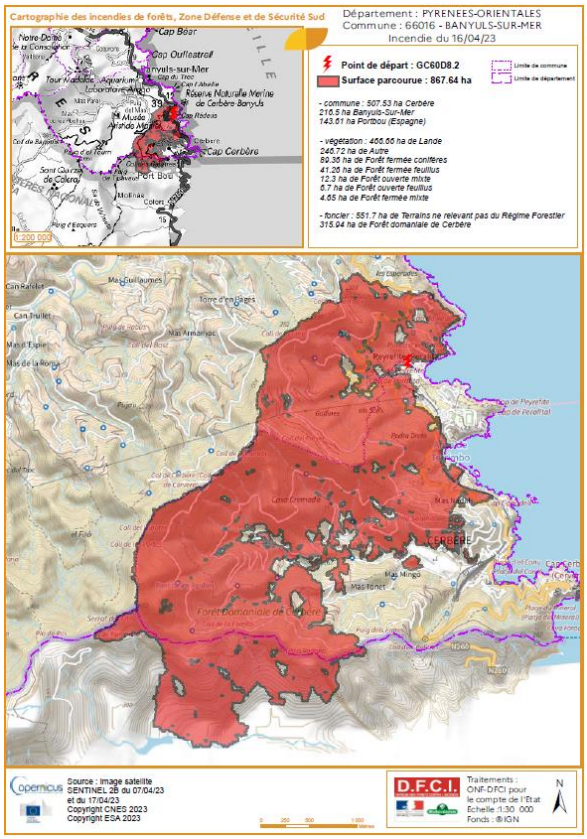


Figure 22. Watershed exposed to flood risk.

Figure 23. Panoramic view showing the extent of the fire, unburned fields within the envelope, and part of the watershed exposed to flood risk.

Argelès sur mer fire of August 14:

This was the second largest fire of the year and largest of the summer.

Favoured by a swirling, violent southerly wind blowing at more than 80 km/h in gusts, with a strong Foehn effect, this fire mainly covered areas of agricultural wasteland similar to low scrubland sheltering highly combustible semi-woody vegetation.

It covered 404 ha, destroyed a campsite and heavily impacted 77 of the 391 buildings (destroyed or externally affected) located within the fire envelope + 50m (record building density, posing major problems for fire-fighting services).

Figure 24. Examples of fire damage (campsite and house destroyed).

Southwest France:

The year 2023 was particularly calm in the South-West of France, in terms of burned area. The annual report includes 2 225 fires that destroyed 1 276 hectares of vegetation, including 353 forest fires burning 238 hectares. There were 9 fires of more than 20 hectares, mainly winter pastoral fires located in the Pyrénées-Atlantiques, which represent ~30% of the burned areas of the neo-Aquitaine territory.

Analysis of fire outbreaks:

The 2023 season ranks second, just after 2022, in terms of the number of fire outbreaks. Unusual records were set at the beginning of the year, for the months of January and February, exceeding the peaks recorded in 2022. The summer season remained strong, with values generally above average and an annual peak recorded in July. Nine of the twelve departments in the Nouvelle-Aquitaine region recorded a significant increase in fire outbreaks compared to their annual averages (2006-2022): e.g. +563% for Corrèze, +237% for Charente and +181% for Deux-Sèvres. This increase is correlated with improved fire data collection by fire departments in south-western France.

Analysis of burnt areas:

With the exception of the months of February-June-October, which saw above average values, the area burned in 2023 was well below that of previous years. This is due to the low level of forest fire activity on the Landes de Gascogne massif, which is usually the setting for large-scale fires. Vienne is the only département to have seen a marked increase in the area burned (+58% compared with the annual average for 2006-2022).

The largest fire recorded this year in the Nouvelle-Aquitaine region was on February 21, 2023, in the commune of Arette (Pyrénées-Atlantiques), with a burnt area of 111 hectares.

Fire causes

6 533 fires, or 36% of the total, have a known cause. This percentage, higher than the 2006-2021 average of 26% of fires with a known cause, and up from 33% last year, reflects progress in the search for causes. Of those fires with a known cause:

- 260 were attributed to a natural cause (lightning), 1% of all fires or 4% of fires with a known cause, which is lower than the average of 7% of fires with a known cause.

- 4 453 were accidental in nature, amounting to 25% of all fires or 68% of fires with a known cause, which is close to the average of 67% of fires with a known cause.

- 1 820 fires were deliberate, i.e. 10% of all fires or 28% of fires with a known cause, which is close to the average of 26% of fires with a known cause.

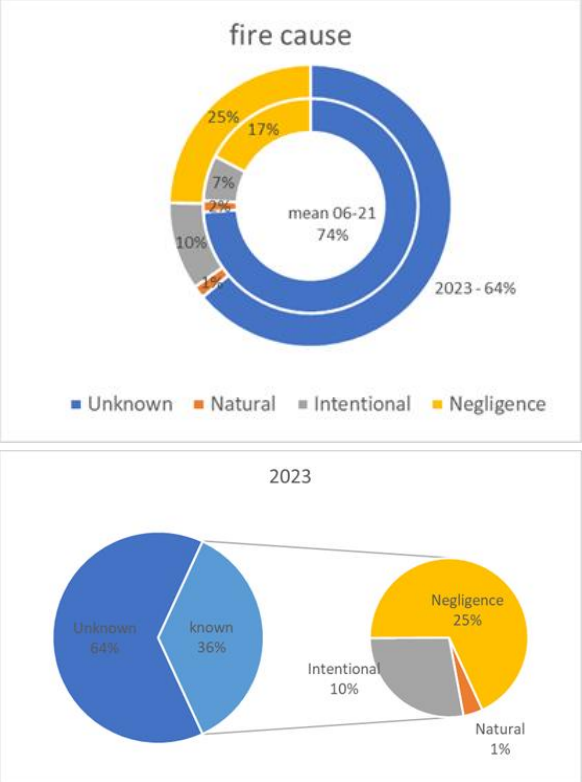


Figure 25. Fire causes in France in 2023.

Fire fighting means

Land resources

To support the departmental fire and rescue services, the Civil Protection Department can call on a total of 51 preventive columns (3 000 firefighters and over 500 fire-fighting vehicles). Over the course of the summer, the number of reinforcements involved in the operational system is close to 11 000 man-days. The southern zone, where almost all reinforcements were deployed, benefited from the equivalent of 19 preventive and 21 curative columns. The principle of national solidarity, the cornerstone of operations during the summer control campaign, was not compromised in 2023.

In addition, 500 rescue engineers from military civil protection units were also involved in the summer operations, which proved to be relatively low in terms of operational commitments.

For the first time in the fight against forest fires, France hosted several European modules as part of the ERCC-led principle of anticipation and knowledge exchange. In July and August, FDF groups from Austria, Poland and Romania, with or without firefighting equipment (GFFF-UV or GFFF), were integrated into the operational systems of the SDISs in Provence and Corsica. Initially planned, the deployment of a Slovenian module was cancelled due to flooding in the country.

Air resources

Comprising 12 Canadairs, 8 DASH and 3 Beech aircraft (2 of which are equipped with optronics), the national fleet has been bolstered by the rental of helicopters (6 heavy and 4 light, working in pairs) and 5 water-bombing aircraft (1 DASH and 4 Air-Tractor).

In 2023, the national fleet of bombers with 35 aircraft has enabled the deployment of 2 permanent detachments of 7 aircraft (Bordeaux and Ajaccio). Furthermore, thanks to a finer network, the pre-positioning of helicopters in the heart of risk areas has resulted in shorter response times.

Finally, the number of retardant refuelling stations has been increased compared with 2022, with the deployment of a station in the South-West (Mont-de-Marsan) and in the East (Epinal).

At the same time, the strengthening of existing structures in Hyères, Limoges, Bordeaux and the establishment an aerial retardant stockpile in the South-West, have ensured that the national system will not suffer any shortfall in retardant capacity.

Between June 26 and September 9 2023, 95 armed air watch (GAAR) were coordinated by the national coordination centre from Nîmes. 7 flew over the South-West quarter (Aquitaine and Midi-Pyrénées) and the majority concerned the Mediterranean coast. In total, 750 flight hours were dedicated to this pillar of our intervention doctrine. The GAAR brought some sixty fires under control in their initial stages, despite particularly unfavourable conditions.

In total, as part of the national system, the planes carried out more than 1 700 drops during 1 460 flight hours. The water bombing helicopters carried out nearly 1 500 drops (1 481) during 428 flight hours.

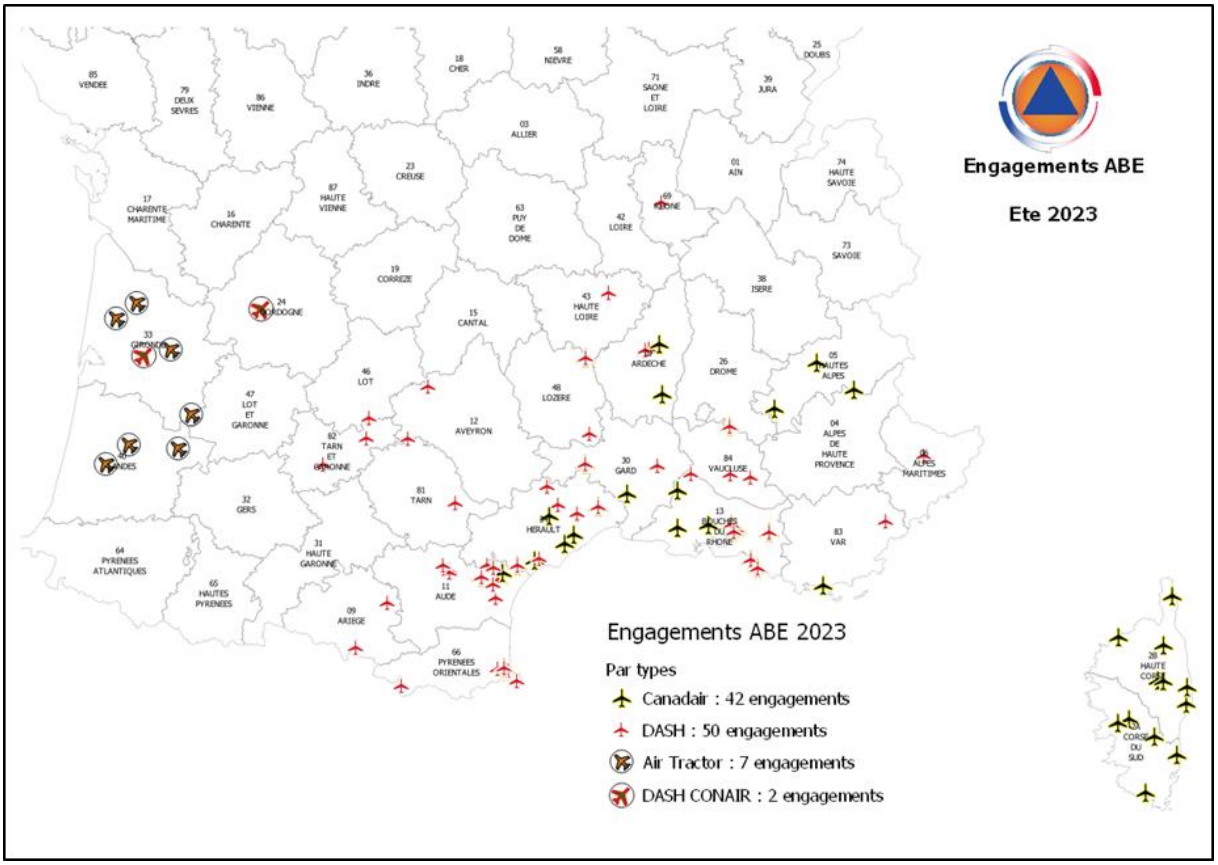


Figure 26. Main commitments of national air resources.

Impact on human lives

The year 2023 was marked by three deaths from very small fires: two elderly civilians (apparently following a heart attack, without it being really known whether the fire was caused by the use of fire that escaped because of the heart attack or whether it occurred because of the stress of seeing the fire escape) and a female firefighter crushed by the collapse of a burning tree following a lightning strike.

Political consequences

Following the first announcements of the year 2022, numerous measures have been taken, in addition to the reinforcement of the control resources already presented.

An ambitious law published in July 2023

French parliamentarians voted on an important law, setting the course to follow for the next decade. It covers all aspects of forest fire protection: governance of actions, prevention, educating the general public about the risk, control, and ultimately, reconstruction. All stakeholders and managers involved in forest protection and safety are concerned, at all geographical levels, from local to national.

It is divided into 8 sections, whose titles speak for themselves:

- Develop a national and regional strategy aimed at strengthening prevention, protection and the fight against the intensification and spread of fire risk;

- Better regulate the areas bordering forests, urban areas and infrastructures to reduce fire outbreaks and the vulnerability of people and property;

In particular, this section focuses on strengthening and simplifying the implementation of legal obligations for clearing brush and creating simplified methods for prohibiting urban development in areas at risk of wildfires.

- Manage the forest and promote forestry in the face of fire risk (mainly in private forests, which account for three quarters of the French forest area and lack management due to fragmentation);

- Improve forest management and development by understanding forest fire protection on a massif-wide scale;

- Mobilize the farming community to strengthen synergies between agricultural practices and forest fire prevention;

- Raise public awareness of fire risks;

- Equip fire-fighting systems to cope with the risks;

- Fund the reconstitution of more resilient forests after a fire.

Since the law was passed, a number of regulations have been issued to implement these measures. The last of these should be published before the end of 2024, including the national strategy, which was drawn up in consultation with a large number of civil society partners.

A significant increase in forest resources dedicated to prevention (patrols, regulatory control, etc.)

The Ministry of Agriculture has doubled the forest resources dedicated to prevention:

- by financing a general interest mission for the *Office National des Forêts* (National Forestry Office).

- and by providing approved forest fire protection union associations with surveillance resources (4-wheel drive vehicles equipped with water tanks).

Surveillance and patrol resources have been increased in historical territories and deployed in new areas identified as being at risk.

Strengthening weather forecasts

Over the past two years, Météo-France's assistance during the sensitive period has been extended from the Mediterranean basin to cover half of the French territory affected by the extension of the forest fire risk (south-west, west coast to Normandy and Centre Val de Loire). This operational expertise is supported by a vegetation dryness measurement network. This tool, intended for the State's representative in the regions and his departments, enables the meteorological danger of fire to be forecast for sub-departmental territories (outbreak, propagation, intensity). It is used to arbitrate and pre-position surveillance and fire-fighting resources, and provides real-time monitoring and assistance.

In addition to these professional forecasts, an educational tool has been set up to educate the general public about best practices during the summer season. This indicator, called "*météo des forêts*" (forest weather), gives a danger level for each département every day at 5pm, based on a 4-color code ranging from low to very high.

(Source: Ministère de l'Intérieur – DGSCGC; Ministère de l'Agriculture et de l'Agroalimentaire: DGPE/SDFE/SDFCB/BGED, France).

1.2.10 Germany

Fire occurrence and affected surfaces

According to the data supplied by the authorities, in 2023 a total of 1 059 forest fires were reported in Germany, corresponding to a burnt area of 1 240 ha (790 ha in deciduous forests and 362 ha in coniferous forests). The number of fires and the total burnt area were both less than half of the values recorded in 2022.

In 2023 the most affected province (Land) in terms of both numbers of fires and total burnt area was Brandenburg, amounting to nearly two-thirds of the total burnt area recorded in the year as a result of particularly heavy losses in broadleaved forest. However, Mecklenburg-Vorpommern lost the greatest area of coniferous forest (Table 10, Figure 27). Two Länder (Bremen and Hamburg) did not record any fires. There is no information for Saarland.

Table 10. Burnt area in total and by forest type, and total number of fires, Federal Republic of Germany, 2023 (ordered by total burnt area).

	Burnt area (ha)			*Number of fires*
	Coniferous forest	*Broadleaved forest*	*Total*	
Brandenburg	45.75	719.43	765.18	251
Mecklenburg-Vorpommern	190.61	1.22	191.83	57
Sachsen[1]	18.32	30.89	137.25	114
Bayern	30.06	13.51	43.57	75
Sachsen-Anhalt	17.20	5.21	22.41	62
Hessen	13.90	6.60	20.50	52
Niedersachsen	17.04	2.16	19.20	224
Nordrhein-Westfalen	11.30	4.30	15.60	75
Thüringen	6.76	1.42	8.18	42
Baden-Württemberg	5.17	1.58	6.74	65
Rheinland-Pfalz	1.84	3.34	5.18	29
Berlin	3.05	0.58	3.63	8
Schleswig-Holstein	0.61	0.00	0.61	4
Hamburg	0.40	0.00	0.40	1
Bremen	0.00	0.00	0.00	0
Saarland[2]	-	-	-	-
Germany	**362.01**	**790.24**	**1240.28**	**1059**

1 The total includes 88.03 ha of non-wooded land.
2 No information (no reliable data available).

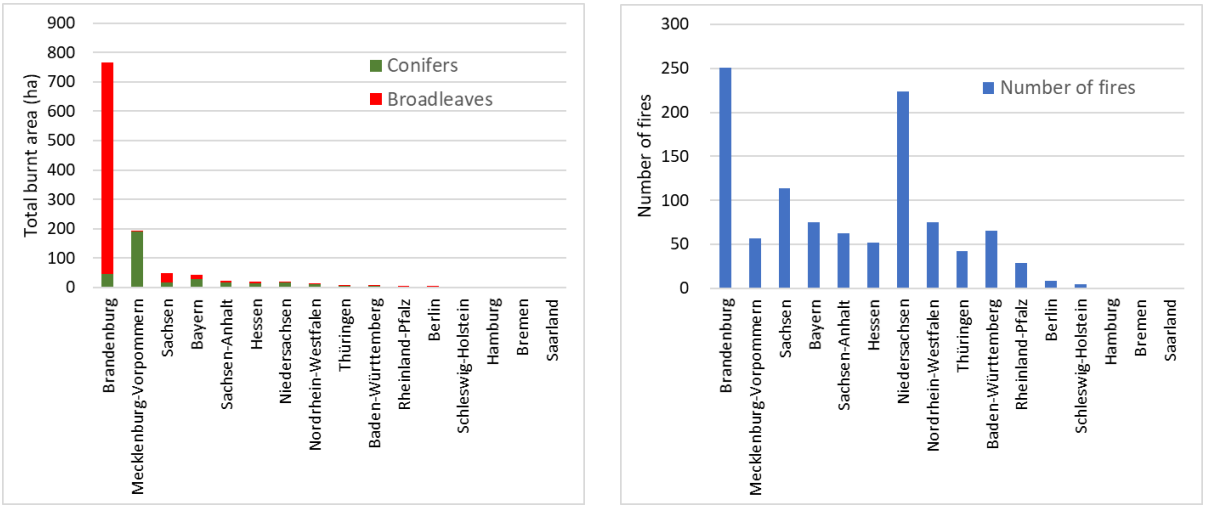


Figure 27. Burnt area (left) and number of fires (right) in Germany in 2023 by Land, ordered by total burnt area.

In 2023 almost all of the damage occurred between May and July. (Figure 28).

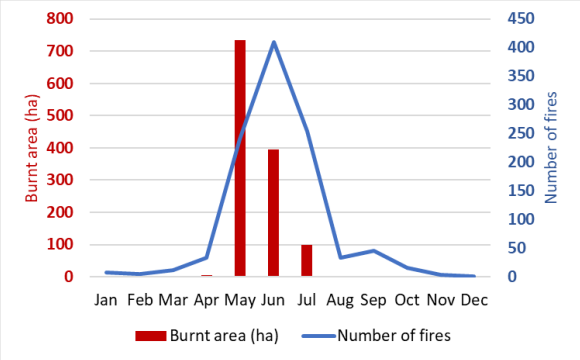


Figure 28. Number of fires and burnt area by month in Germany in 2023.

The economic damage caused by forest fires in 2023 is estimated to be around 1.19 million Euro (Table 11). This is above the long-term average from 1991 to 2022, which is 1.87 million Euro. The cost per hectare burnt in 2023 was estimated at 959 Euro/hectare, a reduction compared with the last 3 years.

Table 11. Losses from forest fires in Germany in 2021-3.

	Year	2021	2022	**2023**
Total volume of non-recoverable wood (1000m³ overbark)	Sawlog size	8.1	299	**1662**
	Other	12.9	226	**1848**
	Total	21	525	**3509**
Total value (1000 Euro)	Wood & other tangible losses[1)]	659	4851	**957**
	Other[2)]	11	285	**237**
	Total	670	5136	**1195**

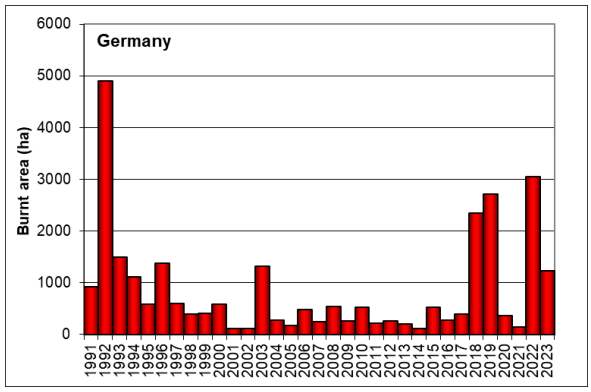
1) Estimate of the stand expectation value less the stumpage value plus consequential costs caused by fire (additional planting cost etc.) as well as other material damage.
2) Other damage according to material value method (Koch) or other comparable cost estimates.

In 2023, approximately 5.52 million Euro were spent on prevention and control measures (Table 12).

Table 12. Expenditure on forest fire prevention and control.

Expenditure (1000 Euro)	2021	2022	**2023**
Forest service	5499	5537	**5016**
Other (public and private)	527	633	**501**
Total	6026	6170	**5517**

The trend of the burnt areas, number of fires and average fire size in Germany for the years 1991-2023 are shown in Figure 29.



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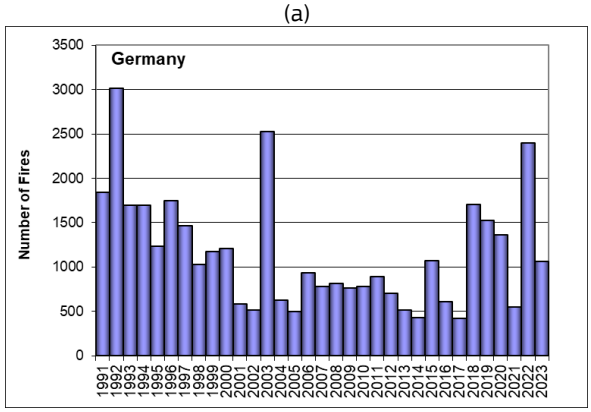

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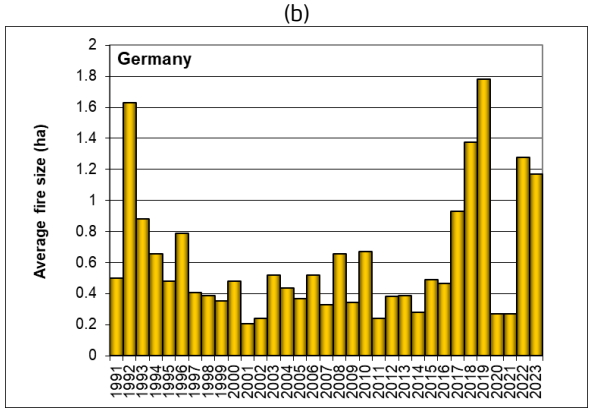

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Figure 29. Burnt areas (a), number of fires (b) and average fire size (c) in Germany from 1991 to 2023.

Burnt areas and numbers of fires categorised by land and ownership type are detailed below in Table 13 and Table 14.

Table 13. Type of land.

	2021	2022	**2023**
Coniferous	95.46	1870.90	**362.01**
Non-coniferous	52.35	1187.06	**790.24**
Total	147.81	3057.96	**1240.28**
Number of fires	548	2397	**1059**

Table 14. Type of ownership

	2021	2022	**2023**
Public	88.86	1683.95	**413.82**
Private	58.95	1374.01	**826.45**
Total	147.81	3057.96	**1240.28**
Number of fires	548	2397	**1059**

Fire causes and impacts

The main causes of forest fires during 2023 are shown in Figure 30 and Table 15.

Within the category of accident/negligence fires, the majority (141) were caused by the general public (campers, visitors, children etc.): Table 16.

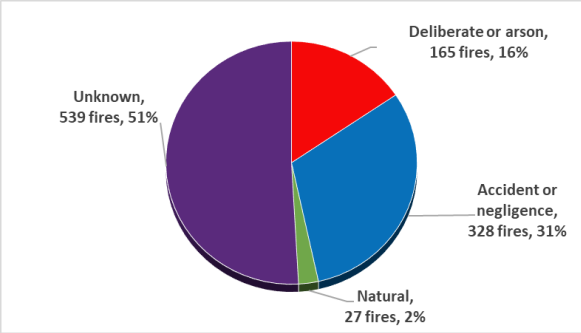


Figure 30. Main causes of forest fires in 2023

Table 15. Main causes of fires in 2021-2023.

	Number of fires			Burnt area (Hectares		
	2021	2022	**2023**	2021	2022	**2023**
Arson	92	467	**165**	20.05	1102.30	**34.56**
Negligence (total)	160	811	**328**	76.46	657.71	**239.59**
Natural causes (lightning)	7	41	**27**	0.48	7.59	**6.45**
Unknown causes	289	1078	**539**	50.82	1290.37	**959.68**
Total fires	548	2397	**1059**	147.81	3057.96	**1240.28**

Table 16. Detailed breakdown of negligence causes in 2021-2023.

	Number of fires			Burnt area (Hectares		
	2021	2022	**2023**	2021	2022	**2023**
Agricultural operations	16	66	**29**	9.83	127.77	**26.73**
Logging and forest operations (including prescribed burning)	25	73	**41**	3.22	15.74	**6.24**
Other industrial activities	1	2	**1**	0.08	0.55	**1.00**
Communications (railways, electricity lines, etc)	7	20	**13**	0.17	6.99	**1.27**
General public (campers, other visitors, children)	74	363	**141**	19.70	157.70	**14.20**
Other (including military, etc.)	37	287	**103**	43.46	348.95	**190.15**

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

1.2.11 Greece

Fire danger in the 2023 fire season

The 2023 fire season started with particularly low temperatures and there were also flooding phenomena in several areas of the country. Both May and June were colder than their normal levels, mainly in the central and northern parts of the country. Moreover, average rainfall values were generally higher than normal in most areas. However, hailstorms were recorded in some continental places, causing damage.

July 2023 was the warmest July on record in the past 64 years, with average temperature values exceeding by 2 to 3.5 degrees Celsius the normal values throughout the country. The reason was the continuous transportation of very hot gas masses to our country for a period of fifteen days. The result was the recording of a serious heat wave lasting from 12/7 το 26/7.

Apart from the very high, maximum temperatures recorded, minimal temperatures increased gradually as well, reaching or exceeding the temperature of 30 degrees Celsius in some places. This fact combined with the increased relative humidity created intense conditions of discomfort in all regions of the country.

The first week of August was hot, with a ten-day period of relatively cool weather following and high temperature values throughout our country during the last ten days of this month. However, significant amounts of rain were recorded due to instability in western and northern parts of Greece..

Fire occurrence and affected surfaces

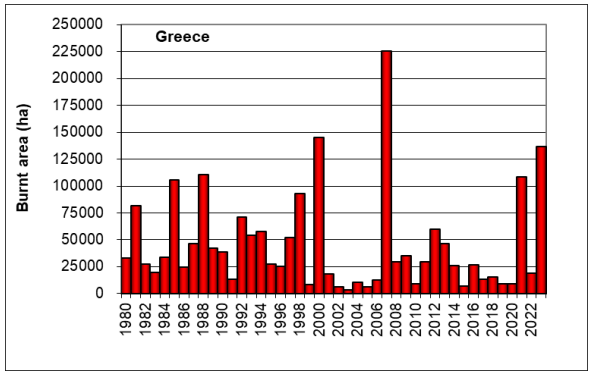
According to the data supplied by the local Forest Services, the most notable forest fires for 2023 are listed below:

- 17th July Kouvaras, in Attica area
- 17th July Dervenohoria, in Attica area
- 18st July Rhodes island
- 23rd July Karystos, in Evia Island
- 23nd July Corfu island
- 26th July Volos area
- 18th August Evros area
- 23rd August Rodope area

During the forest fire season of 2023, a total number of 941 forest fires were recorded in Greece, with a total affected burnt area of 136 498.76 hectares of forested and non-forested land. More specifically, 127 602.26 hectares of forested land and 8 896.5 hectares of non-forested land were burned. Most fire incidents (713) resulted in less than 1.00 hectare of burnt area.

According to the current provisional results, there is not any change in the number of forest fires, but there is a significant increase in burned area. Twenty six (26) forest fires burnt more than 500 hectares, which led to a huge amount of burned area (Figure 31, Table 17).

The yearly trends in terms of numbers of fires, burnt areas and average fire size in Greece from 1980 are shown in Figure 31.



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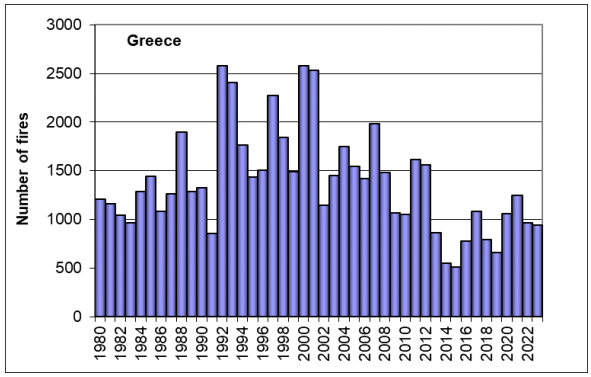

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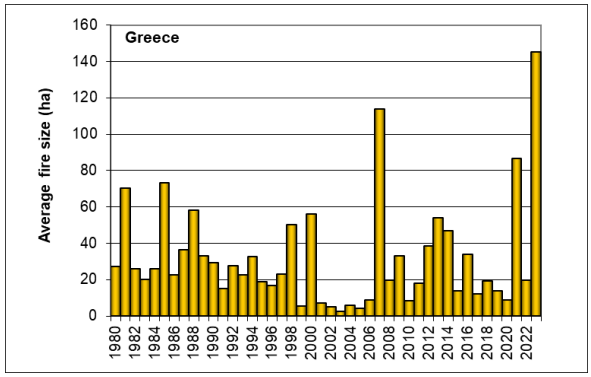

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Figure 31. Burnt areas (a), number of fires (b) and average fire size (c) in Greece from 1980 to 2023.

Table 1 shows the number of fires and burnt area in Greece in 2023 Inspections of Forest Policy Implementation.

These numbers are still provisional and are likely to rise when the compilation of fire data will be completed.

Table 17 Number of fires and burned area in 2023 by Inspection of Forest Policy Implementation.

FOREST ADMINISTRATION AUTHORITIES	*Number of fires*						*Burned area (ha)*		
	Total	*<1 ha*	*1-5 ha*	*5-100 ha*	*100-500 ha*	*>500 ha*	*Total*	*Wooded*	*Non wooded*
Macedonia-Thrace	148	104	22	17	0	5	58943.55	54340.16	4603.39
Epirus & Western Macedonia	156	119	27	10	0	0	264.47	230.07	34.40
Thessaly and Central Greece	301	219	38	23	8	13	40617.05	38951.25	1665.80
Peloponnese, Western Greece & Ionian	187	162	15	6	1	3	5489.08	5303.53	185.55
Attica	33	20	5	4	0	4	12644.12	12303.36	340.76
Crete	94	82	10	2	0	0	159.14	142.29	16.85
Aegean	22	7	5	7	2	1	18381.35	16331.60	2049.75
TOTAL	**941***	**713**	**122**	**69**	**11**	**26**	**136498.76**	**127602.26**	**8896.50**

***** *Figures are still provisional and are likely to rise when the compilation of fire data is completed.*

Figure 32. Burnt areas in Greece for 2023 – EPaDaP (The National Forest Fire Observatory).

Injuries and loss of human lives

During the firefighting period of 2023, there were twenty-three (23) deaths of citizens and one (1) firefighter (five-year obligation), while two (2) citizens as well as twenty-three (23) firefighters were injured.

Fire fighting means and information campaigns

Fire Department Personnel of the year 2023

Overall, the serving strength of PA personnel including civilian personnel, seasonal personnel and volunteer firefighters for the year 2023 was as follows:

- 11 424 General and Special Duties firefighting personnel (serving force 31-10-2023),
- 2 368 firefighters with a five-year obligation (serving force 31-10-2023),
- 105 civil servants,
- 2 472 Seasonal Firefighters: They were hired under an IDOX employment contract that expired on 10-31-2023,
- 4074 volunteer firefighters of Law 4029/2011 (10-31-2023),
- 500 Special Unit of Forestry Operations (EMODE).

Fire Department vehicles of the year 2023

The PS has a total of 3 255 vehicles of various types. These vehicles are distinguished as follows:

Firefighting vehicles (Waterfalls)	1954
Support vehicles	1021
Special vehicles	205
Motor cycles	75
Total	**3255**

The aerial means used during the 2023 campaign are shown in Table 18.

Table 18. Aerial means participating in the 2023 campaign.

National fleet		
Type	Number	Availability 2023 (max)
Aircraft CL-415	7	6
Aircraft CL-215	11	9
Aircraft PEZETEL	21	18
Helicopter SUPER PUMA AS 332 L1	2	1
Helicopter BK 117 CL	3	2
Helicopter CHINOOK	3	3
Helicopter SUPER PUMA of Greek army	1	1
Helicopter SUPER PUMA of Greek police force	2	2
Total	**50**	**42**
Leased air means		
Type	Availability 2023	
Medium Press Helicopters	20	
Heavy Duty Helicopters	10	
Lightweight Type of Aircraft	19	
Total	**49**	

Fire Prevention Activities

The Ministry of Environment and Energy, with the program called *Antinero*, implement intensive fire protection actions with the aim of shielding against the climate crisis, which affects the Mediterranean ecosystems. The design and implementation of the *Antinero* program for the year of 2023 focuses on the management, removal, and cleaning of forest fuel at:

- Peri-urban areas, where mixed zones of forests and settlements are located, to effectively deal with fires in these areas and protect human life,
- Areas of special environmental value (protected areas), but also of cultural heritage (archaeological sites),
- Road network (upstream and along the road) and dangerous facilities such as camps since these areas are considered as possible fire-starting points due to intense human presence or systems that could possibly cause a fire to start,
- Sensitive forest ecosystems of the whole country's territory, within a plan to pay back the local communities.

Furthermore, the program includes works of improvement of the forest road network, which is critical and necessary for providing the needed access within the forest ecosystems, so that the fire service would be able to have an early response to fire incidents.

All the above have contributed to confronting wildfires in our country in the best possible way, by protecting human life and rescuing important ecosystems and cultural heritage sites.

Climate Change

Climatic conditions and how they impacted the fire season

According to historical climate data, the average temperature in Greece in 2023 was about 1.3°C higher than the normal value (the average annual temperatures during the period of 1981-2010). The years 2023 and 2010 were the warmest years in Greece, in the history of the last 64 years.

The last 17 years (2007-2023) are generally warmer than normal, as only positive temperature deviations from the 1981-2010 average temperature are observed. The warmest years for which we had the largest positive deviations from the normal value of annual temperature (above 1°C) are 2023, 2018 and 2010.

(Source: Ministry of Environment and Energy; General Secretariat of The Forests, Greece).

1.2.12 Hungary

Fire danger in the 2023 fire season

FWI-derived data and values were reported throughout the whole fire season by the forest authority (FA). FA has been using JRC's data service to monitor the daily fire danger situation.

During the first half of the year, average temperatures were lower than average and precipitation was above the average of the last 100 years. Fire danger of forest fires was low during this period. There were no high FWI values in the spring. In the second half of summer and early autumn, precipitation was low and the FWI showed an increase. In the lowland pine region, heat days occurred during the summer. A fire ban was ordered for 26 days in July due to high fire danger.

Fire occurrence and affected surfaces

Forest fires data are collected in close cooperation with the disaster management authority. Data are collected on the spot by fire fighters, who upload the database day by day. Forest fires data are produced and analysed with a GIS method and checked on the spot by the forest authority. The gathered fire data are processed and evaluated by size, date, cause and duration of fires. Data from 2011-2023 are shown in Table 19.

Table 19. Number of fires and burnt areas.

Year	*Total number of wildfires*	*Forest fires*		*Other land types*
		Number	*Burned area (ha)*	*Number*
2011	8 436	2 021	8 056	6 415
2012	15 794	2 657	14 115	13 137
2013	4 424	761	1 955	3 663
2014	5 535	1 042	4 454	4 493
2015	5 057	1 069	4 730	3 988
2016	2 531	452	974	2 079
2017	6 782	1 454	4 934	5 328
2018	2 981	530	906	2 451
2019	7 296	2 088	6 541	5 208
2020	4 339	1 239	2 895	3 100
2021	4 350	1 154	2 413	3 196
2022	8 687	2 731	20 947	5 956
2023	**2 685**	**675**	**911**	**2 010**

The spring fire season accounted for 52% of all forest fires. 95% of spring fires were less than one hectare due to above-average precipitation. There were no large fires. The largest area burnt was 30 hectares. A total of 98 forest fires occurred in the highly risk-prone Northern Hungary region in the February-May period. Overall, the number of fires was well below average. During the summer, there were only 4 forest fires covering more than 10 hectares. These fires occurred in the lowland sandy region.

The yearly trends in terms of number of fires and burnt areas between 2011 and 2023 are shown in Figure 34.

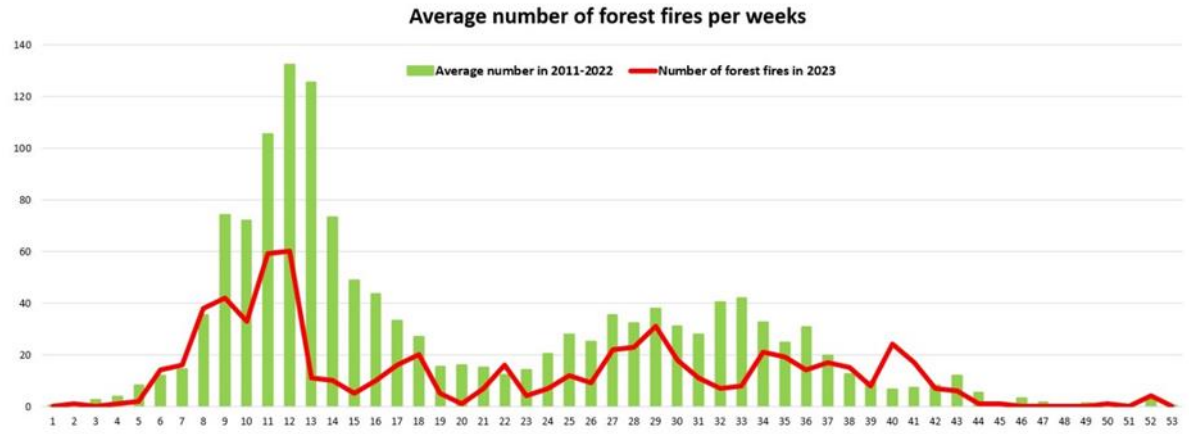


Figure 33. Average number of forest fires per week in Hungary 2023.

Figure 35 shows the location of forest fires in Hungary. Most forest fires occur in northern Hungary and the central part of the country. Most spring fires burn in northern areas (Borsod-Abaúj-Zemplén County, Heves County, Nógrád County and Pest County) which indicates these areas as high forest fire danger zones. In these areas not only traditional grassland management methods, but other social-economic factors add to forest fire danger.

With GIS analysis, we can say that the majority of forest fires do not ignite inside the forest, but also in the agricultural area adjacent to it.

We have found that 54% of the fires occurred in 500-metre zone around residential areas. 85% of all forest fires were no further than 2 km from residential areas in 2023.

Table 20. Classification of fires by size class in Hungary in 2023.

Classification of burnt area	Number of forest fires	Burnt area (ha)
less than 1 ha	537	123
1 – 50 ha	137	788
50 – 100 ha	0	0
100 – 500 ha	0	0
more than 500 ha	0	0
Total:	**674**	**911**

98% of forest fires were surface fires this fire season, when surface litter and other dead vegetal parts and smaller shrubs burnt down. The average rate of fires smaller than 1 hectare is almost 70%. Statistical analysis shows that the number of forest fires under 0.5 ha has been increasing in the last decade. In particular, the increase in the number of spot fires under 1000 m^2 is significant (Table 20).

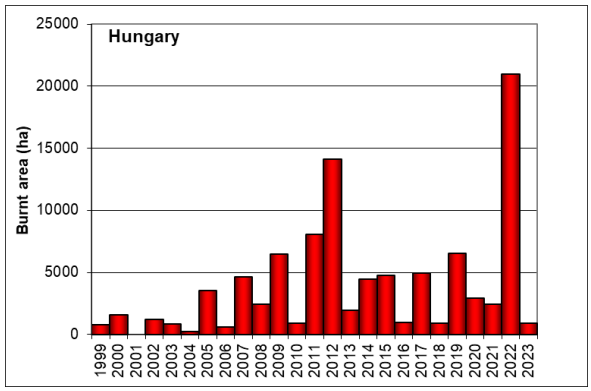
The forest fire records shows that a total of 182 hectares of forest land were burned or affected by forest fire during 2023. In addition, more than 534 hectares of grass vegetation and 195 hectares of other wooded land were destroyed in forest fires. These values are the lowest according to the statistics recorded since 2011 (Table 21).

Table 21. Fires in 2023 by forest type.

Forest type	Total burnt area (ha)
Forested land	182
Other wooded land	195
Other land	534
Total	**911**

Fire Causes

99% of forest fires are human-induced (negligence or arson). Most fires are induced by (adults and infants) negligence and only a small proportion of fires are caused by arsonists. Typical forest fire causes are the incorrectly extinguished fires of hikers, and the illicit agricultural fires, throwing cigarette butt and sometimes slash burning.



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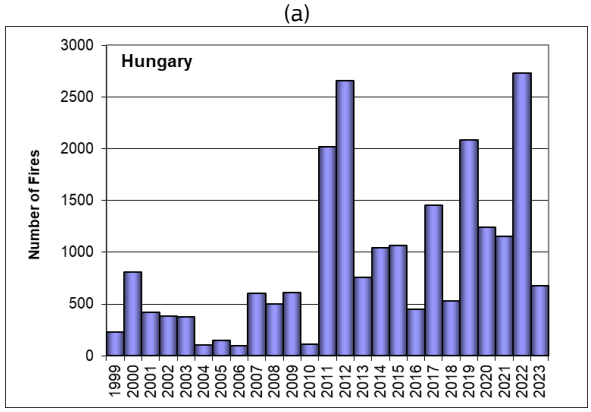

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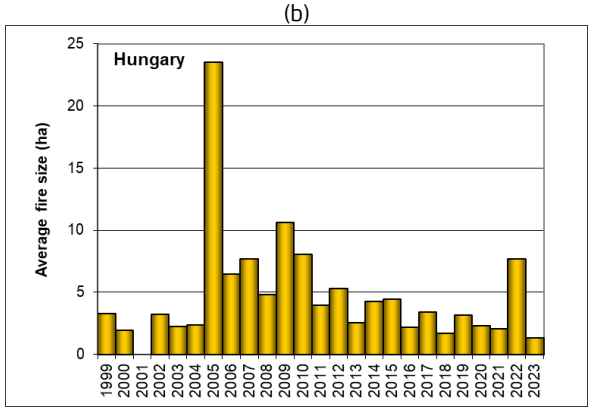

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Figure 34. Burnt areas (a), number of fires (b) and average fire size (c) in Hungary from 1999 to 2023.

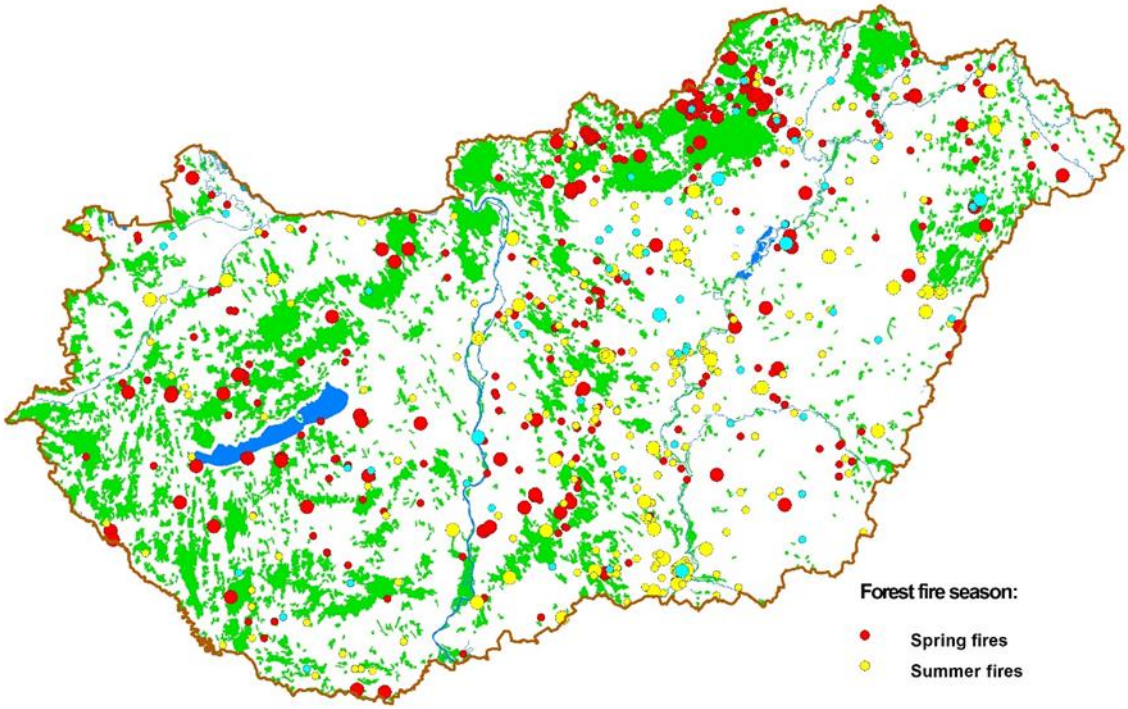


Figure 35. Locations of forest fires in Hungary in 2023.

Fire prevention activities and fire information campaigns

Forest fire prevention is carried out in cooperation with the forestry authority and the National Directorate General for Disaster Management, based on community and domestic legislation.

The forestry authority also participates in the work of the Forest Fire Working Group of the National Fire Prevention Committee. The National Food Chain Safety Office has delegated experts to the Disaster Risk Assessment System project, which is implemented by the National Directorate General for Disaster Management. Forest fire plans have been reviewed at the forest management level. New relevant information must be provided by the forest managers to the fire brigade. The forest fire protection regulation has also been amended.

Fire fighting means

85% of fires were usually extinguished in less than an hour after arrival at the fire. The fire service arrived at the fire in 30 minutes on average.

Fire season summary

- total number of wildfires 2 685
- 675 forest fires with 911 ha burnt area
- 353 forest fires in Spring
- Total fire ban in Summer (12.07 – 06.08)
- No large fires

(Source: National Food Chain Safety Office; Forestry Directorate, Hungary).

1.2.13 Ireland

The Department of Agriculture, Food and Marine (DAFM) is the agency responsible for forest Protection in Ireland.

Fire occurrence and affected surfaces

Based on available Copernicus and data from DAFM assessments DAFM during 2023 it is estimated that approximately 5 700 ha of land was affected by fire, including 100 ha of forest lands. The forest land affected comprised 100 ha of state owned forest land.

Table 22. Estimated total losses in 2023.

Forest	Non-Forest
100 ha	5 600 ha

Fire danger during the 2023 fire season

Fire risk conditions for 2023 were largely within expected normal patterns, with most risk phases confined to Early Spring period. The end of February saw a significant initial phase of dry, strong wind conditions combined with the last days of permitted controlled burning season for landowners. The majority of observed fire activity during 2023 occurred during this initial phase, predominantly in South Western Counties. This activity appears to have been strongly associated with traditional burning practice on extensive agricultural land used for upland grazing. The DAFM Forest Fire Danger Rating System was activated in early March 2023 with a Condition Yellow Notice. A further five Condition Orange Notices were issued between April and Early June 2023, in line with weather and fuel risk conditions. Low fire risk conditions generally prevailed throughout the summer months. No Condition Red Fire Danger Naotices issued during 2023.

Fire prevention activities

The Meteorological Fire Danger Rating system developed by Met Eireann (Irish National Weather Service) was used operationally to produce fire Danger Notices throughout 2023. A number of Helicopter-borne fire patrols were undertaken by the National Parks and Wildlife service, during risk periods and during busy bank holiday weekends. As in previous years, several landowners had financial penalties imposed under farm payment schemes by DAFM where burning was found to have taken place outside of the legally permitted period. In a number of cases, farmers were penalised where fires were permitted to burn overnight from February 28th, into the illegal period commencing March 1st. Following a high intensity phase of burning in February there was a noticeable decrease in agricultural burning activity during the remaining closed season. Later fire activity observed during this later period was associated with peat-cutting, Illegal dumping and public recreational activity.

Fire Activity

Fire activity in Ireland is primarily monitored through three Regional Emergency Control Centres covering Southern, Western and Eastern Regions. 2023 saw most fire activity taking place during the legally permitted period, prior to March 1st, and generally reduced levels of agricultural burning activity during the main risk season, and a greater focus of fire activity on non-agricultural land types, particularly lands with public access.

Fire Suppression

Fire suppression activities are usually conducted and led by Local Authority Fire and Rescue Services. On state owned forest lands, National Parks and Nature Reserves, these services can be augmented by additional firefighting personnel, air support and ground equipment from Coillte Teoranta (State Forestry Board), National Parks and Wildlife Service, Bord Na Mona (Irish Peat Board) and the Irish Defence Forces where required. Ground operations during 2023 were augmented by 2 Helicopters (2 X EC120) sourced from private sector contractors with additional medium lift helicopter support (AW 139, EC135) available from the Irish Defence Forces where required.

International Assistance

No international assistance operations took place during 2023.

Loss of human lives

There were no deaths or structure losses reported following forest fires during 2023. One public radio transmitter station was damaged by fire in Co. Kerry on February 28th, 2023.

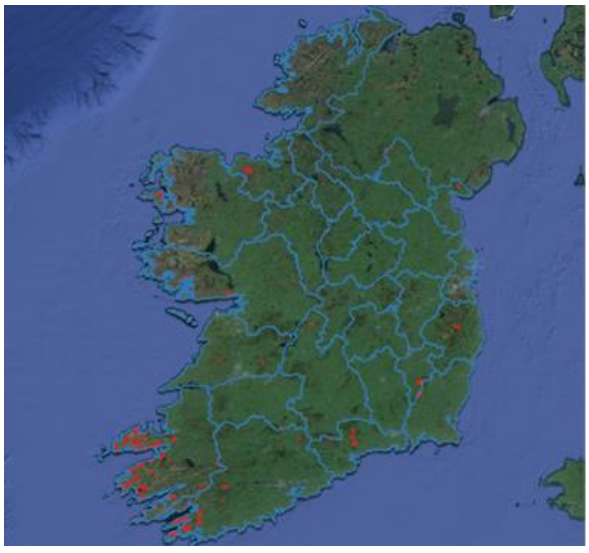


Figure 36. Recorded fire locations during 2023.

(*Source: Forest Service, Department of Agriculture, Food and the Marine, Ireland*).

1.2.14 Italy

Fire danger

In 2023, the mean fire danger in Italy during the fire season (July to September) was above the average (period 1988-2023), corresponding to 94% of the highest FWI in 2007 (Figure 37, left). Note that FWI does not display a strong trend over the period of analysis (red dotted line - Figure 37, left).

A significant proportion of the inter-annual change in total burnt area in Italy is explained by changes in fire weather (Figure 37, right). A change in FWI from one year to the next is correlated with the corresponding change in burnt area, with 2023 showing average changes for both FWI and burnt area.

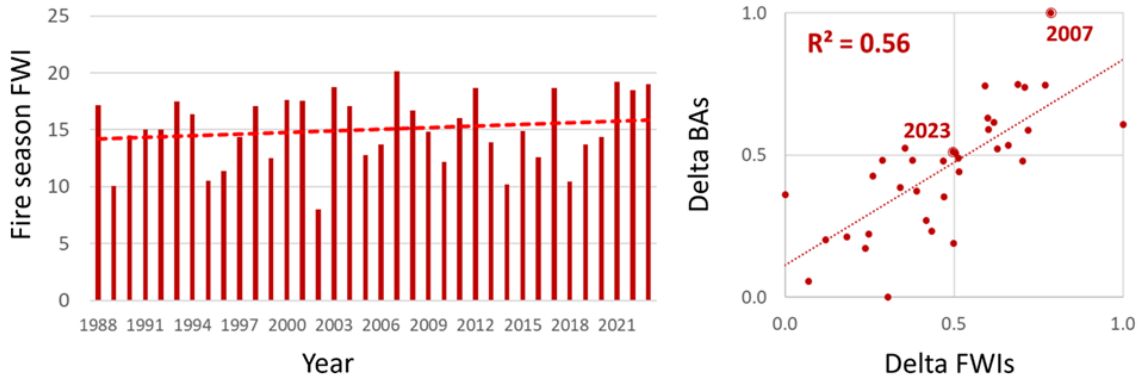


Figure 37. Mean daily fire weather in Italy during the fire season (July-September) from year 1988 to 2023. The red dotted line indicates the linear trend over the period of analysis (left). Total burnt area in Italy for years 1988-2023 as a function of mean daily fire weather during the fire season (right). Calculations used the delta approach to correct for autocorrelation: a change in burnt area (Delta BAs) from one year to the next is correlated with the corresponding delta in FWI. Changes are standardized from 0 to 1. Year 2007 (highest FWI and largest burnt area) and 2023 are evidenced by a double circle. Fire weather was indexed using the FWI according to the Global fire danger re-analysis (Vitolo et al. 2019).

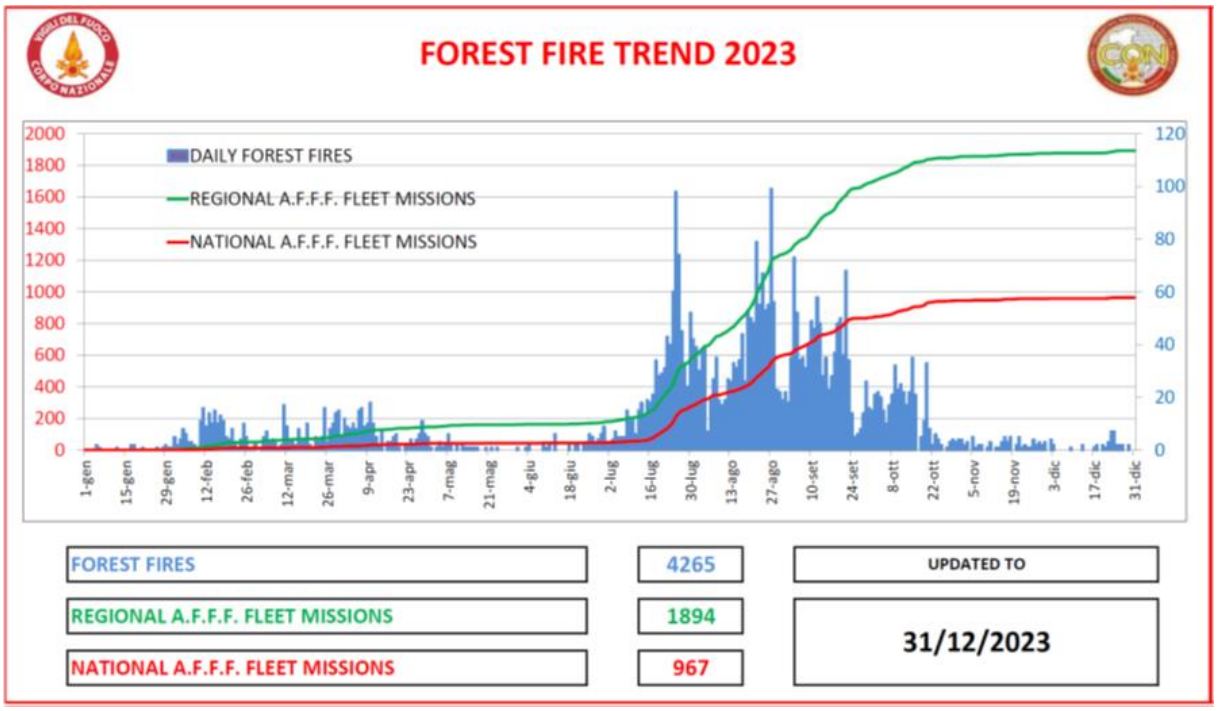


Figure 38. Daily number of forest fires in 2023; number of missions of forest fire fighting aircraft.

In Italy, 2023 was at the second place among the warmest years since 1800, with a temperature 0.82 degrees higher than the historical average. Significant positive anomalies, exceeding 2°C, were recorded in July, September, with a peak in October of +3.27°C.

The first 4 months of the year were marked first by a serious drought, and, afterwards, by numerous extreme events such as heavy rainfall especially in the northern area of the Country. Very heavy rainfall was registered in May, when Emilia Romagna was strongly affected by floods in the eastern flat lands and by a great number of landslides on the hills and mountains of the Appennini area. Landslides became even more problematic for forest fire fighting in the northern Appennini area, due to their impact on the road network, especially the rural and forest one, which was heavily damaged. Often enough, firefighters had to re-open dirt roads with dozers and scrapers to reach the fire fronts with ground crews.

Rainfalls still above average were registered in June, July and August in the northern part of the Country. July was particularly dry in the south-central area, while in September and most of October the same condition affected the entire territory. The CDD (Consecutive Dry Days) index, which represents the maximum number of consecutive dry days in the year, shows fairly contained values across most of the National territory. High values were observed only in Sicilia and Sardegna (up to 165 consecutive dry days in Sicilia and up to 100 in Sardegna), followed by the Ionian coast of Calabria (up to 100 days) and a good part of Puglia.

The consequences of this meteorological situation are directly correlated to the trend of forest fires reported in Figure 38.

The first months of 2023 were characterized by extremely dry conditions. Lombardia and Piemonte were the most affected regions by fires, even though, thanks to the minor number of windy days, no dangerous events were registered. The rainfalls of May and June 2023 then caused a break of the fires and a postponement of the summer campaign which saw at least 3 more dangerous peaks: in the third decade of July (24-27 July) when strong scirocco winds and high temperatures led to critical situations in Sicilia, Calabria and Puglia; in the second half of September (21-23 September) and in mid-October, an anomalous period for forest fires in Italy. Especially in Sicilia, but also in Calabria, the fires affected large interface areas, which unfortunately caused some casualties among citizens.

Fire occurrence and affected surfaces

In 2023 Italy was affected by a total of 4 265 forest fires. The number was lower than the previous year: -34.7%. On the contrary the burnt area has significantly increased, from 71 694 hectares in 2022 to 88 805 in 2023. Consequently, the average area per fire has almost doubled, passing from 10.9 ha in 2022 to 20.8 ha in 2023. Looking at the burnt area we can put in evidence that the overall surface is split almost equally between forest and non-forest areas.

Analysing data at the regional level, the serious problem of the fires in Sicilia is evident: both in terms of number of events (1 160) and burnt areas (57 533 hectares). In Calabria too, the burnt areas have increased compared to the previous year.

Table 23. Number of fires and burnt area in Italy by region in 2023.

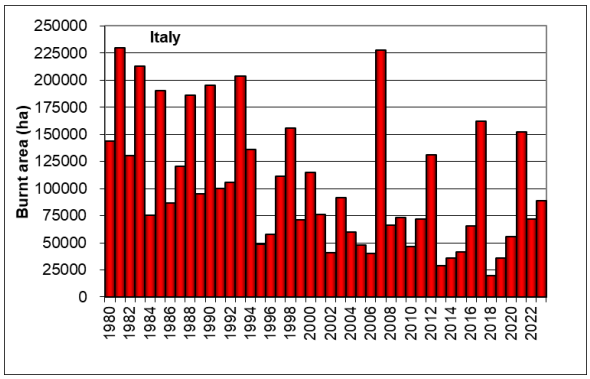
	Num. fires	% share of fires	Forest	Non-forest	Total	Av. fire size
ABRUZZO	44	1	547.8	182.4	730.2	16.6
BASILICATA	163	3.8	612.3	1130.2	1742.5	10.7
BOLZANO	33	0.8	28.5	0.1	28.6	0.9
CALABRIA	515	12.1	7176.2	1384.4	8560.6	16.6
CAMPANIA	398	9.3	2122.5	815.4	2937.9	7.4
EMILIA ROMAGNA	68	1.6	52	15.3	67.3	1.0
FRIULI	33	0.8	3.7	4.7	8.4	0.3
LAZIO	246	5.8	2631.8	512.7	3144.5	12.8
LIGURIA	134	3.1	788.7	20.5	809.2	6.0
LOMBARDIA	188	4.4	207.9	70.4	278.3	1.5
MARCHE	30	0.7	15.1	20.6	35.7	1.2
MOLISE	67	1.6	171.8	391.7	563.5	8.4
PIEMONTE	196	4.6	929	126.2	1055.2	5.4
PUGLIA	387	9.1	2464.5	5135.8	7600.3	19.6
SARDEGNA	249	5.8	1003.1	2059.6	3062.7	12.3
SICILIA	1160	27.2	22618.6	34914.5	57533.1	49.6
TOSCANA	242	5.7	218.5	218.5	437	1.8
TRENTO	25	0.6	26.1	0.2	26.3	1.1
UMBRIA	54	1.3	31.5	28.2	59.7	1.1
VALLE D'AOSTA	6	0.1	90	28.9	118.9	19.8
VENETO	27	0.6	4.3	1.5	5.8	0.2
TOTAL	4265	100	41743.9	47061.8	88805.7	20.8

Source: COMANDO CARABINIERI PER LA TUTELA FORESTALE – Nucleo Informativo Antincendio Boscivo, *ANALISI SUL FENOMENO INCENDI BOSCHIVI 2023.*

Figure 39. Wildfire in a mountain area of Calabria [*photo by CNVVF*].

Figure 40. (top and bottom): Wildfires often affect very impervious areas where it is difficult to work with the ground crews [*Photos by CNVVF*].

The yearly trends in terms of numbers of fires and burnt areas in Italy since 1980 are shown in Figure 41.



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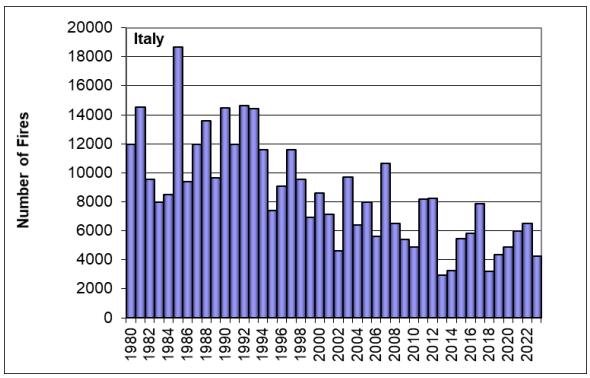

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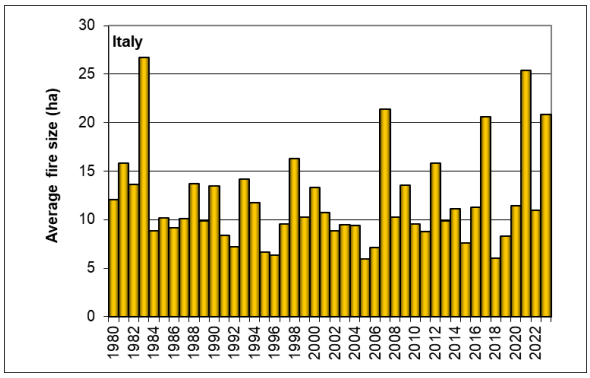

(c)

Figure 41. Burnt areas (a), number of fires (b) and average fire size (c) in Italy from 1980 to 2023.

Fire causes

With regard to man-made and intentional fires, the most frequent motivations are the renewal of pastures, disagreements between hunters, vandalism, retaliation against private individuals and public administration. Unintentional causes are mainly due to activities of burning plant debris generated by agriculture activities, as well as to recreational activities. 1% of forest fires are due to natural causes (lightings).

The ignitions are distributed uniformly throughout all the days of the week, with greater frequency during the hottest hours of the day (12.00–17.00). Fires affected mainly hilly territories with vegetation characterized by Mediterranean shrub. Often these areas have been already affected by fires in the previous 5 years.

Figure 42. Burnt area in the Reggio Calabria province: in 2023 Reggio Calabria was one of the provinces in Italy most affected by wildfires [*photo by CNVVF*].

Fire fighting means

In Italy, according to the national law, the local Authorities "*Regione*" have the task to extinguish forest fires with ground crews, composed of volunteers and forest workers, as well as Regional Forest Corps in the autonomous regions and provinces. Ground crews are supported by light and medium helicopters rented by the "*Regioni*". Each regional system is managed by a Common Operational Room. Regions can sign specific agreements with the National Fire and Rescue Service (CNVVF) to carry out the activity of forest firefighting. The State coordinates, through the Unified Air Operational Centre (COAU), the National Forest Firefighting Air Fleet: 18 Canadair CL415 and 6 heavy helicopters Erickson S64, all of them owned and managed by the National Fire and Rescue Service.

During the summer campaign, some military helicopters, other medium-sized helicopters from CNVVF and 2 AT 802 F Fire Boss planes rented by the Civil Protection Department are also available. These planes were added as a RescEU module to the Italian AFFF Module consisting of 2 Canadair CL415.

Regional air fleets include some 65 helicopters operated by private companies. Sardegna also rented a Super Puma helicopter with the bambi-bucket; this helicopter is also used by Regional Forest Corps to move the back-fire crews.

In the course of 2023, regional aircrafts were engaged on 1 894 missions; National assets received 967 requests (55% of which submitted by Sicilia and Calabria).

Figure 43. One of the Italian Erickson S64 managed by National Fire and Rescue Service (left); S64 during the scoop with the pond snorkel (right). [*Photos by CNVVF*].

Figure 44. The helicopter Super Puma of Regione Sardegna in action [*Photo by CFVA Sardegna*].

In Italy ground crews (hand crews and engine crews) make a large use of pick-ups with small water tank (400-600 litres) apt to move on the narrow roads of the Italian network covering hills and mountains. The National Fire and Rescue Service usually employs pick-ups too and Fire Trucks (up to 4000 litres), and provides also heavy Fire Engines to refill smaller means.

Hand crews and engine crews work in close collaboration with the small and medium helicopters under the coordination of the Incident Commander. Often, in the mountain areas, ground crews set up mobile water points for helicopters using removable tanks refilled by heavy fire engines.

When the road network does not allow the crew to reach the fire front with trucks, ground crews, especially in the northern part of the country, use long fire hose lines to control the flames on the flanks and for mop up operations. If the road network is not dense enough to allow for the use of hoses, the crews use hand-tools like rakes, beaters, shovels, hoes, etc. Blowers are frequently used especially in the pastures and in broadleaved forests during the winter fire season.

Figure 45. CNVVF Forest fire truck [*Photo by CNVVF*].

Figure 46. Forest Fires Fighting Volunteers from Piemonte and Sicilia during the FFF twinning initiatives of summer 2023 [*photo by Piemonte Forest Fire Fighting Volunteers Corps*].

Figure 47. Forest Fires Fighting Volunteers in action during the FFF twinning initiatives of summer 2023 in Sicilia; often the fires affected cultivated and uncultivated agricultural lands [*photo by Piemonte Forest Fire Fighting Volunteers Corps*].

When possible, according to safety conditions, and in particular to the knowledge of the places, ground crews work during the night with hand-tools and hoses too, taking advantage of the lower temperature and higher air humidity.

Figure 48. Advanced Command Post for a WUI fire in Lombardia: operators from FFF Volunteers, Fire Brigade, Red Cross work together to coodinate the operations [*Photo by CNVVF*].

Figure 49. In the northern Appennini mountains, especially in Romagna, the heavy rainfall affected the rural and forest road network; in case of wildfires the firefighters had to re-open the dirt roads to permit to the ground crews to arrive close to the fires [*Photo by CNVVF*].

After the National Mobilization of 2021, the most affected regions of the South (Sicilia, Sardegna, Calabria, Puglia) signed special agreements with the northern regions of the Country (Friuli V.G., Veneto, Lombardia, Piemonte, Liguria) and some National Volunteer Organizations. So that the northern Forest Fires Fighting Volunteers moved to the southern areas for the summer period, to support the local System in patrolling and to attack the fires.

During the summer campaign, in periods of maximum activity, over 800 CNVVF operators are exclusively engaged daily in Forest Fire Fighting activities based on agreements with the regions. In addition to these, on the basis of the National fire susceptibility bulletin issued daily by the Civil protection Department, almost 1000 firefighters from the FFF modules of CNVVF national mobilization device, can be moved very quickly throughout the National territory in case of a crisis. It should also be remembered that the 6000 operators of the CNVVF's ordinary daily service intervene, where necessary, in support of the regional FFF Systems as well as on all non-forest vegetation fires which, often underestimated, constitute a very heavy commitment for the National Fire and Rescue Service.

It is worth highlighting that, in the last years, wildfire campaigns were no more well defined in terms of time and space, and often complicated by contemporary hydrogeological events. The borderlines between forests and agricultural lands are no longer well defined. In the marginal areas, fields are no longer cultivated, and transition shrub stands are growing, becoming apt for fast spreading fires. For these reasons, the protective effect of cultivated areas is decreasing and, in the worst years, like 2007 or 2017, agricultural areas cannot be considered any more as lines to stop wildland fires; on the contrary, they become areas which allow a faster spread of fires to the forests. The example of the olive groves affected by *Xylella fastidiosa* in Puglia clearly highlights this situation. Fires involving agricultural areas, including those uncultivated and with transition shrub stands, are growing, and their number exceeds forest fires. This evolution also increasingly challenges the response system.

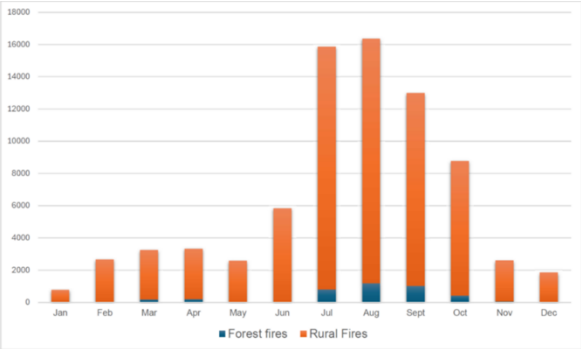

Figure 50. Monthly distribution of rural fires (forest and non-forest vegetation fires) in 2023.

Figure 50 shows the comparison between rural fires (the sum of forest and non-forest vegetation fires corresponding to code 301 of the CNVVF statistics) and forest fires (according to the definition of law 353/2000). The number of non-forest fires is much higher: of more than 76 000 rural fires, some 4 200 are forest fires.

After the 2017 fire campaign, one of the worst in the history of the Country, the Italian Government decided to increase the ground and air resources of the National Fire and Rescue Service with a 10-year funding scheme aiming to improve the response of the State to wildfires. Having acquired heavy and medium helicopters, and light pickups for the narrow road network of the rural areas, CNVVF is now going to complete a new procurement of medium forest fire trucks (2000-3000 litres) and a special Unit able to use Long Term Retardant on the ground. From 2021 the Government introduced a new additional 4-year fund aimed to improve air means, ground means, training, etc. both for the National and the Regional resources.

The ever-increasing use of drones in forest fire fighting also has to be mentioned. UASs (Unmanned Aircraft Systems) are used by all the components of the Forest fire fighting System for patrolling, assessment, monitoring, mapping burnt area as ortho-mosaic when the wildfire is put out, and investigations. In Italy the use of drones in forest fire fighting is under the coordination of the Incident Commander, who is in charge of all technical activities for fighting wildfires. Calabria Region has developed an interesting patrolling and early warning system on its territory based on the use of drones. The information arrives directly to the regional operations room which uses it to assess the situation and send the appropriate resources for extinguishing. The images are also used for investigation and to sanction the burning of agricultural plant residues, which is not permitted in the fire season.

In wildfire scenarios, the National Fire and Rescue Service uses drones to assess the ongoing situation and manage the operations in WUI areas when the wildfire is close to infrastructure or urban sites, especially in the night when the manned aircraft have no possibility to fight the fire.

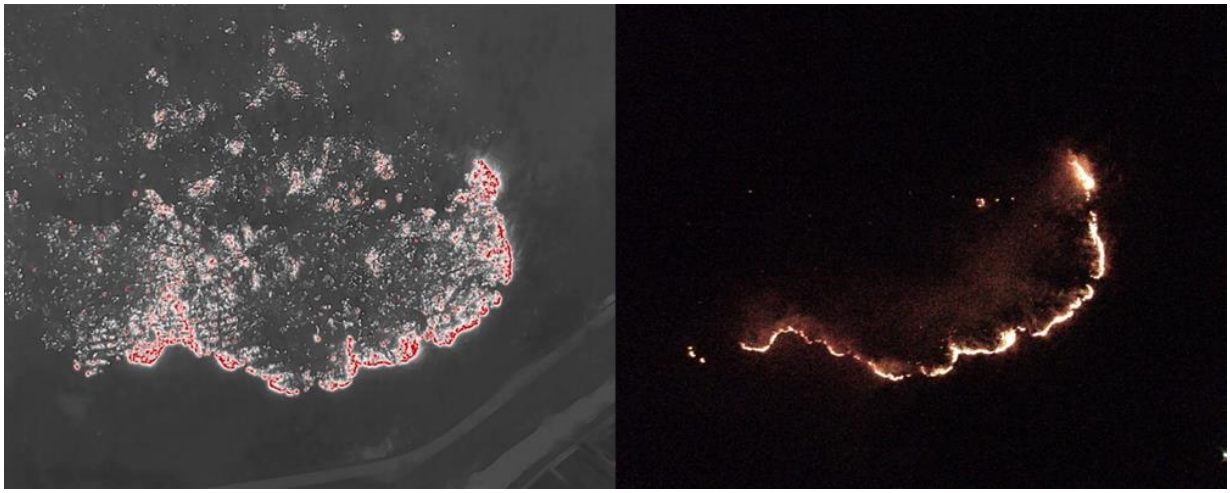

Figure 51. Fire Monitoring in night (flames close to houses) by UAS equipped with both thermal and optical camera [*Photo by CNVVF*].

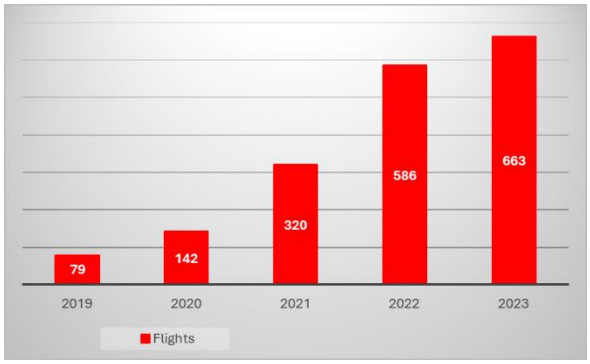

Figure 52. Increase of National Fire and Rescue Service UAS Fleet deployment in wildfires.

One of the most useful activities for the National Fire and Rescue Service is to use drones to look for hot spots during mop-up operations. These flights can be done with thermal cameras, with the possibility to geo-reference the hot-spot that can be positioned on a map. The processed data are made available early in the morning to the Incident Commander to deploy ground teams on specific targets.

Figure 53. Hot spots in ground fire, revealed in aerial view by thermal camera installed on UAS; Italy – Varese - Montegrino Valtravaglia WUI fire in March 2023 [*Photo by CNVVF*].

Fire prevention activities and information campaigns

Fire prevention in Italy involves several actors both at regional and national level. The individual regional administrations prepare the "Regional Fire Management Plan" (RFM-Plan) for their territory of competence in which fire prevention activities are planned, normally for the next 5/10 years (Art. 3, Law 353/2000). The planned activities include: i) the maintenance of the road and water network to support firefighting; ii) the implementation of management and pyroforestry interventions (i.e., collection of potentially combustible biomass, mowing, pruning, prescribed burning) to increase the resistance and resilience of forests and improve forest ecosystem services; (iii) information campaigns targeting citizens with both short-term (e.g. fire hazard assessment) and long-term (e.g. increased risk awareness) objectives.

The RFM plan is completed with the Specific Fire Prevention Plans, identifies the territories at high risk of fire and defines the spatial-temporal distribution and resources for management and prevention activities, including extraordinary interventions with the aim of improving the structures of forest vegetation and its resistance and resilience to fire disturbances.

The main funding scheme to finance forest fire prevention interventions in Italy, as defined by both the RFM Plans and the Specific Fire Prevention Plans, remains made up of the measures and interventions co-financed by the European Commission with the EAFRD fund of the Common Agricultural Policy (CAP) for Rural Development: (https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/rural-development_en).

For the new CAP programming phase 2023-2027, Regulation (EU) No. 2115 of 2021 defines the new implementation model for interventions eligible for EU co-financing. The tool for outlining this new approach is the National Strategic Plan (NSP) of the CAP, which is implemented in the individual regions with the Regional Programming Complements (CPR). The new EU Regulation has re-proposed, in a single measure (SRD12 - Investments for the prevention and restoration of forest damage) direct support for interventions for prevention (Sub-measure SRD12.1) and the restoration of damaged forests (SRD12.2).

Submeasure SRD12.1 provides for investments aimed at carrying out prevention interventions, essential to ensure the maintenance of the national forest heritage and its protection from natural disasters, adverse weather conditions or catastrophic events, including fires, hydrogeological instability, storms, floods, attacks by harmful organisms and plant diseases.

Submeasure SRD12.2 provides for investments aimed at carrying out interventions for the ecological and functional restoration and/or recovery of forest ecosystems affected by natural disasters, adverse weather conditions or catastrophic events, including fires, hydrogeological instability, storms, floods, attacks by harmful organisms and plant diseases.

With an average annual increase in the number of fires and forest areas affected by fires, compared to the previous programming period (2014-2020/22), there was a significant reduction in the resources committed by the regions for prevention and restoration interventions at national level. A financial commitment co-financed by the European EAFRD fund of € 200 000 000 is planned and the intervention will be activated by all regional administrations, with the exception of the Autonomous Province of Trento and Campania Region which provide their own resources to carry out similar interventions.

Overall, therefore, there is a financial commitment reduced by 60% compared to the previous programming phase 2014-2020/22.

In 2023 The Department of Firefighters, Public Rescue and Civil Defense of the Ministry of Interior, in collaboration with the Department for Information and Press of the Presidency of the Council of Ministry organized the information campaign "*Protect what you love*". The concept of the campaign was to raise awareness among the citizens to protect the environment from wildfires avoiding risky behaviours.

In 2023, in the framework of the information campaign "*I don't risk*" the Civil Protection Department introduced also a special part on forest fire risk.

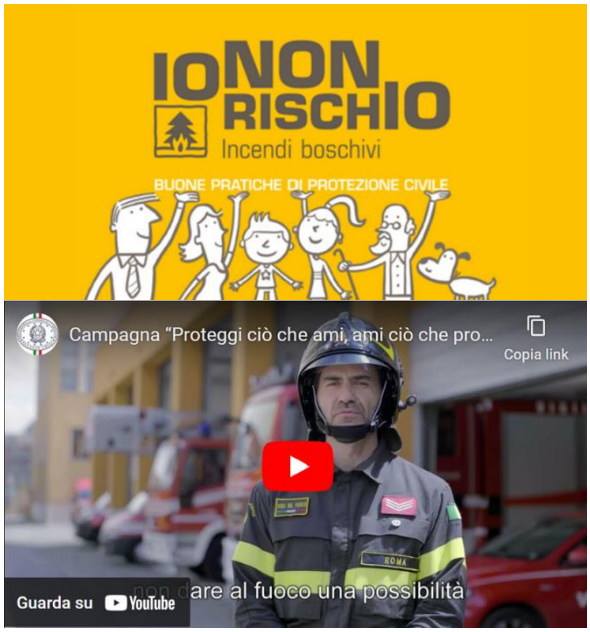

Figure 54. Information campaigns on forest fire in Italy in 2023 [*internet web sites of Italian Civil Protection Department and CNVVF*].

Injuries and loss of human lives

According to the National Fire and Rescue Service data (through the official reporting system 'Stat-Ri-web') and the Sendai Framework for Disaster Risk Reduction information, in 2023 there were no casualties among first responders.

13 civilian casualties were attributed to wildfires; in several cases the victims were elderly people who were using fire to eliminate plant residues.

International Assistance Operations in 2023

During 2023 only one forest fire fighting mission was carried out by the Italian AFFF module on request by the EU Civil Protection Mechanism. Two Canadair CL 415 aircraft of the National Fire and Rescue Service were engaged in the mission reported in Table 24.

Italian "RescEU" Canadair operated with French and Greek aircraft, under coordination of Local Emergency authority for fighting wildfires located at the north-west of Athens.

Figure 55. Italian, French and Greek crews in operational briefing at the Elefsis airport during Italian "RescEU" module deployment for the Athens Wildfire in July 2023 [*photo by CNVVF*].

Figure 56. Italian Canadair in Elefsis airport; in the background the smoke of the wildfire [*photo by CNVVF*].

Table 24. Forest fire fighting mission carried out by the Italian AFFF module on request by the EU Civil Protection Mechanism.

Country	Date	Type and number of air means	Number of flights	Hours of flight	Number of drops
Greece (Elefsis airport)	18–22/07/2023	2 Canadair CL 415	13	26:30	95

Figure 57. Fireman in action on a wildfire [*Photo by CNVVF*].

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Corpo Nazionale dei Vigili del Fuoco (CNVVF)

Corpo Volontari Antincendi Boschivi del Piemonte

Corpo Forestale e di Vigilanza Ambientale della Sardegna (CFVA)

(Sources: Comando Carabinieri per la Tutela Forestale - Nucleo Informativo Antincendio Boschivo; Italian National Fire and rescue Service – Forest fire Fighting Service; Ministry of Agriculture, Food Sovereignty and Forests – General Directorate of Mountain Economy and Forests, Italy).

1.2.15 Latvia

Fire danger in the 2023 fire season

In 2023, the forest fire-fighting period was set from 1 May and lasted until 15th of September.

Fire occurrence and affected surfaces

Overall, 2023 was characterized by relatively average fire danger. In total, 571 forest fires were detected and extinguished during the year, affecting 622.46 hectares of forest land, including 113.69 hectares of young forest. Additionally, the State Forest Service registered and extinguished 82 fires covering 14.56 hectares outside forest areas. The largest forest fire occurred on April 23, 2023, in the Riga Regional Forestry Administration, in Ādaži Municipality, at the National Armed Forces Ādaži Training Area, where 53.11 hectares of forest land burned. The average forest fire area in 2023 was 0.98 hectares.

Table 25. Number of fires and burnt areas by month in 2023.

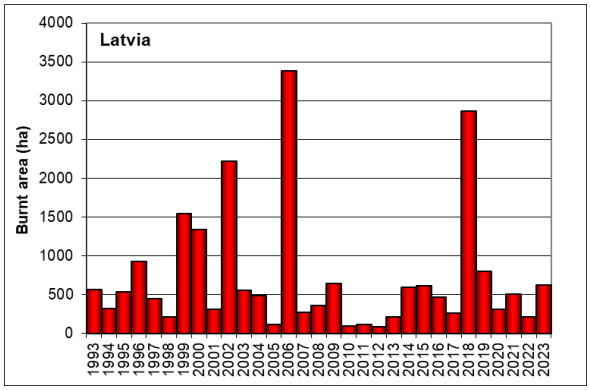
Month	Number of forest fires	Burnt area (ha)
January	0	0
February	0	0
March	1	0.0002
April	77	179.1964
May	207	304.5383
June	175	116.6675
July	57	12.9155
August	36	0.761
September	13	7.4571
October	2	0.19
November	3	0.7397
December	0	0
Total*	**571**	**622.4657**

Fire prevention measures in 2023 cost 272 935 Euro (Table 26).

Table 26: Expenditure on fire prevention measures in Latvia in 2023.

Title	*Costs, EUR*
Latvian State forest	
Purchase of forest firefighting equipment	108423
Existing fire break cultivation, 2979 km.	79243
Water point, warning sign renovation	85269
Total	**272935**
Riga City Forest	
Creating new fire breaks, 0 km	
Existing fire break cultivation, 521km	

The yearly trends in terms of number of fires, burnt area and average fire size since 1993 in Latvia are shown in Figure 58.



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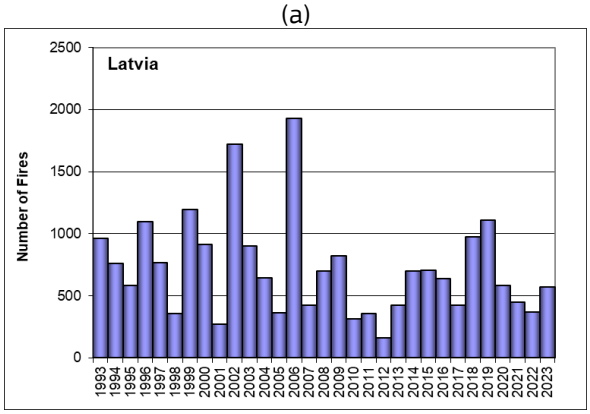

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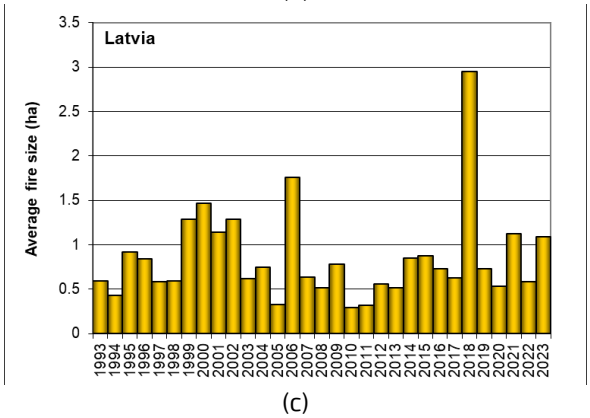

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Figure 58. Burnt areas (a), number of fires (b) and average fire size (c) in Latvia from 1993 to 2023.

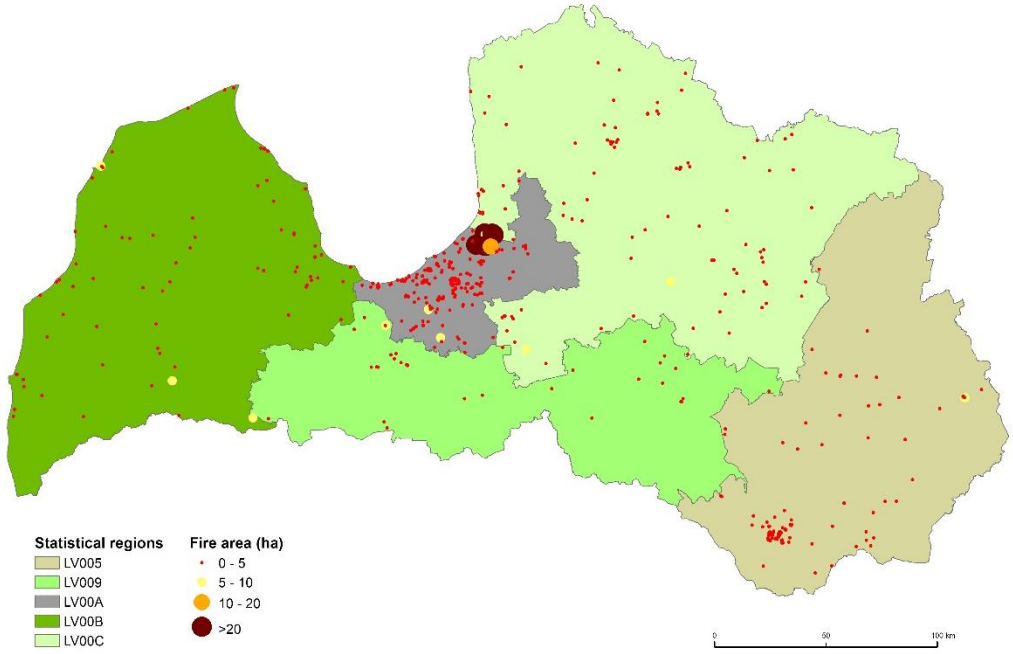


Figure 59. Map of forest fire locations in Latvia in 2023.

Preventive measures

The service uses a network of fire observation towers (178 fire observation towers) to ensure fire protection. In 2020, the State Forest Service installed a Remote Fire Detection and Monitoring System (RFDMS) on 12 fire observation towers in the Riga Regional Forestry Administration. In 2023, an application was submitted to expand the RFDMS system network to an additional 11 fire observation towers in the North Kurzeme Forestry Administration.

Fire fighting means and new equipment

In the summer of 2023, the Service provided jobs for seasonal employees in 387 positions (tower duty officers, drivers of specialized fire trucks, forest firefighters, forest fire station managers, operational duty officers). In total, the service has 17 Mercedes Benz UNIMOG 4000 and 18 Mercedes Benz UNIMOG 4023 forest fire trucks and 5 Volvo FMX 6X6 fire trucks with a water capacity of 10 m^3 to ensure the prompt detection, containment, and extinguishing of forest fires. The service also has 83 Toyota Hilux off-road vehicles equipped with firefighting equipment. In addition to the existing 16 quad bikes, 4 Polaris Sportsman 6x6 quad bikes were purchased.

Operations of mutual assistance

The State Forest Service supported the defenders of Ukraine by donating 5 forest fire trucks (GAZ 66, ZIL 131), (Figure 60, Figure 61).

Figure 60. Donated trucks to Ukraine in 2023.

Figure 61. Donated trucks to Ukraine in 2023.

(Source: State Forest Service, Environmental and Forest Protection Division, Latvia).

1.2.16 Lithuania

Fire danger in the 2023 fire season

The number of wildfires and the total burnt area was higher than in 2022. The first fire in 2023 was recorded in April, the last one in October. Fire danger during the fire season 2023 was characterized by high temperatures levels and high wind levels. A heat wave in Lithuania occurred in July and August. The number of fires was influenced substantially by the weather conditions in spring and summer. The most notable forest fires for season 2023 are listed below.

Date	Burnt area, ha
2023-07-11	5.5
2023-06-09	3.2
2023-05-30	3.03
2023-07-18	2.9

Fire occurrence and affected surfaces

In 2023, according to the data of the State Forest Enterprise, 167 forest fires occurred damaging 59.63 ha of forest, of which 39.9 ha was in State forest, and 19.74 ha covered forest fires in private forests. In 2023, 14 forest fires were bigger than 1 ha, with a total burnt area over 30.42 ha. The highest number of forest fires occurred in May (59 fires), and the highest burned forest area was in July.

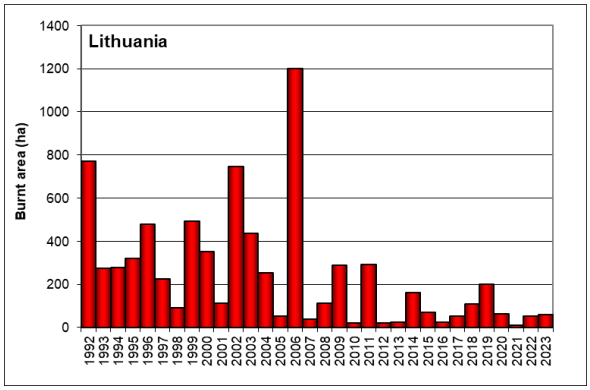
Fire Causes

In many cases, the ignition source for fires is associated with traditional agricultural burning practices, although the fire causes for the majority of fire incidents remained unknown. Fire departments of the regional units and forest officials have reportedly visited fire locations 368 times, according to reports of forest fires.

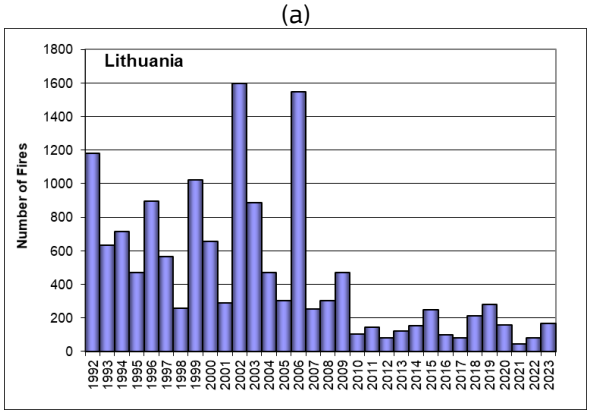
Economic costs

The total damage was estimated to be 67 563 euro.

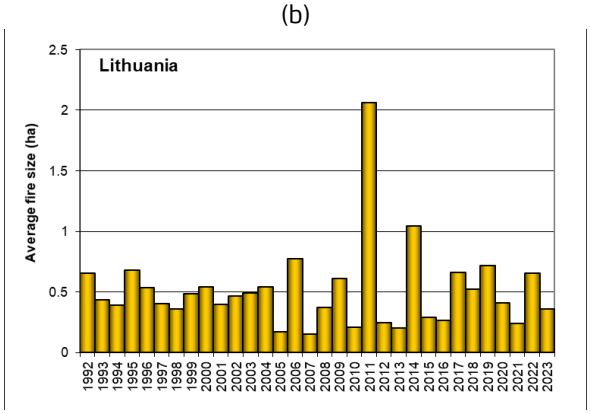
The yearly trends in terms of number of fires and burnt area since 1992 in Lithuania are shown in Figure 62.



(a)



(b)



(c)

Figure 62. Burnt areas (a), number of fires (b) and average fire size (c) in Lithuania from 1992 to 2023.

Fire prevention activities

The State Forests Enterprise organizes the establishment of a uniform system of state fire prevention protection measures. Contracts between Lithuanian Hydro meteorological Service and State Forests Enterprise are signed annually concerning calculations of complex forest fire figures and pronouncements of classes of fire rates in each territory of the state forest enterprise.

A Forest Fire Danger Map is updated daily (at 12 a.m.) from April to September and can be found on http://www.meteo.lt/lt/web/guest/misku-gaisringumo-klases-prognozes.

Every year state forest enterprises, together with Fire and Rescue Services and Armed Forces, organize educational training in the forest in order to check how organizations are able to organize forest fire extinction, manage difficult situations, control the actions, collaborate with each other and keep the connection.

In order to sustain the system of general state fire protection measures, state forest enterprises budgeted 3.40 million Euro from their own funds in 2023, and 12 000 km of firebreaks were mineralized.

Automatic early warning systems for forest fire prevention "Fire Watch" are used in the 25 regional divisions of State Forest Enterprise having forests with high fire risk (total 24 central stands and 84 detectors). Forest fire detection systems help to detect forest fire focus coordinates with better precision, so that the fire brigades can arrive at the fire faster and extinguish it more effectively.

Operations of mutual assistance and loss of human lives

No operations of mutual assistance were taken and no casualties were reported in Lithuania during the fire season of 2023.

Climate Change

In 2022, the average air temperature in Lithuania was 7.9 °C, i.e. 0.5° higher than the standard 1991-2020 climate norm (SKN), which is 7.4 °C.

Based on the 2023 average air temperature deviation data from SKN in Lithuania, the differences in this temperature anomaly became evident throughout the territory, and especially between the extreme north-western and southern regions of the country. A positive air temperature deviation of more than 1°C from SKN was established throughout Lithuania, but in many regions of the country, a deviation of more than 1.3° C, the average annual air temperature, was recorded, covering the southern and sometimes western and central parts of the country.

The average air temperature differed the least from SKN in the north-western part of Žemaitija, where it was up to 1.1° higher than the norm. The coldest month was February with a negative air temperature 0.2 °C (Figure 63). In 2023 the lowest daily air temperature was recorded in the first month of the year, on January 6. In Zarasai, it dropped to -9.5°C. June, August and September were very warm, with average monthly temperatures of 17.1, 19.5 and 16.5°C, respectively (Figure 63). September was even 3.7° warmer than SKN and became the warmest September since 1961. Despite a cooler than usual July, the hottest day of the year was recorded on July 16. The highest daily air temperature in Kalvarija jumped to 34.9°C.

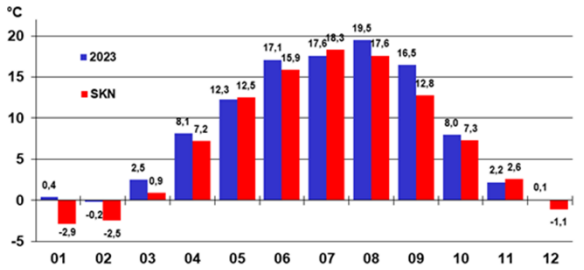


Figure 63. Average air temperature in the months of 2023 and the standard climate norm SKN.

According to the data of monthly average air temperature deviation from SKN, three months were colder than the norm and nine months were warmer (Figure 64). The average July temperature deviated the most from SKN to the negative side (negative anomaly of 0.7°C). A much warmer period than SKN lasted from January to May. Another warm period covered the months of August to October. January's positive anomaly was not as great as September's (3.7°C), but was still impressive, even at 3.3°C.

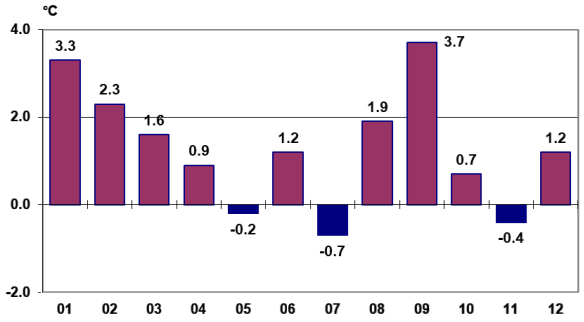


Figure 64. Monthly deviation of the average air temperature from SKN for 2023.

For the second year in a row, the winter was warmer than usual – the average air temperature of this season was -0.8ºC (positive anomaly of 1.4°, Figure 65). All other seasons were also warmer than normal. The average autumn temperature deviated the most from SKN – a positive anomaly of even 1.3° C. The deviation in spring (0.7°C) was similar to that in summer (0.8°C).

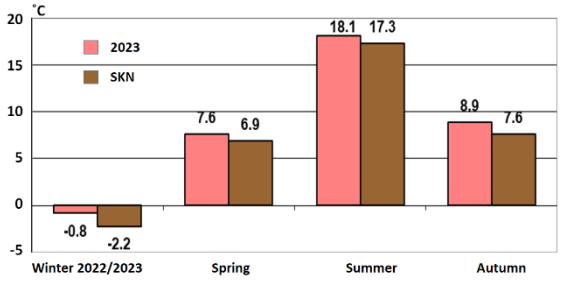


Figure 65. 2023 seasonal average air temperature (ºC) and SKN

The year 2023 was slightly wetter than usual in Lithuania – 719 mm of precipitation fell on average, i.e. 103% SKN (1991-2020 precipitation SKN is 695 mm). The annual amount of precipitation in the territory of the country varied from 500 to 1126 mm.

May was the driest month of the year, with an average of 16 mm of precipitation, i.e. about a third of SKN (Figure 66, Figure 67). It was the second driest May since 1961. Only about half of the normal precipitation, 51%, is recorded in September. Dry weather prevailed in April, June and July, when about 0.7 SKN of precipitation fell. On the contrary, an unusually wet (118 mm) October occurred – the SNR was exceeded more than 1.7 times. There was no shortage of moisture and hot August, with almost 1.7 SKN of precipitation falling and it being the wettest month of the year (128 mm). More precipitation than normal was registered in January, March, November and December (115-136% of SKN). The closest amount of precipitation to the norm was in February, 91% of SKN (Figure 66, Figure 67).

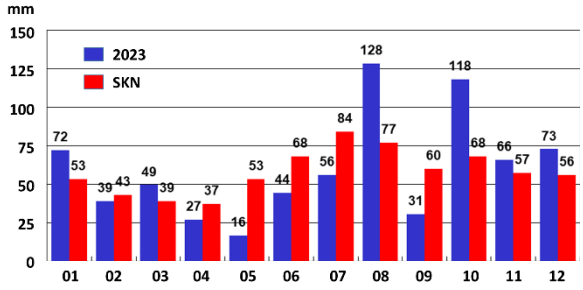


Figure 66. 2023 monthly rainfall (mm) and SKN.

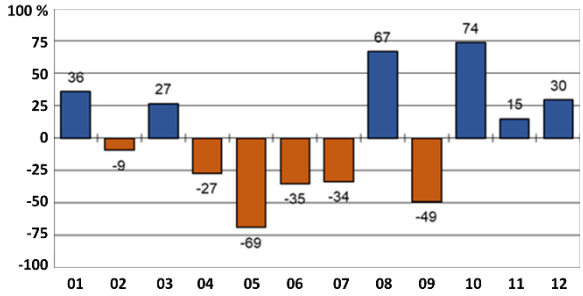


Figure 67. 2023 monthly precipitation deviation (%) from SKN (0=norm, below 0=less than norm, above 0=more than normal).

This year, 21 natural and 1 catastrophic meteorological phenomena (hereinafter referred to as SMR and KMR) and 25 natural hydrological phenomena (hereinafter referred to as SHR) were registered, of which 7 were related to the flow of rivers and 18 were related to very high water levels. In the course of the year, SMRs were unevenly distributed: 11 SMRs and 1 KMR were registered in summer, 4 SMRs in spring, 5 in autumn and only 1 SMR in winter. Frost, heat and drought in the forests covered more than a third of the country's territory, other phenomena were local. An unusually high number of frosts occurred, as many as 4, and most of them were recorded in the spring, with one frost also occurring in early summer. It should be emphasized that the period with frosts, which started at the end of April, was prolonged and in some places lasted even 8 nights without a break, in addition, some nights recorded minimum air temperature records, and in the Skudos reached absolute on May 6 air temperature record, -6.2ºC. It is clear that the frosts (especially in late spring and early summer) caused great losses to both gardens and crops. The biggest damage in 2023 the northern and some southern and eastern regions of the country experienced very strong storms at the beginning and end of August. A particularly strong storm raged in Žagare and some northern districts on August 5-8: trees were uprooted, electricity supply was cut off, cars, house roofs, greenhouses, etc. were smashed. During this storm, very large hail was recorded (diameter of icicles in places 2-9 cm), 50-80 mm of very heavy rain was recorded. In addition, in the late evening of August 6, the Kybartai recorded a catastrophic phenomenon - a very strong wind (gust speed reached 33.5 m/s) and the town was badly hit. Several phenomena, such as a tornado and a very strong wind on the coast, were local and did not cause major damage, but the work of the Klaipėda seaport was disrupted. The heat of mid-August and 2 droughts during the vegetation period of plants also did not cover a larger area of the country and did not cause significant losses.

(Source: State Forest Enterprise, Lithuanian Hydrometeorological Service, Nature Protection and Forest Policy Group, Ministry of Environment, Republic of Lithuania)

1.2.17 The Netherlands

Fire danger in the 2023 fire season

After the warm and dry 2022, the fire danger in 2023 was most of the times low. In May and June, a period of more than 30 consecutive days without rain caused elevated wildfire danger. Due to the wet spring, these fires mainly consumed fine fuels. No fires were recorded with large impacts.

Fire occurrence and affected surfaces

In 2023, 405 wildfires were reported. This number is in the same order of magnitude but slightly below the average number of wildfires that occurred between 2017 and 2022 (611 per year), since the wildfire statistics were set up again in The Netherlands (Stoof *et a*l, 2024). As discussed by Stoof *et al* (2024), all wildfires are included in our count, regardless of their size or of the fuel type (forest, heathland, cropland, etc.) they burn in. This means that also fires of 10-100 m^2 are counted. Only 0.2% of all wildfires in The Netherlands is detected by MODIS (Stoof *et al*, 2024). For 2023, even the more detailed MODIS/SENTINEL2 product detected none of the wildfires that occurred, but only two larger management burns (Fig. 1). Management burning is common in Springtime, with a small number of land managers burning heathland before the 15th of March when the growing season starts and burning is no longer allowed. These fires are often very small (<1 ha) except on two military sites where larger burns (~20-50 ha) also take place.

The MODIS & VIIRS NRT burned area product in EFFIS did not record these management burns, but did detect one wildfire at the ASK military site (Figure 68), the other 'burned areas' this product detected in 2023 did not match with on-the-ground reported fires and were therefore classified as false positives.

Ground-based estimates of wildfire size were available for 148 out of 405 fires recorded in 2023 (37%), and amounted to 116 hectares. This surface area estimated from photo and video material, or in the field, although this is not systematically done for all fires. With 116 hectares counted, the total estimated surface area burned by wildfire in 2023 is lower than the average of 2017-2022 (405 ha per year; Stoof *et al*, 2024). Neither the total fire count nor the surface area of 116 ha includes controlled management burns.

The vegetation type in which wildfires occur is registered for most wildfires, based on field observation, ground-based imagery and news reports. In 2023, 1.5 hectare (1%) of the affected area was forest, 82.6 hectare (71%) was other non-wooded land (mostly heather and grassland) and 24.3 hectare (21%) was agricultural land.

The largest wildfire in 2023 was a fire on a military training site in 't Harde, where 75 hectares of heather burnt with a patchy flaming front on 13 June 2023. Outside military sites, the largest fire was an 11-ha crop fire in Alteveer (province of Groningen, in the very northeast of The Netherlands) on 8 July 2023. While neither of these largest wildfires were detected by the EFFIS burned area product MODIS/SENTINEL2, the 75-ha wildfire was detected on the MODIS & VIIRS NRT burned area product (Figure 68) and with VIIRS hotspots, and the Alteveer wildfire was detected by VIIRS hotspots.

Figure 68. In 2023, the EFFIS burned area product derived from MODIS/SENTINEL2 recorded two fires in the centre of The Netherlands (left). These two fires occurred both on 2 March 2023, on the military site ASK near the village of 't Harde (centre). The MODIS & VIIRS NRT burned area product recorded one actual wildfire, also on the ASK military site (right), though the satellite estimated site (197 ha) was 2.5-fold higher than estimated on the ground (75 ha).

Figure 58 shows the total burnt area, number of fires and average fire size in The Netherlands since 2017.

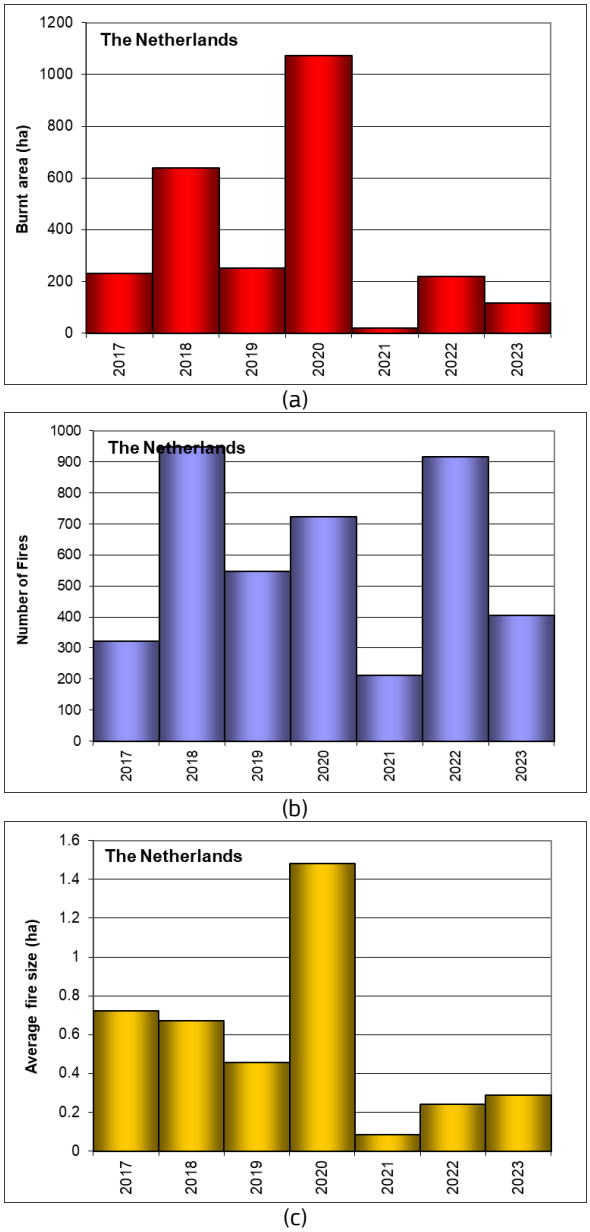


Figure 69. Burnt areas (a), number of fires (b) and average fire size (c) in The Netherlands from 2017 to 2023.

Fire causes

Fire cause investigation is not systematically done for wildfires in the Netherlands. The information available on fire causes in 2023 is therefore based on informal assessment.

No fires were investigated by the Wildfire Cause and Origin Investigation Team. This team is in transition towards a new organization where the aim is to collect data from most of the wildfires in The Netherlands. The implementation will take a few years.

For 287 fires (70% of the total), the cause was not assessed or listed at all, while 62 fires (15% of total) were informally assessed. In most of the informally assessed fire causes, the assumption is that the fires were set deliberately. The only wildfires for which the cause was deemed certain occurred on military terrain, where 56 wildfires ignited due to the use of weapons during shooting practice.

Anecdotal evidence suggests that the number of fires ignited by natural causes (lightning) or due to working activities near vegetation (EFFIS classification 304 – 'Works') in the Netherlands is very small, with the far majority of fires caused by human behaviour (deliberate or accidental).

Fire fighting means

In 2023, 797 fire engines were sent to extinguish the wildfires, with an average of ~2 engines per fire. In addition, the suppression activities were supported by a total of 237 water tenders (with a capacity of at least 10 m^3 per water tender).

Five times, an Unmanned Aerial Vehicle from the Fire Department was requested to make thermal images of fire behaviour and spread. The Wildfire Tactical Advisors were deployed two times. The Fire Bucket Operations team was not deployed in 2023. The Netherlands has two Handcrews, which were both deployed once in 2023.

Fire prevention activities and information campaigns

Currently, a lot of activities regarding wildfire management are going on in The Netherlands, both at the political and the operational level.

In 2023, two major projects have been started within the Netherlands Fire Service:

Taskforce Wildfire Management. This Taskforce resulted in the publication of a new vision on wildfire management for The Netherlands under changing (climate) conditions. There are three main themes in the vision, based on integrated fire management:

1. Prevention and risk management,
2. Smart suppression and capacity building, and
3. Research and development of knowledge.

National Crisis Plan. In collaboration between the board of Fire Chiefs and the Ministry of Justice and Safety, the national crisis plan will be updated. In this is included how uncontrollable wildfires can be prevented and how the operations are organized during a – or multiple – wildfire(s).

In the beginning of 2023, the first steps toward a National Action Wildfires Centre (*Landelijk Actiecentrum Natuurbranden*) were made. This centre will coordinate emergency management during wildfires, monitoring fire danger and where necessary gathering a team of operational experts to organize sub-regional assistance during wildfires and work out scenarios of the possible fire spread and impact.

In 2024, a new team of Wildfire Behaviour Analysts was created which is now part of this centre with the aim to better forecast high fire danger situations in The Netherlands.

Policy developments

Ministerial working visits. Minister Van der Wal from the Ministry of Agriculture, Nature and Food Quality conducted several working visits to inform herself regarding the prevention and suppression of landscape fires. In June 2023, the Minister visited the Catalan Fire and Rescue Service (Figure 70), to discuss lessons that can be learned from other countries.

This visit was co-organized between the Dutch government and fire service, the GRAF team from the Catalan Fire and Rescue Service and the Pau Costa Foundation. Speakers included people from practice (local government, local fire services, and a wine maker involved in the Rosas fire that was discussed by Newman-Thacker *et al*, 2023) as well as academia (Wageningen University), also in the context of the EU-project FIRE-RES. In February 2024, Minister van der Wal visited the Sallandse Heuvelrug with the Dutch association of forest and nature owners (VBNE, Figure 70), discussing the need for an integrated approach in which safety and nature management go hand in hand[5].

Figure 70. Minister Van der Wal visiting the Catalan Fire and Rescue Service to discuss lessons learned (left), and a diversity of forest and nature owners and managers on the Sallandse Heuvelrug (right).

National Centre of Expertise.

Also in 2024, the Ministry of Agriculture, Nature and Food Quality (LNV) reserved a total budget of €70 million for wildfire prevention, governance and a national Centre of Expertise for wildfire management for the years 2024-2029. This budget is meant to support actions that will reduce the risk of uncontrollable wildfires.

National stakeholder days and training

In autumn 2023 three large stakeholder meetings took place focused on wildfires.

- Living with Integrated Fire Management training (9-13 Oct, Walsrode, Germany). This training aimed to bring together people from a range of different fields and countries to provide opportunity for interdisciplinary learning and networking, with topics ranging from fire ecology to the EU legal framework and adaptive management. The training was organized by the Living Lab Germany-Netherlands (Wageningen University and Waldbrandteam), and the Catalan Fire Service, and funded by the EU FIRE-RES project. This training is further described by Nebot et al. (2024), and will be replicated in Portugal in Fall 2024.
- NIPV wildfire symposium (22 Nov 2023, Netherlands), organized by the National Institute for Safety, focused on the Vision wildfire management of the Wildfire Taskforce of the Dutch Fire Service, including Dutch and international speakers from North-West Europe.
- WUR national stakeholder day The State of the Wildfires 2023 (27 Nov 2023, Netherlands). This meeting was funded by the FIRE-RES and SEMEDFIRE projects, and brought together ~75 professionals from 38 organizations including land management, emergency services, governance and academia. Talks and interactive workshops aiming to 1) bring together diverse professionals active in fire management, provide insight into the state of the wildfires, from global to local scale, in science and practice, and 3) learn together from best practices and fantastic failures.

For 2024, the latter two initiatives will join, with a large meeting organized on 20 Nov 2024, Staat van natuurbranden 2024 – samen voorwaarts (State of the wildfires, forward together), hosted by the Province of Noord-Brabant and organized by the forest service, fire service and Wageningen University.

[5] https://vbne.nl/minister-van-der-wal-bezoekt-sallandse-heuvelrug/

Figure 71. Large stakeholder meetings focused on wildfires that were organized in Fall 2024: Living with Integrated Fire Management training, NIPV symposium, and WUR national stakeholder day.

Injuries and losses of human lives

No injuries were reported in 2023.

Operations of mutual assistance

The Netherlands Fire Service did not provide mutual assistance in 2023. Likewise, there was no need for formal assistance from neighbouring countries, other than regular cross-border assistance within the border area of The Netherlands, Germany and Belgium.

Climate change

Climatic conditions and how they impacted the fire season

Table 27. Summary of weather conditions in 2023 (KNMI, 2024).

Weather conditions	**2023**	**Normal**
Ice days with max. temp. < 0°C	0	8
Frost days with min. temp. < 0°C	41	53
Warm days with max. temp. > 20°C	117	93
Summer days with max. temp. > 25°C	38	28
Tropical days with max. temp. > 30°C	5	5
Hours of sunshine	1913	1774
Precipitation (mm)	1060*	795*

** This is the average amount of rainfall over the whole of The Netherlands.*

National adaptation strategies

As previously mentioned, the Ministry of LNV has reserved €70 million for wildfire prevention measures and a national Centre of Expertise. This budget will be available from 2024-2029 for provinces, nature managers and other organizations to reduce the risk of uncontrollable wildfires.

The Ministry of LNV is also coordinating the theme of wildfire management on a national level by organizing structural meetings between stakeholders on an administrative and operational level.

The Dutch Environmental Assessment Agency has reviewed the current climate risks in The Netherlands, in which wildfires is also addressed (Van Gaalen *et al*, 2024). An analysis of future climate risks related to wildfires is being conducted by Wageningen University and will be part of an analysis of a wide range of future risks expected given potential societal and climatological developments. This analysis will also include adaptation options as well as policy approaches that may be taken to manage these risks.

Practical and applied research

The Netherlands Institute for Public Safety (NIPV) is participating in various research activities, like the EU-funded EWED project (Extreme Wildfire Event Data Hub for Improved Decision Making, https://civil-protection-knowledge-network.europa.eu/projects/ewed). On a national scale, the data collection has been improved in the past year and an experiment to measure fire spread and intensity has been conducted.

In 2024, the NIPV started the programme of wildfire safety: a new knowledge hub where practical and applied research will be conducted and shared.

Scientific Research

New Dutch wildfire statistics. Stoof *et al* (2024) published the first wildfire statistics since official recordkeeping halted in 1994. In the period 2017-2022, 611 wildfires and 405 ha burned on average per year, which MODIS satellite data vastly underestimate. Fires burned more heathland than forest, were small (mean fire size 1.5 ha), were caused by people, and often burned simultaneously, in Spring and in Summer drought. The paper also reports on fatalities and economic costs, and argues for the need of a legal framework to ensure continuity of recordkeeping, as the core foundation of integrated fire management, to create a baseline for climate change, and to fulfil international reporting requirements.

Megafire. The word 'megafire' is increasingly used to describe impactful wildfires, under multiple meanings, both in academia and popular media. Stoof *et al* (2024b) analysed and found that 'megafire' originated in the popular news media over 20 years before it appeared in science. Megafire is used in a diversity of languages, considers landscape fires as well as urban fires, and has a variety of meanings in addition to size. The authors illustrate that what constitutes 'mega' is relative and highly context-dependent in space and time, given variation in landscape, climate, and anthropogenic controls. Stoof *et al* (2024b) argue that megafire is widely used as an emotive term that is best left for popular media. For those wanting to use it in science, what constitutes a megafire should be defined by the context in which it is used, not by a metric of one-size-fits-all.

Other academic research and student projects

At Vrije Universiteit (VU) Amsterdam, Shudong Zhang published his PhD thesis about biotic effects on the flammability of plant material in ecosystems. One of the important findings from the PhD, based on experimental research in the VU fire laboratory, study was that tunnels in deadwood excavated by longhorn beetles can enhance its flammability.

As drought induced tree mortality is increasing the wood-boring beetle activity in the NW Europe and other regions, this effect, when scaled up, could be relevant for wildfire behaviour more broadly.

At Wageningen University, PhD research in the PyroLife project is ongoing in terms of transdisciplinary fire learning (Kathleen Uyttewaal), fire resilient landscapes (Fiona Newman Thacker) and learning from integrated water management (Hugo Lambrechts). Master student projects include studies on the oral fire history of The Netherlands (Myriam de Vroome) and lessons learned from the 2022 wildfire disasters in England (Aniek Henken, Vera ten Bruggecate).

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(Source: Netherlands Institute for Public Safety, Netherlands Fire Service; Department of Environmental Sciences, Wageningen University, Netherlands).

1.2.18 Norway

Fire danger in the 2023 fire season

Norway transitioned from the WBKZ-system to the FWI (Fire Weather Index) in 2021. The system is adapted to Norwegian conditions. Weather parameters encompass a range of factors, including air temperature, humidity, precipitation, wind and snow.

The standard fire season typically spans from March to September. However, variations are anticipated given the length of the country, stretching 1 750 km from south to north. This diversity can result in divergent conditions, such as flooding in one region of Norway while another area contends with a high forest fire index.

Initiating in the south-west during March and April, the fire season gradually extends southward and eastward as the season progresses. The western regions primarily encounter brush fires, while in the southern areas, swiftly drying pine trees on impoverished soil constitute the most prevalent fire risk. The largest forested regions are concentrated in the eastern part of Norway.

In 2023, parts of Finnmark were classified as "Warm" while large parts of the north-, mid- and eastern part of Norway were classified as "Cold." The rest of the country experienced "Normal" conditions. The year ranked as the 37th warmest in a record dating back to 1900.

The extreme weather event named Hans contributed to categorizing 2023 as "Very wet" or "Extremely wet" across large parts of the eastern part of Norway and the inland areas of Vestland. The rest of Southern Norway experienced mainly "Normal" precipitation levels.

In Northern Norway, there was generally less precipitation than normal, especially in Nordland, where large areas could be classified as "Dry" or "Very dry." Parts of Finnmark experienced "Wet" or "Very wet" conditions in 2023.

Overall, the country received 5% more precipitation than normal.

For the 2023 season, there was high fire risk in the first part of the summer. In the end of June, there were several fires every day where helicopters were in use. In the end of June and until the autumn, there was more precipitation than normal, and there were several floods in the southern part of Norway.

Fire occurrence and affected surfaces

In 2023 there were 1 251 forest fires recorded in Norway; 1 646 ha of productive forest and 1 413 ha of other wooded land. The statistics are for all fires, regardless of size.

The trends regarding the number of fires, burnt areas and average sire size from 2001-2023 are shown in Figure 8.

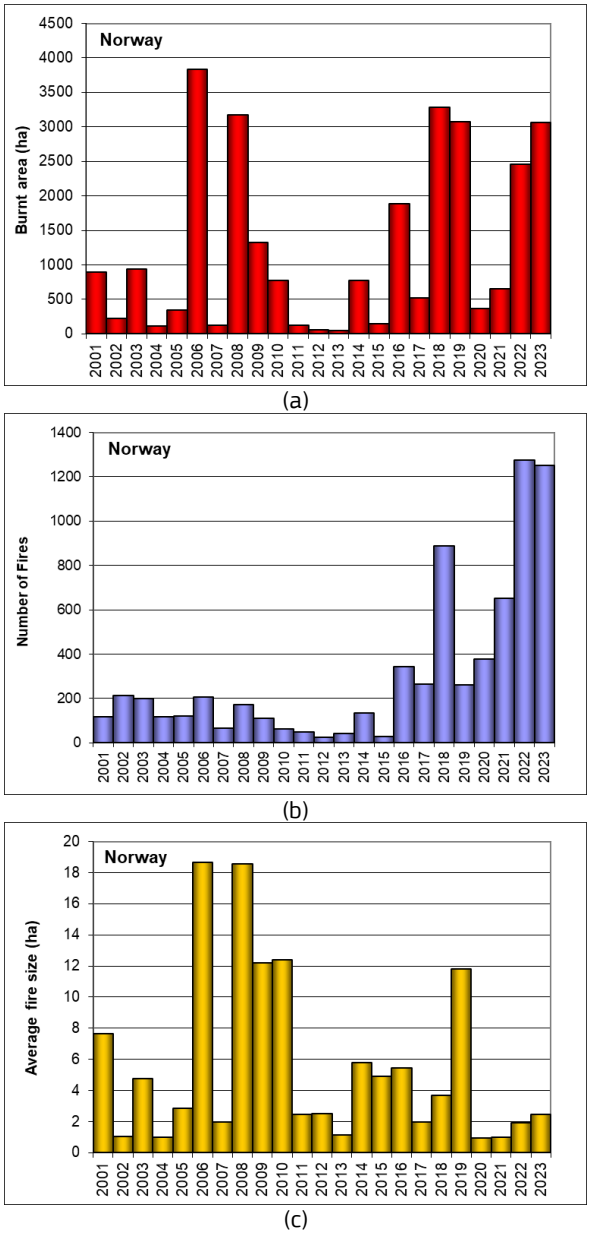
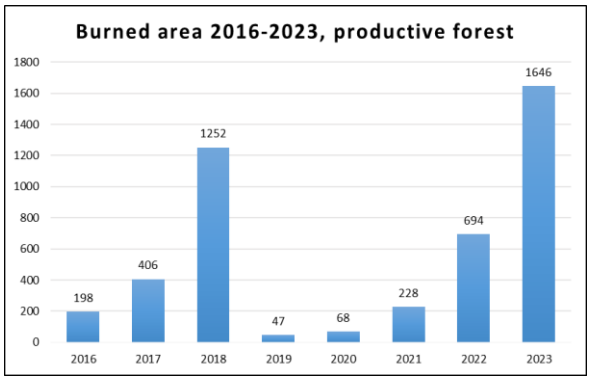


Figure 72. Burnt areas (a), number of fires (b) and average fire size (c) in Norway from 2001 to 2023.



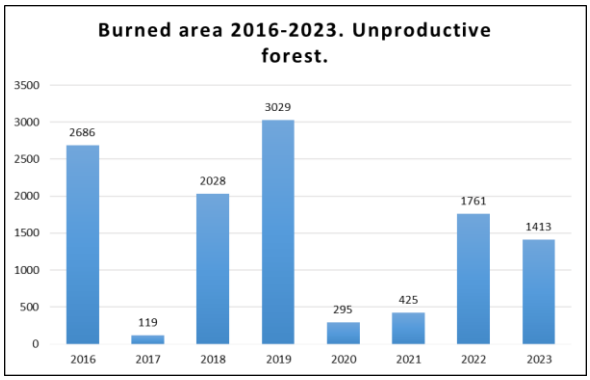


Figure 73. Burnt area of productive/unproductive forest in Norway 2016-2023.

Fire fighting means

The Directorate for Civil Protection have a partnership with a private helicopter company. From April 15 to September 15, one helicopter is on standby in the eastern part of Norway (Torp). With eight strategic bases nationwide and agreements with other entities, the company's reach is extensive. The number of standby helicopters increases during high fire risk periods.

In 2023, helicopters were deployed in 81 fires (total 101 helicopters) with 208 flight hours. Including training, the total flight hours amounted to 349.

To ensure effective response during major forest fire outbreaks, the Directorate for Civil Protection has established a proficient expert team to support local fire chiefs upon request for helicopter assistance.

Norwegian fire services have approximately 4 000 full-time and 8 000 part-time firefighters, operating as an all-risk service. Municipalities with significant forest fire risk have dedicated groups managed by the fire services for forest fire suppression.

Figure 74. Prescribed burning. (*Photo: Jan André Yrke*).

Fire prevention activities and information campaigns

In Norway, the municipalities are responsible for the Fire Services, which encompass both prevention and preparedness concerning forest fires. Nevertheless, certain activities are on a national level and are followed up by the Directorate for Civil Protection.

<u>The responsibilities of the Directorate for Civil Protection include</u>:

- Framing regulations and legislation for the population in general and the Fire Services in particular. Using fire in forests or wildlands is prohibited by law from April 15th to September 15th in Norway.
- Manage and maintain agreements with air resources, coordinating the deployment and quantity of helicopters.
- Managing and upholding agreement with the forest fire management support group.
- Developing and sustaining a statistical reporting system for fires, known as BRIS.
- Facilitating the Norwegian Forest Fire Committee, comprised of members representing the Directorate for Civil Protection, Fire Services, The Norwegian Meteorological Institute, Insurance agencies, Aerial resource providers, and Fire Associations.

<u>The responsibilities of the: Norwegian Meteorological Institute include</u>:

- Providing information on the forest fire index through the internet, and providing information through television (Forecast) when the forest fire index is high.

<u>The responsibilities of the Fire Service and municipalities include</u>:

- Preparedness: focusing on effective handling of fires, particularly emphasizing initial attack approaches, considering the fire's potential impact.
- Prevention: risk analysis, aerial and ground monitoring, skill building exercises, information campaigns and controlled prescribed burning. Prescribed burning is important for maintaining forest and heathland areas, thereby reducing the occurrence of forest fires and the risk of spreading towards urban areas.

For controlled prescribed burning there have been 51 activities and 600 hectares of wildland was burned. The controlled prescribed burning is mainly for the maintenance of the pasture areas/vegetation, but there is also a biodiversity effect.

Figure 75. Prescribed burning. (*Photo:Åshild Irene Lie*)

Fire causes

The primary causes of forest and wildland fires are typically man-made. Examples: burning debris or grass in the spring, activities related to forestry, ignition on purpose etc.

The primary natural cause is lightning during thunderstorms. These events can lead to fires either immediately, or they might ignite the following day as a result of drying processes.

Climate change

Climatic conditions and how they impacted the fire season

Climate change in Norway leads to higher air temperature and it is expected that there will be more precipitation, but also droughts due to increased temperature.

The consequences of this are increased growth in grass, shrubs and trees. This leads to overgrowing of cultural landscapes, a longer fire season and larger fires as a result of more fuel.

National adaptation strategies / plans. in particular regarding plans to adapt the forest sector to climate change in order to limit forest fire risks.

The Directorate for Civil Protection is still working with analysis to adapt the national preparedness to large forest fires. It will at a later stage be made a preventive analysis.

Research activities aimed at improving fire management

Project: Reducing fire disaster risk through dynamic risk assessment and management (DYNAMIC)
Period: October 2019 – September 2024
Owner: Western Norway University of Sciences
Contact: Maria-Monika Metallinou Log, prof.
Description: The project "Reducing Risk of Fire Disasters through Dynamic Risk Modeling and Management (DYNAMIC)" aims to understand parameters leading to catastrophic fires. Methods to detect and forecast risk peaks will be developed. Research includes fostering volunteer heath fire teams, risk-reducing measures, and public alert systems to mitigate future fire risks. Knowledge dissemination ensures enhanced safety.

Project: Treeads, funded by EUs Horizon 2020
Period: December 2021 – May 2025
Owner: Rise Fire Research as
Contact: Kemal S. Arsava, project coordinator
Description: TREEADS aims to increase environmental sustainability and urban/ rural ecosystems safety through redefining and reinforcing forests protection and management by developing and validating an innovative, sustainable and applied holistic wildfire management approach.

Project: Prediction of ignition and spread of wildfires in Scandinavia: from experiments to models (PREWISS)
Period: October 2021 – September 2025
Owner: Western Norway University of Sciences
Contact: Maria de Las Nieves Fernandez Anez, Associate Professor
Description: Global warming induces hotter, drier conditions, increasing wildfire risk in Northern Europe. PREWISS aims to predict and mitigate wildfires by studying vegetation flammability and developing a mathematical model with geospatial data. Understanding ignition conditions is crucial. The project addresses the need for effective wildfire management in Scandinavian vegetation.

In addition, there are several projects in Europe that have Norwegian partners (e.g. Fire Res).

Operations of mutual assistance

None.

Injuries and loss of human lives

None.

Figure 76. Prescribed burning (*Photo: Jon Egil Frette*).

(Source: Directorate for Civil Protection (DSB), Norway).

1.2.19 Poland

Fire danger in the 2023 season

The meteorological conditions determined the forest fire danger risk trend in the year 2023 and favoured the occurrence of forest fires, especially in the first half of the fire season. The diagrams (Figure 77 - Figure 82) show the variations of air temperatures, precipitation, pine (*Pinus sylvestris* L.) litter moisture, relative air humidity, and the national degree of forest fire danger risk (NDFFDR) in the 2023 fire season (April-September) and average degree of forest fire danger for the forecast zones. They also present the number of fire outbreaks.

The average air temperature in the 2023 fire season was 16.5°C at 9.00 a.m. and 24.7°C at 1.00 p.m. It was similar to the average temperature of the last decade (2013 - 2022), which was 16.4°C and 21.3°C respectively. In 2022, it was 15.8°C and 20.8°C respectively. In April, the coolest month of the 2023 season, the average temperature was 8.0°C at 9.00 a.m. and 12.3°C at 1.00 p.m. These temperatures were 0.8°C higher at 9.00 a.m. and 0.6°C higher at 1.00 p.m. than in 2022.

In May, the average air temperature increased to 14.7°C at 9.00 a.m. and up to 19.3°C at 1.00 p.m. June, July and August were similar in terms of temperatures, which were respectively 19.8°C, 20.5°C and 19.6°C at 9.00 a.m. and for 1.00 p.m. it was 24.5°C, 25.4°C and 24.7°C.

The warmest month of the 2023 season was July. In September, the air temperature dropped to 16.1°C at 9.00 a.m. and 24.2°C at 1.00 p.m. The maximum air temperature occurred on 15 August at 1.00 p.m. and was 33.3°C.

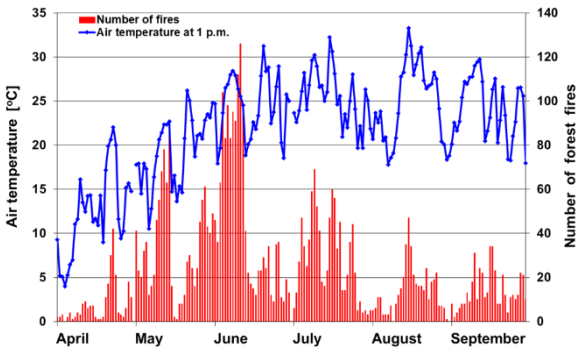


Figure 77. Air temperatures and numbers of forest fires in fire season 2023.

The average daily precipitation in the 2023 season was 1.8 mm (0.1 mm less than in the 2022 season). By comparison, the mean daily rainfall in 2013-2022 was 2.1 mm. The highest mean daily rainfall occurred in August, amounting to 3.6 mm/day. The maximum value of precipitation (17.7 mm/day) in the 2023 season was recorded on 6 August.

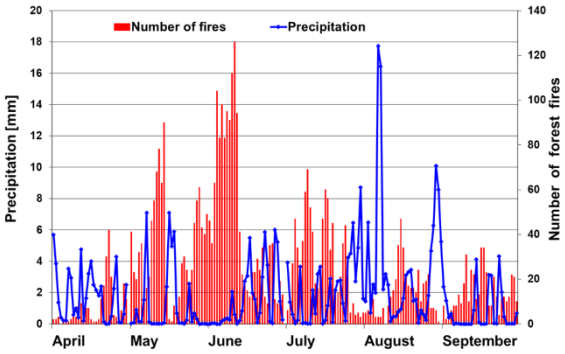


Figure 78. Precipitation and numbers of forest fires in fire season 2023.

The average moisture content of pine litter (*Pinus sylvestris* L.), an indicator combustible material for Polish forests, was 29.9% at 9.00 a.m. and 24.3% at 1.00 p.m., which is below the flammability threshold for dead ground cover, which is 30%. In the 2021 and 2022 seasons, they were 35.0% and 29.0% and 29.7% and 25.3%, respectively. For comparison, in the last decade, covering the years 2013-2022, they were at the level of 30.8 and 25.4%, respectively. In May 2023, the lowest values were recorded (24.1% and 19.3%, respectively). In April, August and September, the litter moisture was above the average for the 2023 season. The highest average litter moisture was in April (38.3% and 32.4%, respectively).

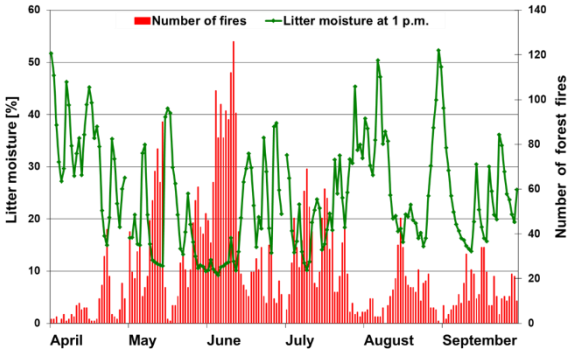


Figure 79. Litter moisture and numbers of forest fires in fire season 2023.

The average relative humidity in the 2023 season was 76.7% at 9.00 a.m. and 53.9% at 1.00 p.m. It was similar to the value of the average relative humidity in 2013-2022 for 9:00 a.m. and 1.00 p.m. (76.1% and 55.5%, respectively). For comparison, in 2022 it was 76.5% and 54.5% respectively.

The lowest values (below the average for the 2023 season) at 9.00 a.m. were recorded in June, July and August (62.6%, 67.1% and 71.6%). The highest morning relative humidity values for the season occurred in April (81.5%) and September (92.4%). In the afternoon observation period, air humidity below the average for the season were in May (46.2%), June (47.5%) and July (49.0%). The highest afternoon values of relative air humidity occurred in April (61.8%), August (62.1%) and September (56.7%).

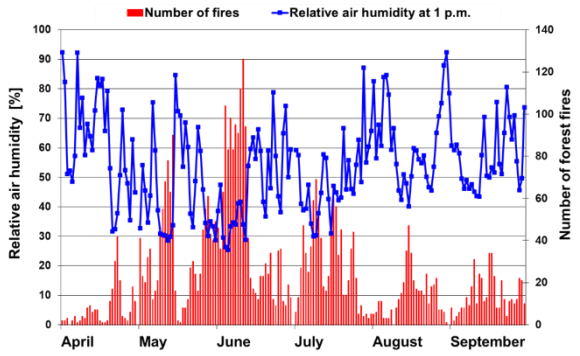


Figure 80. Relative air humidity and numbers of forest fires in fire season 2023.

In Poland, the degree of forest fire danger is determined for 60 prognostic zones, which have been separated on the basis of, among others, the presence of large dense forest complexes, homogeneity in terms of climate, habitat conditions, frequency and size of forest fires and the presence of large urban agglomerations. This degree is determined at 9.00 a.m. and 1.00 p.m. on the basis of measurements of meteorological parameters:

- air temperature and relative humidity,
- daily precipitation total,
- moisture content of the pine litter.

The determination of the degree of forest fire danger is carried out by the organisational units of the State Forests using their own automated network of meteorological measuring points in the forest areas.

The average national degree of forest fire danger (NDFFDR) in the four-degree scale (0, 1, 2, and 3) reached 1.0. at at 9 a.m. and 1.4 at 1 p.m. It was identical in compared to the 2022 season, when it was 1.1 and 1.3 respectively. This means that the fire danger in the whole analysed period was low.

The greatest forest fire danger appeared in May, when NDFFDR reached 1.6 at 9 a.m., and 1.8 at 1 p.m.

The percentage of occurrence in the third level of forest fire danger in the afternoon was 34.2% in May, 34.2% in June and 22.1% in August. The lowest forest fire danger was in April, when NDFFDR reached 0.6 at 9 a.m. and 0.8 at 1 p.m., and the percentage of occurrence in the third level of forest fire danger was 0.2 in the morning, and 7.1% in the afternoon.

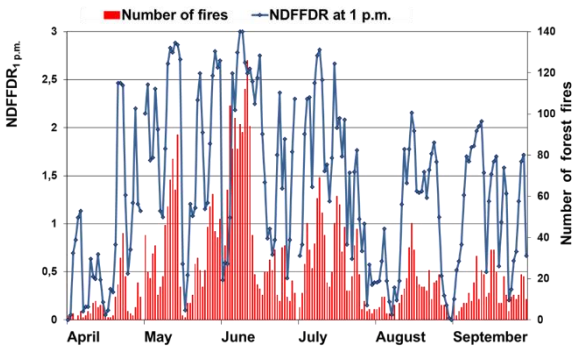


Figure 81. The National Degree of Forest Fire Danger Risk and numbers of forest fires in fire season 2023.

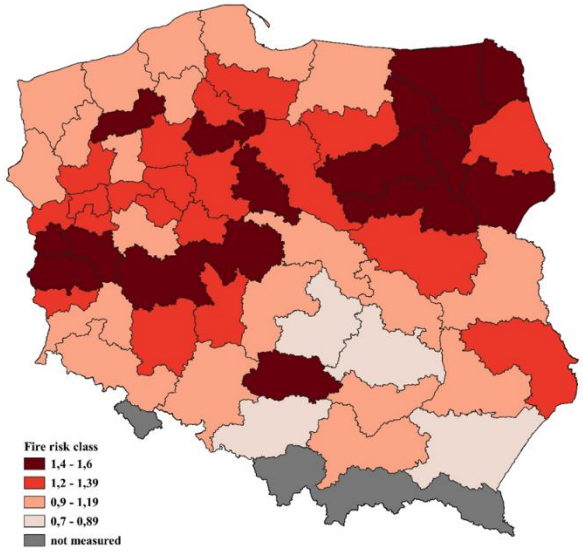


Figure 82. Average degree of forest fire danger for forecast zones in the fire season in 2023.

Fire occurrence and affected surfaces

In 2023 in Poland, a total of 4 908 fires broke out (3 278 in forest and 1 630 in other non-wooded natural land), over 2 091 less than in 2022 (6 999 fires), with a surface area of 1 128.75 ha (771.21 ha forest and 357.54 ha other non-wooded natural land), over 1 723.99 ha less than in the last year (2 852.74 ha) - Table 28 and Figure 85.

The greatest proportion of fires occurred in June (28.83%; i.e. 1 415 fires) - Figure 83. This was followed by May (21.64%) and July (18.13%). The lowest number of fires in the fire season (April - September) occurred in April (4.71%) and September (8.52%). 90.57% of fires occurred in the fire season.

The largest number of fires in 2023, similar to last year, occurred in Mazowieckie Province (1 416 – 28.85%).

The lowest number of forest fires occurred in Opolskie Province (58 – 1.18%) and Małopolskie Province (58 – 1.18%). These data are illustrated in Figure 86 - Figure 88.

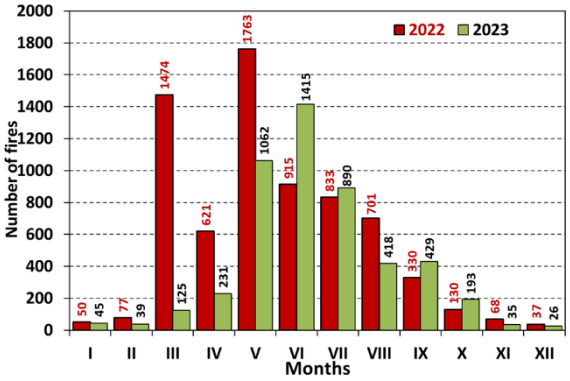


Figure 83. Distribution of number of forest fires by months in 2022 and 2023 in Poland.

The largest burnt forest areas and other non-wooded natural land were recorded in:

- Mazowieckie Province (269.96 ha),
- Warmińsko-Mazurskie Province (206.06 ha),
- Łódzkie Province (100.22 ha).

The smallest area was in Małopolskie Province (6.21 ha) and Śląskie Province (16.90 ha).

Small fires; i.e. with a surface area of less than or equal to 1 ha, represented 96.78% of all the fires in 2023 (Figure 84), with the burnt area amounting to 45.05%.

Fires with a surface area of between 1 ha and 10 ha represented 5.39% of all the fires, with the burnt area representing 33.51%. Large fires with a surface area of between 10 ha and 100 ha represented 0.39% of all the fires, with the burnt area representing 21.43%.

The largest fire had an area of 71.83 ha and took place on a military training ground.

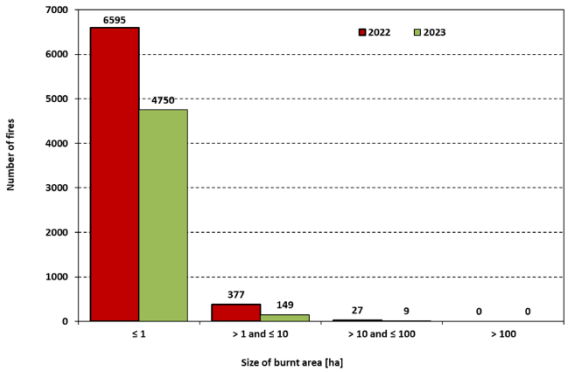


Figure 84. Distribution of the number of forest fires by size of burnt area in the years 2022 and 2023 in Poland.

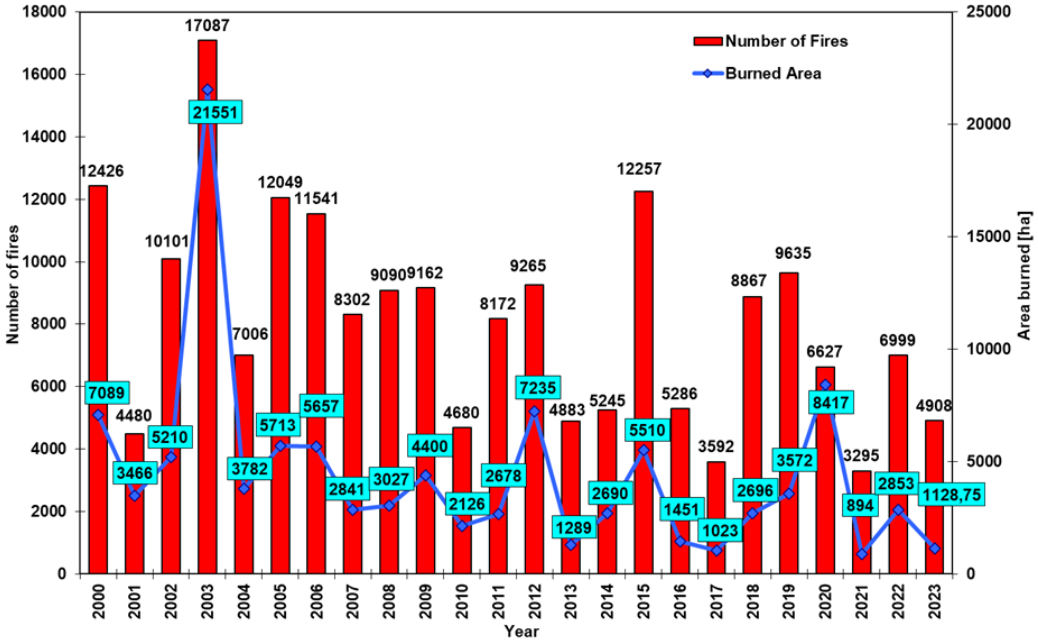


Figure 85. Total number of fires on high forest and area burned in Poland in the period 2000-2023.

Table 28. Forest fires in Poland in the period 2007-2023.

Year	Number of fires			Burnt area (ha)		
	Forest	Non wooded	Total	Forest	Non wooded	Total
2007	5 086	3 216	8 302	1 642.64	1 198.24	2 840.88
2008	5 568	3 522	9 090	1 810.74	1 216.39	3 027.13
2009	5 633	3 529	9 162	2 524.58	1 875.90	4 400.48
2010	2 975	1 705	4 680	1 358.26	767.98	2 126.24
2011	5 126	3 046	8 172	1 526.11	1 151.66	2 677.77
2012	5 752	3 513	9 265	4 781.65	2 453.62	7 235.27
2013	3 168	1 715	4 883	810.42	478.12	1 288.54
2014	3 603	1 642	5 245	1 956.90	733.55	2 690.45
2015	8 292	3 965	12 257	3 765.87	1 744.03	5 509.90
2016	3 545	1 741	5 286	862.37	588.68	1 451.05
2017	2 334	1 258	3 592	692.73	329.80	1 022.53
2018	5 947	2 920	8 867	2 047.26	648.87	2 696.13
2019	6 532	3 103	9 635	2 340.74	1 231.73	3 572.47
2020	4 458	2 169	6 627	1 842.34	6 574.30	8 416.64
2021	2 243	1 052	3 295	575.42	318.32	893.74
2022	4 806	2 193	6 999	2 207.65	645.09	2 852.74
2023	3 278	1 630	4 908	771.21	357.54	1 128.75

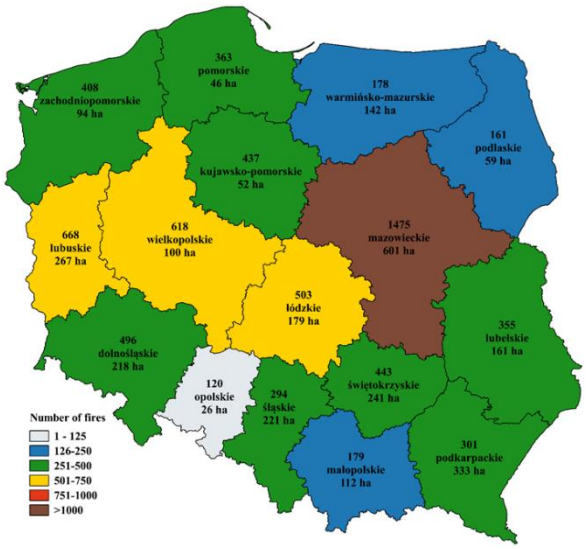


Figure 86. Number of forest fires and burned areas by provinces (NUTS2) in 2022.

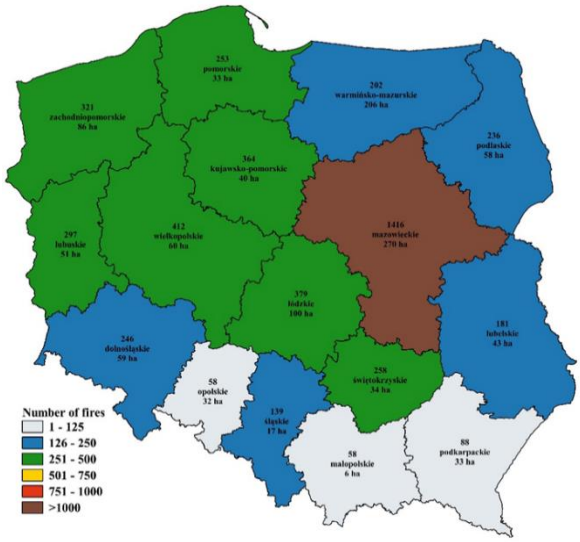


Figure 87. Number of forest fires and burned areas by provinces (NUTS2) in 2023.

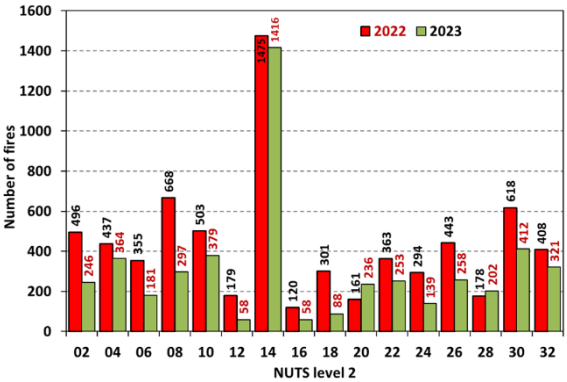
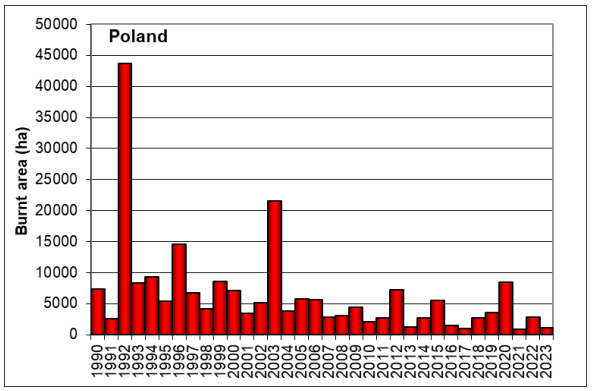
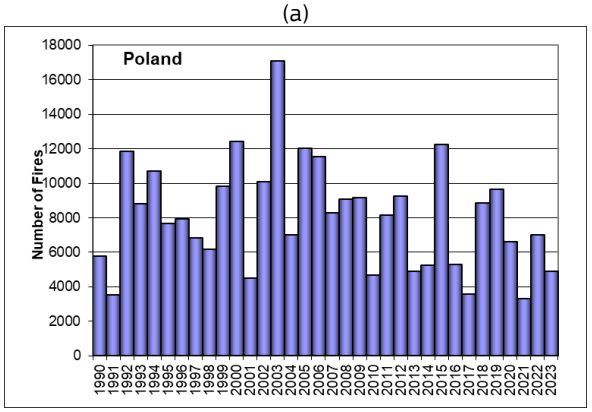


Figure 88. Distribution of the number of forest fires by province (NUTS2) in 2022 and 2023 in Poland. (02 - dolnośląskie, 04 - kujawsko-pomorskie, 06 - lubelskie, 08 – lubuskie, 10 - łódzkie, 12 – małopolskie, 14 – mazowieckie, 16 – opolskie, 18 – podkarpackie, 20 – podlaskie, 22 – pomorskie, 24 – śląskie, 26 – świętokrzyskie, 28 – warmińsko-mazurskie, 30 – wielkopolskie, 32 – zachodniopomorskie).

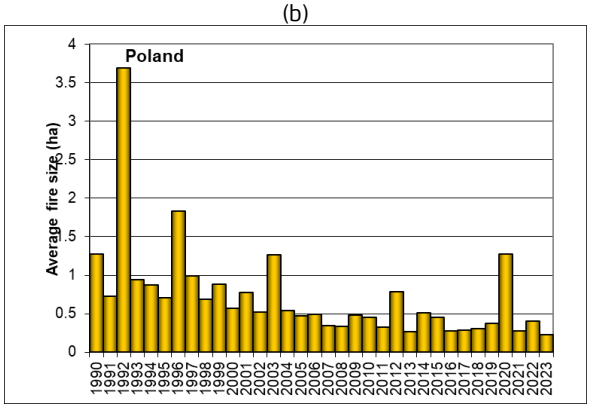
The burnt area, number of fires and average fire size for the years 1990-2023 are shown in Figure 89.



(a)



(b)



(c)

Figure 89. Burnt areas (a), number of fires (b) and average fire size (c) in Poland from 1990 to 2023.

Fire causes

The main causes of fires in 2023 were identified as unknown, accounting for 82.15% (4 032 fires). Forest fires related to human activity, including "deliberate", accounted for 8.07% (396 fires), "accidents" 5.77% (283 fires) (Figure 90).

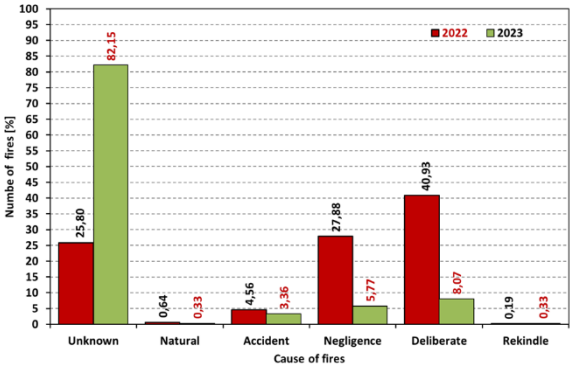


Figure 90. Distribution of the number of forest fires by causes in 2022 and 2023 in Poland.

Fire fighting means and information campaigns

The "State Forests" National Forest Holding (State Forests NFH) had at its disposal equipment, consisting of:

- 33 fire suppression airplanes, 5 helicopters and 5 patrol aircraft
- 332 light fire trucks, including 324 vehicles with a fire extinguishing module,
- 4 medium and 2 heavy fire vehicles,
- 235 portable pumps, including 165 floating ones.

These means were used to extinguish 3% of all the fires in the areas managed by the State Forests NFH, whereas the other fires were suppressed by units of the State Fire Service and voluntary fire brigades.

In 2023, as part of information and promotion activities, the following measures in the State Forests NFH were taken:

- about 7 700 lectures in schools, youth camps and at country-meetings,
- 678 interviews were given on radio and television, 340 articles were published in the press and 81 on the Internet,
- 151 competitions related to fire protection issues were organised.

Last year, to inform and educate the public about the extent of the State Forests' involvement in forest fire protection activities, an infographic was developed presenting all the aforementioned elements of the fire protection system in Poland (Figure 91).

Figure 91. Infographic presenting all the elements of the fire protection system in Poland (General Directorate of the State Forests).

Fire prevention activities

In forest areas managed by the State Forests NFH, works were carried out to prevent the conditions for fire outbreaks and to reduce their spread, by repairing 3 409 km of fuel breaks and building 49.54 km of new fuel breaks; in addition, forests were cleaned over a surface area of 15 656 ha, by reducing the quantity of inflammable biomass.

The observation system of the State Forests NFH consisted of:

- 715 fire protection lookout towers, including 401 (56%) equipped with a system of TV cameras;
- 5 patrol airplanes, 33 fire suppression airplanes and 5 helicopters;
- 332 light fire trucks.

In areas administered by the State Forests, it was found that the effectiveness of detecting fires by sight was 30% (452 forest fires), aircraft detected 2% of fires (26 forest fires), and bystanders reported 64%. The remaining 4% of fires were detected by fire patrols and State Forests employees (69 forest fires).

The communication and alarm network in the State Forests NFH consisted of: 5 576 radio-telephones, including 951 base sets, 1 894 mobile sets and 2 731 hand held sets, as well as 76 converters to the frequency band used by the State Fire Service.

Water supply for fire suppression purposes was provided by 11 209 water supply points, including 3 946 natural points and 2 500 artificial points. Moreover, water was supplied by 4 700 hydrants located in the vicinity of forests.

In the organizational units of the State Forests, the efficiency of the forest fire protection system is improving every year. However, this is related to the large financial outlays that the State Forests incur every year for fire protection. In 2023, the costs incurred for forest fire protection amounted to PLN 141 657 thousand. PLN, including PLN 35 751 thousand PLN for air patrolling the forest and using planes to extinguish fires.

In 2023, the State Forests completed the implementation of an eight-year project (implementation period: 2016-2023) called "*Comprehensive project for the adaptation of forests and forestry to climate change – prevention, counteraction, and mitigation of the effects of threats related to forest fires*." The aim of the project was to reduce the negative effects caused by forest fires, efficiently detect the source of danger, and minimize losses. In the longer term, the project aimed to reduce the average area affected by fires and expand the monitoring of forest areas, particularly in forest districts classified in the highest fire risk category.

The total cost of the project was 88 million PLN, of which 50.5 million PLN was funded by the European Union's Cohesion Fund. The funding was allocated for infrastructure development, including:

1) the development and modernization of early warning and risk forecasting systems, including:

- construction and modernization of fire lookout towers (138 units)
- purchase of modern equipment for detecting fires (183 units)
- equipping alarm- dispatch points (42 units)
- construction of meteorological stations (12 units)

2) technical support for the rescue and firefighting system in case of forest fires, including:

- purchase of pickup trucks with skid units (67 units)

Preparatory work for the start of the second edition of the project, on a broader scope, is currently underway.

In 2023, the Forest Research Institute carried out research work:

- in connection with fire risk monitoring in the Białowieża Forest, where the potential fire risk in the Białowieża Forest Districts has increased as a result of the outbreak of the spruce bark beetle and the resulting overexposure of stands with grass cover. These problems were mentioned in the article "Impact of forest stands dieback as a result of bark beetle (*Ips typographus*) outbreak on the fire risk in the Białowieża Forest" published in Leśne Praca Badawcze, No. 83 (doi:10.48538/lpb-2023-0001);
- in relation to type A firebreaks maintained along public roads and intended to limit the spread of forest fires. As part of the project, a review of the types of firebreaks along public roads in selected European countries was conducted, as described in the article "Rules for the construction of firebreaks along public roads in selected European countries", published in Folia Forestalia Polonica, No. 65 (4) (doi:10.2478/ffp-2023-0020).

The Forest Research Institute coordinates the work and checks the accuracy of the data contained in the National Information System on Forest Fires, which is available at the following address: https://bazapozarow.ibles.pl.

As part of the information measures carried out from March to October (at 9:00 am and 1:00 pm), a fire risk map is drawn up for the entire country, which is available on the website https://bazapozarow.ibles.pl/zagrozenie/

(Source: Forest Research Institute, Forest Fire Protection Laboratory; General Directorate of State Forests, Poland).

1.2.20 Portugal

Fire danger in the 2023 fire season

The information and maps regarding fire hazard are produced annually by the Portuguese nature conservation and forest service (ICNF – *Instituto da Conservação da Natureza e das Florestas*) in the beginning of the year and are updated in late spring. The 2023 fire hazard map (Figure 92) showed the Portuguese mainland regions that were predicted as most exposed to wildfires, located mainly at interior of the Centre and North regions and in Algarve.

This map contains not only the wildfire hazard scaled from 1 to 5 for each 25 metre pixel, but also the delimitation of TPGI ("territories with potential for large wildfires"), which are forest lands that, cumulatively: i) have 500 hectares or more, ii) have a high or very high wildfire hazard (top two classes) and iii) did not burn in the last 10 years.

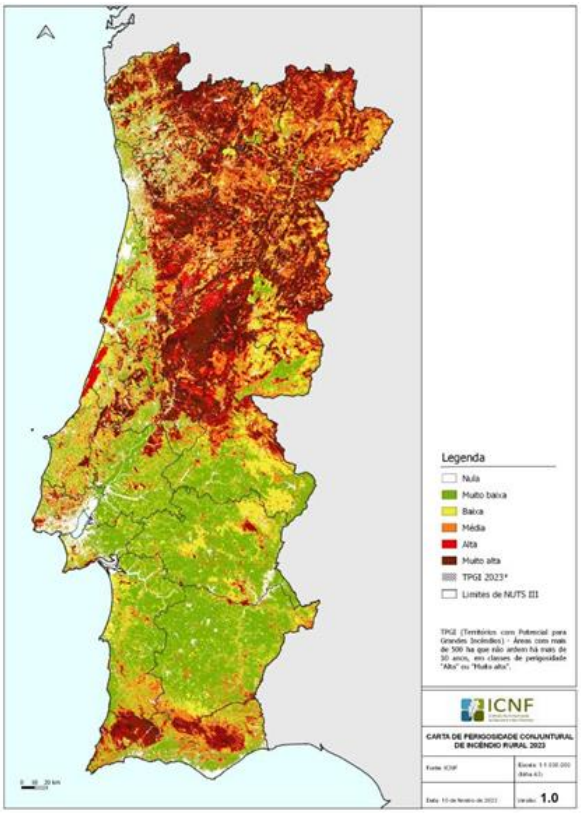


Figure 92. 2023 fire hazard map.

A local and daily wildfire danger evaluation is published for each of the 278 municipalities of Portuguese mainland territory (Figure 93) and for the Autonomous Region of Madeira by the Portuguese meteorological service (IPMA – *Instituto Português do Mar e da Atmosfera*). This evaluation combines the annual wildfire hazard map (Figure 92) with the meteorological forecast for each day (FWI index).

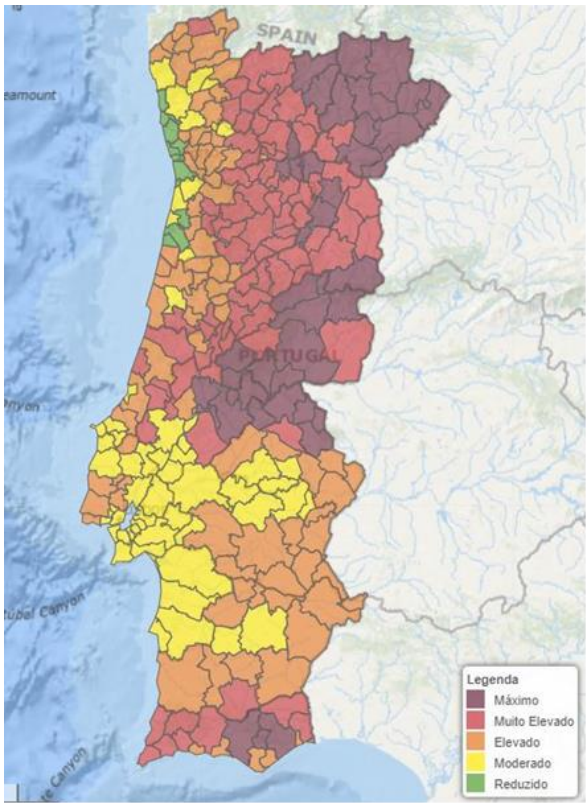


Figure 93. Example of evaluation of the daily wildfire danger for a summer day in 2023 (17th of August). Source: IPMA).

The evolution of fire danger in 2023 was strongly influenced by the severe drought affecting almost the entire territory, with the exception of the autumn months. The August 2023 Palmer Drought Severity index (PDSI) map for the Portuguese mainland is shown in Figure 94. In this month, most of the country was in drought (97%), with 19% of the territory in severe drought and 27% in extreme drought, in result of the abnormally dry months of February, March, April and May.

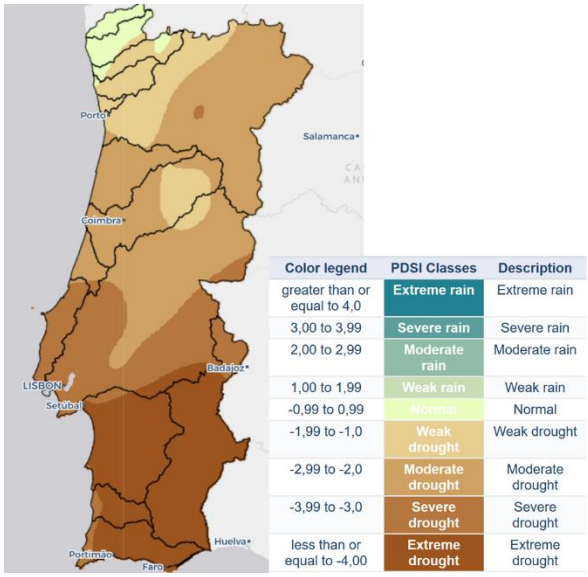


Figure 94. Palmer Drought Severity index (PDSI) for the Portuguese mainland (August 2023). [Source: IPMA].

Fire occurrence and affected surfaces

In Portuguese mainland (NUTS I PT1) the burnt area in 2023 was 34 510 ha (Table 29(, which is 72% less than the average of the previous decade (125 042 ha). The largest wildfire in 2023 occurred at São Teotónio/Odemira (region of Alentejo) and resulted in 7.5 thousand hectares burned (Figure 95).

Regarding the number of wildfires, there was in 2023 a total of 7 523 fires which represents a decrease of 46% when compared to the average of fires in the last decade and a decrease of 28% when compared with the number of wildfires that occurred in 2022.

Table 29. Number of wildfires and burnt area in Portugal mainland territory from 2013 to 2023.

Year	Number of wildfires	Burnt area (ha)
2013	23 129	160 387
2014	9 388	22 820
2015	19 643	67 200
2016	16 104	167 808
2017	21 006	539 921
2018	12 274	44 578
2019	10 832	42 085
2020	9 619	67 170
2021	8 186	28 360
2022	10 390	110 097
Annual average 2013-2022	14 057	125 042
2023	**7 523**	**34 010**

The most affected NUTS II regions in 2023 were the North and Centre regions, each with a total burnt area around 12 thousand hectares. The combined burnt area of these two regions represents 72% of the total burnt area (Table 31).

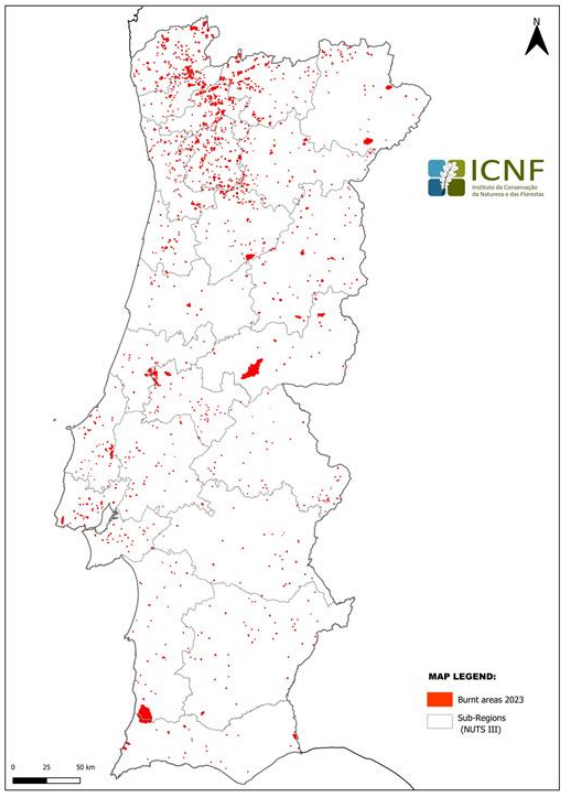


Figure 95. Burnt areas in 2023 in Portuguese Mainland territory. [Source: ICNF].

Around 38% of the total number of fires in 2023 occurred in July and August (Table 30). Wildfires in these two summer months represent around 69% of the 2023 total burnt area.

Table 30. Wildfires in Portugal Mainland (monthly distribution)

Month	Number of fires	Burnt area (ha)			
		Forest and other wooded land	Shrublands	Agricultural land	Total
January	47	3	100	1	104
February	1003	1169	3940	51	5160
March	451	285	541	32	858
April	707	684	669	61	1414
May	985	471	318	218	1008
June	564	199	70	66	334
July	1163	996	591	152	1739
August	1713	14983	5459	1499	21940
September	388	186	165	14	366
October	429	444	1032	10	1487
November	35	0	20	0	20
December	38	2	77	0	80
TOTAL	**7 523**	**19 423**	**12 983**	**2 104**	**34 510**

Table 31. Number of fires and burnt areas in Portugal in 2023 (NUTS2).

PT1 - NUTS 2 Region	Number of fires	Burnt area (ha)			
		Forest and other wooded land	Shrublands	Agricultural land	Total
North	3989	3938	8019	402	12359
Centre	2042	9190	2486	806	12482
Lisbon	429	150	286	87	523
Alentejo	788	5779	1810	768	8357
Algarve	275	366	382	40	789
TOTAL	**7 523**	**19 423**	**12 983**	**2 104**	**34 510**

At Madeira's archipelago (PT3) 39 wildfires were recorded in 2023. The total burnt area in this autonomous region was 5 154 ha (2 068 ha in forest and other wooded lands and 3 086 ha in shrublands). These values are justified by the wildfires that occurred in October in the forest areas in Calheta and Porto Moniz (Figure 96). These wildfires were associated with exceptional meteorological conditions and accounted for approximately 98% of the total burned area in 2023.

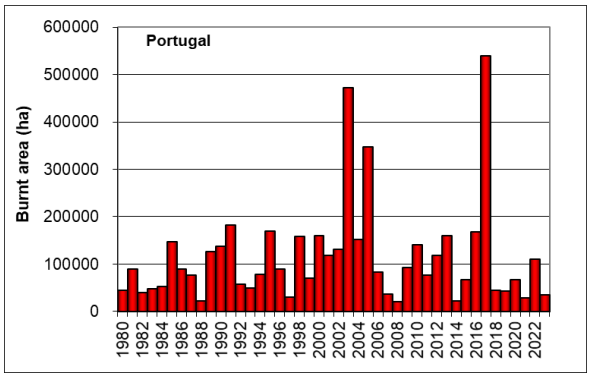
Figure 96. Burnt areas in 2023 in Madeira. [Source: IFCN - Institute for Forests and Nature Conservation – Madeira].

At the Azores' archipelago (PT2) a total of 183 wildfires were recorded in 2023. The total burnt area at Azores was not collected, but it was rather small when comparing to Madeira or Mainland territories.

With an approach analyses that seeks to remove the effect of meteorology in the assessment of the annual burnt area extension, each rural fire in 2023 was assigned a "weighted burnt area" value, obtained from the average of the burnt area of all fires (for the decade 2013-2022) of the respective DSR class in the respective district. As a result, a total value of "weighted burnt area" (for the year 2023) of 111 275 hectares was estimated. This value reflects the total burned area that would be obtained if all fires from 2023 followed the historical average "behaviour" given the meteorological severity of the day/place in which they occurred.

The actual burnt area value (34 510 ha) represents 31% of the "weighted burnt area", which means that the area burned in 2023 is considerably lower than the "expected" area burned considering the meteorological severity observed.

The yearly trends in the number of fires and burnt areas in Portugal is shown in Figure 97.



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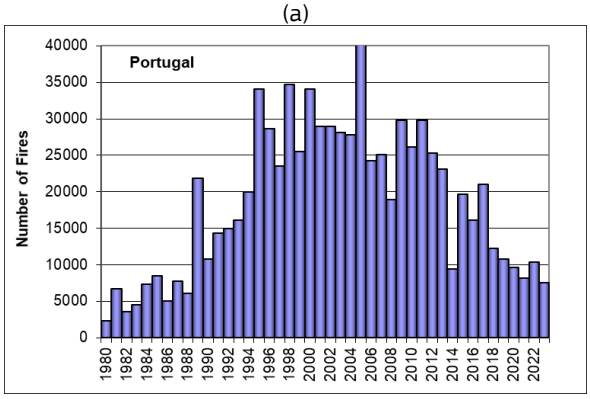

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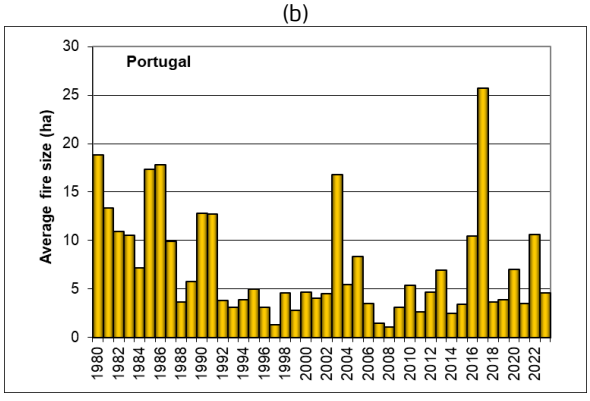


(c)

Figure 97. Burnt areas (a), number of fires (b) and average fire size (c) in Portugal 1980-2023.

Figure 98. With 6 553 hectares, the Carrascal fire occurred during the most critical period of the year (from the 4th to the 13th of August) and mainly affected forest stands dominated by maritime pine and eucalyptus and also shrublands in the Centro region of the Mainland. With a loss of forest value which amounted to 1.4 million euros, this was the second largest wildfire in the country after the Baiona fire (in Alentejo and Algarve), which affected 7 513 ha. [*Source: ICNF*].

Fire causes

Of the 7 523 occurrences registered in 2023, the National Republican Guard proceeded with the investigation of causes for 7 260 wildfires (97%), of which 2 362 were of unknown origin (Figure 99).

Among those fires with determined cause, intentional acts (arson) corresponded to 31% and accidents or negligence caused the ignition of 62% of the total number of fires (Figure 100).

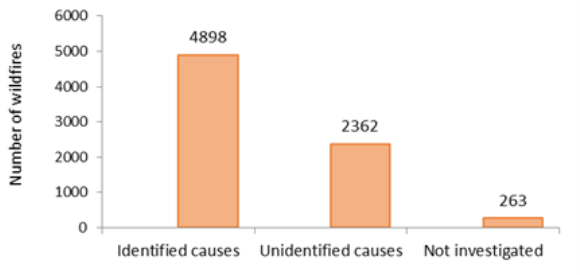


Figure 99. Wildfires 2023 causes investigation.

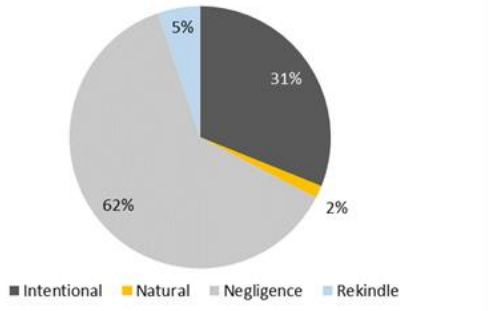


Figure 100. Main causes of rural fires 2023.

The use of fire for renewal of pastures in mountainous regions still has a strong impact on the amount of burnt areas. In 2023 the application for fire permits allowed a more controlled use of fire (see "Assistance phone-line and burning permit") and the project "MARQ" (short for "Support mechanism for pastoral burning") helped 20 shepherds and treated 932 hectares of grazing lands with prescribed burnings.

Fire fighting means

Between June and October, the national forest and wildland firefighting system (DECIR) in the Portuguese mainland, coordinated by the National Authority for Emergency and Civil Protection (ANEPC), was reinforced in accordance to the annual national plan (DON n. 2). During this time, 13 891 operational personnel, 2 990 vehicles, and 72 aircraft were continuously available. In addition to the resources that were permanently available, the ability to strengthen the device with 15 000 additional operational personnel and 4 750 vehicles, using the resources of all civil protection officers (entities with responsibilities recognised by Portuguese legislation in the context of response to accidents or disasters) has always been guaranteed.

Among the operational personnel, the following stand out: 7 749 firefighters with 1 722 firetrucks, 1 016 military and 190 vehicles of the National Guard (GNR), 221 operational and 75 vehicles of the Civil Protection Special Force (FEPC), 2 465 elements and 510 vehicles of the Forest Service (ICNF), and 236 elements and 70 vehicles from the pulp and paper companies (AFOCELCA).

The 72 aircraft in the wildland firefighting system completed 4 572 air operations and accumulated 4 797 flight hours.

92.03% of the fires were resolved within 90 minutes after the alert, while the remaining 714 fires exceeded this time frame. Only 4 fires that lasted longer than 90 minutes were extinguished 24 hours after the alert was issued.

In 2023, the primary objective of this reinforcement was to improve coordinating capability in order to increase response effectiveness. In this regard, many initiatives were launched in the areas of training, preparation, and deployment. For example, 58 command post teams were established (48 at the subregional level and 10 at the regional level), as well as 24 evaluation and reconnaissance teams (working at the subregional level). Fire analysis and decision support were also subjects strengthened in 2023.

Following the work carried out since 2018, last year, it was possible to ensure the operation and 3 Fire Analysis and Use Teams (EAUFs), 1 Decision Support Unit for the Analysis of Rural Fire (NAD-AIR) and operate 2 Recognition and Coordination Aircraft (AVRACs), based on the resources of the FEPC.

The EAUFs is a group of 3 experts in fire analysis and the application of technical fire, deployed in the context of fire suppression operations or fuel management. In 2023 this teams were involved in 20 fire suppression operations as a support to the Incident Commander.

Figure 101. EAUF integrated in a command post [Source: ANEPC].

The NAD-AIR is a decision support unit that works at the national level to assist the command structure in collecting, analysing, and interpreting key data about fire risk, behaviour, and impacts. Every day, NAD-AIR conducts a strategic analysis to assess the impact of meteorological conditions on fire risk and potential wildfire behaviour at the national and regional level. When rural fires break out, this unit assesses the situation and creates an operational support document (INFOP) for the incident commander. The document includes a forecast of weather and fire behaviour, as well as tactical priorities and safety suggestions. In 2023, NAD-AIR produced 53 strategic analyses and 30 INFOP.

Figure 102. Decision Support Unit for the Analysis of Rural Fire (NAD-AIR).

The AVRAC are lightweight aircraft that can collect and transmit data directly from the fire to the operational command structure. It has a camera that can collect RGB or infrared images and transmit them to decision support systems in real-time. Its crew includes a fire analyst from FEPC who is in constant contact with NAD-AIR. In 2023, the AVRAC conducted 118 data collection missions in wildfires.

A decision support system was implemented to ensure mapping and analysis of fire suppression activities, the development of products for the operational chain of command, and a continuous flow of data/information amongst on-site stakeholders (common picture). The technology, known as "FEB Monitorização", provides a geospatial intelligence solution. It is built on ArcGIS technology and features a WebGIS interface, dashboards, and mobile applications. Overall, it integrates real-time data with previously generated and/or analysed static information, such as remote sensing data, operational asset geolocation, and pertinent data to aid decision-making. All civil protection agents can access it.

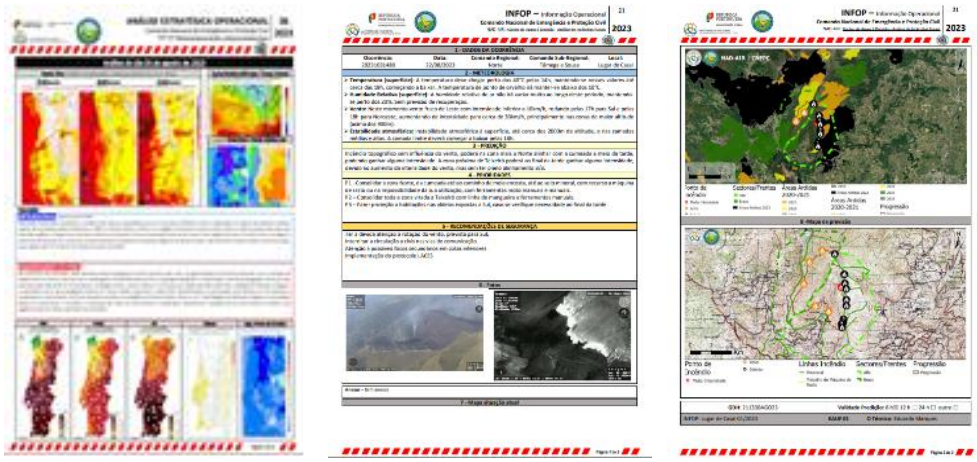


Figure 103. Strategic analysis (left) and operational support documents (centre and right). [Source: ANEPC].

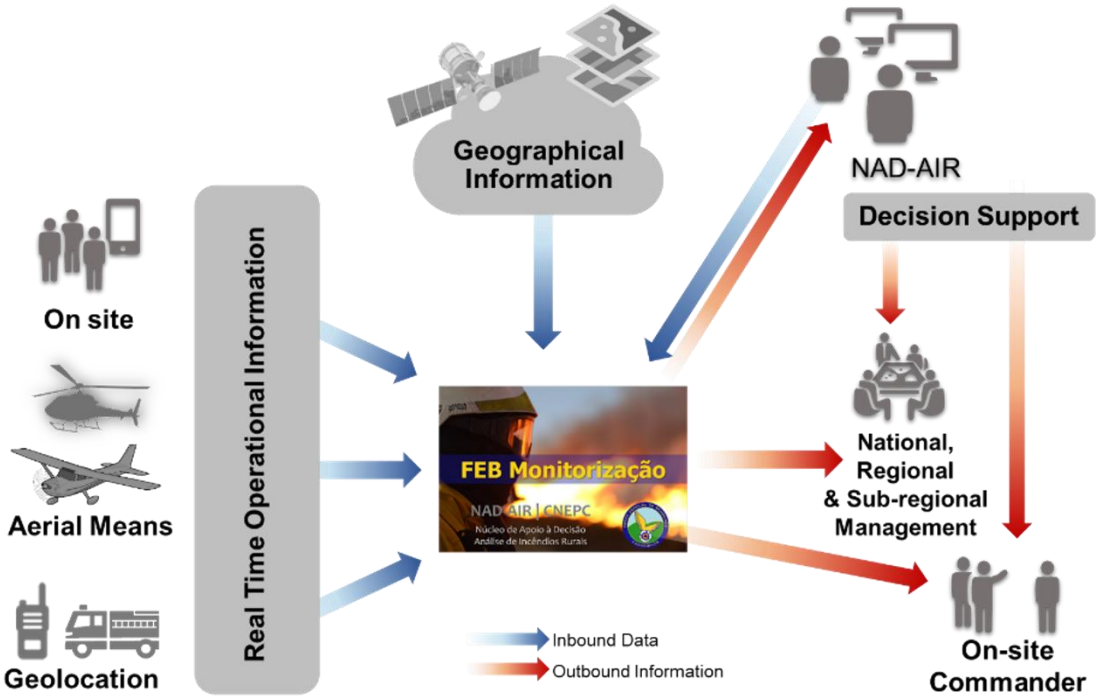


Figure 104. FEB Monitorização – decision support system data flow [Source: ANEPC].

Fire prevention activities and information campaigns

Planning

In 2023, the implementation of the National Action Program (PNA) continued. The PNA develops the strategic options defined in the National Integrated Plan for Rural Fire Management (approved and published in June 2020), namely programs, projects and initiatives that materialize the four strategic guidelines: increasing the value of rural areas; value the rural environment; modify behaviours; manage risks efficiently.

The National Plan's vision is "Protect Portugal from severe rural fires" and, despite the likely increase of the fire risk, the targets for the 2020-2030 planning horizon are:

- The loss of lives in fires, although possible, is rare;
- The ratio of fires extending across more than 500 ha is below 0.3% of the total number of fires;
- The cumulative burned area over a period of eleven years is less than 660 000 ha.

During 2023, the remaining 2 regional action programs were approved (for the Alentejo and Algarve regions) and also during 2023 the public awareness, lessons learned and professional qualification national subcommittees saw relevant results.

In 2023 Portugal invested 483 million euros (M€) in governance and management of rural fire risk, not counting the involvement of local administration and landowners. This investment represents a sharing of 54% (261 M€) in prevention and 46% (222 M€) in suppression. It is worth highlighting the evolution since 2017, when total expenditure amounted to around 143 M€, with 20% allocated to prevention and 80% to suppression.

In the 8th edition of the International Forest Fire Conference in Porto, the SGIFR was used as an inspiring model for integrated management of rural fires at an international level through the "Landscape Fire Governance Framework", which became a reference for the political discussion of the problem.

Forest fuels management

Forest fuels management is one of the key-actions in the forest fire prevention domain. In 2023 a total area of 85 536 ha were managed, of which 2.7 thousand with prescribed burning, and 5 709 ha of shaded fuelbreaks were implemented.

Water reservoirs

During 2023, 702 water reservoirs (including water tanks) had maintenance and improvement works and 28 new water reservoirs were created.

Forest roads

In 2023, more than 2 thousand kilometres of forest roads were created or under heavy maintenance.

"Portugal Chama" campaign

In 2023, the "*Portugal Chama*" ("Portugal is Calling") awareness campaign proceeded. Its main message is the individual responsibility in order to promote, among citizens, a more adequate behaviour and practices towards the reduction of the high number of ignitions and the increase of the territory resilience to fires.

It is a comprehensive nationwide campaign (mainly on TV, radio, printed press and social media), however it focuses on the most relevant causes of rural fires, both in terms of the number of occurrences and in terms of the burnt area (heap burnings, renewal of pastures in mountain grazing areas, use of machinery and recreational activities and leisure in rural areas).

The Campaign, which began in May 2023, included the broadcast of 279 TV spots, 29 606 radio spots (national, regional and local) and 218 printed press advertisements, mainly in the most fire-prone regions.

"Safe Village – Safe People" Program

The Safe Village - Safe People Program was created in Portugal in 2018. The "Safe Village" part of the program is defined as a driver for the protection of population clusters residing at urban-forest interfaces by implementing structural solutions. The "Safe People" component aims to raise awareness among local authorities about risky behaviour prevention, self-protection measures, and the implementation of simulation evacuation plans. In 2023, the "Safe Village" and "Safe People" programs continued, jointly promoted with the municipalities and civil parishes. From the start of these programs in 2018, to the end of 2023, 2 242 communities were involved (of which 2 093 have a designated local safety officer), 916 evacuation plans were developed, and over 2 900 locations of refuge and shelter were identified.

Public Warning system

In Portugal, Civil Protection Entities provide, at various territorial levels, the broadcast of public warnings in the event of a significant emergency or catastrophe. In the event of a wildfire, the Local Civil Protection uses heritage methods (such as sirens, megaphones, door-to-door contact, and so on) to provide local notice. Similarly, at the national level, the ANEPC publishes warnings via media, Internet-based platforms (websites, social networks), and Location-Based SMS, which sends bulk notifications to mobile phones.

The SMS warning system is Portugal's most wide-range system for broadcasting alerts. SMS are sent by mobile telecommunications carriers at the request of ANEPC, and messages are conveyed to individuals in geographical regions prone to the impending or occurrence of a wildfire. The system does not require registration and also includes mobile devices that connect to national mobile networks via roaming.

The accumulated values for the period 2018-2023 recorded 40 activations of rural fires risk and 79.2 million SMS sent. There was one wildfire-related activation in 2023: in August, 4.1 million written messages were transmitted to mobile phone customers in locations with the highest level of fire danger.

Automatic daily emails service

ICNF provides an automatic daily email distribution service that provides useful information to all agents involved in wildfire prevention and suppression operations. Among the information that is daily spread within this service, stands out two email types:

- "*Locais críticos*" – This email provides the daily forest hazard information for the user region, showing the places (list and map) where the fire hazard is expected to be worst. The fire hazard is estimated with an algorithm that combines meteorological forecast with structural fire hazard, local ignition and burnt area historical statistics, among other variables.
- "*Perigo de reacendimento*" – This email provides a list and map of the recently extinguished fires that are, simultaneously, more probable to rekindle and are expected to do more damage.

Assistance phone-line and burning permit

During 2023 the official assistance phone line continued. More than 112 thousand calls were received from citizens, mainly to obtain information and help with the web application that analyses fire hazard and gives individual authorization to the use of fire in vegetation debris burning and pasture renewal. The official phone line also provides information on fuel management prescriptions around houses and other infrastructures in order to reduce the fire risk.

The burning permit application processed 1 165 352 permits in 2023 (with a maximum of 17 197 permits processed in just one day, on November 24th) and has around 705 thousand registered users. The permits are granted if the local weather forecast analyses shows that the burning can be executed in a safe way. This programme is considered to be a very important tool in reducing the number of fires (and burnt area), as burnings are one of the most significant cause of wildfire in Portugal.

Post-fire management

In 2023, there were 4 burned areas with more than 500 ha, and 4 emergency stabilization reports were produced, for 16 384 ha of burned area and a total planned investment of 4.9 million euros of community and national funds.

Shortly after the fires, ICNF began, with its own resources and teams from the Forest Sappers Program, emergency stabilization work in the burned areas of Senhorim/Nelas, Carrascal/Castelo Branco, Valverde/Mogadouro, Baiona/Odemira and Argozelo/ Vimious.

Injuries and losses of human lives

The impact of forest and wildland fires on human lives has been reducing since 2017, and that was also the case of 2023, with no civil or operational deaths and 6 major injuries documented, including 4 civil protection agents. In 2023 the total number of injured people was 208.

Figure 105. Post-fire remediation work in the burned area of Valverde (municipality of Mogadouro, North region), carried out by ICNF in September 2023. The photographs, taken at the beginning of summer 2024, demonstrates the high effectiveness of these interventions (small dams), which aim to capture sediments and reduce the speed of water flow, thus mitigating erosion and degradation of watercourses and forest roads. [Source: ICNF].

Operations of mutual assistance

In 2023, under the Portuguese-Spanish bilateral agreement on cross-border initial attack, Spanish resources responded to 12 fires in Portuguese territory, employing 21 planes, 21 vehicles, and 134 operational personnel. Portugal has sent 58 firemen, 16 vehicles, and 1 firefighting aircraft to 2 fires near the border in Cáceres/Sierra de Gata and Cáceres/Coria.

Portugal contributed for the Union Civil Protection Mechanism (UCPM) deploying 2 AT-802F Fire Boss aircraft (light planes) under the rescEU initiative. Additionally, Portugal received support of two Ground Firefighting teams (GFFF) provided by Finland and Latvia with a total of 40 firemen. Between 15th of August and 15th of September the international teams worked and trained in close cooperation with the Portuguese FEPC teams. During their deployment they were involved in 7 fire suppression missions, 40 operational trainings and 18 technical visits.

Figure 106. Finnish and Latvian GFFF Teams [Source: ANEPC].

Climate change

According to data from AGIF, 170 thousand tons of carbon were emitted in 2023, which corresponds to 625 thousand tons of carbon dioxide equivalent (tonEqCO2) resulting from rural fires. During the 2018-2023 five-year period, the emission of 2.5 million tons of CO2 was avoided.

(Sources: Ministry of Agriculture and Fisheries, Institute for Nature Conservation and Forests (ICNF), SGIF/System for Forest Fire Information Management; Ministry of Internal Administration, National Authority for Emergency and Civil Protection (ANEPC); Ministry of Agriculture and Fisheries, Agency for Integrated Rural Fire Management (AGIF); Regional Government of the Azores, The Azores Regional Civil Protection and Fire Service, Regional Government of Madeira, Institute for Forests and Nature Conservation, Portugal).

1.2.21 Republic of North Macedonia

Fire danger in the 2023 fire season

The forest fire season for 2023 in North Macedonia began with relatively high temperatures until the middle of the July, especially in August. Moreover, June was characterized with unstable weather conditions that prevailed during certain periods of the month, with rain, local thunderstorms and hail. The majority of fires occurred in the late spring and during the summer months. The summer of 2023 was hot over many regions, particularly in the east and south east region.

Fire occurrence and affected surfaces

During the year 2023 there were 584 fires of which 104 were forest fires, affecting in total an area of 529 ha. The agricultural affected area was 480 ha and the total affected area was 2 006 ha. 17.8% of the total numbers of fires were forest fires.

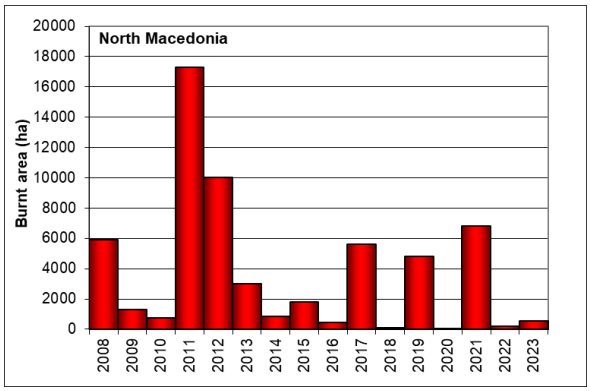
The comparative charts for burnt area, number of fires and average fire size for the years 2007-2022 as well as the number of fires and burnt area according to types of fires for the year 2023 are shown in in Figure 107 and Figure 109.

Operations of mutual assistance

There were no operations of mutual assistance.

Loss of lives

No casualties were reported in North Macedonia during the forest fires season of 2023.



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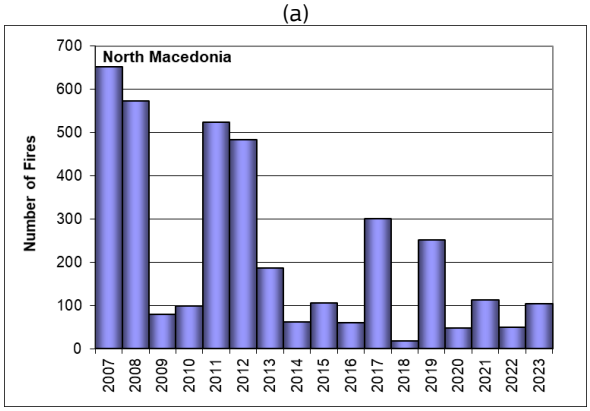

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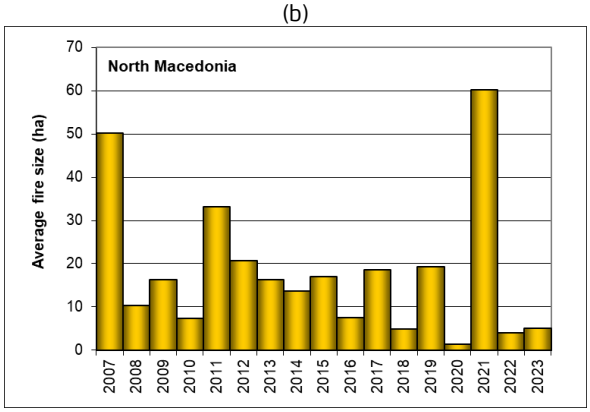


(c)

Figure 107. Burnt areas (a), number of fires (b) and average fire size (c) in North Macedonia from 2007 to 2023.

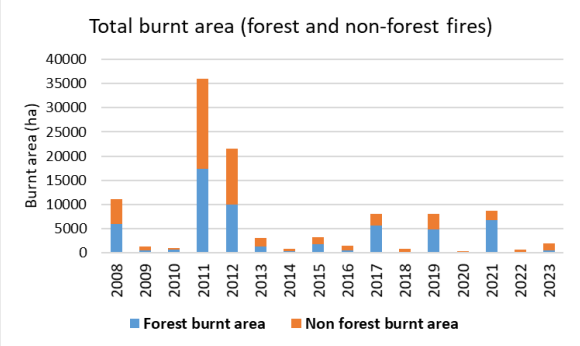
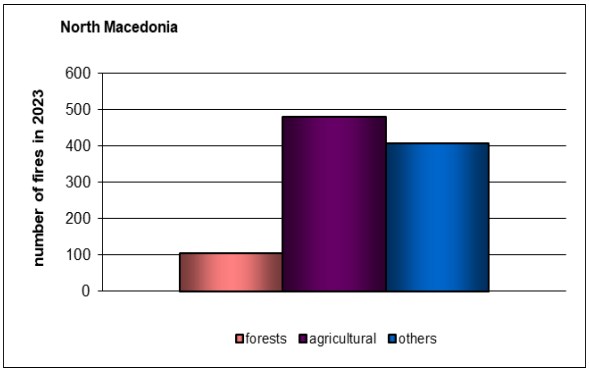


Figure 108. Total burnt area of forest and non-forest fires in North Macedonia from 2008 to 2023.



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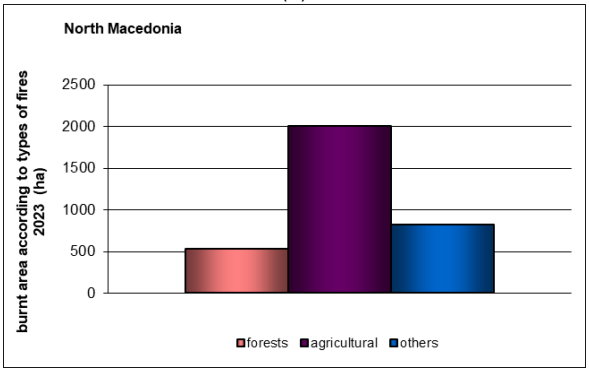


(b)

Figure 109. Number of fires (a) and burnt area (b) according to the type of fires in 2023.

Fire prevention activities and information campaigns

The Department for Prevention, Planning and Development from Protection and rescue directorate started preparations for the upcoming fire season in October 2022. Immediately after, the preparations began with updating the planning documents, checking the condition of equipment for extinguishing fires, the condition of the protection and rescue forces.

The Annual Operational Plans for forest fire management were created by the PC "National forests" and its subsidiaries. The problems were noted and approaches were taken to resolve them. The prevention activities start conducting meetings before the season of forest fires, and this year the staff of the 35 department at Local level Protection and Rescue Directorate - PRD conducted a campaign for reduction of risks from forest fires from 10.03 to 10.04.2023. The National Forest authority kept its efforts in the forest fire planning at the local and municipal 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 and the Municipal Operational Plans, which are part of the previous plans and are updated on a yearly basis. The municipalities provide technical support, by the end of the year there were established 34 Plans for Forest Fire Prevention and 28 Municipal Operational Plans approved. 96% of the municipalities are covered by Forest Fire Prevention Municipal Plans.

As part of the campaign, manuals for reducing the risk of fires were distributed in major cities in the country, at toll booths, at border crossings, in rural areas, in National Parks, picnic places where posters with steps of forest fire protection were placed. Fire prevention and firefighting activities were undertaken along with public information campaigns. For the purpose of awareness raising, media events such as press conferences, short reports and announcements on the TV and radio were organized.

Collaboration with the operational meteorological services has been consolidated in order to improve the performances by integrating additional data sources.

We have developed a public awareness campaign for forest fires prevention under the slogan "*Let's protect the forest from fire*". Several actions were taken, following three main strategic axes: National awareness campaigns in the media, warning for hazardous behaviours, promoted by the National Authority for Civil Protection, National Forest Authority and municipalities.

In the public information domain, the National Authority of Civil Protection –Protection and Rescue Directorate –PRD made significant efforts on the availability of on-line information. To reach that goal, they published seven reports, as a critical period and the PRD services displayed online information of the most relevant forest fire incidents. Also, the Meteorological Services provided online information concerning FWI and its forecast. The PRD also provided its partners with an online service for FWI mapping.

School campaigns

During 2023 there were more than 15 presentations in schools and colleges in North Macedonia, giving information to raise awareness on environmental issues, social and economic factors caused by fires, its causes and how it can be avoided. Between 05 and 07 June, there was the final trip for the winners of the competition of this school campaign.

Rural Campaigns

In these campaigns direct actions are intended for the rural population trying to sensitize the population about the most common types of negligence. They transmit a message about the importance of human action to prevent fires.

The Protection and rescue directorate together within the Ministry of Interior through its organizational units realized a preventive activity regarding landscape fire. During immediate meetings, leaflets with practical advice for greater protection were distributed to the citizens, and through short educational talks, they were informed about the risks of lighting a fire in an open space and its consequences in cooperation with the public enterprise National Forests in accordance with the operational plan implemented the preventive campaign "*Resilient landscapes - key to surviving wildfires*". The main goal of the campaign was the protection and preservation of green forest areas, agricultural land, meadows and pastures from fires, primarily by raising the awareness of citizens about the risks of wildfires and their damage.

Climate Change

Landscape Fire Management play a crucial role in national policies to combat and adapt to climate change. The climate is changing and it is evident in whole territory of the country. National adaptation strategies / plans and in particular regarding plans to adapt the forest sector to climate change in order to reduce the probability of catastrophic forest fire seasons which greatly increase the emission of CO2 take a specifies the main objectives for forest-based business and activities.

National adaptation strategies

In the North Macedonia through the project Landscape Fire Management in Western Balkan (LFMWB), was created a draft version of National strategy for Adapted Fire Management at the landscape level in the Republic of North Macedonia. Now is working in progress for Action plan.

A Landscape Fire Management country report was created.

Research activities aimed at improving fire management

There is a crucial need for reorganization and integration of the Protection and rescue system in order to improve fire landscape management.

Project: Landscape Fire Management in Western Balkan (LFMWB), Swiss Agency for Development and Cooperation–SD, Farmahem-Skopje, Helvetas-Swiss in cooperation with Regional Forest Fire Monitoring Center (RFMC) Ministry of Agriculture, Forestry and Water Economy as partner, for the period of 4 + 4 years.

(Source: Protection and rescue Directorate, Sector for prevention, planning and development, Republic of North Macedonia).

1.2.22 Romania

Meteorological characteristics during 2023

The average temperature across the country, 11.4 ºC, was 1.8 ºC higher than the median of the standard reference period (1991-2020). From a thermal perspective, positive anomalies were recorded for 9 out of the 12 months of the year, with the country's average monthly temperature being higher than the median of the standard reference period (1991-2020) by values ranging from 0.9 ºC (February) to 5.4 ºC (January). Out of the 12 months, only in April, May, and June were the deviations negative, with values ranging from 0.2 ºC in June to 1.6 ºC in April.

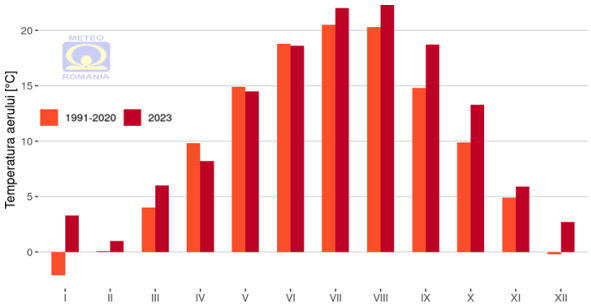


Figure 110. The national mean monthly temperature in Romania in 2023, compared with the standard climatological normal (1991-2020).

The year 2023 ranks as the warmest year on record in Romania, based on data from 129 meteorological stations with complete series from 1961 to 2023. This ranking is also confirmed by an analysis based on the national average temperature calculated from data from 29 meteorological stations with complete series from 1900 to 2023.

The highest values, over 14ºC, were recorded in the Danube meadow and the southern coast. Temperatures between 12 and 14ºC were recorded in Dobrogea and the low plain areas of the south, east, and west of the country. Values ranging from 8 to 12ºC were observed in the sub-Carpathian and plateau areas of Moldova and Transylvania, while in the mountainous areas and intramontane depressions, the annual average temperature varied between 2 and 8ºC. In the very high mountainous areas, above 2200 metres, the annual average temperature dropped below 0ºC.

According to the classification of the severity of the average annual temperature in 2023, it was extremely hot in almost the entire country. In the high mountain areas, the thermal regime was warm and very warm. The deviation of the average air temperature in 2023 from the median of the standard reference period (1991-2020) was positive throughout the country, and most deviations exceeded 1ºC. Values above 2ºC were recorded in the south of the country, in Moldova, and in Dobrogea. In western Romania and Transylvania, thermal anomalies ranged between 1 and 2ºC.

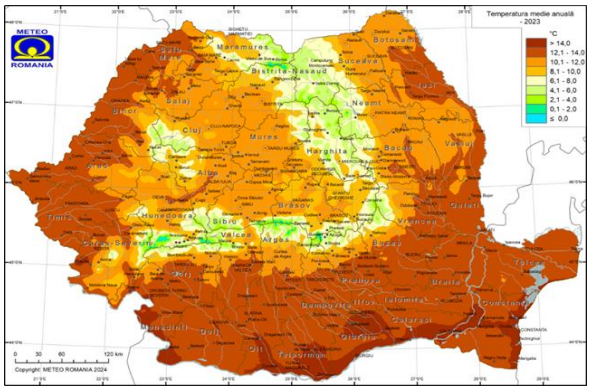


Figure 111. Annual mean air temperature in 2023 in Romania.

The maximum temperature in 2023 varied between 42.0ºC, recorded in Zimnicea on July 25th and in Cernavodă on July 26th, and 16.8ºC at Vârful Omu on July 25th.

The minimum temperature in 2023 ranged between -31.1ºC, recorded at Întorsura Buzăului on February 9th, and -5.6ºC, at Sulina on February 10th.

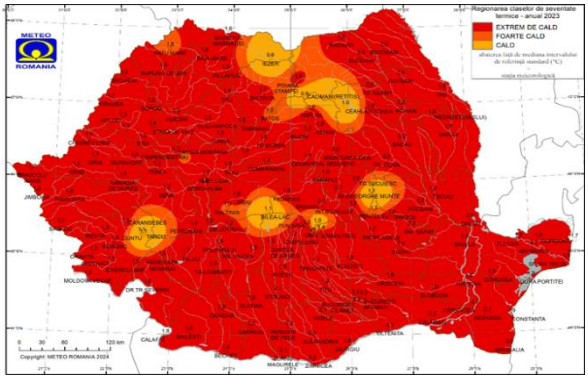


Figure 112. Regional classification of thermal severity classes in 2023.

The total amount of precipitation in 2023, averaging 661.3 mm across the country, was only 1.4% lower compared to the standard reference period (1991-2020). On a monthly basis, the deviation values of the monthly precipitation amounts were negative in March, May, July-October, and December, ranging from 2% (July) to 60% (October). In the remaining months, the deviations were positive, ranging from 2% (June) to 121% (November).

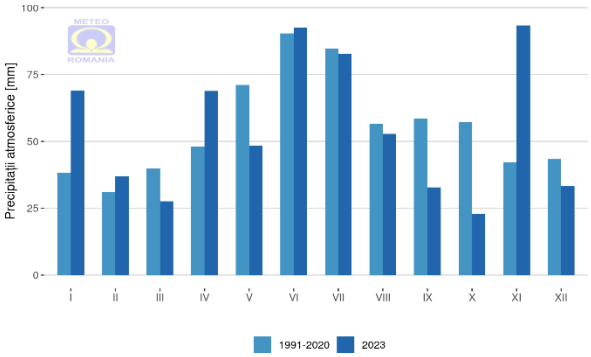


Figure 113. Evolution of Monthly Precipitation Amounts (mm), National Average for Romania in 2023, compared to the median of the standard climatological period (1991-2020).

In 2023, the total amount of precipitation varied between 212.3 mm at the Sulina meteorological station and 2143.4 mm at Stâna de Vale. In the southern coast, the Danube Delta, and isolated areas in Moldova and northern Muntenia, it was below 600 mm. Values between 400 and 600 mm were recorded in the extracarpathian areas, in central Transylvania, and isolated areas in the far west of the country. In northern Transylvania, Banat, and northern Oltenia, the values ranged between 600 and 800 mm. The most significant amounts of precipitation were recorded in the mountainous area. Thus, in the northern Eastern Carpathians (Rodna Mountains area), in the central and western Southern Carpathians (Făgăraş, Parâng, and Retezat Mountains), and in the Apuseni Mountains, they exceeded 1 400 mm, and on the high peaks of these massifs, values over 2 000 mm were recorded.

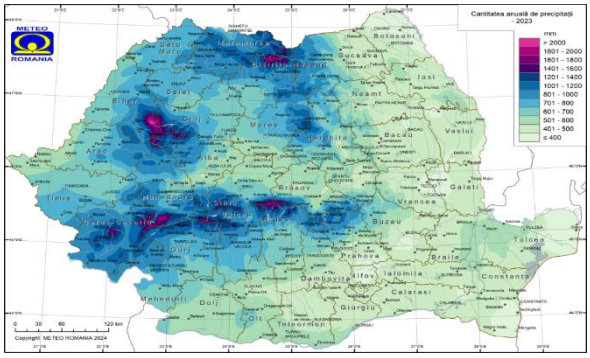


Figure 114. Annual precipitation amount in 2023 in Romania.

The deviation of the precipitation amount in 2023 from the median of the standard reference period (1991-2020), calculated in percentages, was negative in Moldova and Muntenia. Positive deviations were recorded in the north and northwest of the country and isolated areas elsewhere. These exceeded 20% in the northern Eastern Carpathians (Poiana Stampei, Iezer, Călimani), as well as in the Vlădeasa Mountains (Stâna de Vale) and the Beiuş Depression (Ştei). The highest positive deviation was 58% at Cuntu.

Analysing the classification into pluviometric severity classes of the annual precipitation amounts in 2023, it is found that the pluviometric regime was deficient and very deficient in Moldova, Muntenia, southern Dobrogea, the Danube Delta, and extensive areas of central Transylvania. It was excessive, very excessive, or extremely excessive locally in the northern Eastern and Western Carpathians, northwestern Transylvania, Banat, and eastern Crişana. Elsewhere, the pluviometric regime was within normal limits.

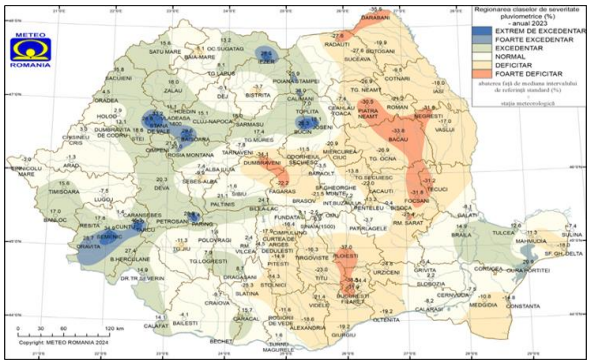


Figure 115. Regional classification of pluviometric severity classes in 2023.

The highest total annual precipitation amount in 2023 was 2143.4 mm recorded at the Stâna de Vale meteorological station (Bihor county), while the lowest, 212.3 mm, was recorded at Sulina.

The highest amount of precipitation fallen in 24 hours (mm), recorded in 2023, was 138.4 mm at the Horezu meteorological station on September 17th.

Fire occurrence and affected surfaces

Unlike the year 2022 which was the worst year ever since we have registered data, in 2023 in Romania 170 forest fires occurred and affected 554.25 ha, primarily due to the very rainy spring, which is the time when the population traditionally used to burn dry vegetation on pastures.

The first fire in Romania was on 02nd of January and the second fire was reported on the 19th of February. The last reported fire was on 30th of December.

The largest affected area by a forest fire was about 37.40 hectares and the smallest area was about 0.01 hectares. At the national level, 170 forest fires were recorded, affecting 554.25 ha in the national forest fund.

Due to the fires, at the national level it was estimated damage of 169 thousand Euros. 236,12 thousand seedlings of plantations and natural regenerations were burned, as well as 751.87 cubic meters of standing or under operation timber.

The firefighting actions involved a total of 3 687 people, of whom:

- Forest rangers – 827 people;
- Military and civilian fire-fighters – 1618 people;
- Policemen and gendarmes – 277 people;
- Volunteers (Citizens) – 965 people

A summary of the number of fires and total burnt area by cause, land ownership and fire type is presented in Table 32-Table 34.

Table 32. Causes of forest fires.

Cause of fire	EFFIS code	Number of fires	Burnt area (ha)
Unknown	100	61	200.82
Electrical power	301	5	4.82
Vehicles	303	1	0.01
Explosives	305	1	0.01
Other accident	307	3	35.00
Vegetation management	411	48	140.12
Agricultural burnings	412	20	94.16
Recreation	414	2	0.65
Other negligent use of fire	415	17	56.88
Cigarettes	422	9	14.89
Other use of glowing object	424	1	5.00
Vandalism	513	1	1.79
Rekindle	600	1	0.10

Table 33. Nature of the affected property.

Property type	Number of fires	Burnt area (ha)
State public property	99	248.15
Communities public/private property	11	55.35
Private property	60	246.19

(2 fires occurred on lands belonging to several forms of ownership).

Table 34. Type of fire.

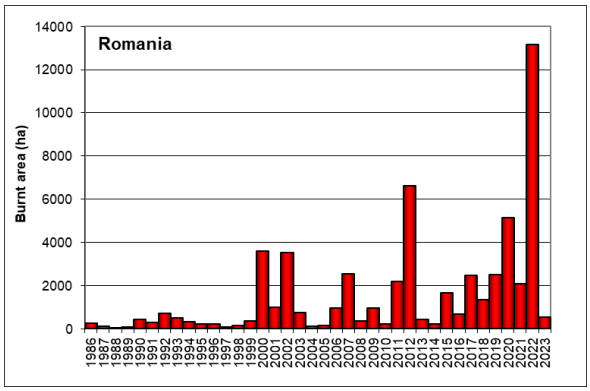
Fire type	Number of fires	Burnt area (ha)
Litter fires	139	416.45
Mixed fires (litter, canopy, underground)	31	137.80

In 2023, the months of March and October saw the highest number of forest fires, with 37 fires affecting 142 hectares of forest and 47 fires affecting 139 hectares of forest, respectively. In contrast, January, June, and December recorded 1 fire, 4 fires, and 2 fires, respectively, with the affected areas being 0.2 hectares, 0.39 hectares, and 0.68 hectares.

In 2023, there were 2 forest vegetation fires lasting more than 24 hours. Notably, one fire in Dumitrești, Vrancea County, was extinguished after 32 hours, and another in Chiojdeni, Vrancea County, was extinguished after 56 hours. The largest area affected by a single fire was 37.40 hectares in Sichevița, Caraș-Severin County. The greatest quantity of burned timber was 703 cubic metres in the Roșiorii de Vede Forest District, Teleorman County. The most significant number of affected saplings was 170 000 in the Codrii Cămării Forest District, Bihor County.

Generally, in Romania, forest fires occur during the vegetative dormancy period, resulting in minor damage, mostly involving litter fires that superficially affect the soil's organic horizon and the organisms in that area. However, if the fire encounters a young plantation, especially one with coniferous species, the small height of the saplings leads to the complete burning of their crowns, resulting in the total loss of the plantation and necessitating replanting of the affected areas.

The burnt area, number of fires and average fire size for the years 2000-2023 are shown in Figure 116.



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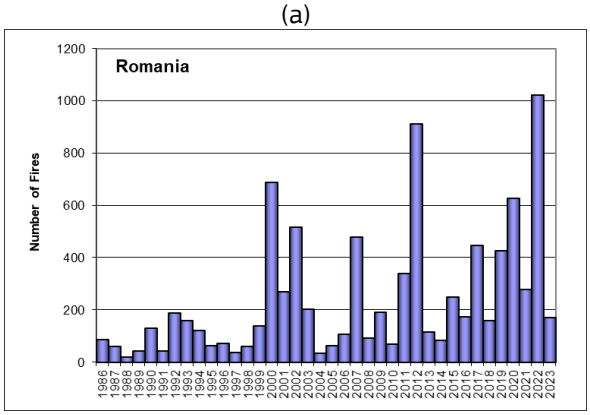

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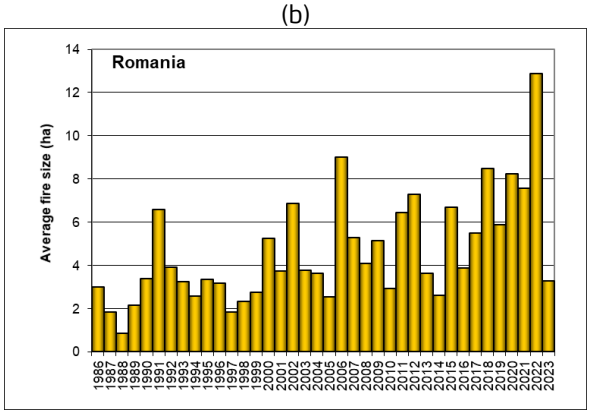


(c)

Figure 116. Burnt area (a), number of fires (b) and average fire size (c) in Romania from 1986 to 2023.

(Source: Romanian Ministry of Environment, Waters and Forests (forest fires data); Romanian National Meteorological Institute (meteorological data, Romania).

1.2.23 Serbia

Introduction

According to the second national forest inventory with data released in 2023, the total forest area in the Republic of Serbia (without data for the administrative provinces of Kosovo and Metohija) covers 2 854 955.8 ha.

State-owned forests represent 58.3% of the forested area whilst 41.7% is in private ownership. The most dominant are broadleaved types of forest with beech and oaks as a main species, while pure coniferous types of forest cover less than 8% of the total forested area.

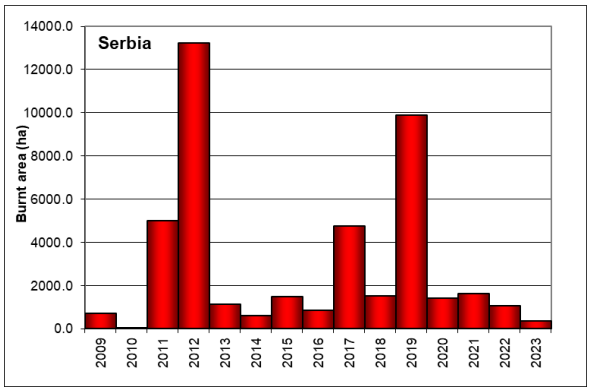
The elevation in Serbia ranges from 28 to 2 169 m. Annual air temperature varies from 11°C for the altitudes of up to 300 m to 6 °C for altitudes over 1 000 m. Lower regions receive from 540-820 mm of precipitation while higher regions with altitudes above 1 000 m receive from 700-1000 mm of precipitation on average.

Fire occurrence and affected surfaces

The 2023 fire season was calmer than an average fire season in Serbia. Only 33 forest fires were recorded with more than 358 ha of total burnt area and with 10.9 ha of forest fire on average [Table 35, Figure 117]. The biggest forest fire, with 244.8 ha of burnt area, was recorded in the forest district of Leskovac, which is situated in the southern part of Serbia. Usually, Serbia has two peaks of forest fire activity. The first one occurs in March or April and the second one in July and August, depending on the season. Contrary to the previous fire season in 2022, when the highest fire activity was recorded in March and April, during the 2023 season the highest fire activity was recorded in October with 247.9 ha of burnt area [Figure 118b].

Table 35. Number of fires and burnt area in Serbia.

Year	Number of fires	Burnt area (ha)	Average burnt area
2012	318	13226.44	41.59
2013	46	1131.83	24.61
2014	23	599.19	26.05
2015	68	1474.24	21.68
2016	45	843.29	18.74
2017	222	4756.80	21.43
2018	62	1501.92	24.22
2019	189	9871.73	52.23
2020	81	1417.43	17.50
2021	75	1633.53	21.78
2022	66	1052.99	15.95
2023	33	358.22	10.86



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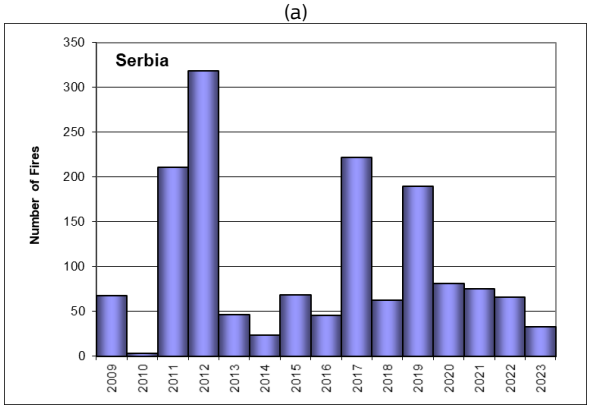

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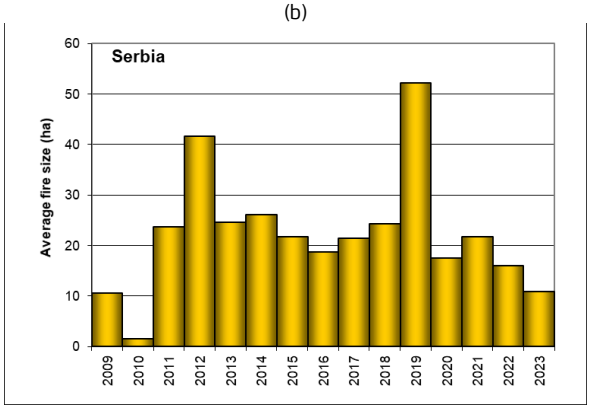


(c)

Figure 117. Burnt area (a), number of fires (b) and average fire size (c) in Serbia from 2009 to 2023.

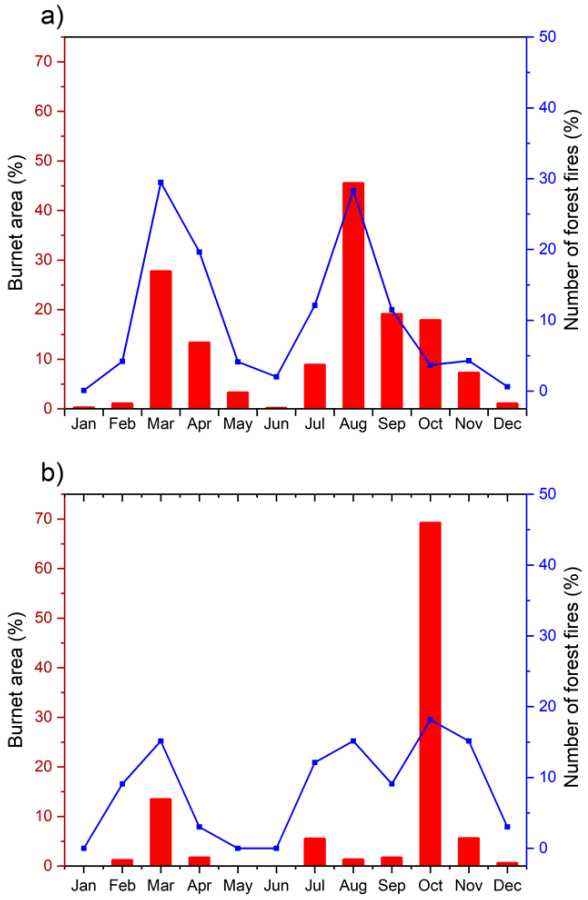


Figure 118. Monthly distribution of forest fires: a) for the years 2013-2023, b) season 2023.

Fire prevention activities and information campaigns

Information about the FWI is provided by the Republic Hydrometerologica Service of Serbia on a daily basis for each administrative unit in Serbia at the NUTS2 level. Fire danger activities are prohibited during the fire season in all forests. State Forest Enterprises starts a campaign in the public media about the forest fire danger each year before the fire season. The Forest Directorate, as a part of the Ministry of Agriculture, Forestry and Water Management invested in the maintenance and establishment of new fuel breaks at a cost of 475 and 1 440 euros per km respectively, before the 2023 fire season.

Injuries and losses of human lives

During the 2023 season there were no losses of human lives in forest fires.

Fire causes

The main cause of the forest fire was negligence during the previous decade [59.2%], as was also the case in the 2023 fire season, where negligence was reported as a major cause in 75.8% of cases, followed by unknown causes [15.2%] (Figure 119).

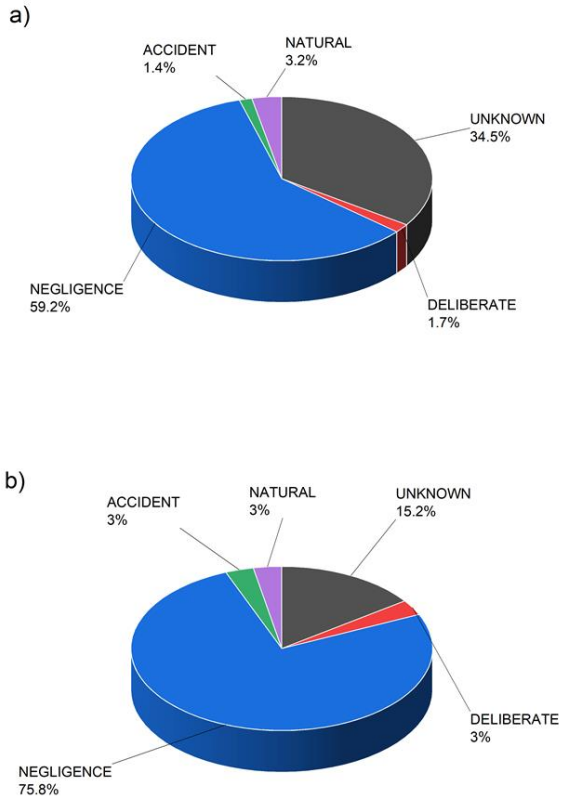


Figure 119. Causes of forest fire: [a] for the years 2013-2023; [b] season 2023.

Firefighting means.

All firefighting measures are under the responsibility of the Sector for Emergency Situations, which is a part of the Ministry of Internal Affairs in Serbia. The operational core of the Sector consists of members of operational fire and rescue units. At any moment, 3 280 of them are ready to react. The seat of the Sector for Emergency Situations consists of several departments including the Directorate for Fire and Rescue Units and Civil Protection. At the local level, the Sector has 27 organizational units, four Emergency Situations Administrations in Belgrade, Kragujevac, Nis and Novi Sad, and 23 Departments for Emergency Situations all around Serbia. Along with the ground troops and firefighting vehicles, at least four helicopters are available for fire suppression if it is needed from the other parts of the Ministry of Internal Affairs in Serbia.

Operations of mutual assistance.

Serbia assisted to Greece in combating the large forest fire during July and August 2023. A team of 36 firefighters from the Sector for Emergency Situations (Ministry of Interior), equipped with 14 vehicles followed by two medical experts and one ambulance vehicle were sent on July 25 to Greece. On 26 August, a team of 30 firefighters from the Sector for Emergency Situations were sent again to Greece.

Climatic conditions and how they impacted the fire season.

During the 2023 fire season, the highest daily air temperature (39.0°C) was recorded on July 25 in Dimitrovgrad and Nis.

The highest number of tropical days, a total of 64 days, was recorded in Leskovac. In other parts of Serbia, 37 to 60 tropical days were recorded, which is 3 to 18 tropical days more than the average number for the reference period 1991-2020.

In most of Serbia, the year 2023 was above the average amounts of precipitation. It was extremely rainy in Sjenica, while other parts can be categorized as rainy and very rainy. The annual precipitation varied, ranging from 663.7 mm in Novi Sad to 963.9 mm in Loznica. In mountainous areas, the precipitation ranged from 943.0 mm at Crni Vrh to 1276.3 mm at Kopaonik. The highest daily precipitation of 78.8 mm was recorded in Banatski Karlovac on August 16.

In contrast to the 2022 fire season, when four heat waves were observed, during the summer of 2023, only two heat waves were recorded in Serbia. The first heat wave occurred from July 15 to July 16 and affected the northern and southern regions of Serbia. Subsequently, a second heat wave took place from August 21 to August 28, primarily impacting the northern (Sombor) and some eastern parts of the country (Negotin).

An additional four heat waves were observed during the autumn. The initial heat wave spanned from September 7 to 13, primarily affecting the northern regions. The second occurred from September 17 to 23, impacting parts of northern and western Serbia. The third heat wave took place from September 26 to 30, again in the northern areas. The fourth wave, affecting most of the country, lasted from October 20 to 25. The longest heat wave was recorded in Dimitrovgrad, extending from October 20 to 31.

https://www.hidmet.gov.rs/data/klimatologija/eng/2023.pdf

National adaptation strategies / plans

The Serbian Law on climate change was adopted on 18 March 2021, and its implementation will establish a system for reducing greenhouse gas emissions and ensuring adaptation to changed climate conditions. The law fulfils the obligations under the UN Framework Convention and the Paris Agreement and harmonizes domestic legislation with European Union regulation.

Research activities aimed at improving fire management

During 2023, no new research activities were supported by the Forest Directorate.

(Sources: Forest Directorate- Ministry of Agriculture, Forestry and Water Management, Center for Forest Fire Research - University of Belgrade Faculty of Forestry, Serbia).

1.2.24 Slovakia

Fire danger in the 2023 fire season

The year 2023 finished as the second warmest in terms of temperature since at least 1931. Statistically very significant (annual) deviations occurred throughout the territory of Slovakia, so we characterize it as strongly too extremely above normal in terms of temperature. Smaller (statistically above normal) deviations occurred in the part of Horehronia, Liptov and Tatras. Deviations from the long-term average of 1991-2020 ranged from +0.6 °C to +1.6 °C, which means that there were positive deviations throughout Slovakia. Compared to individual normals (defined as the average or sum for a 30-year period of a certain meteorological element or characteristic), the year 2023 was +1.3 °C warmer compared to 1991-2020, respectively. By +1.8 °C compared to 1981 – 2010, or +2.4 °C compared to 1961 – 1990.

The year 2023 was -0.03 °C cooler than the warmest year 2014, or +4.5 °C warmer than the coldest year 1940, at least since 1931.

The highest air temperature (annual) we recorded in Bratislava at the airport was 12.6 °C with a deviation of +1.4 °C from 1991–2020 (the 1st warmest year at least since 1931). The average deviation for the territory of Slovakia was +1.2 °C.

If we were to evaluate Slovakia as a whole, the spatial total of precipitation calculated by the isohyet method reached 1 003 mm in 2023, which represents 132% of normal, and such precipitation is considered significantly above normal.

Since 1981, annual rainfall totals have been calculated using this method, for the entire territory of Slovakia, higher only once, in 2010, when they reached an extreme value of 1 255 mm. The order of the months with the most precipitation according to the mentioned method was in 2023: November (120 mm) and August (120 mm), December (105 mm) and January (103 mm). Therefore, among the first four such months there were one summer, one autumn and two winter months. The combination of January, November and December is particularly noteworthy. On the contrary, in this exceptionally rich year for precipitation, the monthly precipitation totals were relatively lowest in March (45 mm) and April (54 mm), i.e. the spring months.

From the point of view of atmospheric precipitation, Gemer was interesting in 2023. For example, in Rožňava, the annual total of precipitation this year reached 1 043 mm. It was the third highest annual rainfall there since at least 1881, or in the last 143 years. Higher annual precipitation totals were recorded there only in 2010 (1 163 mm) and in 1937 (1 084 mm), and more than 1 000 mm of annual precipitation reached there only in these three reported years of the analysed period. At the same time, it should be remembered that this region was affected by an extraordinary lack of precipitation and drought the year before (2022).

The highest annual precipitation totals in Slovakia in 2023 reached more than 1 700 mm (for example, Jasná 1 743 mm, Skalnaté Pleso 1 778 mm), and the lowest annual precipitation totals in Slovakia reached just over 600 mm in 2023 (for example, Pusté Úľany 602 mm).

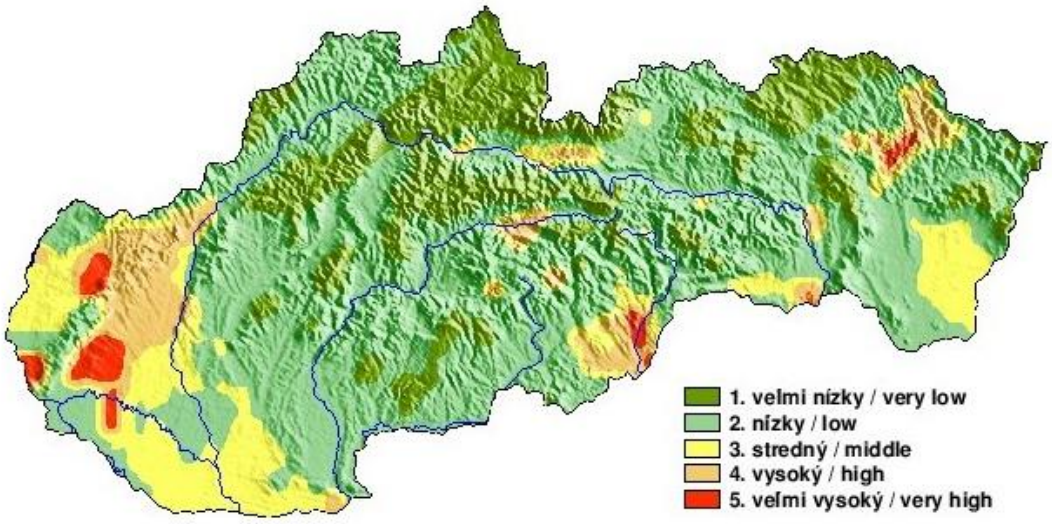


Figure 120. Information on the forest fire index - Slovak Hydrometeorological institute.

Fire occurrence and affected surfaces

In 2023, according to the records of the Fire Engineering and Expertise Institute of the Ministry of the Interior of the Slovak Republic ("PTEU"), 55 forest fires were recorded with a total burnt area of 29.64 ha. The damage caused by the fires was calculated at €89 035. Compared to 2022, the number of fires is significantly lower (297 in 2022), the total burnt area also decreased significantly compared to 2022 (1 209.56 ha in 2022). The total calculated damage also decreased several times compared to 2022 (€1 196 510). No people were killed and one person was injured in the forest fires.

The most fires were registered in the districts of Čadca (6 fires), Senica (5 fires), Pezinok, Liptovský, Mikuláš, Košice III, Brezno (3 fires each).

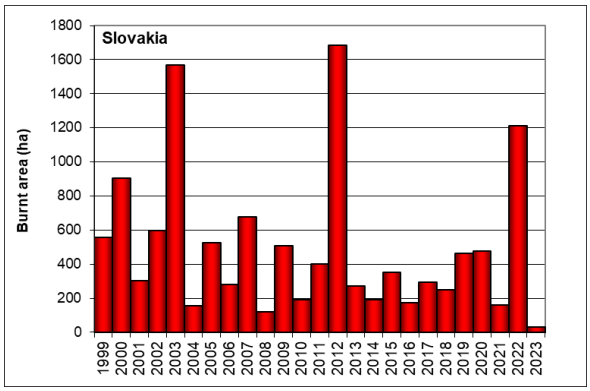
The areas most damaged by forest fires were registered in the districts of Pezinok (14.02 ha), Malacky (7.51 ha) and Čadca (2.55 ha).

The biggest damage caused by the forest fire was the fire of two export forest sets for the export of wood in the cadastral territory of Bojná village, Topoľčany district. The fire caused direct damage of €50 100 and the forest was not affected. The cause was determined to be intentional ignition by an unknown person. Furthermore, there was a a forest fire in the Little Carpathian Mountains near Veľký Javorník in the cadastral area of Svätý Jur, Pezinok district, which spread rapidly due to the wind. The cause of the fire was intentional ignition by an unknown person, the affected area was 14 ha and the direct damage amounted to €20 000.

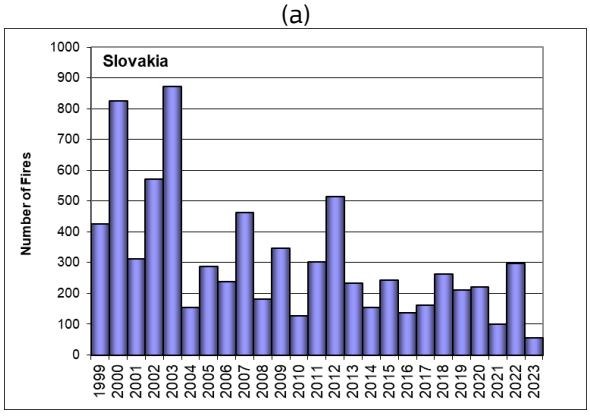
Forests burned most often in the months of July (11 fires), June (10 fires), and May (8 fires).

The most extensive fire was recorded on 24/07/2024 in the vicinity of the village of Svätý Júr, Pezinok (owned by the city of Svätý Júr.) and affected 14 ha of leafy vegetation and neighboring grasslands. The cause of the fire was intentional ignition by an unknown person. The damage caused was estimated at €20 000.

The total number of fires, burnt area and average fire size from 1991 to 2023 are shown in Figure 121 and the number of fires and burnt area by month in 2023 are presented in Figure 122.



(a)



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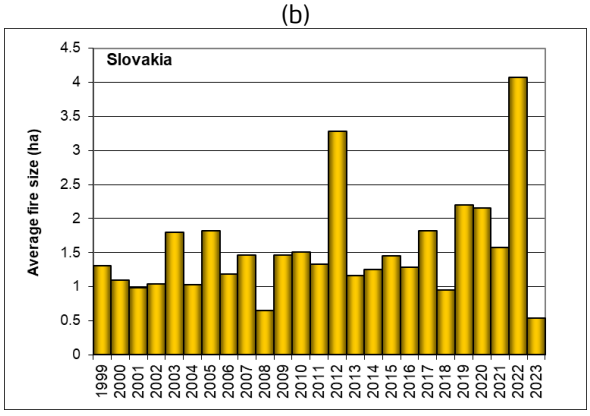

(c)

Figure 121. Burnt areas (a), number of fires (b) and average fire size (c) in Slovakia from 1999 to 2023.

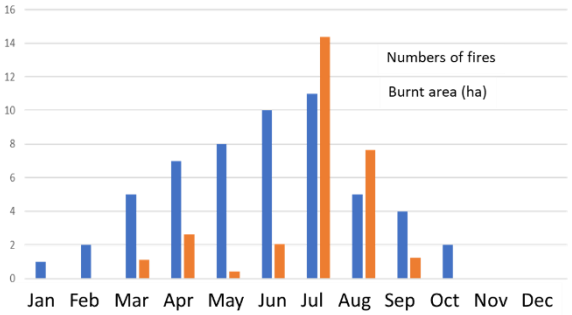

Figure 122. Number of fires and burnt area by month in Slovakia 2023.

Fire prevention activities

The prevention of forest fires was ensured by the owners, managers or managers of the forest, especially at the time of increased danger of fire occurrence in accordance with § 6b par. 1 letter c) Act no. 314/2001 Coll. on fire protection as amended

- Provide information on the forest fire index through the internet page of the Slovak Hydrometeorological institute;
- Provide information through television when the forest fire index is high;
- Information campaigns;
- Prohibit fire dangerous activities in periods with high Fire index;
- Use of a stationary camera system for the early detection of forest fires.

Injuries and loss of human lives

During the 2023 fire season, one person was reported injured in Slovakia.

Fire causes

The most common cause of forest fires was - unknown cause (17 fires), burning of waste and garbage outside landfills (10 fires), intentional ignition by a known person (6 fires).

Forest fire causes in 2023 are shown in Figure 123, and causes for the years 2013–2023 are presented in Table 36.

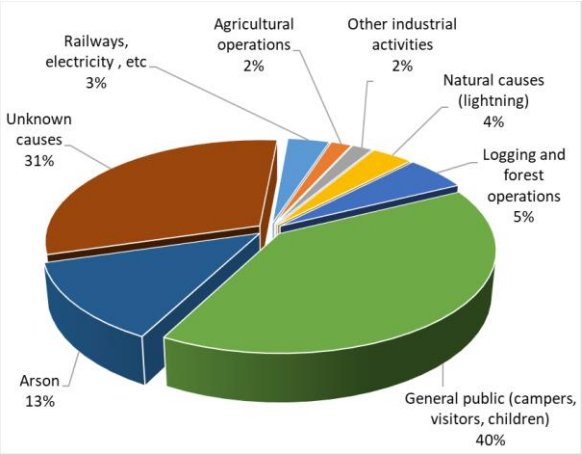

Figure 123. Causes of forest fires in 2023.

Table 36. Forest fire causes for the years 2013-2023 (number of fires).

	Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Basic information	Total fires	**233**	**153**	**242**	**136**	**162**	**262**	**210**	**221**	**101**	**297**	**55**
Known causes (Human)	Arson	33	26	23	12	11	19	7	18	8	22	7
	Negligence (see also B below)	177	112	167	98	108	179	156	113	63	195	29
Known causes (Natural)	Lightning	4	2	12	0	10	9	4	0	6	9	2
Unknown	Unknown	19	13	40	26	33	55	43	36	24	71	17
B: Supplementary information: Total negligence	Agricultural operations	26	24	26	21	20	19	25	39	8	10	1
	Logging/forest operations	15	18	21	14	21	37	27	5	27	14	3
	Other industrial activities	7	1	5	0	0	1	28	1	1	2	1
	Communications (railways, electricity lines, etc.)	3	1	2	1	2	2	3	7	2	2	2
	General public (campers, other visitors, children)	125	67	110	62	65	119	72	113	24	72	21
	Other (military, etc.)	1	1	3	0	0	1	1	2	2	2	1


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Figure 124. (above and previous page). Fire fighting in Slovakia 2023.

(Processed: National Forest Centre - Forest Research Institute Zvolen, Slovakia; Source: Institute for Fires and Expertise of the Ministry of Interior of the Slovak Republic).

1.2.25 Slovenia

In In 2023, according to the data of the Forest Service, 40 forest fires were reported, with a total burnt area of 118.45 ha, of which only 5 ha were in forest (Table 37). One fire was over 100 ha and only one other was over 1 ha.

Table 37. Number of fires and burnt area in Slovenia 2023.

Number of fires	< 1 ha	38
	>= 1 ha	1
	>=100 ha	1
	>=500 ha	0
	Total	40
Burnt area	Woodland	4.93
	Bushes	0.00
	Non woodland	113.52
	Total	118.45

Figure 126 shows the trends in terms of number of fires and burnt area in Slovenia from 2002. As was the case in previous years, the most affected region was Sežana, where the only large fire of the year occurred (Table 38, Figure 127).

Fire causes

In 2023, 5 fires (12.5%) were of unknown origin. Of the remaining fires, 15 (37.5%) were deliberately started, 2 (5%) were of natural origin and the remaining 18 (45%) were reported as accidental or negligent (Figure 125).

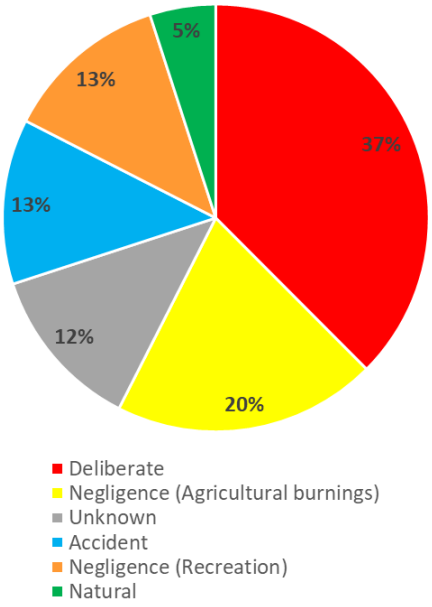
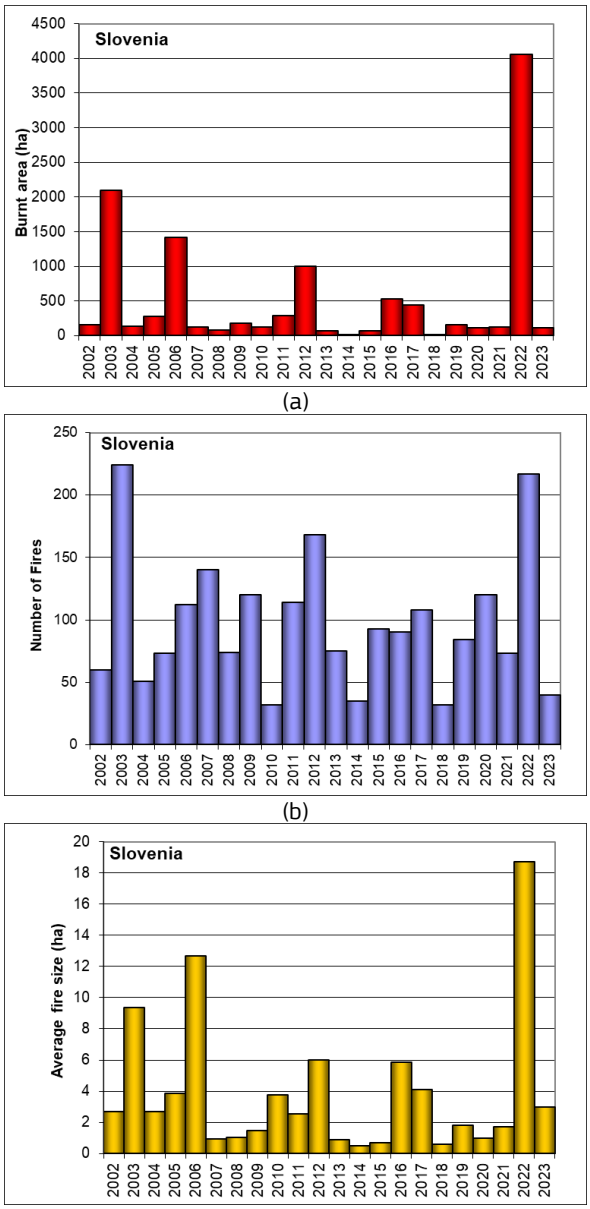


Figure 125. Causes of forest fires in Slovenia in 2023.



(a)

(b)

(c)

Figure 126. Burnt areas (a), number of fires (b) and average fire size (c) in Slovenia from 2002 to 2023.

Table 38. Number of fires and burnt area by forest management unit in Slovenia in 2023.

	Number of fires					Burnt area (ha)			
Region	**<1 ha**	**≥1 ha**	**≥100 ha**	**≥500 ha**	**Total**	**Forest**	**Scrub**	**Non wooded**	**Total**
Tolmin	0	0	0	0	0	0.00	0.00	0.00	0.00
Bled	0	0	0	0	0	0.00	0.00	0.00	0.00
Kranj	2	0	0	0	2	0.00	0.00	0.00	0.00
Ljubljana	8	0	0	0	8	0.94	0.00	0.02	0.96
Postojna	1	0	0	0	1	0.04	0.00	0.10	0.14
Kočevje	1	0	0	0	1	0.00	0.00	0.00	0.00
Novo mesto	6	0	0	0	6	0.64	0.00	0.89	1.53
Brežice	0	0	0	0	0	0.00	0.00	0.00	0.00
Celje	2	1	0	0	3	1.24	0.00	0.02	1.26
Nazarje	0	0	0	0	0	0.00	0.00	0.00	0.00
Slovenj Gradec	0	0	0	0	0	0.00	0.00	0.00	0.00
Maribor	0	0	0	0	0	0.00	0.00	0.00	0.00
Murska Sobota	0	0	0	0	0	0.00	0.00	0.00	0.00
Sežana	18	0	1	0	19	2.07	0.00	112.49	114.56
Total	**38**	**1**	**1**	**0**	**40**	**4.93**	**0.00**	**113.52**	**118.45**

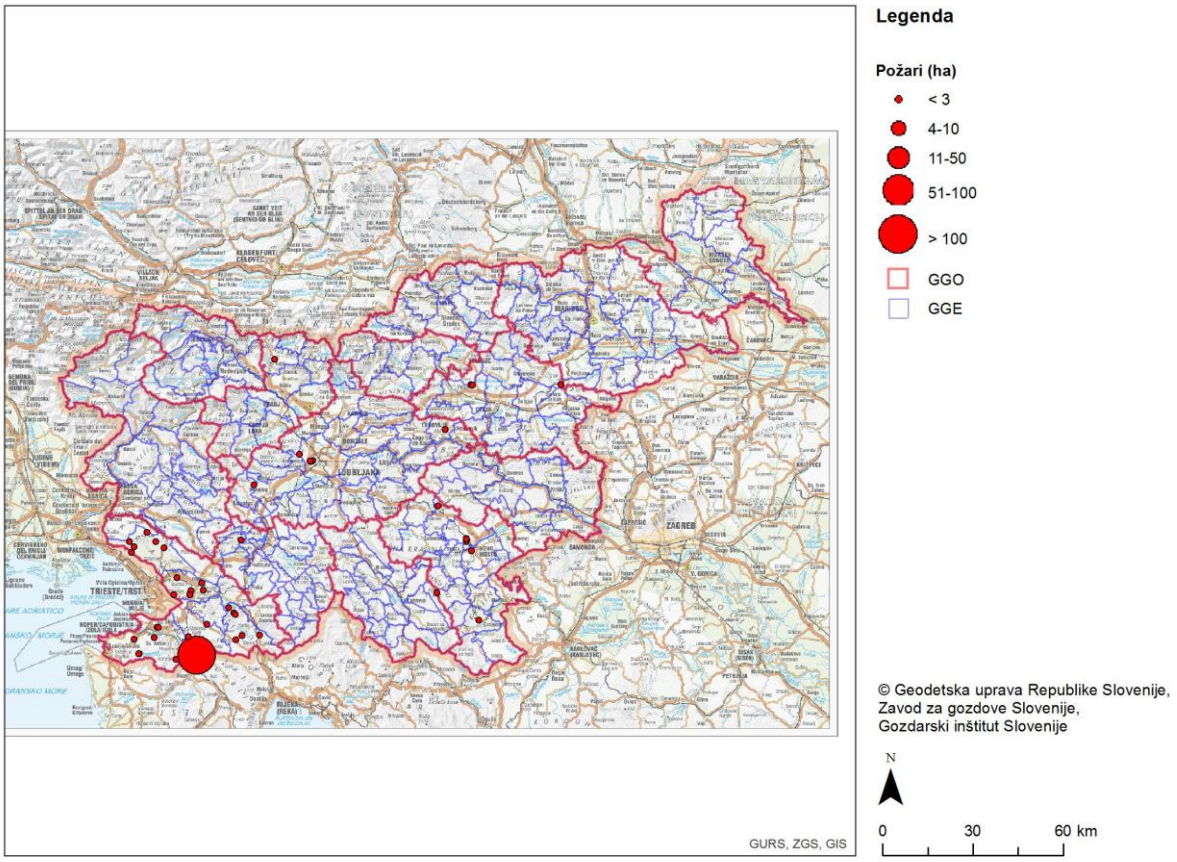


Figure 127. Map of fires in Slovenia in 2023.

(Source: Ministry of Agriculture and the Environment, Slovenia)

1.2.26 Spain

Fire danger in 2023

According to the State Meteorological Agency (AEMET), the year 2023 in Spain was extremely warm, with an average temperature of 15.2˚C in the Iberian Peninsula. 2023 was the second warmest year of the historical record, which started in 1961.

It should be noted that the year was very warm in the South of Galicia, West of Castilla y León, and in the centre of Castilla-La Mancha. 2023 was extremely warm in the rest of the Iberian Peninsula. In the Canary Islands and the Balearic Islands, the year was very warm overall.

In 2023, there were four heat waves in the Iberian Peninsula and the Balearic Islands, occurring in these dates: 9-12 July, 17-19 July, 6-13 August, and 18-25 August. In the Canary Islands, there were three heat waves, two in July (10-14 and 20-24), and one extremely long in August (2-17).

Regarding rainfall, 2023 was very dry in most of Spain, becoming the 6th driest year since 1961, and the 4th in 21st century.

Number of fires and affected surfaces

The provisional statistics for the period between January 1 and December 31, 2023, are compiled with the information sent by the Autonomous Communities on a weekly basis during the high-risk season (i.e., from 1st June to 15th October) and monthly for the rest of the year.

Number of forest fires

According to these data, the total number of fires has decreased by 22.36% compared with the average of the last decade, with a decrease of 18.16% in the number of small fires (area <1 ha) and 30.84% in larger fires (area ≥ 1 ha), respectively.

Table 39. Number of fires in 2023 compared with 10 year average.

	Average 2013-2022	*2023*
Number of fires <1ha	6678	5465
Number of fires ≥1ha	3301	2283
Total	**9979**	**7748**

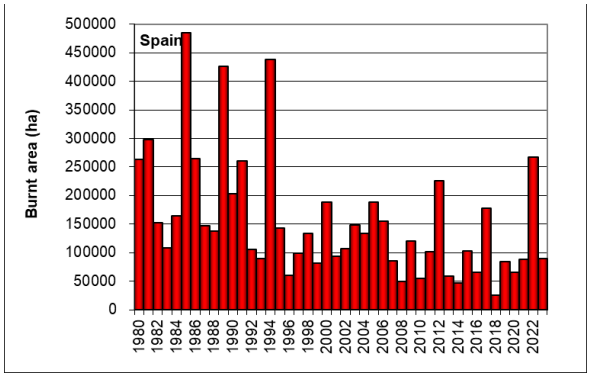
Table 40. Burnt area in 2023 compared with the 10 year average.

Burnt area (ha)	*Average 2013-2022*	*2023*
Wooded land	33655.00	37427.89
Non-wooded land	66851.00	51640.44
Forest	**100506.00**	**89068.33**

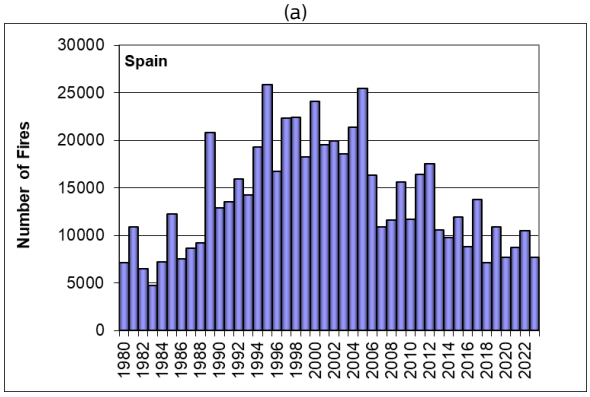
Burnt areas

Regarding the burnt areas, there was a decrease compared with the 10-year average of 22.75% in non-wooded lands and 11.38% in forest areas (sum of wooded and non-wooded lands). Burnt area of wooded lands increased 11.21% compared with the 10-year average. The year 2023 depicts the fourth position of the decade in terms of affected forest area.

The yearly trends in terms of numbers of fires and burnt areas in Spain since 1980 are shown in Figure 128.



(a)



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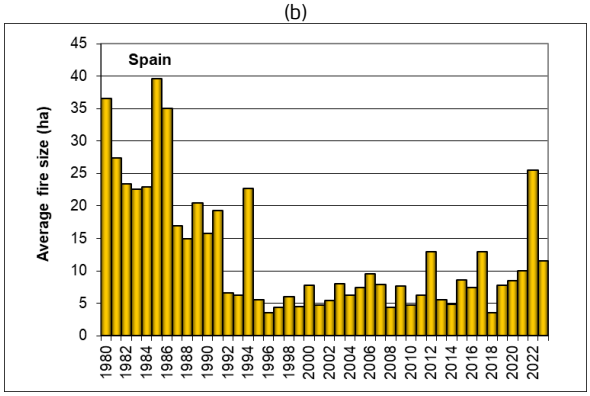


(c)

Figure 128. Burnt area (a), number of fires (b) and average fire size (c) in Spain since 1980.

Large fires

According to the provisional statistics compiled by the relevant departments in the Autonomous Communities, during 2023 there were 19 large forest fires (Grandes Incendios Forestales, GIF), a category which includes fires affecting more than 500 hectares (Table 41). The particularity of 2023 is that only 3 of the large forest fires took place during the high-risk season (i.e., from 1st June to 15th October).

In total, the GIFs accounted for 59.31% of the total burnt area, but only 0.25% of the total number of fires that occurred in the year.

Regarding the incidence of GIF by geographic regions, the Northwest experienced 73.68% of the GIF, accounting for 39.61% of the total burnt area by GIF.

The forest area affected in the Canary Islands was mainly produced (85.90%) by the GIFs that occurred in Puntagorda and Arafo (S.C. Tenerife).

Of the 19 large fires, 10 (53%) had consequences on the population or their assets, and 8 (42%) required the activation of the Emergency Military Unit (*Unidad Militar de Emergencias*, UME) for their suppression. In 16 (84%) of these large fires participated the resources of the Ministry for the Ecological Transition and Demographic Challenge (*Ministerio para la Transición Ecológica y el Reto Demográfico*, MITECO).

Table 41. Large fires (>500 ha) in 2023.

Province	*Municipality of origin*	*Start date*	*Burnt area (ha)*
Asturias	Belmonte de Miranda	09/03	700.00
Castellón/Teruel	Villanueva de Viver/San Agustín	23/03	4220.58
Asturias	Piloña	23/03	552.00
Lugo	Baleira	28/03	1590.05
Asturias	Ponga	28/03	701.40
Asturias	Tineo	29/03	556.60
Asturias	Cangas de Onís	29/03	701.00
Asturias	Parres	29/03	1078.70
Asturias	Piloña	29/03	546.00
Asturias	Tineo	29/03	725.00
Asturias	Belmonte de Miranda	31/03	678.90
Asturias	Piloña	3/04	500.00
Asturias	Valdés	5/04	9750.00
Asturias	Allande	8/04	550.00
Cáceres	Pinofranqueado	17/05	10470.13
S.C Tenerife	Puntagorda (Island of La Palma)	15/07	2600.00
S.C Tenerife	Arafo (Island of Tenerife)	15/08	12529.90
Lugo	Trabada	12/10	2296.53
Valencia	Montitxelvo	02/11	2077.18
Total burnt area			***52823.97***

The two large fires with the widest burnt area were also the ones with major consequences for the population and their assets:

- Arafo (Island of Tenerife): started on August 15 and it was controlled on September 11. However, it reactivated on October 4. It was the largest forest fire of the year, burning an estimated area of 12 529.90 ha. 16 250 people from 8 municipalities had to be evacuated, 2 557 of whom required shelter, and two municipalities were confined. Two interveners were injured. There was damage to houses and 8 roadblocks. For its suppression, UME was activated, together with regional resources and MITECO resources.

Figure 129. BRIF of La Palma working at night on the suppression of Arafo (Island of Tenerife) fire, 23/08/2023. *Source: Ministry for the Ecological Transition and Demographic Challenge, Wildland Fire Management Service, Spain*

- Pinofranqueado (Cáceres): started on May 17 and it was suppressed on June 6. It burned an estimated area of 10 470.13 ha. 700 people from 4 municipalities had to be evacuated, 550 of whom required shelter, and one municipality was confined. One intervener was injured. There were 3 roadblocks. For its suppression, UME was activated, together with regional resources (from Extremadura, Castilla-La Mancha and Castilla y León) and MITECO resources. In addition, Portuguese resources also participated (25 vehicles and 111 firefighters) by means of the Treaty of cross-border cooperation between the two countries.

Geographical distribution of forest fires

Given the heterogeneity of the national territory in terms of meteorology, topography, vegetation and existing socioeconomic factors, forest fires are traditionally analysed by region according to four zones that are considered homogeneous. The defined zones are the following:

NORTHWEST: includes the autonomous communities of Galicia, Asturias, Cantabria and the provinces of León and Zamora.

MEDITERRANEAN: includes the coastal autonomous communities with the Mediterranean Sea, including its interior provinces.

CANARY ISLANDS: includes the entire Canary archipelago.

INTERIOR COMMUNITIES: Includes the provinces of the rest of the non-coastal autonomous communities, except León and Zamora, as well as the Basque Country.

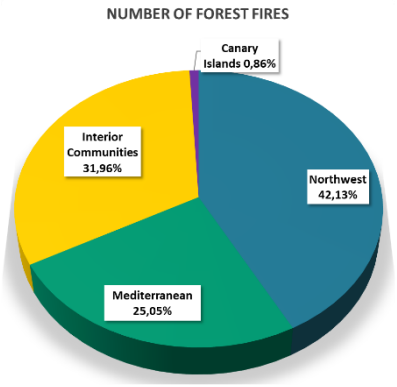
The Northwest region suffered the highest number of fires, with 42.13% of the annual total. It is followed by the Interior Communities (31.96%), the Mediterranean region (25.05%) and, finally, the Canary Islands with less than 1% of the total number of fires.

Considering the wooded land, the highest percentage of burnt area occurred in the Canary Islands (35.10%), followed by the Interior Communities (30.79%).

Regarding the burnt area, the Northwest region depicts 50.25% of the total, followed by the Canary Islands (19.77%), the Interior Communities (19.53%) and the Mediterranean region (10.44%).

The distribution of the total number of fires by geographical area is shown in Figure 130.

a)



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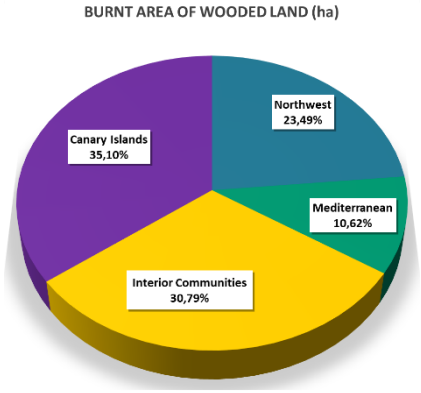

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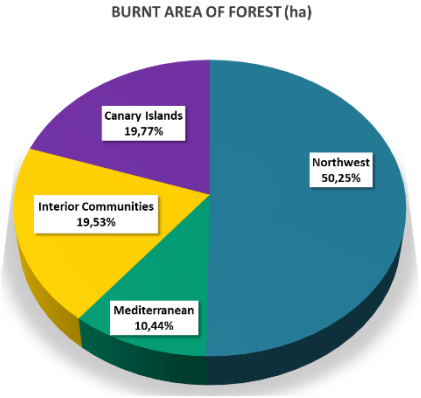


Figure 130. Number of forest fires (a), burnt area of wooded land (b), and burnt area of forest (c) in 2023 by geographic region.

Civil Protection in forest fires

Loss of human life and injuries

In 2023, we regret to report the death of an individual in Nuñomoral (Cáceres) in a fire caused by stubble burn on February 4.

In 9 forest fires, at least 74 people had to be assisted by health services, 26 of them belonging to the suppression teams.

Damage to infrastructure

Due to the continuity of the houses with the forest, the risk of so-called Urban-Forest Interface Fires causes damage to houses and other infrastructures. Thus, in 2023, 8 forest fires caused damage to infrastructures.

Evacuations and disruption to transport

Preventive evacuations were carried out in 55 fires, affecting more than 28 150 people, highlighting:

- 16 250 evacuees, Arafo/Candelaria (Island of Tenerife), August 15 and reactivation in October
- 4 565 evacuees, Puntagorda/Tijarafe/El paso (Island of La Palma), July 15
- 2 357 evacuees, Villanueva de Viver (Castellón), March 23
- 1 200 evacuees, Montitxelvo (Valencia), November 2
- 700 evacuees, Pinofranqueado (Cáceres), May 17
- 310 evacuees, Navelgas/Foyedo y Valdés/Tineo/Lavadoira (Asturias), March 27
- 200 evacuees, Aigües (Alicante), January 16
- 200 evacuees, Tejeda/Vega de San Mateo (Island of Gran Canaria), July 25.

Roads were cut in 32 fires, mostly regional and local, but on 8 occasions the State Road Network was affected. In 7 forest fires, the railroad network was interrupted.

Operations of mutual assistance

Cross-border cooperation with Portugal

In 2023, as in previous years, the Protocol between Spain and Portugal on technical cooperation and mutual assistance in Civil Protection matters and the Additional Protocol on mutual aid in border areas was applied and thus support was given to Portugal in the following operations:

Support with Spanish resources in cross-border fires in Portuguese territory:

- Two with State resources and regional resources of Galicia and Castilla y León
- Eight with regional resources of Galicia
- Three with regional resources of Castilla y León
- One with regional resources of Andalucía
- One with regional resources of Extremadura
- Two with State resources, one by means of the Bilateral Agreement and the other by the Cross-border Protocol.

Support with Portuguese resources in cross-border fires in Spanish territory:

These mutual aid protocols also imply aid from Portugal in the Spanish territory, which materialised in the following operations:

- Extremadura, on 4 occasions

Cross-border cooperation with France

During 2023, there was an intervention of regional resources of Cataluña in Céret (Cerbére) fire on April 16, and Spain received French support in Portbou (Girona) fire on August 4.

Operations of assistance through European Union Civil Protection Mechanism

During 2023, Spain received 5 requests of assistance through European Union Civil Protection Mechanism:

- Chile (27 days, February 2023): in the area of Ñuble-Biobío-Araucanía. Participation of 32 BRIF firefighters, 10 FAST experts from State and regional administrations, and 2 EUPCT officers.
- Canada (14 days, 15-28 June): 100 firefighters from State and regional administrations.
- Tunisia (1 day, July 26): in Mloula Tabarka. Participation of 2 Canadair aircrafts, 1 A400M and 22 personnel, in the frame of RescEU programme.
- Greece (5 days, August 30 – September 3): in the area of Sidiro-Provatonas. Participation of 2 Canadair aircrafts and 26 personnel, in the frame of RescEU programme.
- Greece (7 days, 17-23 September): in Alexandroupolis fires. Participation of 10 FAST experts from State and regional administrations.

Figure 131. Support of Spanish resources in Chile forest fires (February 2023).
Source: Ministry for the Ecological Transition and Demographic Challenge, Wildland Fire Management Service, Spain

State resources for prevention and suppression

Integral Prevention Teams (*Equipos de Prevención Integral de Incendios Forestales*, EPRIF) and Prevention and Assessment Teams (*Equipos de Prevención y Análisis de Incendios Forestale*s, EPAIF)

In 2023, MITECO deployed 17 Integral Prevention Teams (EPRIF) and 7 Prevention and Assessment Teams (EPAIF).

17 EPRIFs were operational during 2023: 4 annuals centred in prevention all year and 13 operational during off-summer months.

EPRIFs mainly work on training activities and meetings with various groups, including ranchers, farmers, hunters, neighbourhood associations, representatives of town halls or teachers, in order to reconcile interests and raise awareness of forest fire prevention.

From January 2022, 7 EPAIF were put in place, bringing together prevention and assessment activities. During low risk season, they work on prevention tasks. In the summer season, they associate with Assessment and Planning Mobile Units (UMAP vehicles) in order to participate in suppression activities, such as giving support to Autonomous Communities or MITECO's Operational Centre by elaborating risk bulletins, meteorological assessments or post-fire analyses. Three of these teams also work on suppression during winter-spring season. During 2023, these teams have continued their work, coordinating with competent administrations and defining their action lines.

It is worth mentioning that, during 2023, these teams treated 820.69 hectares by performing 187 prescribed and controlled burns. This helps to reduce the risk of forest fires by reducing forest fuel and creating discontinuities in the vegetation, while also achieving other objectives such as improving pastures, favouring the habitat of various species or improving accessibility in the forest areas. A total of 700 plots were prepared for burning, although the weather conditions did not allow all of the work to be completed.

Preventive Work Brigades (*Brigadas de Labores Preventivas, BLP*)

The Preventive Work Brigades acted, in collaboration with the autonomous administrations, from the beginning of the year until the beginning of the summer campaign. Once the summer campaign was over, preventive work was resumed, which ended at the end of December.

During these two work periods, they carried out fire prevention work on more than 1 600 hectares of forest land, which mainly consisted of construction and maintenance of strips and areas of greater resistance to forest fires, through clearing, thinning, pruning and prescribed burning.

In total, more than 600 workers distributed in the 10 Preventive Work Brigades carried out preventive forestry work close to the surroundings of BRIF bases. As already noted, the BLPs also work from time to time in support of EPRIFs in the execution of prescribed burns.

The Preventive Work Brigades also collaborate in suppression activities. During 2023, the BLP carried out 54 actions in 20 forest fires.

Reinforcement Brigades in Forest Fires (*Brigadas de Refuerzo en Incendios Forestales*: BRIF)

MITECO deploys 5 BRIF-i during the winter-spring campaign in the Northwest of the Peninsula, and 10 BRIFs during the summer campaign distributed throughout the national territory.

In the summer campaign the BRIF are composed of three teams, each comprising 2 foremen and 14 specialists under the command of 1 technician. For transport and support for fire suppression they have two transport and suppression helicopters with 1 200 litres of capacity. In the Puerto del Pico (Ávila) aerial base, a BRIF-B type brigade is available, which is smaller in size and similar to the brigades of the BRIF-i winter campaign, consisting of 3 teams of 7 specialists, 1 foreman and 1 technician equipped with a single helicopter.

These highly specialised helicopter transport personnel units can operate anywhere in the country where needed. BRIF personnel receive continuous education and training that allows them to act in the most demanding situations and the most complicated fires. The mastery of all techniques of suppression, including backburning, is essential in their performance.

In the 2023 campaign, the BRIF worked for 2 728 hours in 214 fire operations and suppressed a total front length of 218 092 metres. The BRIF with the highest activity during this campaign was that of Tineo (Asturias), with 56 operations summing up the summer and winter campaigns.

During the winter campaign, the BRIF of Ruente (Cantabria) operated 53 times. This BRIF is only operational during the winter-spring months.

Aerial resources

The Wildland Fire Management Service of MITECO coordinates the deployment of the State aerial means, which cover the national forest area throughout the year. During the two periods of highest occurrence of forest fires, winter-spring and summer campaigns, the number of available means is strengthened. Complete information on these means is available on:
https://www.miteco.gob.es/es/biodiversidad/temas/incendios-forestales/extincion/medios_aereos.aspx
During 2023, MITECO's aerial means carried out a total of 793 operations in 306 forest fires, in support of the Autonomous Communities and other countries. In total, they flew for 2 958 hours, making 14 783 drops. Table 42 details the number of State aerial means operations in support of the Autonomous Communities and other countries.

Figure 132. BRIF of Prado de Esquiladores (Cuenca) performing boarding practices, 02/08/2023.
Source: Ministry for the Ecological Transition and Demographic Challenge, Wildland Fire Management Service, Spain.

Table 42. Number of State aerial means operations in support of the Autonomous Communities and other countries in 2023.

Autonomous community	Number of fires	Number of operations	Flight hours	Drops
Andalucía	16	21	59:15	324
Aragón	5	7	10:56	65
Asturias, Principado de	77	114	349:53	2175
Balears, Illes	4	49	253:36	1109
Canarias	9	218	1219:20	6492
Cantabria	45	46	104:46	735
Castilla y León	44	96	280:10	1224
Castilla-La Mancha	8	13	35:58	85
Cataluña	14	19	44:49	130
Ceuta	0	0	0:00	0
Comunidad Valenciana	16	59	252:42	1274
Extremadura	44	101	159:39	648
Galicia	6	2	1:28	3
Madrid, Comunidad de	2	2	1:23	3
Murcia, Región de	0	0	0:00	0
Navarra, Comunidad Foral de	2	2	4:05	25
País Vasco	9	23	54:08	183
Rioja, La	0	0	0:00	0
NATIONAL TOTAL	**301**	**772**	**2832:08**	**14475**
Other countries: Portugal	3	9	50:24	147
Other countries: Greece	1	10	61:56	125
Other countries: Tunisia	1	2	14:26	36
TOTAL	**306**	**793**	**2958:54**	**14783**

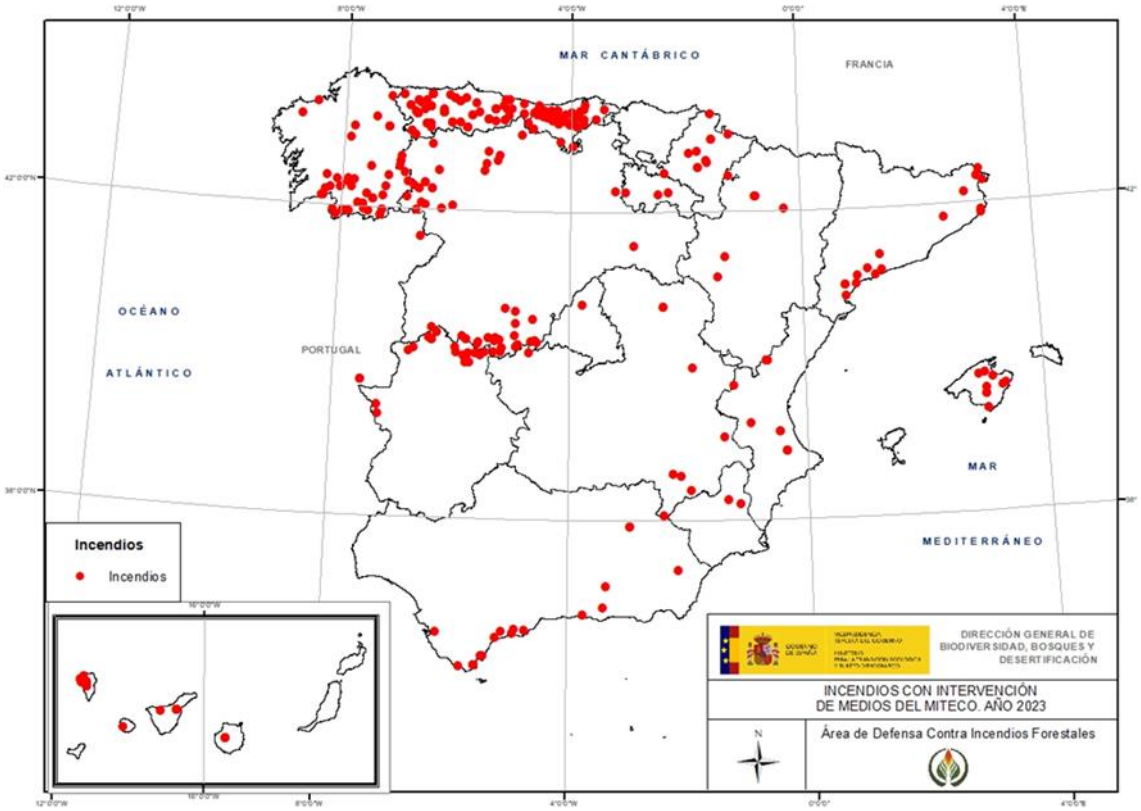


Figure 133. . Location of forest fires with the participation of MITECO resources of suppression during 2023.

Other prevention activities

Training and awareness actions against forest fires

During 2023, the traveling exhibition entitled "*50 years of knowledge and prevention of forest fires*", created in 2019 to commemorate 50 years of the National Forest Fire Statistics (*Estadística General de Incendios Forestales*, EGIF), was shown in various centres and public spaces of several provinces (Navarra, Zamora, Cáceres, Asturias and Palencia).

Artificial intelligence techniques for the analysis and prediction of forest fires

During 2023, the ARBARIA project continued. This is a computer system for the analysis and prediction of forest fires making use of artificial intelligence techniques associated with Machine Learning and Deep Learning. It has been developed together with the Ministry of Agriculture, Fisheries and Food.

ARBARIA uses historical data on forest fires that have occurred in Spain in recent decades and open data related to meteorology and socioeconomic factors. Applying two different algorithmic models, ARBARIA makes it possible to explain and predict the weekly occurrence of fires at the provincial level, as well as to identify patterns of forest fire causality associated with the socioeconomic characteristics of each municipality. The predictive and explanatory capacity of both models provides valuable information for prevention and suppression actions.

Coordination and planning actions

Joint Commission, Ministry of Defence - Ministry for the Ecological Transition and Demographic Challenge

During 2023, two meetings of the Joint Commission were held in order to coordinate the operational, maintenance and availability needs of the Canadair aircrafts owned by MITECO and operated and maintained by the 43-Group of the Air Forces. Meetings were held on February 3 and December 13, respectively, to agree on the deployment and renewal of the aircraft fleet, as well as to analyse aspects of the 2023 campaign.

Committee for the Fight against Forest Fires (CLIF)

This is a technical committee for coordination between the competent administrations in the management of forest fires, chaired by the Deputy Director General for Forest Policy. During 2023, there were two ordinary meetings, before and after the summer season (May 9-10 and November 29, respectively).

Centre for the Coordination of National Information on Forest Fires (CCINIF)

In accordance with Royal Decree-law 11/2005, the main functions of the CCINIF are to channel and make available to all the competent public administrations and in real time, all the available information related to: evolution of fire risk; material, technical and personal means available at all times; and forest fires, once they occur.

Information on operations involving the MITECO's State means is updated twice a day on the webpage. Likewise, the operations of the State means in the forest fires that occurred the previous day are published daily, and the link to the fire risk map published by the State Meteorological Agency for the next seven days is shown.

This information can be consulted updated daily at the following link:
https://www.miteco.gob.es/es/biodiversidad/temas/incendios-forestales/estadisticas-actuaciones.aspx

National Wildfire Preparedness Programme

Regarding to the preparedness actions promoted in 2023 by MITECO in the frame of this Programme, we can highlight the following:

- Joint exercises: in 2023, work focused on planning the 2024 joint exercise, involving the Autonomous Communities of La Rioja, Navarra and País Vasco.
- Expert exchanges: an exchange on aerial resources coordination was held in Sevilla in October 2023. Representatives from 13 Autonomous Communities, SEPRONA (Guardia Civil), 43-Group of the Air Forces and the Emergency Military Unit attended the exchange.

Forest Fires Assessment and Advisory Team (FAST): the team is formed by fire experts mainly from the Autonomous Communities and the State Administration, and they carry out assessment and advisory missions. During 2023, FAST team participated in international assessment missions in Dominican Republic, Chile and Greece.

(Source: Ministry for the Ecological Transition and Demographic Challenge, Wildland Fire Management Service, Spain).

1.2.27 Sweden

Fire danger in the 2023 fire season

The spring in Sweden started with rather cold and unstable weather in March, however, in April the weather was influenced by high pressure with dry weather conditions and only a few episodes with precipitation.

The stable, dry and clear weather conditions continued in May and a warm and a dry air mass was transported into Sweden. The grass fire danger season started in February in southern Sweden and ended in mid-June in northern Sweden. The total number of days with grass fire danger warning in 2023 in Sweden were slightly fewer (96) in comparison to 2022 and 2021 (103 and 108).

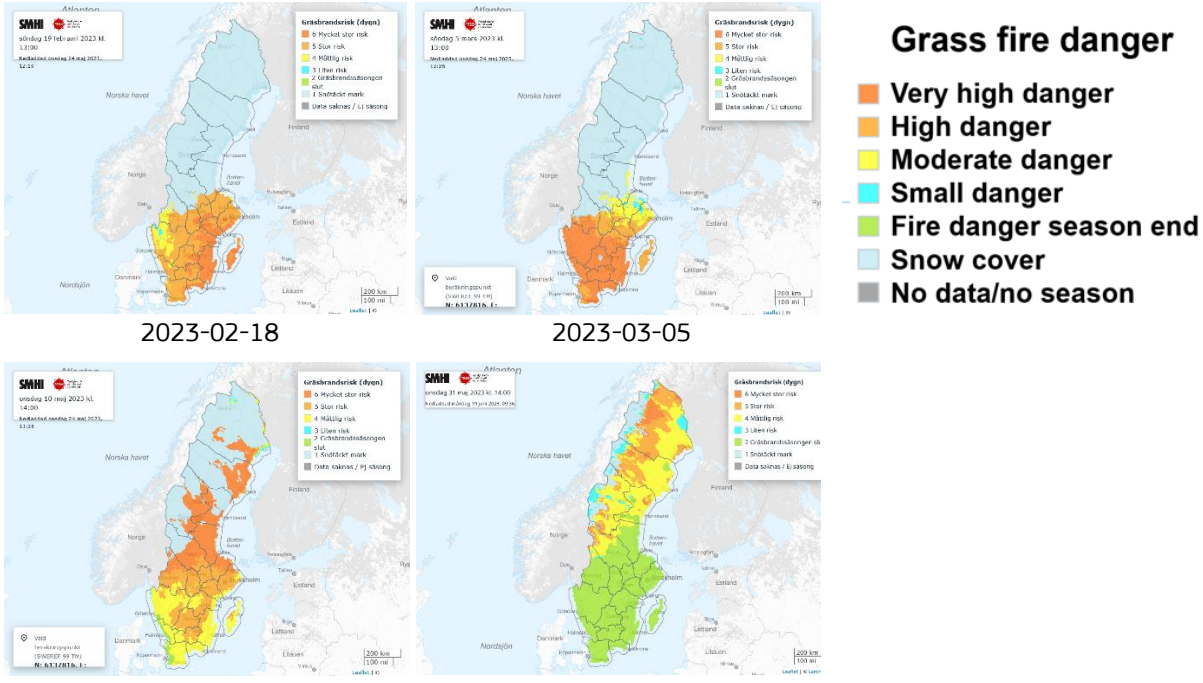


Figure 134. Grass fire danger in Sweden in February – May 2023.

The seasonal variation of weather and fire danger was – to a large extent – divided into two parts during 2023 in Sweden; in general, a warm and dry first part during May and June with an increasing fuel dryness and rather long periods with high to extreme fire danger and a second part in July and August with, in general, humid and unstable conditions with a lot of precipitation.

The forest fire danger season started in the beginning of May when a high-pressure system influenced the weather. Furthermore, it was rather windy conditions which increased the FWI values to very high levels in southern Sweden. The forest fire danger was reduced temporarily in the middle of May and increased again in southern Sweden at the end of the month. In June, the dry and warm weather conditions continued and the forest fire season also started in northern Sweden. In the middle of June, the FWI values reached extreme levels in large parts of Sweden.

In July, the weather became more influenced by low pressure systems and changed into unstable, humid and rather cold conditions. There was a lot of precipitation, especially in south-western Sweden. Thus, the forest fire danger decreased in most regions in Sweden. However, in the south-eastern and the northernmost parts of Sweden there was less precipitation and the fire danger remained very high. In August, the forest fire danger decreased in all parts of Sweden when two deep low-pressure systems passed through Sweden. For several weather stations, it was the wettest August on record, and in several places there were also new precipitation records regardless of month.

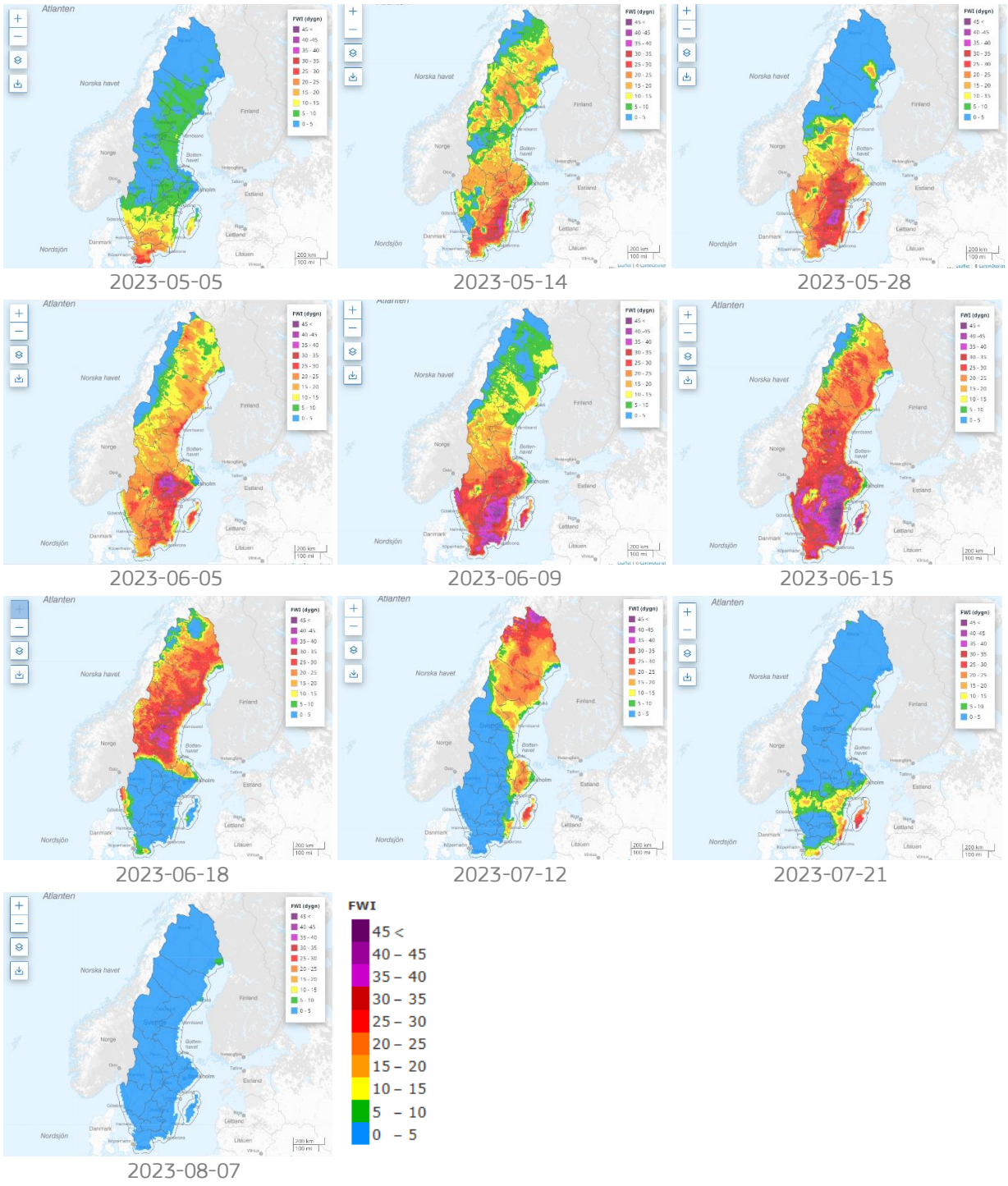


Figure 135. Some examples of forest fires danger maps season 2023, FWI-value.

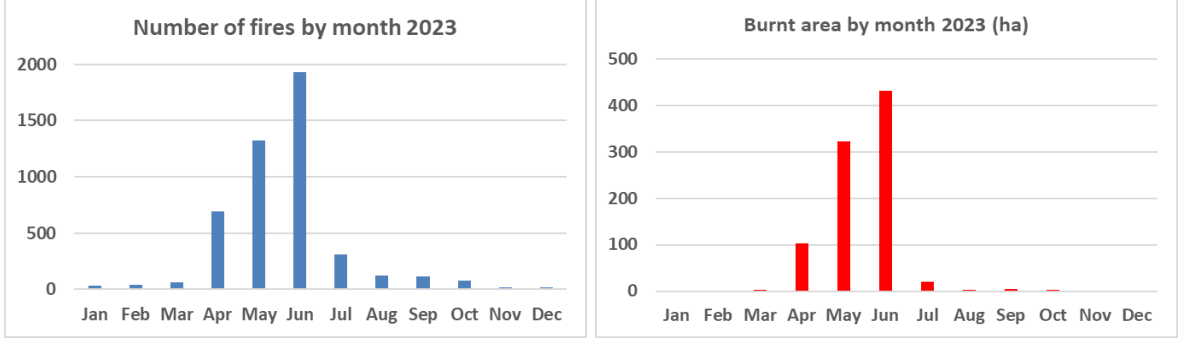


Figure 136. Monthly numbers of fires and burnt areas in Sweden in 2023.

Fire occurrence and affected area

The number of fires recorded during 2023 was 4 744. The burned area consisted of 546 ha productive forest, 197 ha other wooded land, 89 ha other open land and 62 ha agriculture field or pasture.

The burnt area, number of fires and average fire size for the years 1998-2023 are shown in Figure 137.

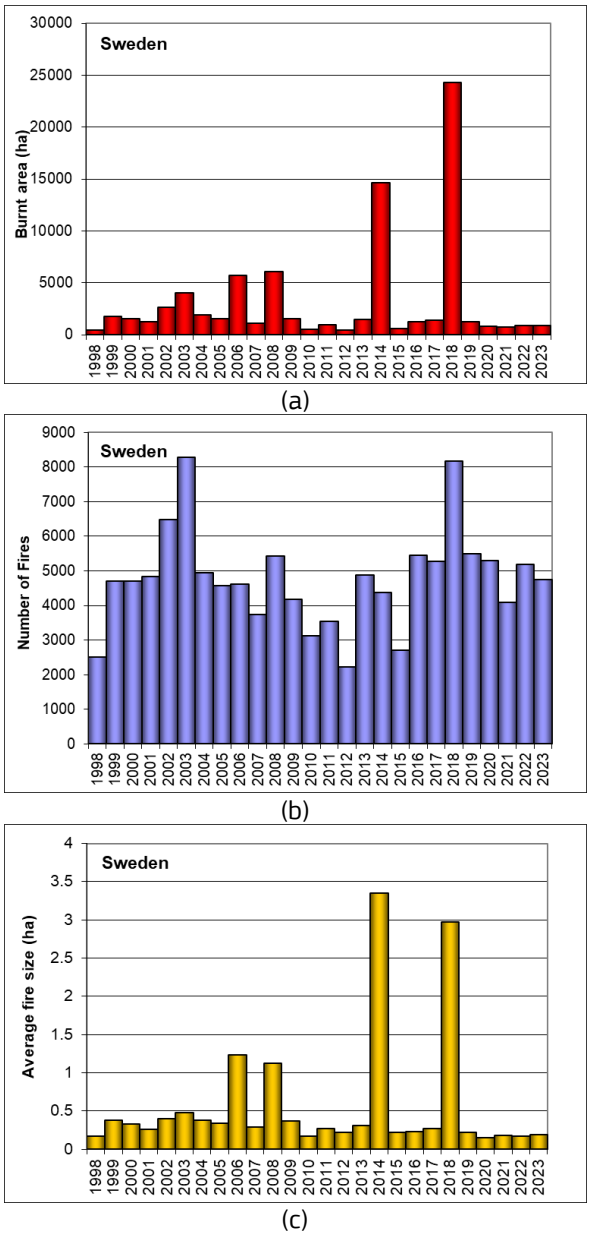


Figure 137. Burnt areas (a), number of fires (b) and average fire size (c) in Sweden from 1998 to 2023.

There were 11 fires equal to or larger than 10 ha. None of the fires exceeded 100 ha. The largest forest fire covered 75 ha and occurred on 12 of June.

Fire causes

During 2023 almost half of the fires had unknown causes (47%) and 17% were deliberate. 11% were caused by use of fire, 5% known but not specified, 4% recreation and 3% lightning.

Injuries and loss of human life

During 2023, 1 civil person died in connection with wildfires. Furthermore, 18 civilians were injured, 5 of which were transported to healthcare.

Notable fires of 2023 in Sweden

Despite the extreme fire weather index values over large parts of Sweden during May and June, none of the wildfires of 2023 grew beyond 100 ha and only one beyond 75 ha.

The largest wildfire of the year occurred on June 12-13th in the municipality of Nybro in southern Sweden. The area burned was 75 ha, most of it during the first day.

A train caused several ignitions along a 4 km stretch of railway in the municipality of Ljusdal in central Sweden on June 14th. The ignitions resulted in three separate wildfires, covering in total approximately 50 ha. Aggravating factors were the long stretch along the railway that caught fire at several points, poor road access in parts, nearby buildings (down towards the lake). A number of different resources were used, such as the national flying reinforcement resources from MSB, the municipality's crisis organization (food supply), the agricultural route's joint organization for machines that, among other things, have large water tanks (mobile manure tanks), local forest contractors, etc.

At Målarberget in the municipality of Norberg, a wildfire that had been under control and left over to landowner patrol re-ignited on 26 June a couple of days after it had first been suppressed. The fire spread was fast with sections of crowning in younger pine stands. The area burned ended at only 27 ha, but the resources put into the suppression of the escape were significant. Lack of water sources nearby impeded the work by ground crews, and the aerial resources were invaluable in the suppression efforts.

Lightning strikes caused a number of wildfires during the second half of June in northern Sweden. Thanks to assistance from the national aerial resources and, in some instances, cooperation with landowner resources, the fires were quickly suppressed.

Figure 138. Nybro wildfire 1.5 hours after the alarm, when suppression forces arrived (*Source: Birgitta Lundgren Enarsson*).

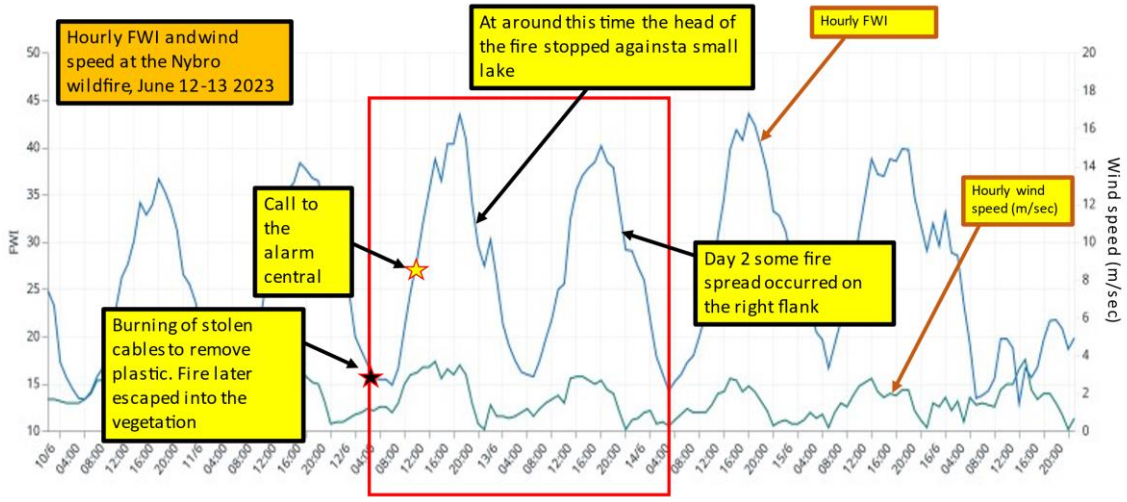


Figure 139. Timeline and FWI values for the Nybro fire.

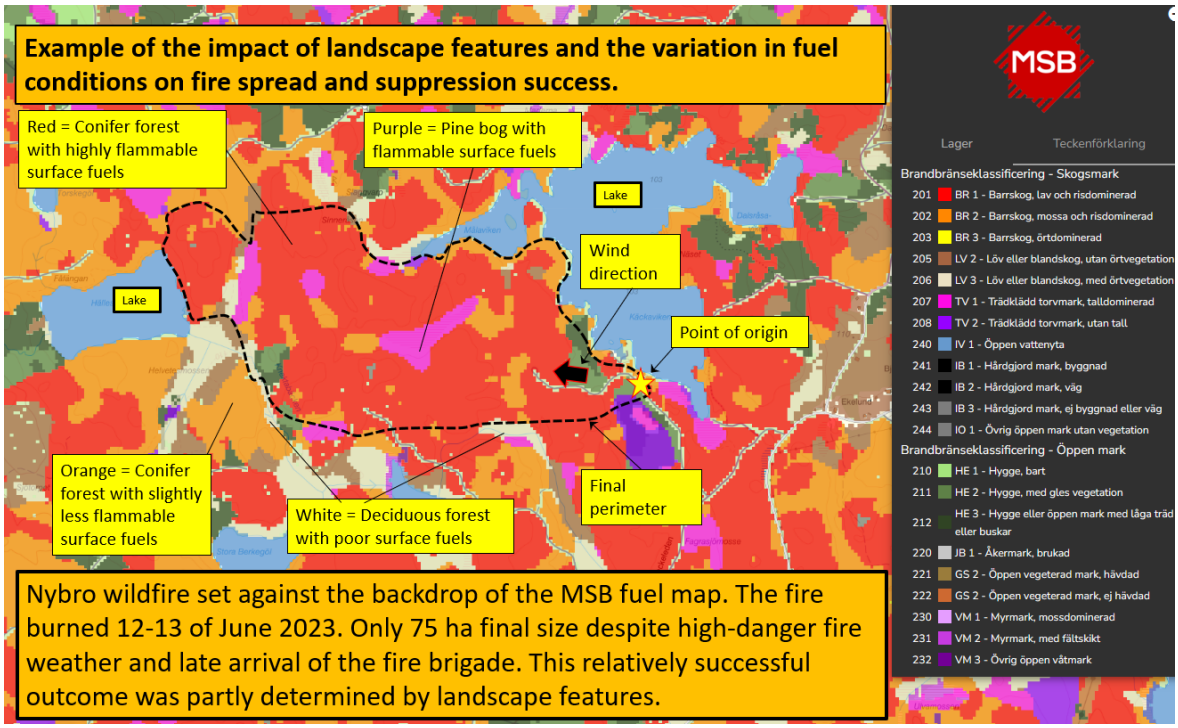


Figure 140. *Source: MSB, Brandbränsleklassificering (Fire fuel classification)* https://msb-bbk.metria.se/

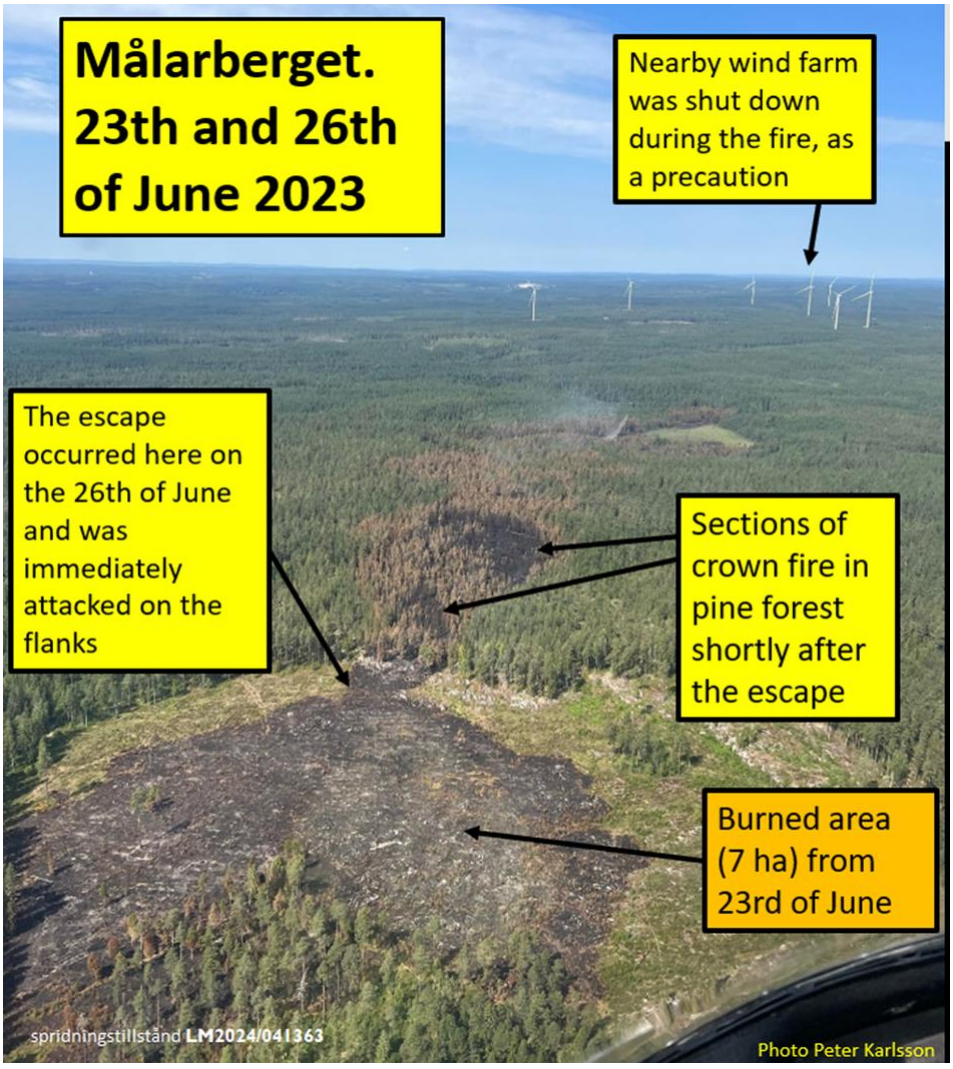


Figure 141. The Målarberget fire. [*Source: Peter Karlsson*].

Text explanations for Figure 139, Figure 140 and Figure 141 have been compiled by Anders Granström, SLU.

Activations of national resources and assistance to rescEU 2023

In 2023, the national airborne reinforcement resources were requested on 119 occasions to wildfires in Sweden. Overall, the airborne resources provided a fast and valuable support to the municipal fire and rescue services. The resources were reallocated on a daily basis to locations with the highest fire danger. The number of activations has continued to increase as the rescue services have become more acquainted with requesting and using the airborne resources. Furthermore, the national material deports reinforcement resources were requested on six occasions.

Remarkably, there were only 7 activations of the national airborne reinforcement resources to wildfires in Sweden in July and none after July, due to humid weather conditions (see the previous section of the seasonal variation of the fire danger).

The Swedish rescEU resources (2 of total 4 Air tractor Fire boss scooping planes) were activated on one occasion to assist on wildfires in Greece in August.

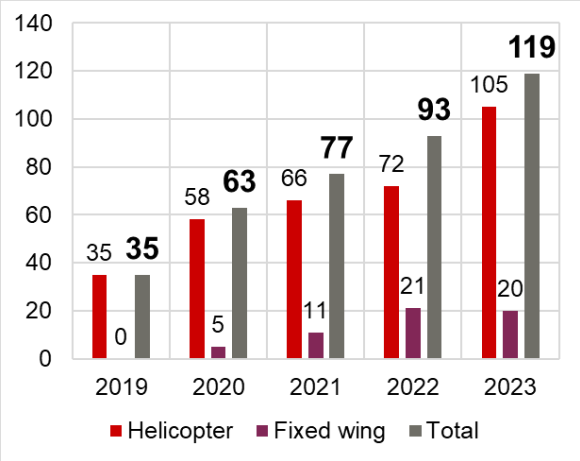


Figure 142. The number of activations of national resources (primarily airborne reinforcement) have continued to increase from 2019-2023 in Sweden. [The bar Total is lower than the sum of the bars Helicopters and Fixed wing since some wildfire operations used both helicopters and fixed wings in 2023].

Prescribed fire and controlled burns, including Natura 2000-areas

Prescribed fire is in Sweden mainly carried out as a habitat restoration measure in standing forest, but also to some extent as a forest regeneration measure to improve seeding on clearcut areas. Reporting controlled burns is not mandatory. Estimates on area burned in controlled burns, also called management fires, is therefore collected from several sources and the actual number is likely to be larger than the verified area that we report here.

The most comprehensive source of information comes from the Swedish Forestry Agency (SFA) who map burnt areas larger than 0.5 hectares on forest land with the help of satellite imagery and incident coordinates. In 2023 the SFA mapped 530 ha of wildfires and an additional 650 ha of controlled burns/management burns. Since most wildfires are smaller than 0.5 ha and low intensity fires in stands with dense tree cover are often difficult to identify in satellite imagery, the number of mapped wildfires will be far fewer than the reported number of incidents. (Source: https://www.skogsstyrelsen.se/globalassets/om-oss/rapporter/rapporter-2024/rapport-2024-06-skogsskador-i-sverige-2023.pdf)

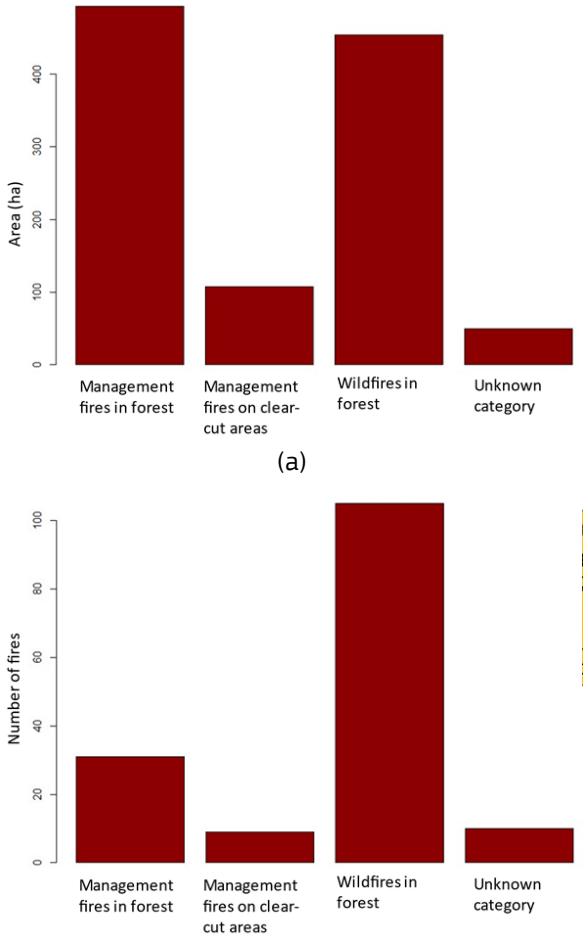


Figure 143 Burnt forest areas larger than 0.5 ha in 2023: (a) Area per category; (b) Number per category.

The LIFE2Taiga-project, an EU-financed project carrying out restoration of the priority habitat 9010 Western Taiga, reports 310 hectares burned by the project partners in controlled habitat restoration burns in Natura 2000-areas in Sweden during 2023. (Map of project areas: https://ext-geoportal.lansstyrelsen.se/standard/?appid=ae8b5316db7d46b38061047fc2c7db07)

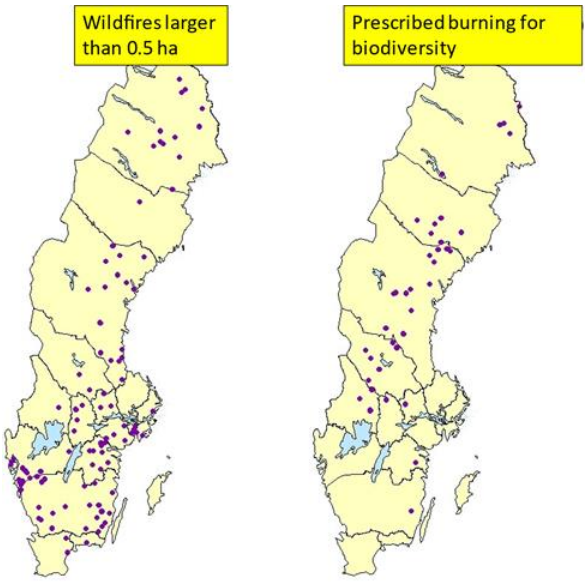


Figure 144. Fires >0.5 ha in 2023 for which the area was measured by the National forest Agency.

MODIS burnt area from EFFIS has been checked against known controlled burns and wildfire incident coordinates. Approximately 50% of the area mapped in EFFIS in 2023 was a result of controlled burns. All of the area mapped by EFFIS in Natura 2000 areas in Sweden in 2023 were due to controlled burns for habitat restoration. The area burnt on firing ranges encompasses both prescribed burns and wildfires.

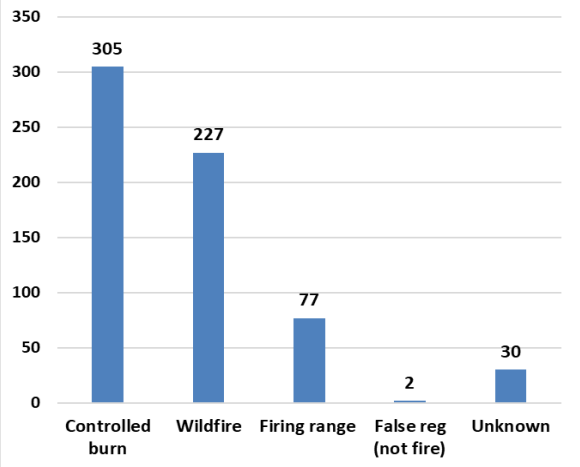


Figure 145. MODIS burnt area from EFFIS, checked against national data for Sweden (hectares).

Fires detected by satellites

Near real-time satellite detection of active fires with VIIRS satellites (NOAA-21, NOAA-20 and Suomi-NPP) has been implemented operationally in Sweden. Alerts are fully automatically sent to the emergency operator (SOS Alarm) with a latency of 15 minutes on average.

During 2023, there were in total 539 satellite detections in Sweden; 95% have been verified as real fires. 61 of a total of 233 detected events were wildfires.

Furthermore, 30% of the wildfires were detected before any alerts from the public. In the figure below, there is an example of satellite detections of the largest wildfire in 2023 in Sweden that occurred on June 12-13th in the municipality of Nybro in southern Sweden.

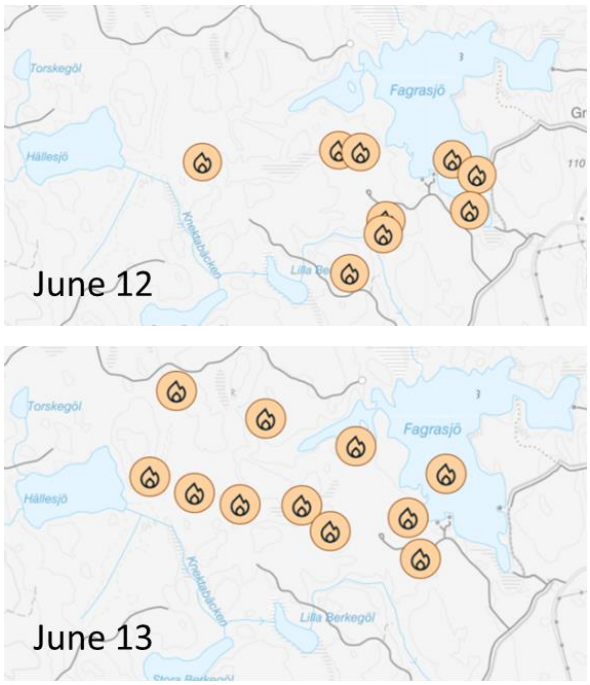


Figure 146. VIIRS satellite detections of the wildfire in the municipality of Nybro in southern Sweden. The spatial resolution of the positioning of the fires is 375 m at nadir; the maximum pixel size at larger scanning angles is about 800 m. The satellite detections correlated well with the spread of the fire.

Two examples of wildfires that were first detected by the satellites in 2023:

- A forest fire was detected by satellite in Gävle municipality on May 27 at 02:00. The municipal fire and rescue service sent resources at 02:22 when the alert from SOS Alarm arrived. On site they concluded that it was a rather large wildfire (300 m × 50 m) and reinforcing resources were called in. According to the municipal fire and rescue service's estimation, the fire was detected approximately 1.5-2 hours earlier thanks to the satellite detection. Thus, without the satellite detection, the fire would have grown even larger and become harder to extinguish.
- A fire was detected by satellite in Markaryd municipality in southern Sweden on May 10 at 12:12. The fire started in a former barn that had been converted into a hostel. The fire spread from the building into the surrounding vegetation and forest. The current fire danger was rather high (FWI daily value > 25) and the municipal fire and rescue service called in national reinforcement resources (2 helicopters). In the evening the fire was under control.

Climate change

During 2023 a new study of changes in forest fire danger under future climate scenarios was carried out by the Swedish meteorological and hydrological institute (SMHI) with fundings from the Swedish Civil Contingencies Agency (MSB). The results indicate a clear increase of high-risk periods of fire danger in southern Sweden and the eastern coastal land of northern Sweden. High-risk periods will occur more frequently, during a longer season, and are both longer and at a generally higher level of fire danger (especially in the middle of the century when the consistency between climate models becomes evident). However, in the midland of northern Sweden the changes are non-robust even for high emission scenarios.

Preventive fire protection measures and risk management in the forestry sector

Forest land covers approximately 68% of the Swedish land area, or 27.9 million hectares. Forestry is an extensive activity, and various works take place in the forest in approximately 500 000 different places in the country per year. Forestry's various players, such as landowners and contractors who carry out forest felling, thinning and land preparation, have developed risk management routines under coordination of the organization Skogforsk.

The industry has, on a voluntary basis, together with several authorities, drawn up a policy with routine and various fire protection measures based on the fire danger level given by SMHI and MSB. The routine means that in the event of a high danger of fire, a local assessment must be made of which protective measures are to be carried out. Through a consultation between the contractor and the client (such as the landowner, timber buyer, etc.), the measures to be carried out are determined and documented. In the event of an extremely high fire danger, the result may be that no work is carried out in the forest.

After a forest fire has been extinguished and further spread prevented by the community's emergency services, the landowner is responsible for guarding and patrolling the fire area and perimeter so that hidden hot spots do not re-ignite and give rise to a new forest fire that spreads outside the previously burnt area. As many of the country's roughly 300 000 landowners have had some difficulties coping with monitoring after a forest fire, a special guidance and information material has been produced. Skogforsk has also maintained this basis in dialogue with authorities and relevant actors.

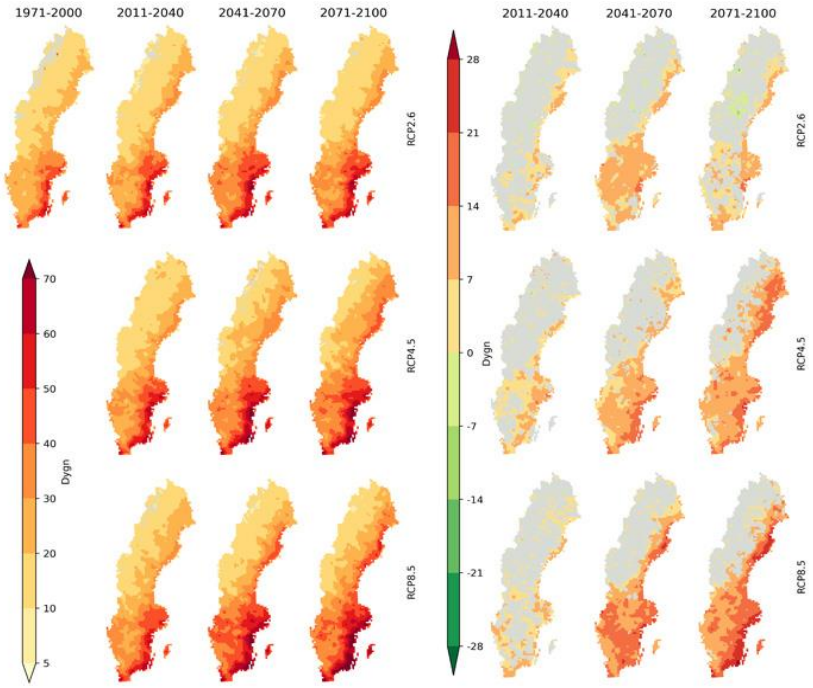


Figure 147. *Average length of the season with high fire danger (left hand side) and future change in the number of days from the historical reference value (right hand side). Every single map shows the median value of the climate model ensemble. Areas with large uncertainties (non-robust changes) are masked with grey colour.*

(Source: Swedish Civil Contingencies Agency (MSB); Civil Protection Department, Natural Hazards and Climate Adaption Section, Sweden).

1.2.28 Switzerland

Weather conditions and state of the forests 2023

In Switzerland, the year 2023 started extremely mild, with maximum temperatures of around 20°C and a marked absence of snow in the mountains. The winter 2022/23 had an average temperature of 1.3 °C above the 1991-2020 norm. It was the eighth mildest winter season since measurements began (i.e., 1864). In the South of the Alps, precipitation in the winter reached between 40 and 65% of the norm. This deficit cumulated on the top of the lack of precipitation of the two previous years. The mild conditions and low rainfall were unfavourable for the Alpine snowpack.

Spring 2023 experienced average temperatures and low rainfall. An exception was the usually cold Alpine valleys with an average temperature of 0.9 to 1 °C above normal. This corresponds to one of the ten mildest springs since measurements began. A rainy March and April resulted in significantly higher than average amounts of precipitation in the Alps and north-eastern Switzerland. The duration of spring sunshine reached 75-90% of the norm in most areas of Switzerland.

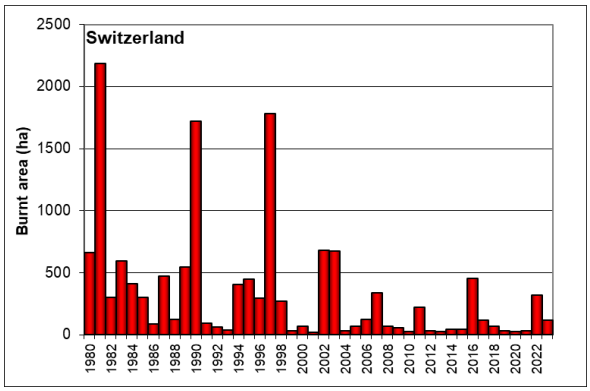
Summer 2023 was marked by two prolonged heat periods. The national average summer temperature (average from June to August) was 1.6 °C above the norm, making it the fifth warmest summer ever recorded in Switzerland. The first heat period was recorded in July with maximum temperatures between 33 and 36 °C, while the second heat period was recorded in mid-August. The total summer precipitation from June to August remained below average, especially in western Switzerland.

Autumn 2023 experienced average temperatures of 2.2 °C above the norm corresponding to the second warmest autumn since the start of the measures. Overall, the three autumn months saw above-average precipitation over a wide area with peaks of 150 to 180% of the normally expected precipitation.

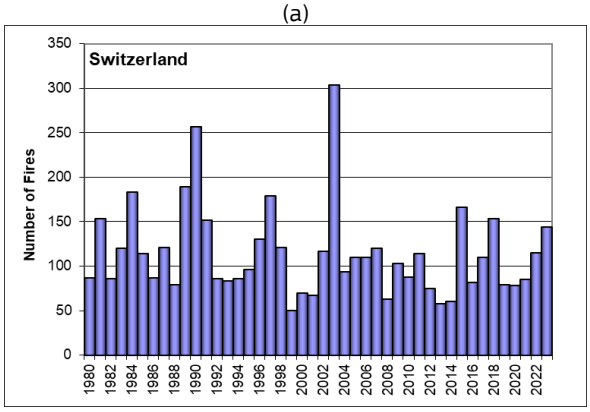
South of the Alps, the end of the year was characterised by strong northerly winds, resulting in dry weather and very mild temperatures.

Fire occurrence and affected surfaces

Due to the mild temperatures, the beginning of the year started with several small wildfires in the south of Switzerland. Later on, until the onset of the first heat period, several small wildfires also occurred north of the Alps.



(a)



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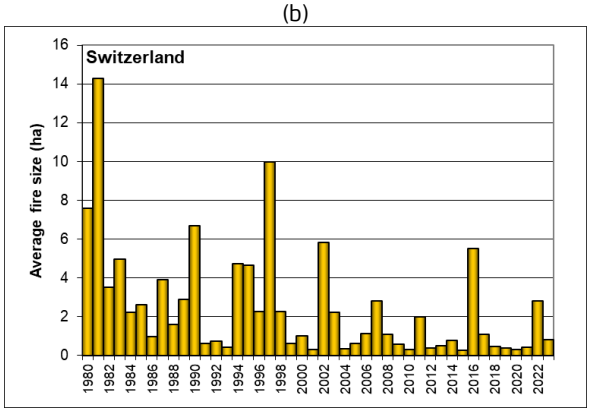


(c)

Figure 148. Burnt areas (a), number of fires (b) and average fire size (c) in Switzerland from 1980-2023.

On 17 July, Switzerland experienced its largest wildfire of the year in Bitsch (Canton Valais), where 100 hectares of forest and grassland burned. The cause, suspected to be a short circuit following the sabotage of a high voltage power lines is still under investigation. The second half of the year saw more wildfires north of the Alps, although they remained localized and small in size.

In total 119.64 hectares burnt in 2023 and 144 wildfires are known.

The summer half year was the main wildfire season in 2023, with 115 known wildfires and the majority of area burnt with 108.3 ha (attributed mainly to the wildfire in Bitsch). In the winter season 29 wildfires occurred for a total area burnt of 11.4 ha.

Fire Causes

The main cause of the wildfires was negligence, whereas in summer 2023, 30 lighting-ignited wildfires occurred.

Fire prevention activities

In early 2023, southern Switzerland faced drought conditions prompting authorities to impose a total fire ban from February through April. Subsequent heavy rainfall in March and April mitigated wildfire danger during the early spring. However, from June onwards, Switzerland experienced low rainfall and high temperatures. The wildfire danger was high in many regions and preventive measures such as fire bans needed to be implemented in several areas. The summer experienced two heat periods, imposing fire bans in the most vulnerable regions. Autumn saw moderate wildfire danger overall, thanks to above-average precipitation on most days. Nonetheless, toward the year's end, dry weather conditions south of the Alps led to an increased wildfire danger. However, the situation did not escalate enough to prompt authorities to implement preventive measures.

Loss of human life

No loss of life or major damages to buildings were reported in 2023.

(Sources: Federal Office for the Environment (FOEN), Swiss Federal Research Institute (WSL), MeteoSwiss).

1.2.29 Türkiye

Fire Danger in the 2023 season

The average temperature in 2023 was 15.1°C, 1.2 °C above the 1991–2020 average of 13.9°C. Monthly average temperatures for 2023 were above long-term monthly averages in July, August and September.

In August 2023, a heat wave occurred in a large area in Türkiye. Temperature records were broken at many stations. Heat waves lasting 5°C and above the 1991-2020 average and lasting between 5-10 days occurred at 22 stations in the central and inner-western parts of Türkiye.

Due to the adverse meteorological conditions mentioned, there has been an increase in both the number and area of forest fires in 2023 compared to the previous year. In 2023, the amount of lost area per fire increased by 0.09 ha/fire compared to the previous year, reaching 6.02 ha/fire

Fire occurrence and affected surfaces

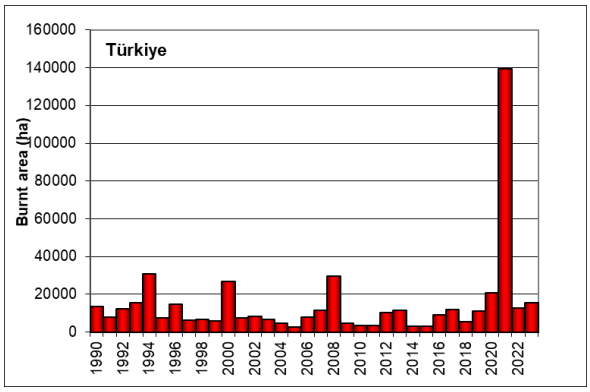
In Türkiye, the coast-line, which starts from Hatay and extends through the Mediterranean and Aegean up to Istanbul, has the highest fire risk. In another words, approximately 57% (12.5 million ha) of Türkiye's forest area is located in fire sensitive areas (Figure 151).

According to data derived from the General Directorate of Forestry, Department of Forest Fire Combating, in 2023 the total burnt area was 15 520 hectares. The number of fires was 2 579 in the same year.

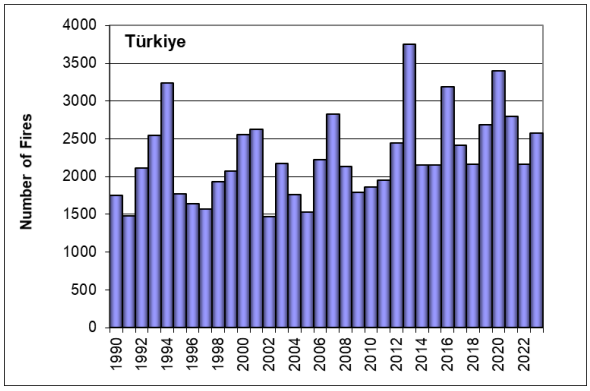
The most notable fires for 2023 are listed below:

Date	Region	Affected Area (Ha)
16/07	Soğukoluk, Belen, Hatay	663
16/07	Kızılkeçili, Çanakkale	1 240
16/07	Kavakoluğu, Gülnar, Mersin	817
26/07	Musacalı, Kınık, İzmir	1 088
22/08	Damyeri, Çanakkale	2 628
04/11	Ilgardere, Çanakkale	1 205

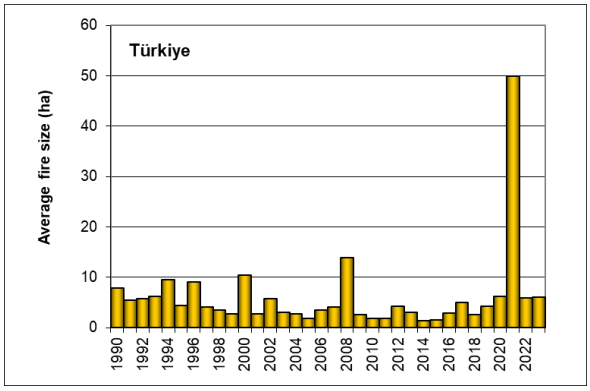
The yearly trends of numbers of fires and burnt areas in Türkiye since 1990 are shown in Figure 149.



(a)



(b)



(c)

Figure 149. Burnt areas (a), number of fires (b) and average fire size (c) in Türkiye from 1990 to 2023.

Forest fires mostly occurred in March-December, particularly in June, July, August and September. When we look at the number of forest fires, August is the highest month with 579 fires and July has the highest burnt area with 7 039 ha.

42% of forest fires occurred in four months (between June and September) and 13 539 hectares of forest area were damaged during this period (Table 43).

Table 44 gives the forest fire statistics for Türkiye 1990-2023.

Table 43. Monthly distribution of forest fires in Türkiye 2023.

Month	Number Of Fires	Burnt Area (Ha)
Jan	131	399
Feb	78	31
Mar	84	42
Apr	61	20
May	58	15
Jun	138	155
Jul	522	7 039
Aug	579	4 808
Sep	563	1 537
Oct	239	260
Nov	108	1 209
Dec	18	6
TOTAL	**2 579**	**15 520**

Table 44. Forest fires in Türkiye 1990-2023.

Year	Fire Number	Burnt Area (ha)
1990	1750	13742
1991	1481	8081
1992	2117	12232
1993	2545	15693
1994	3239	30828
1995	1770	7676
1996	1645	14922
1997	1569	6517
1998	1932	6764
1999	2075	5804
2000	2555	26653
2001	2631	7394
2002	1471	8514
2003	2177	6644
2004	1762	4876
2005	1530	2821
2006	2227	7762
2007	2829	11664
2008	2135	29749
2009	1793	4679
2010	1861	3517
2011	1954	3612
2012	2450	10455
2013	3755	11456
2014	2149	3117
2015	2150	3219
2016	3188	9156
2017	2411	11992
2018	2167	5644
2019	2688	11332
2020	3399	20971
2021	2793	139503
2022	2160	12799
2023	**2579**	**15520**

Fire Causes

In Türkiye, 78% of forest fires take place in forested areas up to 400 metres in altitude.

These areas are:

- High populated areas
- Areas of high migration
- Areas where there are valuable lands
- Places with cadastral problems
- Tourism areas

Most of the fires in Türkiye were caused by human activities (85%). The causes of forest fires in 2023 are shown in Figure 150.

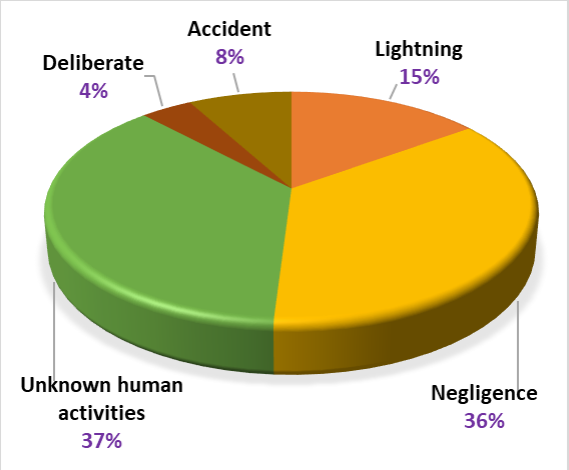


Figure 150. Fire causes in Türkiye in 2023.

In addition to forest fire, General Directorate of Forest has been intervening in agriculture fires in recent years, which is about 3 368 non-forest incidents in 2023 (Figure 152).

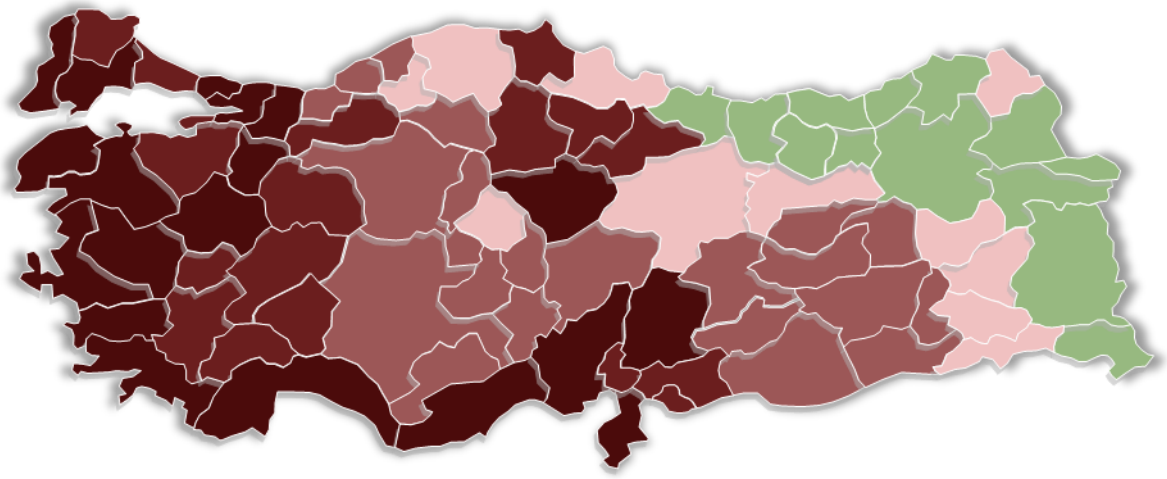


Figure 151. Türkiye Forest Fire Sensitive Map.

Figure 152. Agricultural fire in 2023.

Fire Management

Fire management in Türkiye is carried out under the responsibility of the General Directorate of Forestry (GDF). Duties are carried out by state forest enterprises functioning under regional directorates.

Regardless of the high costs involved, all required activities are planned and implemented immediately. Fire management deals mainly with activities concerning early detection, prevention and control.

Figure 153. Fire Management Centre in Ankara.

The most important factor that brings success in forest fires is early notice of forest fires, then early and effective response to the fire.

Türkiye is one of the countries that uses new generation technologies most effectively, such as artificial intelligence and machine learning in forest fires. In cases of combating forest fires, Türkiye are using cameras, UAV (Unmanned aerial vehicles) and a Decision Support System supported with artificial intelligence to help spot and manage them.

With the Decision Support System, the probability of fire is estimated and possible causes of forest fires are determined.

The infrastructure of this system consists of the behaviour patterns of forest fires that have occurred from the past to the present, the experience of the employees and the technical studies of the scientists. By integrating these into the system, a fire behaviour prediction system is formed and the predicted response methods against possible fires are modelled in real time by combining machine learning and artificial intelligence support. This system supports managers in the coordination and decision making of forest fires.

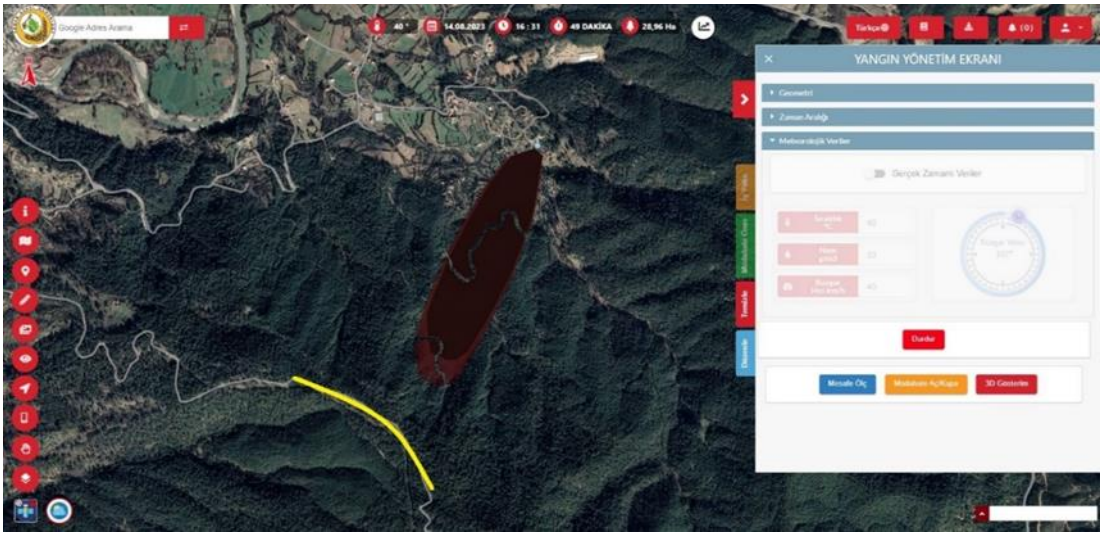


Figure 154. Decision Support System.

Early Fire Warning Systems

So far, a total of 776 fire towers have been built to detect and report fires to firefighting teams. With 368 cameras at 184 points, fires detected in our forests in the fire sensitive zone area are reported to the fire management centres and teams are sent. In addition, forest fires are detected early thanks to 81 unmanned towers equipped with cameras and software.

The system enables rapid detection of forest fire to visible range optical cameras. (Fire Management Centres can also monitor the progress through these cameras. Figure 155).

Figure 155. The camera images from fire towers.

We have 10 UAV's stationed in Muğla, Manisa, Antalya, Adana, Kütahya, Mersin and Çanakkale, and during the fire season, the UAVs make continuous observations for fire detection and fire management. With the UAV, 3 million hectares of land can be scanned against fires in 1 minute. Base stations have been installed on UAVs in order to meet the communication needs in places where there is no GSM coverage area.

Fire detection can be done easily with thermal cameras. Thermal cameras have been found to be very useful for dangers in the ongoing fires at the decision stage. With these tools, the managers are guided in the detection and management of forest fires.

Figure 156. The camera images from unmanned aircraft.

Construction of Pools and Ponds

During 2023, for the purpose of shortening the periods of forest fire attack in forested areas where water sources are scarce, 4 727 fire pools and ponds were used.

With these water sources, the water intake times of the helicopters were shortened (Figure 157).

Figure 157. Fire pools and ponds.

Fire Fighting Means

In 2023, 24 000 personnel were involved in fire detection, communication and extinguishing activities. Ground and air equipment used for firefighting in 2023 are presented in Table 3.

Table 45. Firefighting forces in Türkiye in 2023.

Bulldozer	217	Leased Helicopters	63
Grader	308	Aircraft	10
Fire Truck	1 240	Leased aircraft	14
Water Tank	320	Reserve helicopter	33
First intervention vehicle	2 453	Staff	24 959
Helicopters	465	Volunteer	126 000

Preventive measures

Fire sensitive Regional Forest Directorates

- Construction of fire prevention facilities: Between settlements or agricultural areas and forests, strips are created with fire resistant species. Thus, fires originating from settlements or agricultural lands are prevented from spreading to forests.
- By making silvicultural interventions in forests, it is ensured that the combustible material is reduced and the forests become resistant to fire.
- Fire safety roads and lanes are built and these lanes are maintained every year. In this way, physical barriers are created against forest fires on the one hand, and new fronts are created where fire can be intervened on the other.
- In order to reduce the combustible material load of our forests, cleaning of combustible materials on the roadsides and pruning of trees are carried out.

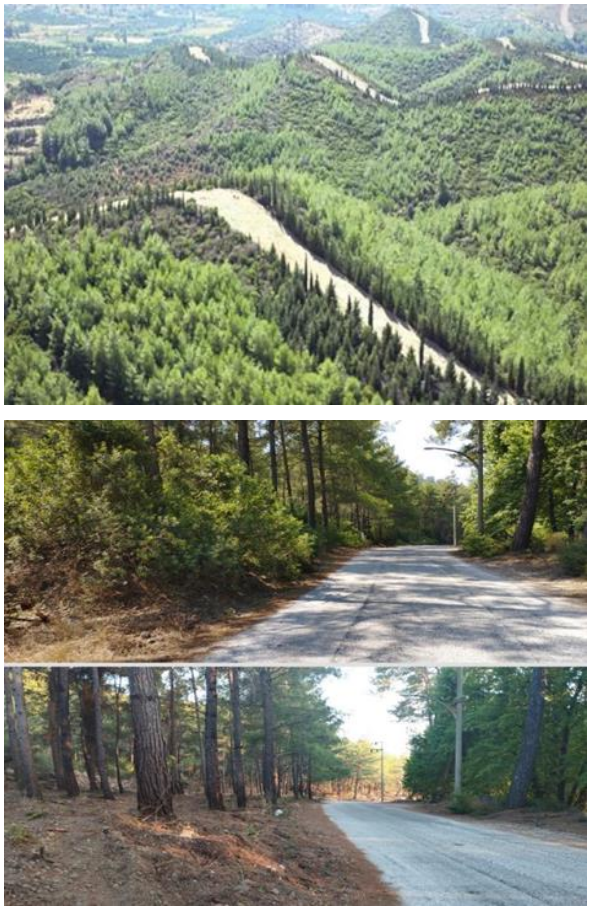


Figure 158. Preventive measures.

MEUS (Meteorological Early Warning System)

We have been using the MEUS (meteorological early warning system) with wind, wind direction, temperature and humidity to create our 3-day daily fire risk maps. (Figure 6). Measures are increased by evaluating hourly changes and relative risks.

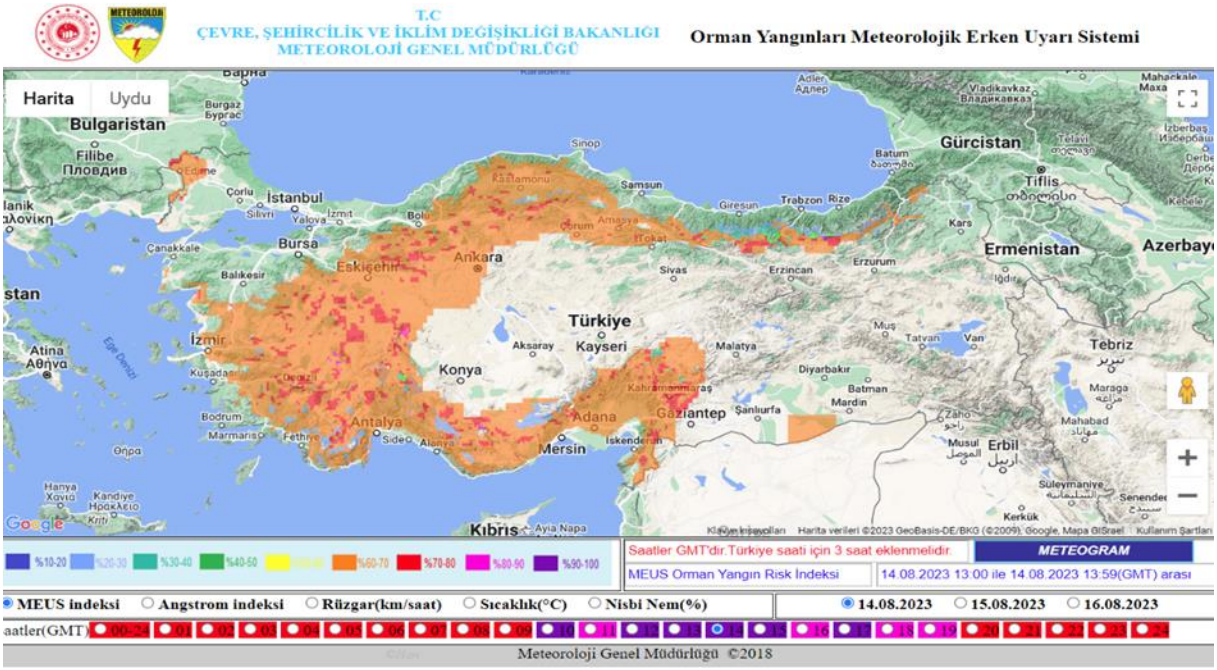


Figure 159. Example of daily fire risk map.

Education, Public awareness and information campaigns.

Several education/training and awareness raising campaigns have been carried out.

A Fire Expert Training Program has been put into effect for personnel who will take charge in forest fires. Subjects such as fire-fighting methods, application of fire-use, first aid etc., have been given to technical staff in this training program.

Figure 160. International Forestry Training Centre in Antalya.

In Antalya International Forestry Training Centre for Personnel Training; a total of 4 300 OGM personnel were trained, including 1 248 forest engineers for Fire Specialization Training, 1 073 sprinkler operators for advanced driving techniques, and 1 979 forest guards. Within the scope of the Fire Management System Training, 238 people from 16 different countries were trained, and 744 people were trained within the scope of other trainings. A total of 5 270 people received training at the Training Centre

Awareness-raising activities for target groups.

Figure 161. Awareness-raising activities in schools.

Awareness-raising activities at national level:

- Activities for specific days and weeks. (e.g. World Forestry Day)
- Coordination meetings with local authorities.
- Cooperation with radio and television channels.
- Cooperation with media and voluntary organizations.
- Training of personnel working in travel agencies and tourist facilities in fire risk areas about forest fires and the preventative measures needed to be taken.
- Training of soldiers and local fire departments.
- We reach our citizens through education and awareness-raising activities in schools throughout the year.

Table 46. Number of fires and burnt area in 2023 by forestry regions and fire size class.

Region	<1.0 Ha		1.1 - 5.0 Ha		5.1 - 20.0 Ha		20.1 - 50.0 Ha		50.1 - 200.0 Ha		200.1 - 500.0 Ha		500.1 - 800 Ha		800.1 – 1500.0 Ha		> 1500 ha		TOTAL	
	Nr Fire	Area (ha)	Nr Fire	Area (ha)	Nr Fire	Area (ha)	Nr Fire	Area (ha)	Nr Fire	Area (ha)	Nr Fire	Area (ha)	Nr Fire	Area (ha)	Nr Fire	Area (ha)	Nr Fire	Area (ha)	Nr Fire	Area (ha)
ADANA	108	12.9	18	40	1	5.9	3	121.2	2	166.0	0	0.0	0	0.0	0	0.0	0	0.0	132	346.1
AMASYA	53	16.7	20	39	4	32.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	77	88.8
ANKARA	22	3.4	22	58	6	59.2	2	66.9	1	70.1	0	0.0	0	0.0	0	0.0	0	0.0	53	257.2
ANTALYA	140	26.3	19	41	0	0.0	1	27.0	1	78.3	1	213.0	0	0.0	0	0.0	0	0.0	162	385.6
ARTVİN	2	0.8	2	2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	4	3.1
BALIKESİR	55	6.9	8	16	4	42.1	1	31.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	68	96.7
BOLU	26	5.5	8	16	3	32.8	1	42.2	1	97.8	1	221.0	0	0.0	0	0.0	0	0.0	40	415.1
BURSA	60	11.0	12	24	1	10.8	2	54.8	1	51.0	1	243.0	0	0.0	0	0.0	0	0.0	77	395.0
ÇANAKKALE	127	15.2	9	22	4	49.0	1	24.4	0	0.0	1	285.9	0	0.0	2	2330.7	1	2629.7	145	5357.0
DENİZLİ	27	7.4	6	11	4	36.5	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	37	55.2
ELAZIĞ	32	11.5	31	70	13	127.0	4	119.6	2	156.3	0	0.0	0	0.0	0	0.0	0	0.0	82	484.6
ERZURUM	14	4.1	2	4	2	12.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	18	21.1
ESKİŞEHİR	16	2.0	11	21	2	21.7	1	35.8	0	0.0	1	313.0	0	0.0	0	0.0	0	0.0	31	393.7
GİRESUN	31	7.9	8	19	4	25.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	43	53.0
HATAY	39	9.9	6	12	2	22.8	1	23.9	0	0.0	0	0.0	1	663.6	0	0.0	0	0.0	49	731.9
ISPARTA	30	3.4	9	14	7	63.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	46	80.9
İSTANBUL	112	16.5	22	55	9	101.0	1	21.6	1	97.9	0	0.0	0	0.0	0	0.0	0	0.0	145	291.8
İZMİR	241	48.5	47	113	12	122.0	6	187.9	4	271.7	3	902.0	0	0.0	1	1089.0	0	0.0	314	2733.8
K.MARAŞ	97	28.9	29	64	10	113.0	4	153.4	2	162.7	0	0.0	0	0.0	0	0.0	0	0.0	142	522.2
KASTAMONU	40	6.7	2	4	1	5.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	43	16.4
KAYSERİ	8	2.0	11	24	3	38.2	1	33.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	23	97.8
KONYA	9	2.9	2	3	2	26.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	13	32.3
KÜTAHYA	26	2.6	4	6	0	0.0	1	43.3	1	178.3	0	0.0	0	0.0	0	0.0	0	0.0	32	230.2
MERSİN	70	13.6	10	22	0	0.0	1	45.3	0	0.0	0	0.0	0	0.0	1	817.1	0	0.0	82	898.1
MUĞLA	294	33.1	16	40	5	55.4	0	0.0	2	274.1	0	0.0	0	0.0	0	0.0	0	0.0	317	402.1
SAKARYA	49	6.9	9	21	2	20.1	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	60	47.9
ŞANLIURFA	25	6.4	2	6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	27	12.3
SİNOP	93	42.4	86	187	29	266.6	1	26.7	1	50.1	0	0.0	0	0.0	0	0.0	0	0.0	210	573.2
TRABZON	30	12.4	13	26	3	33.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	46	71.6
ZONGULDAK	31	3.6	5	9	1	6.9	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	37	19.2
National Park	21	1.9	2	5	0	0.0	0	0.0	0	0.0	1	400.0	0	0.0	0	0.0	0	0.0	24	406.5
TOTAL	**1928**	**374**	**451**	**995**	**134**	**1331**	**32**	**1059**	**19**	**1654**	**9**	**2577**	**1**	**664**	**4**	**4237**	**1**	**2630**	**2579**	**15520**

(Source: General Directorate of Forestry, Ankara, Türkiye).

1.2.30 Ukraine

Through 2023, full-scale invasion of the Russian Federation and active combats continue to be the primary driver affecting spatial and temporal trends in landscape fire distribution. Both sides (the Russian invasion forces and the Ukrainian Military Forces) continue to use forests and windbreaks as shelter for masking of one's forces and military means as well as for fortification settings. Usually the largest forest fires in Ukraine occurred in locations where pine forests dominate. In the last two years (2022 and 2023) spatial distribution of forest fires were determined mostly by the front line and the combat intensity (Figure 162) and partly by UXO / mine pollution.

n 2023, we continue to report the significant impact of war to fire regimes in Ukraine. Large areas of forest lands in Ukraine remain without fire prevention treatments and without any protection due to the high risk to firefighter's lives, especially in occupied territories and areas close to the frontline. By the end of 2023 over 0.708 million hectares of forests that are managed by forest enterprises, institutions and organizations that are coordinated by the State Forest Resources Agency in the territory controlled by Ukraine were designated as impacted by war (potentially has UXO pollution) and 0.214 million hectares were designated as contaminated by mines and UXO. This situation has had a serious impact on fire management effectiveness in Ukraine for now and potentially for decades in advance. The situation regarding forests contaminated by UXO on temporally occupied territories of the forest fund (Autonomous Republic of Crimea, part of Donetsk, Zaporizhzhya, Luhansk, Mykolaiv, Kharkiv and Kherson regions) remains unknown.

Suppression of forest fires in the initial stage is usually the responsibility of the appropriate departments of forestry enterprises (branches of SE "Forests of Ukraine"). Usually if there is a threat of a large forest fire, units from the State Emergency Service of Ukraine, regional state administrations and other services are involved within their competence in order to extinguish the fire. Despite this the implementation of Martial Law by the Ukrainian Parliament in February 2022 changed the situation with a scale of involvement of these services for large wildfires suppression – firefighters from the State Emergency Service of Ukraine have priority for fast response on fires in cities, towns and villages and fires connected with critical and civil infrastructure that still remain the prime target for Russian missile and rocket attacks. A significant proportion of foresters (every 7th: data are current as of August 2023) that were involved in fire prevention and suppression activity had joined the Ukrainian Military Forces and as a result highly experienced personnel were temporarily excluded from the fire protection system.

During 2023, wildfires occur mainly in the War zone (Kharkiv, Luhansk, Donetsk, Kherson and Zaporizzya directions). Distributions of fires were caused by changes in the nature of hostilities in 2023 with the transition to a positional war and the battlefront line became more stable compared to 2022, and there was a significant increase in the density of fires near the frontline (up to 30 km buffer zone).

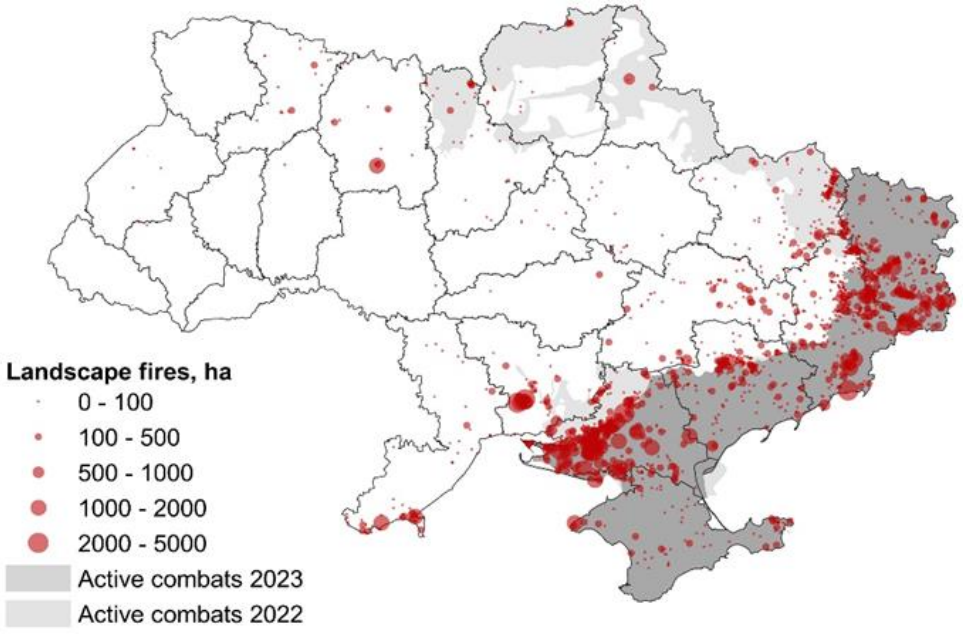


Figure 162. Landscape fires spatial distribution in 2023.
[*Based on European Forest Fire Information System (EFFIS) data*].

Fire danger in the 2023 season

In the 2023 fire season, regions with active combats, such as Chernihiv, Sumy, Kharkiv, Poltava, Dnipro, and Luhansk, had relatively low fire danger during a fire season with relatively cold and rainy weather.

The "meteorological" winter of 2022-2023 in Ukraine came in mid-November 2022, with slight frosts during the day to -3 °C and at night to -9 °C, with significant precipitation in the form of snow, and rain in the South and East part of the country. At the end of January to the beginning of February 2023, a snow cover up to 17 cm high (up to 72 cm in the Carpathians) formed on the territory of Ukraine, except for the southern part of the country, which was preserved everywhere mainly until the middle of February, only in the Carpathians and in the North-East of the country – until the beginning of March 2023.

The fire season of 2023 started unusually late, on April 19. The beginning of spring (March 2023) was cold, with a significant amount of precipitation. In the first half and at the end of the month, air temperatures reached +6...–3 °C during the day and 0...–10 °C at night. Favourable hydrometeorological conditions for the formation of a powerful, long-lasting spring flood in 2023 on the territory of Ukraine. As a result of these factors, the natural conditions for the occurrence of forest fires were formed only in the middle of April 2023.

The beginning of spring in Ukraine, according to long-term observations, is characterized by a small amount of precipitation. However, March 2023 became an exception. Precipitation was observed throughout the country (in the middle and at the end of the month).

April 2023 was unusually rainy. As a result of the mentioned natural factors, the first peak of the combustibility of Ukrainian forests, which usually falls every year at the end of March - April, did not occur in 2023.

May 2023 was slightly dry – only in the last third of May, insignificant precipitation occurred over almost the entire territory of Ukraine.

June, was drier than last year, with an average КПН class (fire danger class) of 3.29, and a number of large forest fires that occurred mostly in the East and South part of Ukraine.

August, usually dry and hot, in 2023 was characterized (for the second year in a row) by significant precipitation in all the territory of Ukraine.

September and October were atypically dry especially in the South part of the country there was a long-lasting 5th-class (extreme) fire danger.

In autumn, every year, in September-October, the East of Ukraine is dominated by hot South-East. wind from Asia, which has the local name "Syhoviy". Periodically for several days, it gains strength and speed from 10 m/s to more than 20 m/s. During the active shellings in September-October 2023 in the East of the country, the Russian occupiers actively used natural conditions (long drought and prevailing wind) to intentionally set fire to natural landscapes with artillery fire, including incendiary ammunition, as a result of which a significant number of small and large forest fires occurred.

Long wet weather conditions formed in November and marked the end of the fire season 2023.

According to the updated national system of fire danger assessment, which was adopted in 2018, the level of fire danger was not high and quite similar to the 2022 fire season (Figure 163). Only during the autumn months, (September and October) fire danger in 2023 was much higher.

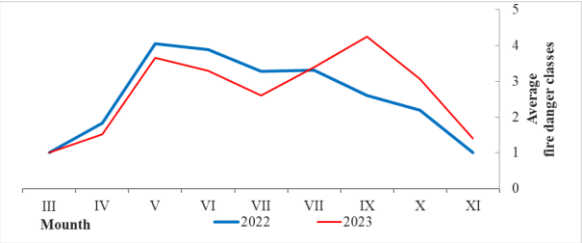


Figure 163. Fire danger classes by national КПН index. 2022 vs 2023.

In 2023, a relatively low level of fire danger was observed. Considering this, it becomes apparent that the severity of Ukraine's 2023 fire season continue to be impacted by war, not extreme weather conditions.

Fire occurrence and affected surfaces

The fire monitoring was carried out without taking into account a large part of the forests (in particular, Zaporizhzhya, Luhansk, Mykolaiv, Donetsk, Kherson and other regions), where military operations were conducted, and part of the territories of these regions are currently under the control of the occupiers. Due to this, total burnt area will be corrected only after the liberation and demining of temporarily occupied territories. The fire statistics comes only from enterprises that are under subordination of State Forest Resources Agency of Ukraine (73% of all forests).

In 2023, on controlled by Ukrainian government forests, 593 fires with a total burnt area of 906.84 hectares were recorded in the forests belonging to the State Forest Resources Agency of Ukraine (Figure 164). The average area of one fire decreased 10 times compared to last year and 2.8 compared to the long-term average, and amounted to 1.53 hectares (Figure 165).

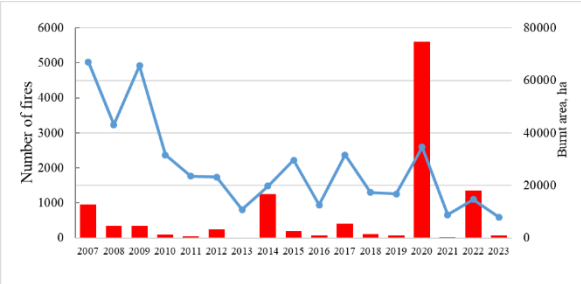


Figure 164. Burnt areas and number of in Ukraine from 2007 to 2023 (N.B. *Official statistics are available only from liberated areas and only after verification by ground teams, so the real burnt area is much larger*).

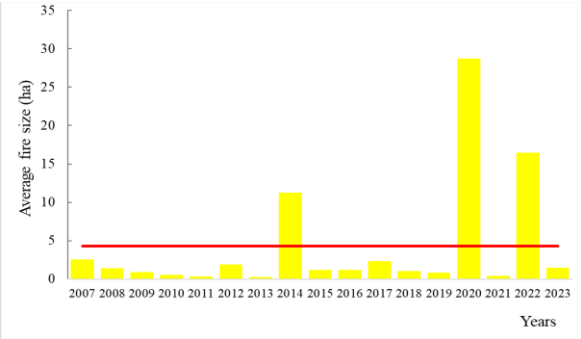


Figure 165. Average fire size in Ukraine from 2007 to 2022 (N.B. *Official statistics are available only from liberated areas and only after verification by ground teams, so the real burnt area is much larger*).

Most forest fires on 2023 occur in the late spring - early summer (36.6% of all fires) and autumn – September and October (38.8% of all fires). In Autumn, active combats were combined with fuel availability (Figure 166).

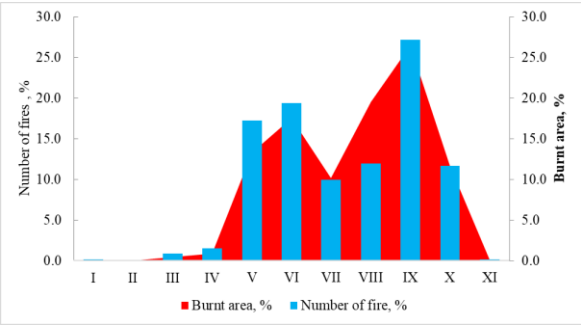


Figure 166. Number of fires and burnt area distribution by month in the 2023 fire season.

During the fire season, there were 35 large forest fires (burnt area size from 5 to 200 hectares). The total area of all large forest fires since the beginning of the year was 446,6 hectares. The total area of registered large forest fires decreased by 47.9 times compared to last year, that have similar weather conditions.

Only in the territories, controlled by Ukraine, were registered crown fires on an area of 20.1 hectares. More than 50% of crown fires occur in August – especially in the East and South regions because of impossibility of fire suppression actions. As a result, small surface fires grow on uncontrolled crown fires (Figure 167).

Figure 167. Crown fire distribution by month in the 2023 fire season.

Enterprises, institutions and organizations of the forestry industry systematically participate in the elimination of fires that occur in natural ecosystems outside the forests (fields, meadows, peatlands, garbage dumps, agricultural lands, etc.) bordering forest areas. The departmental fire protection took part in the suppression of 2.4 thousand cases of such fires on a total area of 1.1 thousand hectares.

Economic losses

The economic losses caused by forest fires are shown in Figure 168. In 2017 they were estimated to be around 43 800 000 Ukrainian hryvnia (UAH), in 2018 – 27 200 000 UAH, in 2019 – 6 700 000 UAH, in 2020 – 19 100 000 000 UAH, in 2021 – 2 100 000 UAH, in 2022 – 1 220 577 000 UAH, and in 2023 – 7 000 000 UAH.

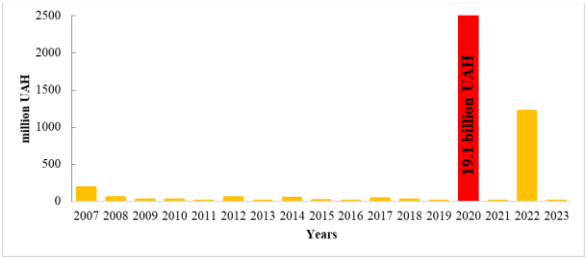


Figure 168. Economic losses caused by forest fires (*data provided by the State Forest Resources Agency of Ukraine and State Service of Statistics*).

Fire Causes

During the last decade, the majority of forest fires (more than 85%) were caused mainly by the negligence of local people. The main cause of forest fires was the violation of the fire safety requirements in forests during the fire season. But in the last 2 years the main cause of forest fires was the ignitions as a result of active hostilities, and shelling, as well as the presence of explosive objects in them, 62% of all forest fires in 2022, and 48% in 2023 respectively.

Fire fighting means and fire prevention activities

The war has had a serious impact on fire management, especially on fire prevention and fire suppression limitations. Despite this, in order to prevent forest fires, enterprises installed almost 7.6 km of firebreaks and 37.6 thousand km of narrow fuelbreaks (up to 2.8 metres wide), and 167.9 thousands kilometres were maintained. A network of 492 fire-watching towers has been created in the forests, of which 436 are equipped with modern television surveillance systems for prompt detection of forest fires.

9 847 billboards and posters on fire prevention are displayed in forest areas along public roads and in public recreation areas. 1 270 articles were published in the mass media, 341 radio and 87 TV appearances were organized, 10 657 lectures and discussions were held on compliance with fire safety requirements in forests.

As part of the all-Ukrainian recreation development program, 57 new typical recreation points have been built to ensure safe recreation of the population in the forest. It is planned to create five classes of leisure centres throughout the country - from small and simple to complexes with a full-fledged infrastructure. One of the goals of this activity is to ensure forest fire protection in the locations with the biggest anthropogenic pressure and high fire risks.

Contamination of forests by mines and UXO leads for limitations especially in fuel management and fire suppression activity, due to high risk for life of involved personnel. By the end of 2023 over 0.708 million hectares of forests that are managed by forest enterprises, institutions and organizations that are coordinated by the State Forest Resources Agency in the territory controlled by Ukraine were designated as impacted by war (potentially has UXO pollution) and 0.214 million hectares were designated as contaminated by mines and UXO. The demining process is initially prioritizing urban areas, settlements, roads, and agricultural fields, with forests having the lowest priority. Demining activities have commenced in liberated regions, yet it has been observed that demining in forested areas presents greater challenges compared to other landscapes, with an estimated progress rate of around 12 square meters per day.

Under national legislation, specialized licensed authorities are responsible for conducting demining operations in Ukraine. The country receives international support for demining efforts, including assistance from organizations such as the United Nations Development Program (UNDP). To keep citizens informed, the State Service of Emergency Situation of Ukraine has launched a webpage (https://dsns.gov.ua/map-demining), displaying contamination areas and the extent of demining work accomplished throughout the territory of Ukraine (Status quo report, 2022). A Special State Mine Action Centre has been founded to facilitate the coordination among multiple organizations, including government agencies, non-governmental organizations (NGOs), and international donors.

For the purpose of professional forest fire training of workers who are involved in forest fires suppression and involved in prevention, the State Enterprise "Forests of Ukraine" issued order No. 1071 dated 02/05/2023 "On the establishment of the "Forest Fire Centre" branch on the territory of the Desnyan settlement community of the Chernihiv district and by order of SE "Forests of Ukraine" dated 02/05/2023 No. 1072, the Regulations on the "Forest Fire Centre" branch were approved. The purchase of property necessary for conducting practical classes and accommodation for industry specialists was carried out. Given the proximity of the "Forest Fire Centre" branch to military facilities, a decision was made to move it to safer location. At the moment, it is registered in the Lugyny, Zhytomyr region. From February 26, 2024, training for 2 groups of 60 people is planned under the program "Forest fire incident commander".

Additionally, the government has taken steps to enhance awareness among forestry personnel regarding the risks associated with unexploded ordnance (UXO) contamination. Training sessions have been organized to educate foresters on mine identification and safety protocols.

The State Forest Resource Agency reported that 2 461 foresters involved in fire prevention and fire suppression activity have been mobilized (every seventh one is involved).

Obtained equipment for forest firefighters. The level of communication and interaction between the State Emergency Service of Ukraine and the State Agency of Forest Resources of Ukraine has increased. The following was received from the State Emergency Service of Ukraine: 36 firetrucks, a crawler, 7 motor pumps, and 44 sets of clothing for firefighters.

International technical assistance.

Ukraine-Lithuania. Firefighting equipment (5 fire trucks) and 300 sets of forest firefighters clothing were received. Ukraine-Estonia. Received 2 fire trucks.

Research activities

In 2023, several research projects and guidelines aimed at improving fire management were completed:

1. "To study features of pyrogenic damage in forests growing in different natural zones in Ukraine and develop the activities to reduce its negative consequences" S. Sydorenko, Ye. Melnyk, I. Koval, V. Voron, J. Kaczmarowski, V. Korsovetskyi. Ukrainian Research Institute of Forestry and Forest Melioration named after G. M. Vysotsky (URIFFM)– Forest Ecology Sector. Steppe Branch of URIFFM.

The project was started in 2020, the project duration is 5 years. The project was started at the request of the State Forest Resources Agency of Ukraine (State Registration No 0120U101893).

2. Quantitative assessment of carbon losses after forest fires in Ukraine / Sydorenko S.H., Koval I.M., Melnyk Ye. Ye., Voron V.P. Kharkiv: URIFFM, 2023. 23 p.

The document presents approaches for assessing short- and long-term carbon losses in forests damaged by fires, taking into account the type of fire, its intensity and severity.

3. Methodology for assessing the probability of forest fires under climate change for Ukraine/ Sydorenko S.H., Balabukh V.O., Melnyk Ye.Ye., Voron V.P., Koval I.M. Kharkiv: URIFFM, 2023. 27p.

Approaches for assessing changes in the forest fire density taking into account climate change scenarios are presented. The document provides information on projections of individual indicators under various climate change scenarios and their impact on the projected change in fire density and forest combustibility (total burnt area per each 1 000 ha of forests). The document can be used for developing projects of forest fire prevention, and fire management planning in the long term.

4. Ukrainian wildfires of war: changes in fire regimes as a result of the direct and indirect effects of war / Sydorenko S.H., Cathelijne R. Stoof. Postdoctoral research has received funding from the MSCA4Ukraine under grant agreement No 1233687.

The objective of the study is to describe the main fire regime in Ukraine and determine the direct and indirect influence of war on this fire regime. Direct influence of war on fire regimes studied according to three temporal periods for all types of landscape and protective areas (Emerald network): 1) during normal period (before war); 2) on a period of local war on the East (2014-2021) and 3) a total war period (since 24 February 2022).

Indirect impact of war assessed due to land use and demographic changes in Ukraine (effects on human activity in terms of ignitions and fuel buildup as well as the influence of people moving into safer regions and changing their activity). As a final output of the study, maps of fire regimes for Ukraine will be developed as well as quantitative estimation of war impacts on natural landscapes.

5. FirEUrisk. This project has been granted funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement no. 101003890. Contributors from Ukraine: Zibtsev S.[1], Myroniuk V.[1], Bogomolov V.[2], Sydorenko S.[2], Soshenskyi O.[1], Kashparov V.[3], Holiaka D.[2]

[1] *Regional Eastern Europe Fire Monitoring Centre*

[2] *Ukrainian Research Institute of Forestry and Forest Melioration named after G. M. Vysotsky*

[3] *Ukrainian Institute of Agricultural Radiology of the National University of Life and Environmental Sciences of Ukraine*

FirEUrisk is a H2020 European project that aims to improve wildfire risk assessment in Europe. We will develop a science-based strategy that includes new tools for assessing the danger and the vulnerabilities of communities and landscapes, reducing their wildfire risks and adapting them for a resilient future.

References:

Poliakova Liubov, Abruscato Silvia (2022). STATUS QUO REPORT – Supporting the recovery and sustainable management of Ukrainian forests and its forest sector. FOREST EUROPE – Liaison Unit Bonn Rapid Response Mechanism - Emerging Issues. Available at: https://foresteurope.org/publications_type/status-quo-report-supporting-the-recovery-and-sustainable-management-of-ukrainian-forests-and-its-forest-sector/

Public Report of Head of State Forest Resources Agency of Ukraine, 2023. Available at: http://surl.li/zixfnt

(Sources: Ukrainian Research Institute of Forestry and Forest Melioration named after G. M. Vysotsky; State Forest Resources Agency of Ukraine; The State Enterprise "Forests of Ukraine"; State Enterprise Forestry Innovation and Analytical Centre, Ukraine).

1.2.31 United Kingdom

Introduction

Parts of the UK experienced a seventh consecutive year of a prolonged dry period as well as several dry and very warm periods, especially in Spring. However despite high temperatures and warm periods the number and impact of wildfires significantly reduced in comparison to 2022.

Fire danger in the 2023 season

The Met Office reported that 2023 broke a number of high temperature and rainfall records over the year, and this pattern is also consistent with our changing climate. 2023 is one of the five warmest years on record for the United Kingdom.

The lion's share of warm, dry, settled, sunny weather during the summer occurred in June – this being the warmest summer month (the last time this occurred was in 1966). Temperatures exceeded 30°C in the UK on five days in June, only one in July and none at all in August, with the highest summer maximum a modest 32.2°C compared to last year's unprecedented 40.3°C record for the UK.

The average mean temperature of 15.8°C in the month eclipsed the previous record for the Junes of 1940 and 1976 by 0.9°C, a huge margin. The UK monthly mean temperature was 2.5°C above the 1991-2020 average, this being the highest monthly anomaly since December 2015. Met Office scientists found that the chances of surpassing the previous record of 14.9°C had more than doubled since the period around 1940 due to human-induced climate change.

Unusually, the two most prolonged spells of fine weather occurred in June and September, separated by rather unsettled weather in July and August, including two named storms.

The early September heatwave saw temperatures exceeding 30°C somewhere in the UK for a run of seven consecutive days, a UK record. This resulted in the UK's joint-warmest September on record for the UK – and the warmest for England and Wales – in series which go back to 1884.

Temperatures peaked at 33.5°C at Faversham on 10 September, in what was the highest temperature recorded in the UK in 2023 – only the fifth time this has occurred in September in observational records.

England

Dept. for Environment, Food and Rural Affairs (Defra)

Working with the Forestry Commission, Defra funded and supported the development of a training programme, designed to consolidate knowledge, skills and understanding of vegetation fires including wildfire incidents and prescribed fire operations. Since its development in 2021, more than 1 000 Lantra accredited training modules have been completed by both public and private land managers and researchers.

England and Wales

To ensure that learning and areas of good practice was captured the NFCC lead officer undertook a wildfire survey of the 2022 seasons. This also captured commentary on climatic factors, national and regional activity levels and lastly a suite of key learning and areas of good practice that could be shared across the sector and partnership environments.

Across 2023 the NFCC lead officer has collaborated closely with colleagues to bring the learning and Areas for Improvement from the survey and debrief process into new ways of working and where further partnership opportunities may exist.

2023 Wildfire Season Incident update: There were 293 wildfires recorded on the National Resilience Reporting Tool (NRT). This represents a 60% decrease on the 2022 reporting period.

UK Fire and Rescue services continue to apply the following criteria to differentiate between more severe and impactful wildfires and other vegetation fires.

- Involves a geographical area of at least one hectare (10 000 square metres);
- Has a sustained flame length of more than 1.5 metres;
- Requires a committed resource of at least four fire and rescue service appliances/resources;
- Requires resources to be committed for at least six hours;
- Presents a serious threat to life, environment, property and infrastructure;

This definition is taken from the UK Fire and Rescue Service National Operational Guidance (NOG) for Wildfires (2016).

Across the 2023 season the number of wildfires has dropped by almost 30% from the previous season. This reduction can be partially attributed to the weather conditions across the start and end of the year.

The Wildfire tactical advisor role has been developed to provide safe systems of work, planning and fire prediction at large complex wildfire incidents to assist the incident management team. NFCC has currently 51 wildfire tactical advisors.

Colleagues within UK National Resilience have taken on an integral role in coordinating the management and deployment of the WTAs, as set out within our current Tac-ad Concept of Operations.

A critical part of delivering on prevention strategies linked to reducing wildfires is fully embedded within the NFCC Communication team. There are seasonal prevention strategies that have been developed and shared across the sector and partnership environment across 2023.

Across the 2023 season bespoke NFCC community safety campaigns have been further enhanced by raising awareness by having a wildfire preparedness week similar to drowning prevention week which focuses on the risks run around property, land management practices etc. by the NFCC, similar to the NPA solution where organisations come together under the guidance for the FRS.

NFCC continues to work closely with cross government departments to support a wide range of support strategies and plans to prepare and deal with wildfire incidents.

There is positive collaborative work with Local Resilience Partnerships to help develop a better understanding of the community risk to wildfires. This work will help support a better understanding of operational preparedness as a service and as a region to increase a wider understanding of risk and shared situational awareness.

England and Wales Wildfire Forum

The England and Wales Wildfire Forum (EWWF) is a multiagency stakeholder group of public, private and third-sector parties which works to address wildfire issues. Throughout 2023, the forum continued to expand to incorporate new member organisations and shared updates amongst members about relevant policy, guidance, research, opportunities and news about wildfires.

Wildfire Framework for England

The Home Office has produced a Wildfire Framework with support from the EWWF and government departments, principally Defra, the Cabinet Office and the Department for Levelling Up, Housing and Communities (DLUHC). This is a significant, and very welcome, document as it "*identifies responsibilities, clarifies relationships and facilitates coordination at government level and between key wildfire stakeholders, in England.*" Therefore, it is of fundamental importance to guiding how the EWWF and other partners liaise with government in a coordinated approach to wildfire mitigation.

https://fireengland.uk/sites/default/files/2021-12/211220%20Wildfire%20Framework%20for%20England.pdf

Scotland

Scottish Fire and Rescue Service attended 144 wildfire incidents in 2023, in comparison to an average of 178 since 2010. The peak periods were between March and May, with the highest amount of 37% of incidents occurring in April. The largest amount of wildfires occurred in northern Scotland (80 incidents), then west (44) and east (20).

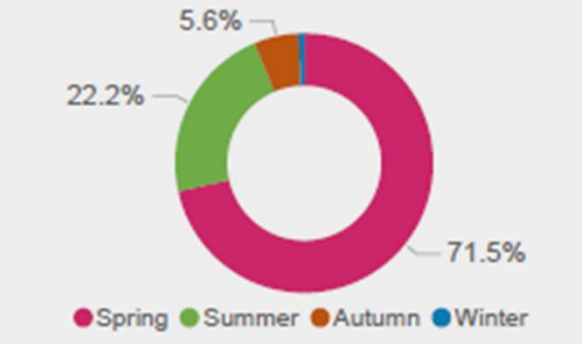


Figure 169. Seasonal distribution of large outdoor fires in 2023.

Wildfires happen throughout the year; however March and April are ideal times to burn, Spring time brings new growth, and typically better and dryer ground conditions to allow burning to take place. Landowners will be preparing their land for the year ahead and this is also true of the wider public. An exceptionally warm June in 2023 has seen figures increase into Summer. However, it is not just warm weather that can increase the chance of wildfires. Frozen air in winter can also dry out the land and provide conditions for wildfires.

With dryer, warmer conditions come greater risks, fires can spread more easily, wind direction can change and fires may unfortunately burn out of control. SFRS in conjunction with the Scottish Wildfire Forum (SWF), issue Wildfire warnings when weather and ground conditions are high and very high for fires.

In Scotland, the Muirburning Season runs from 1st October through to 15th April. This allows landowners to burn for example grasslands and heather for effective land management.

Forest and Land Scotland highlighted the increase in wildfires in 2023 especially in Central Scotland, with the most occurring in June to September.

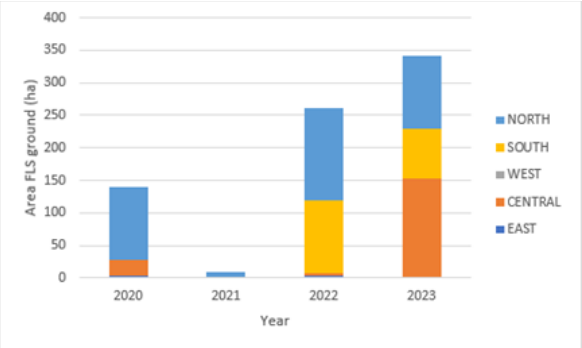


Figure 170. Area burnt between 2020 to 2023 on Forest and land Scotland property.

Wales

During 2023, the Welsh Government formed the Wales Wildfire Board (WWB) and the WWB then produced and published the Wales Wildfire Charter. The aim of the WWB Charter is: "*Through an evolving partnership approach, we will bring together Welsh Government, Emergency Services, Public and Private Organisations, Landowners and Land Users to manage and develop our landscape*." This important document is helping to frame a collaborative national approach to wildfire issues in Wales. Members of the EWWF were involved in developing and launching the Wales Wildfire Board and Wales Wildfire Charter.

Fire prevention activities and information campaigns

The Department for Environment, Food and Rural Affairs (DEFRA), including Forestry Commission, National Parks and Natural England as well as Devolved Administrations supported Fire and Rescue Services using social media and other approaches to inform and warn the public of a period of high wildfire risk.

Lantra accredited Vegetation Fire Training was funded by the Department for Environment, Food and Rural Affairs (DEFRA) and developed and implemented by Forestry Commission for land managers and researchers. This includes training modules on wildfire response, prescribed fire operations and planning and Wildfire Management Planning.

Operations of mutual assistance

No requests were made to the United Kingdom for mutual assistance for wildfire incidents during 2023.

Climate change

His Majesty's Government published National Adaptation Programme 3 in July 2023. https://www.gov.uk/government/publications/third-national-adaptation-programme-nap3

This included wildfire actions across the natural and built environment, highlighting areas of new research and implementation.

Research activities aimed at improving fire management

"Toward a UK fire danger rating system: Understanding fuels, fire behaviour and impacts"

2023 continued the stability to the research activities of the UKFDRS project and progress across the six work packages. We were able to continue with our field monitoring and laboratory work, as well as progress work on earth observation and modelling activities. This included the publishing of numerous papers as well as a practitioner workshop engaging land managers, fire and rescue services and the public.

Team members attended and presented at a range of conferences across the UK and Europe. You can find details on all of these via the project website.

For more information, please visit the project website (www.ukfdrs.com) or find us on Twitter (@ukfdrs).

Leverhulme Centre for Wildfires, Environment and Society.

A collaboration between four UK universities (Imperial College London, King's College London, University of Reading and Royal Holloway, University of London), it is a ten-year, £10-million activity addressing the many challenges of wildfire, integrating approaches from the social and natural sciences. Its aims are to develop theory and advance prediction capability for wildfire; quantify its impacts on societies and economies; and initiate a process leading to better ways for people, ecosystems and wildfire to coexist. For more information please visit the project website: wildfire@imperial.ac.uk and follow on Twitter: @centrewildfires

UK partners in Pyrolife – This is a large ITN network funded by EU H2020 programme to train a new generation of fire scientists embracing diversity of knowledge, approaches, views and cultures. UK partners in Pyrolife are Nick Kettridge at University of Birmingham and Guillermo Rein at Imperial College London.

UK Wildfire Research Group

The UK Wildfire Research Group had a follow-on meeting to discuss the key messages from the conference around human dimensions of UK wildfire and how we can develop research projects to address key research gaps.

The group also contributed to a discussion around the development of wildfire related actions for the National Adaptation Programme 3. To connect with the group, visit https://ukwildfireresearch.co.uk/.

HAZELAB

The Hazelab research group at Imperial College London has made significant contributions to wildfire protection research through two projects, WUI-NITY and SEMEDFIRE, between 2023 and 2024. WUI-NITY, funded by the Fire Protection Research Foundation and in collaboration with Lund University, RMIT university, Movement Strategies, and NRC Canada, focuses on developing a toolkit that couples wildfire spread and evacuation models, utilizing trigger boundaries to inform when evacuation orders should be given relative to progression of the wildfire front. Trigger boundaries define a perimeter around a WUI community that when the wildfire front breaches the perimeter, an evacuation order should be given to allow for sufficient time to evacuate. The project was tested in real-world scenarios, including Swinley Forest in the UK and Roxborough Park in the US. The group also advanced this tool by developing k-PERIL, which generates stochastic trigger boundaries, enhancing the reliability of informing the initiation of evacuations during variable wildfire events.

In parallel, Hazelab played a central role in the SEMEDFIRE project, part of the EU Horizons programme, aimed at improving wildfire preparedness in Cyprus. This collaborative effort included a diverse consortium of institutions and focused on providing the European University of Cyprus and other stakeholders with comprehensive training in fire science, wildfire modelling, and community evacuation strategies. The project involved a consortium including Imperial College London, European University of Cyprus, University of Wageningen, Pau Costa Foundation, and Nîmes Métropole. The project featured real fire demonstrations, and technical presentations on wildfire behaviour and modelling, allowing participants to apply theoretical knowledge in practical settings, thus bridging the gap between theory and practice. The success of SEMEDFIRE highlighted the importance of collaboration and practical training in managing wildfire risks, setting the stage for future joint initiatives to enhance wildfire preparedness in Cyprus and beyond.

To learn more about our research in wildfires and the built environment, please take a look at our website (https://www.imperial.ac.uk/hazelab/).

(Source: Forestry Commission, UK).

1.3 Comparison of Southern EU countries with longer time series (1980-2023)

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

Figure 171a shows the total burnt area per year in the five large 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.

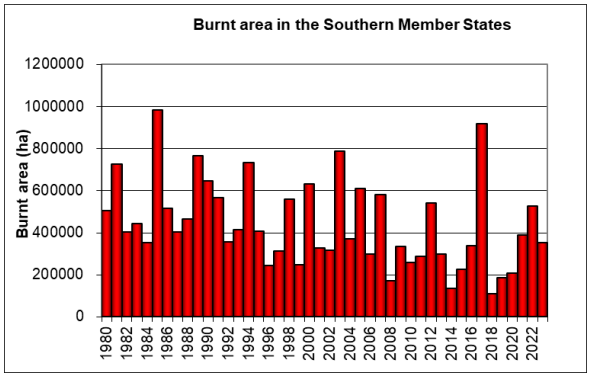
The total burnt area in 2023 was 354 244 ha (Figure 171a), less than the previous two years and close to the average of the last decade. Of the five countries, Greece was the most affected country in 2023, with 136 499 ha burnt, the highest amount recorded since 2007.

Figure 171b shows the yearly number of fires in the five southern Member States since 1980. After the increasing trend during the 1990s, which was also partly due to the improvement in recording procedures, the number of fires was stable for around one decade, and in the last decade a decrease was generally observed. In 2023 the total number of fires was 23 143, a little less than the previous 5 years; see Table 47 and Annex 1 for details.

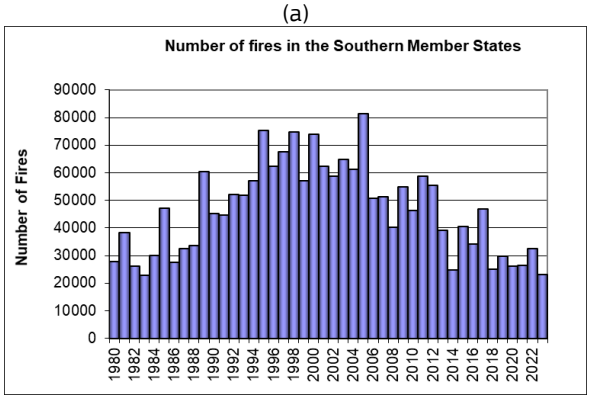
Figure 171c shows the yearly average fire size in the five countries since 1980. There is generally a difference in average fire size before and after 1990. This is a similar trend to that observed in the number of fires and is also partly due to the same reasons (the additional fires that are recorded thanks to the improvements in the statistical systems are the smallest ones). It is also largely due to the improvements of the fire protection services of the countries.

However, some recent years have seen large average fire sizes that compare with the figures of the 1980s.

In 2023 the average fire size was 15.3 ha, similar to the previous two years, although above the mean for the previous 2 decades. The average fire size was particularly large for Greece, with the highest figure recorded since the start of the time series.



(a)



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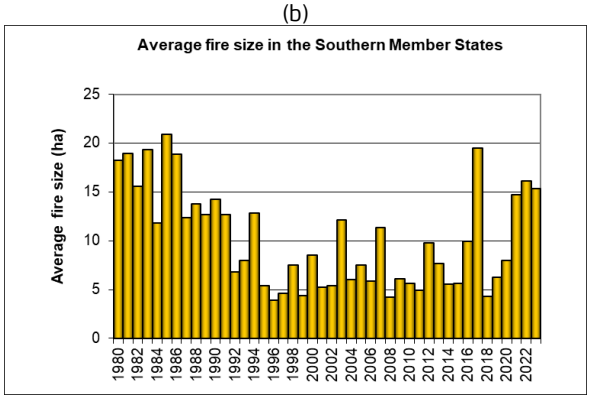


(c)

Figure 171. Burnt area (a) number of fires (b) and average fire size (c) in the five Southern Member States since 1980.

Figure 172 compares the yearly averages of burnt areas, number of fires and average fire size for the periods 1980-89; 1990-1999, 2000-2009, 2010-2019 and 2020-2023 with the figures for 2023. It shows each of the 5 countries separately and also their total.

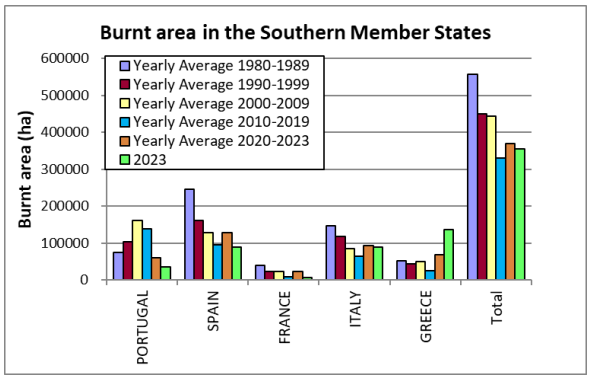
Table 47 gives a summary of the burnt areas and number of fires for the last 42 years, the average for the 1980s, the 1990s, the 2000s, the 2010s and the average for the last 3 years, together with the figures for 2023 alone.

The total number of fires, burnt area and average fire size were all close to the averages in the last two decades, although these figures mask both individual differences both between the countries and different patterns over time (Figure 172).

Figure 173 shows the contribution of each of the five Member States in terms of burnt areas and number of fires to the overall figures for all five countries in 2023.

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. It should also be borne in mind that different ways of recording fires, e.g. through satellite mapping rather than ground measurements, may lead to an under-representation of the smallest fires and result in an inflated figure for average fire size.

In 2023, Spain and Portugal each recorded 33% of the total number of fires in the region (Figure 173b), but Greece experienced the highest proportion of burnt area (39% of the total, Figure 173a).



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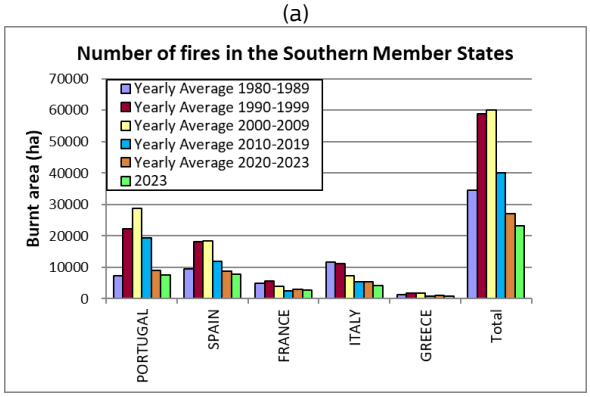

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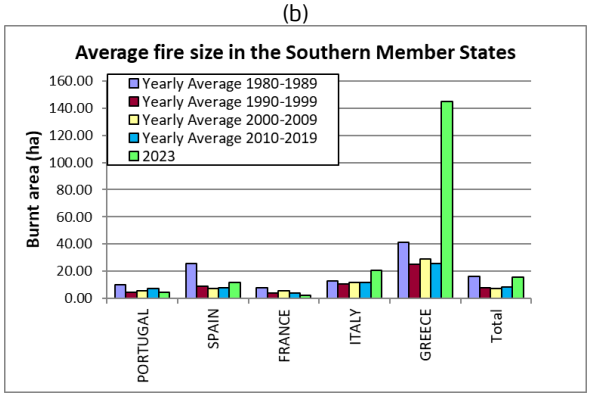
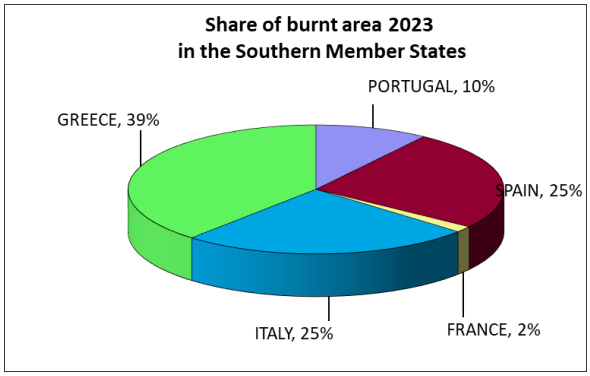


(c)

Figure 172. Burnt areas (a), number of fires (b) and average fire size (c) in the five Southern Member States in the year 2023 as compared with average values for previous decades.



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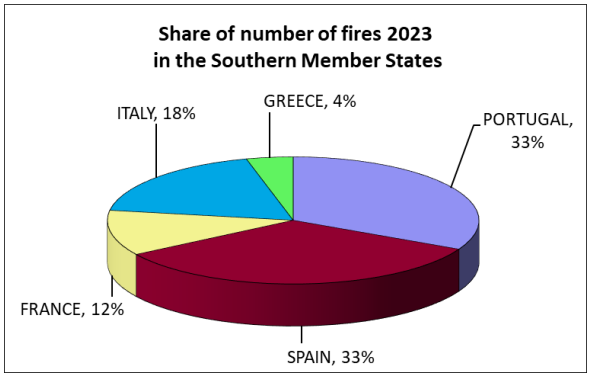


(b)

Figure 173. Share of the total burnt area (a) and the total number of fires (b) in each of the five Southern Member States for 2023.

Table 47. Number of fires and burnt area in the five Southern Member States in the last 44 years.

Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2023	**7 523**	**7 748**	**2 666**	**4 265**	**941**	**23 143**
% of total in 2023	33%	33%	12%	18%	4%	100%
Average 1980-1989	7 381	9 515	4 910	11 575	1 264	34 645
Average 1990-1999	22 250	18 152	5 538	11 164	1 748	58 851
Average 2000-2009	28 774	18 369	3 924	7 259	1 695	60 020
Average 2010-2019	19 362	11 860	2 470	5 420	946	40 057
Average 2020-2023	8 930	8 695	2 993	5 412	1 053	27 083
Average 1980-2023	18 486	13 949	4 100	8 541	1 380	46 456
TOTAL (1980-2023)	813 391	613 734	180 381	375 821	60 729	2 044 056

Burnt areas (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE	TOTAL
2023	**34 510**	**89 068**	**5 361**	**88 806**	**136 499**	**354 244**
% of total in 2023	10%	25%	2%	25%	39%	100%
Average 1980-1989	73 484	244 788	39 157	147 150	52 417	556 995
Average 1990-1999	102 203	161 319	22 735	118 573	44 108	448 938
Average 2000-2009	160 985	127 229	21 741	83 878	49 238	443 071
Average 2010-2019	138 084	94 514	9 308	63 907	24 220	330 033
Average 2020-2023	60 034	127 705	21 746	92 030	68 256	369 771
Average 1980-2023	113 357	154 303	23 100	102 345	44 837	437 942
TOTAL (1980-2023)	4 987 705	6 789 317	1 016 382	4 503 197	1 972 850	1 926 9449

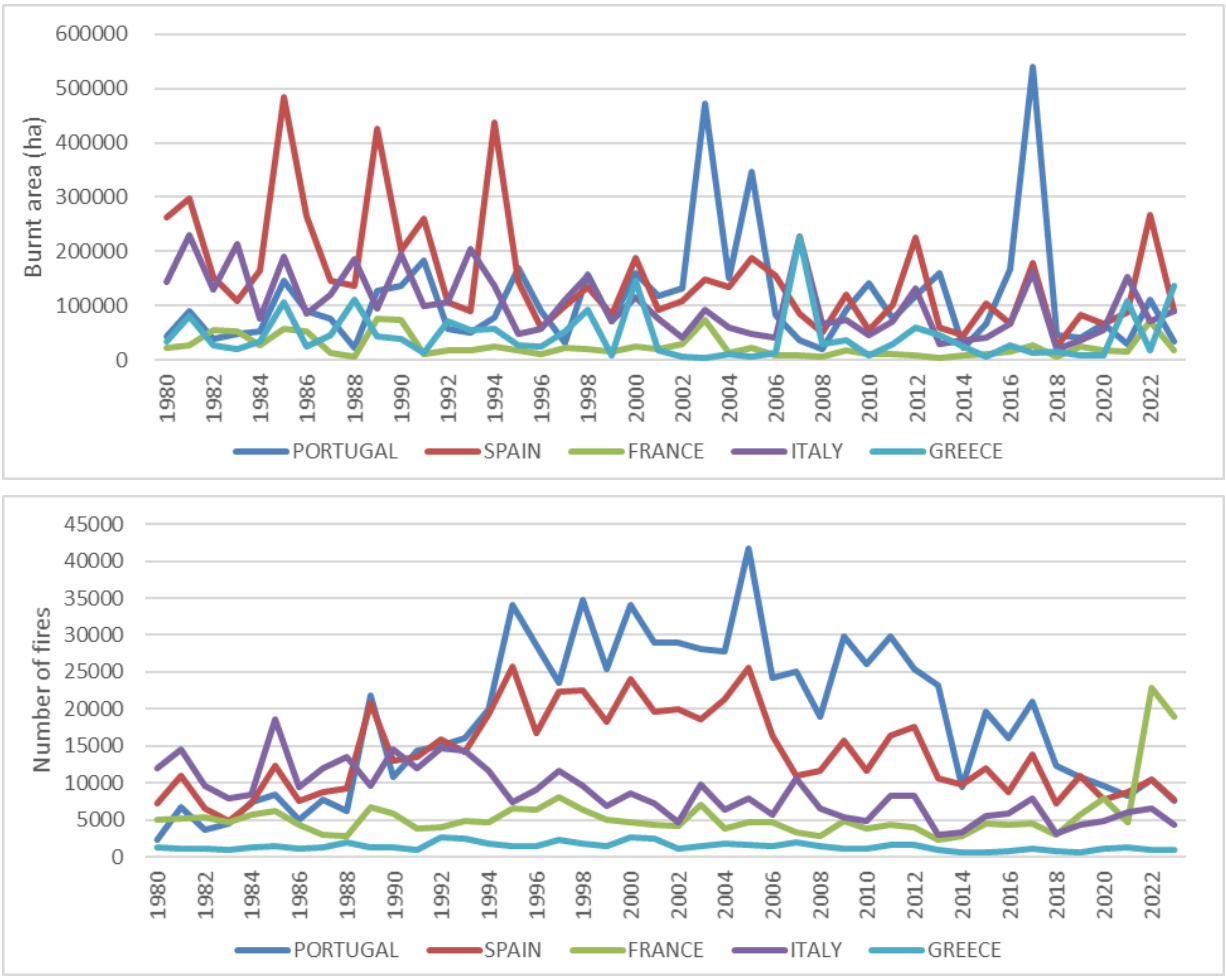


Figure 174. Time series showing the comparative burnt area and number of fires in the 5 large EU-Med countries.

1.4 Middle East and North Africa Countries

1.4.1 Israel

Introduction

Forest, bushes, and open area fires in Israel typically occur between April, when the herbaceous vegetation begins to dry out, and the first rains of the following season, which help to suppress fire risks. The dry, hot conditions during this period make the landscape particularly susceptible to fires, defining the window during which most wildfire incidents are observed.

Fire danger in the 2023 season

The 2023 fire season in Israel was characterized by average meteorological conditions. There were no recorded instances of extreme index days (Figure 1), which indicate particularly high fire risk due to factors such as temperature, wind speed, and humidity levels.

Fire occurrence and affected surfaces

The number of forest fires recorded in 2023 was identical to that in 2022; however, the area burned this year increased by 53%. This significant rise in the extent of burned land suggests that, despite similar fire frequency, those in 2023 were more intense or spread over larger areas, leading to greater environmental impact.

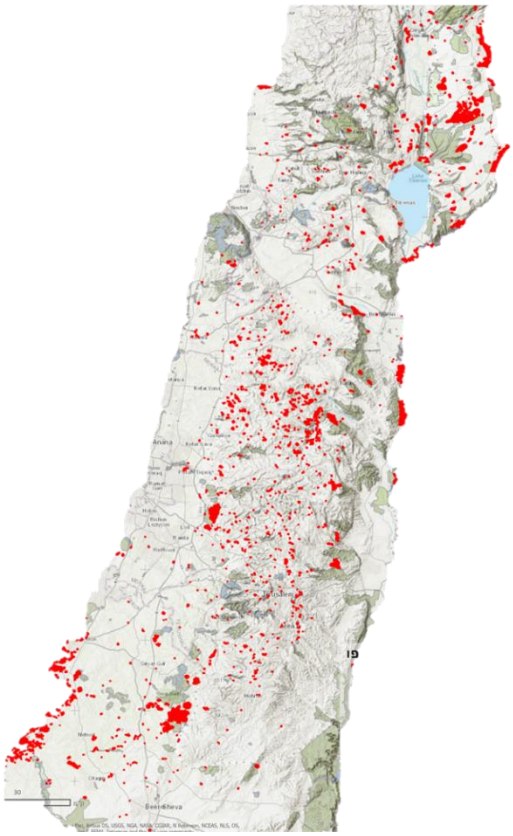


Figure 175. Distribution of wildland fires in 2023.

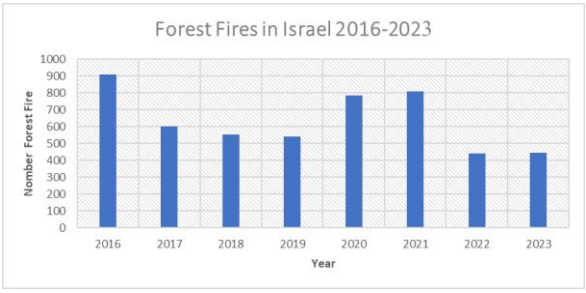


Figure 176. Forest fires in Israel 2016-2023.

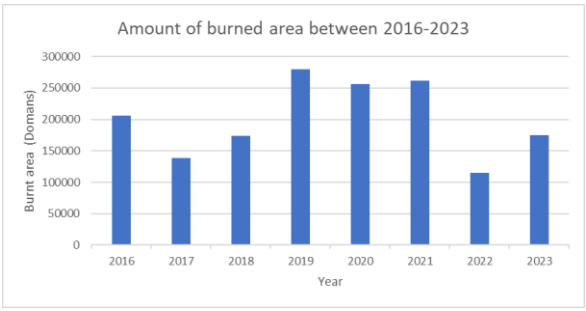


Figure 177. Total burnt area 2016-2023.

July 2023 heat wave

The 'Cleon' heatwave significantly impacted Israel, making July exceptionally hot. July 2023 ranks as the second hottest on record, surpassed only by July 2017, according to spatial measurements dating back to 1950. In some regions, this July was the hottest on record in terms of daily maximum temperatures (Figure 179). Starting on July 12th, an unusually prolonged heatwave began, lasting until the end of the month. The Israel Meteorological Service (IMS) reported that average temperatures were 1.5 to 2.5 degrees Celsius above the norm across all parts of the country, indicating widespread and intense heat throughout the region.

Compared to previous Julys, the 'Cleon' heatwave, despite its extended duration, did not significantly impact the number of wildfire events or the amount of burned land (Figure 180). Interestingly, in years with more moderate temperatures, a larger area was burned, and more fires occurred.

During the 2023 fire season, two firefighters were injured while carrying out firefighting operations in military training areas. These incidents underscore the dangers faced by firefighting personnel, especially in challenging environments like military zones, where additional risks such as unexploded ordnance, may be present.

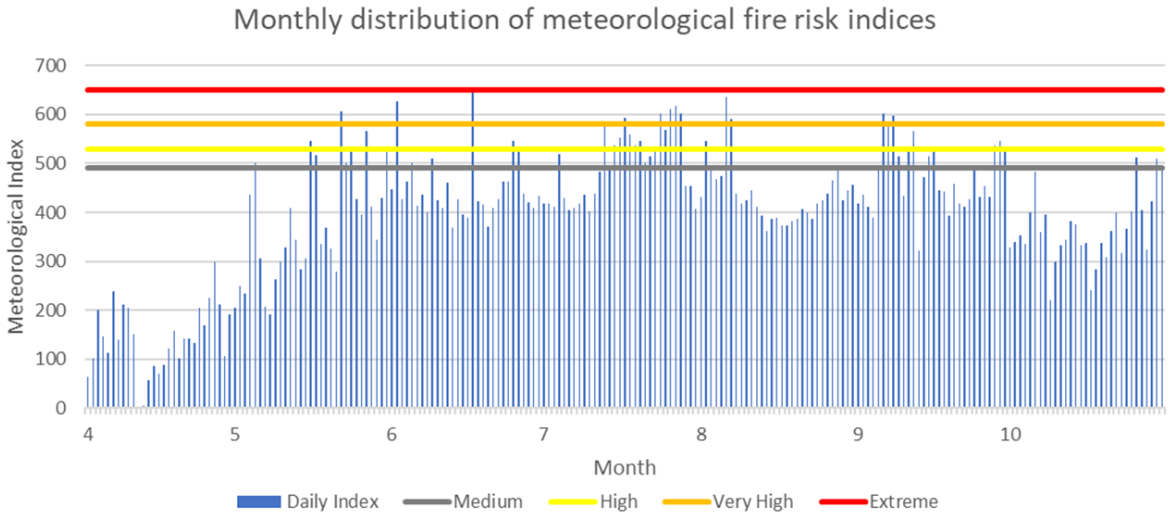


Figure 178. Monthly distribution of meteorological fire risk indices.

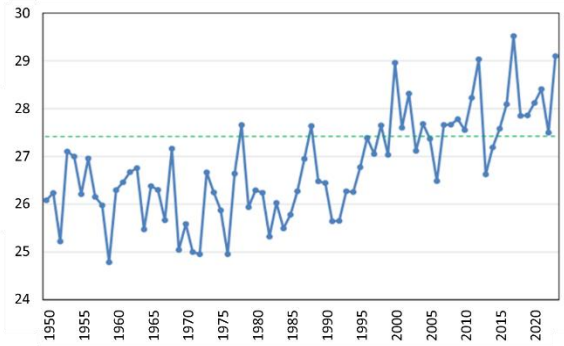


Figure 179. Average daily temperature in July 1950-2023.

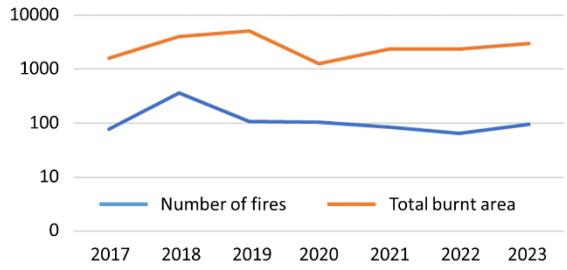


Figure 180. Number of forest fires and total burnt area in the months of July of the years 2017-2023.

Figure 181. wildland fire near Moshav Tal Shahar June 2023.

(Source: Fire and Rescue Commission, Ministry of Public Security, Israel).

1.4.2 Lebanon

Lebanon's annual forest fire reports are collaboratively prepared by the Ministry of Environment (MOE) and the Land and Natural Resources Program, Institute of the Environment, University of Balamand (LNR-IOE-UOB). The information presented primarily relies on the 2023 fire report (MOE/UOB, 2024), which is based solely on field inspections for reported fires. However, it is important to note that many other fires may not have been initially visited in the field and therefore remain unreported. Additionally, Mitri (2024) conducted a post-fire impact assessment of the 2023 fires in Lebanon using satellite images and field surveys. The main results of this assessment are presented accordingly.

Fire danger in 2023

During the 2023 fire season, Lebanon continued to experience a notable decrease in the number and extent of wildfires (excluding areas affected by phosphorus bombing in South Lebanon). This reduction was largely attributed to the continuous successful implementation of a nationwide emergency coordination plan for fire preparedness, risk reduction and awareness previously initiated by the Ministry of Environment and its partners.

Fire season Overview

The calculated start date of the fire danger season for 2023 was March 3, and the calculated end date was September 23, 2023. The peak month (in number of fires) was August (a total of 5 fires) and the peak month (in burned area) was June (a total of 40.5 ha). In 2023, a total of 23 principal fires were reported, affecting a total area of 132.4 ha (Figure 182).

In reality, a significantly larger number of fires might have affected a much greater extent of burnt areas across the country. However, these incidents are not necessarily reflected in the MOE/UOB (2024) report, primarily due to the lack of comprehensive field surveys.

The following graphs (Figure 183, Figure 184) show the occurrence of fires in relationship to mean monthly temperature and monthly precipitation.

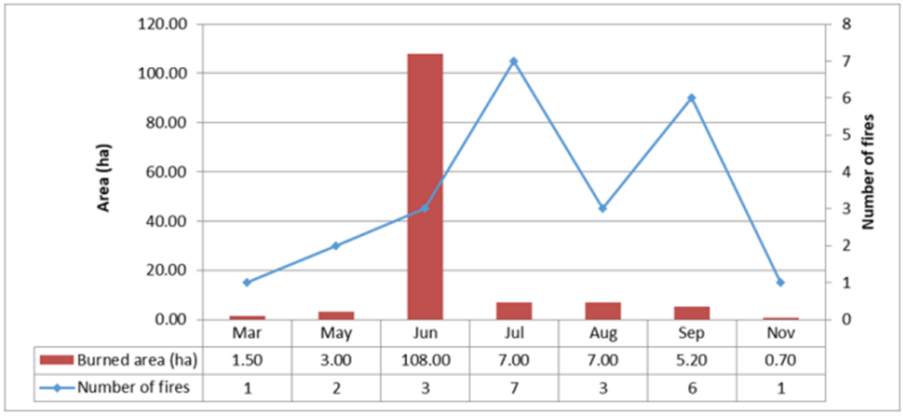


Figure 182. Monthly distribution of fire occurrence and fire affected areas in 2023 (source: MOE/UOB, 2024).

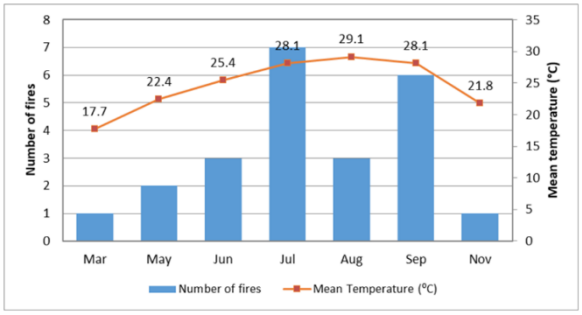


Figure 183. Number of fires in relation to mean temperature.

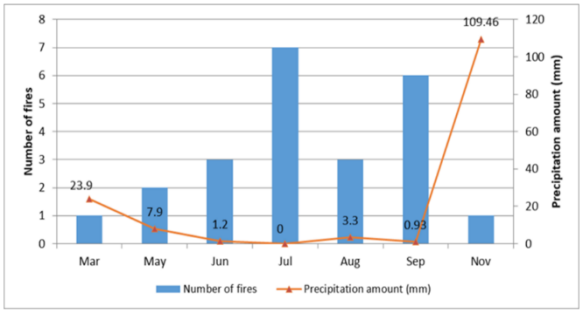


Figure 184. Number of fires in relation to precipitation.

Observation data are reported by the weather station 401030 (OLBA) – Latitude: 34.45 and Longitude: 35.8 at an altitude of 5 m above sea level. These observations are presented for display purposes only and not for use in correlation analysis. en.tutiempo.net/climate/ws-401030.html. Precipitation data were downloaded from https://www.worldweatheronline.com/beirut-weather-averages/beyrouth/lb.aspx

Land use type

The main land cover/land use of fire affected areas (Figure 185) comprised forest/woodlot (92.90%), grassland (3.78%) and agricultural land (3.32%).

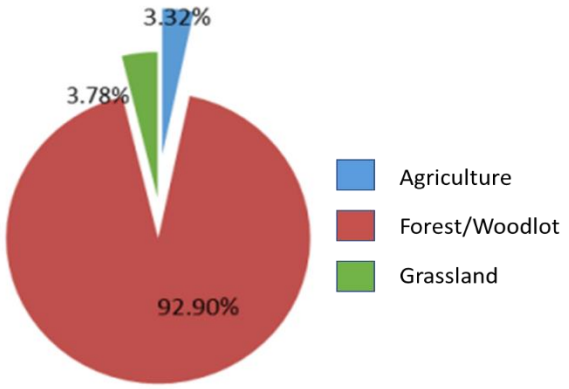


Figure 185. Land-use of fire affected areas (source: MOE/UOB, 2024).

Affected fuel type

A total of 79.61% of affected fuel types (Figure 186) was mixed forests, followed by broadleaved forests (8.91%) and grasslands (4.31%).

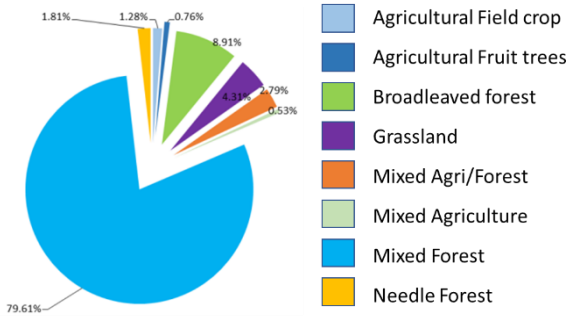


Figure 186. Distribution of fuel type affected by fires (source: MOE/UOB, 2024).

Causes of fire

A total of 92% of the fires had unknown causes. Neglect accounted for 5% of all fire causes while 2% of fire causes were due to Arson (Figure 187).

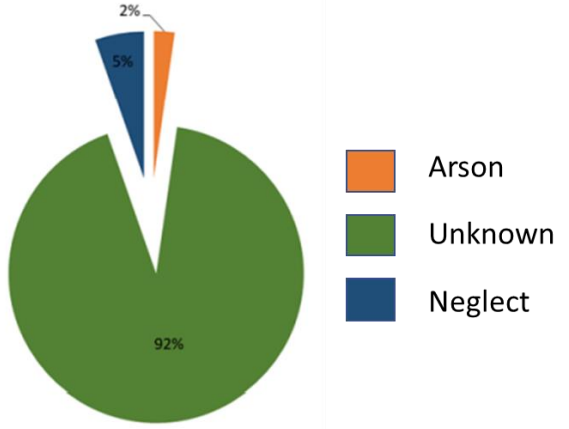


Figure 187. Distribution of main fire causes (source: MOE/UOB, 2024).

Intervention time

It was observed that 52% of first interventions in fire suppressions occurred after 20 minutes and before 1 hour from the reporting time, while 43% of interventions happened within the first 20 minutes after the reporting time (Figure 188).

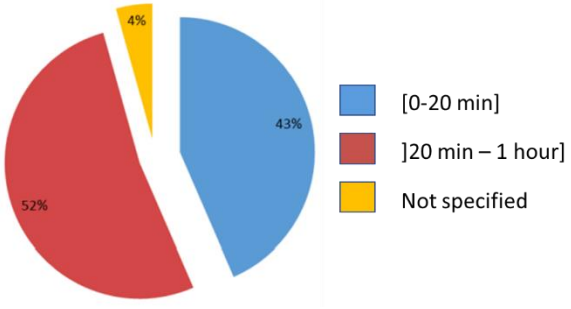


Figure 188. Times for intervention after reporting fires (source: MOE/UOB, 2024).

Fire duration

Fires lasting between 1 and 2 hours accounted for 35% of all fires. Also, fires lasting between 2 and 5 hours and between 5 and 12 hours equally accounted for 26% of all incidents in each case. A total of 9% of fires lasted between 12 and 24 hours, and 4% of fires lasted more than 24 hours. (Figure 189).

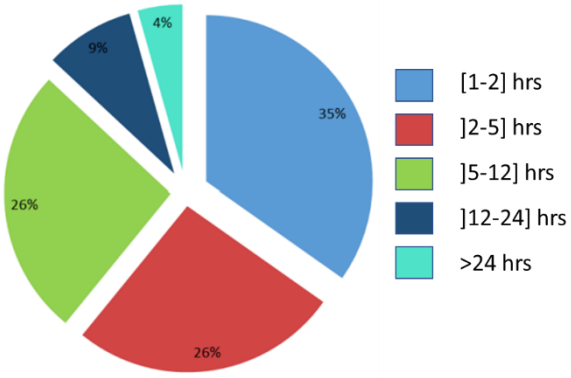


Figure 189. Fire duration (source: MOE/UOB, 2024).

Resources employed in fire suppression

The following human and technical resources were involved in fire suppression of reported fires (Table 48):

Table 48. Human and technical resources involved in fire control throughout 2023 (source: MOE/UOB, 2024).

	Number			
	Small Cars	Water Tanks	Other Cars	Human Resources
Civil Defense	12	51	0	>206
Army*	4	0	0	43
Internal Security	9	0	0	31
Ministry of Agriculture	0	0	0	5
NGO	0	2	0	16
Local Resident	0	0	0	>95
Total	**25**	**53**	**0**	**>396**

* 5 Lebanese Army helicopters used for 2 flights.

Research activities aimed at improving fire management

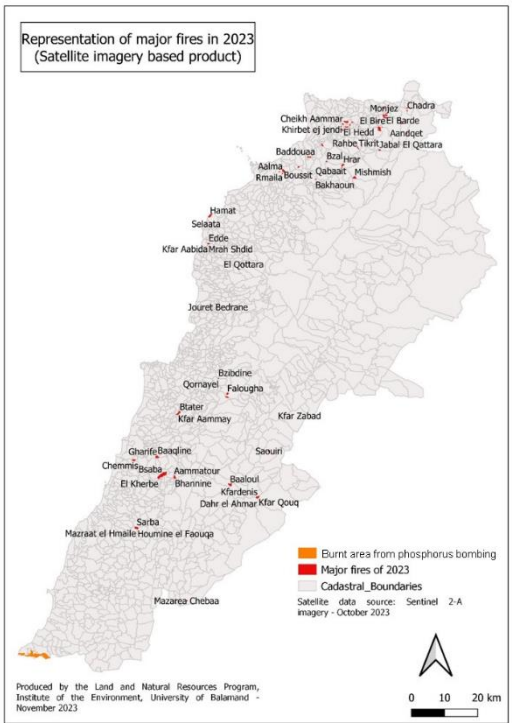


Figure 190. Map of burned areas in 2023 (Source: Mitri 2024).

Mitri (2024) assessed the impact of 2023 fires at the landscape level using Sentinel 2-A images. As a result, a total area of 774 ha of burnt lands was mapped (Figure 190). This included an area of 296 ha of burnt forests (comprising shrubland with dispersed trees). An area of 37 ha of burnt lands was located in high mountainous lands (i.e., >1 500 m above sea level). Also, an area of 70.8 ha burned in agricultural land. The fires burned around 304 ha within Key Biodiversity Areas (KBAs). An additional 462 ha of land was burned as a result of phosphorus bombing in South Lebanon.

Recognizing the urgent need for effective response strategies, a pilot post-fire restoration plan was implemented, drawing on a combination of local expertise, national support, and international guidance.

This restoration plan was performed under the 'Land Degradation Neutrality for mountain landscapes in Lebanon' project funded by GEF and implemented by UNDP in partnership with the Lebanon Ministry of Environment. The initiative, coordinated with the Ministry of Agriculture in Lebanon, was particularly aimed at addressing immediate post-fire challenges, including soil erosion and habitat loss.

The objective of this initiative was to not only initiate a pilot post-fire restoration process in the country but also to serve as a guiding framework for national and local stakeholders in Lebanon to address post-fire restoration effectively.

References:

Mitri, 2024. Mapping Lebanon's burnt areas of 2023: a brief note. Land and Natural Resources Program, Institute of the Environment, University of Balamand.

MOE/UOB, 2024. State of Lebanon's wildfires in 2023. Beirut, Lebanon.

(Source: Land and Natural Resources Program, Institute of the Environment, University of Balamand, Lebanon).

Figure 191. *[Photo credit: George Mitri 2023*].

1.4.3 Morocco

Background

In over 9 million hectares of forest domain representing more than 12% of the national area, forest formations in Morocco cover an area of 5 814 000 ha (broadleaves, conifers…) and 3 318 260 ha of *stipa tenacissima* (Figure 192), and are distributed among the different bioclimatic zones, from semi-arid to humid.

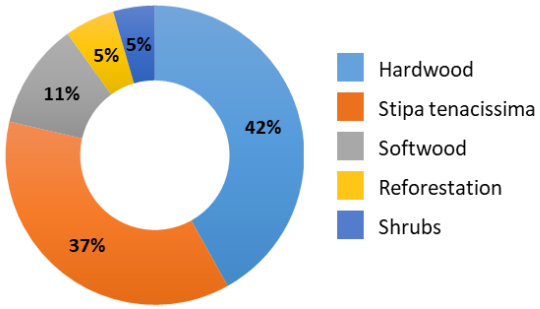


Figure 192. Composition of forest land in Morocco.

As in Mediterranean countries, forested areas in Morocco are subject to a recurrent risk of fires that is favoured by the extreme flammability of forest species during the summer. The consequences of this risk are prejudicial in terms of social, economic and environmental components. Indeed, the forest land is an open space where access (except rare situations) is free. Riparian forest populations live in a subsistence economy (using forests for their needs of construction wood and firewood, various non-timber forest products, and pasture). Consequently, forests are under a very strong human pressure.

Fire occurrence and affected surfaces

From 1960 to 2023

Through the analysis of annual reports of forest fires during the years 1960 to 2023, we see an average of 307 fires per year for an annual average of affected area of 3 383 ha (ANEF, 2023), with maxima of 22 762 ha in 2022 and 11 000 ha in 1983. The absolute minimum is recorded in 2002 with 593 ha (Figure 194, Figure 195).

While the burned area may seem limited in comparison to other Mediterranean countries sharing similar climate and ecological conditions, its significance becomes apparent when considering the pivotal roles forests play and the difficulties associated with their rehabilitation and post-fire regeneration within the national socio-economic and environmental framework.

It is noteworthy that globally, since 1960, there has been a consistent upward trend in both the number of fires and the affected area.

However, when we compare the past two decades, there is a notable shift:: the average number of fires has actually decreased from approximately 500 between 2004-2013 to 453 forest fires in the most recent decade (2014-2023).

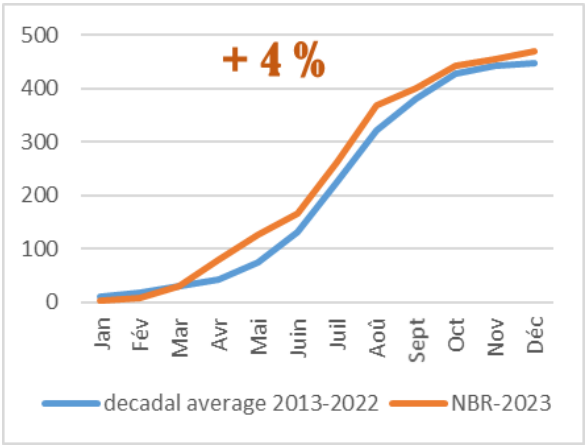
It is worth noting that the affected area per fire, which peaked at 10 hectares during the period from 2014 to 2023, has decreased compared to the national average recorded since 1960 (11 hectares per fire) (Figure 196).

2023 fire season

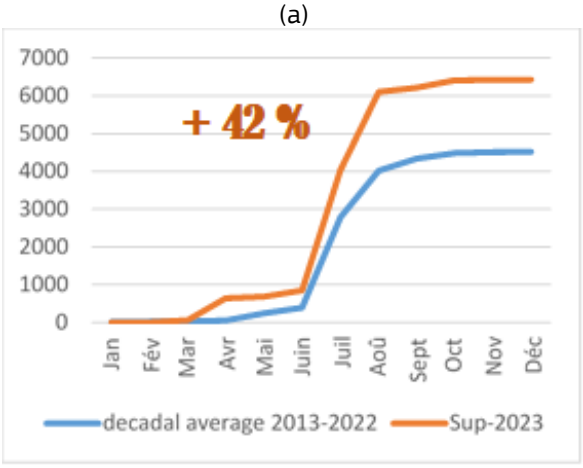
Chronic drought and scorching heat waves which affected the entire country in the summer of 2023 are the compounding factors in the heavy toll concerning the fight against forest fires.

Throughout 2023, a total of 466 fire incidents were recorded, impacting a total area of 6 426 hectares, averaging approximately 14 hectares per fire.

In 2023, there was a notable increase in both the number of fires, rising by approximately 4%, and the area burned, which surged by about 42% compared to the previous decade (2013-2022). (Figure 193).



(a)



(b)

Figure 193. Evolution of number of fires (a) and burnt area (b) in 2023 compared to the last decade.

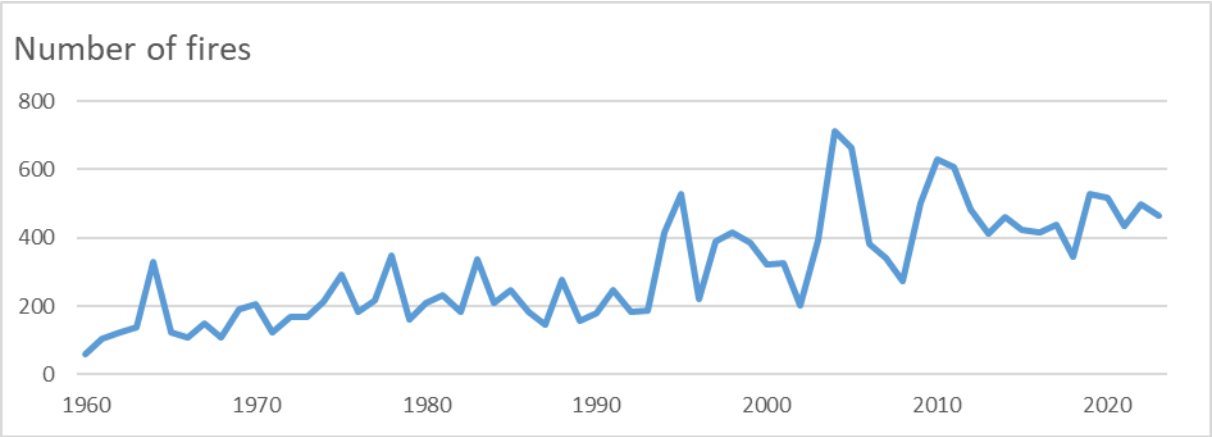


Figure 194. Evolution of forest fire numbers from 1960 to 2023 (ANEF, 2023).

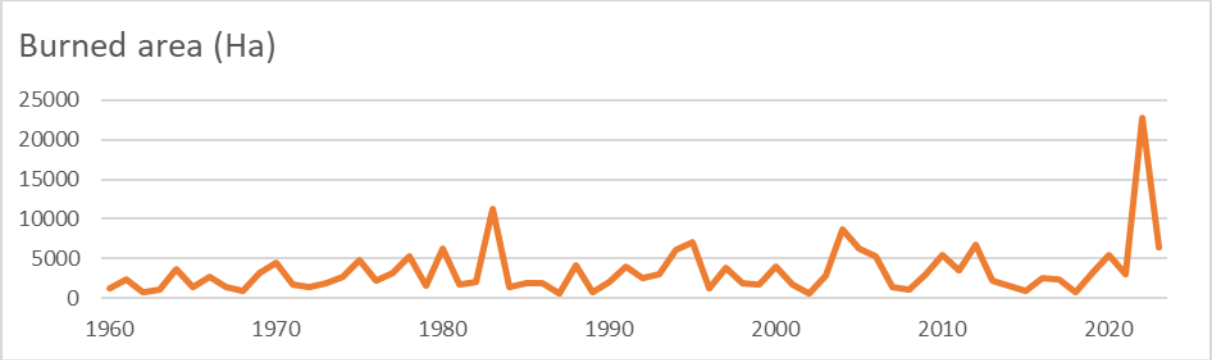


Figure 195. Evolution of forest fire area from 1960 to 2023 (ANEF, 2023).

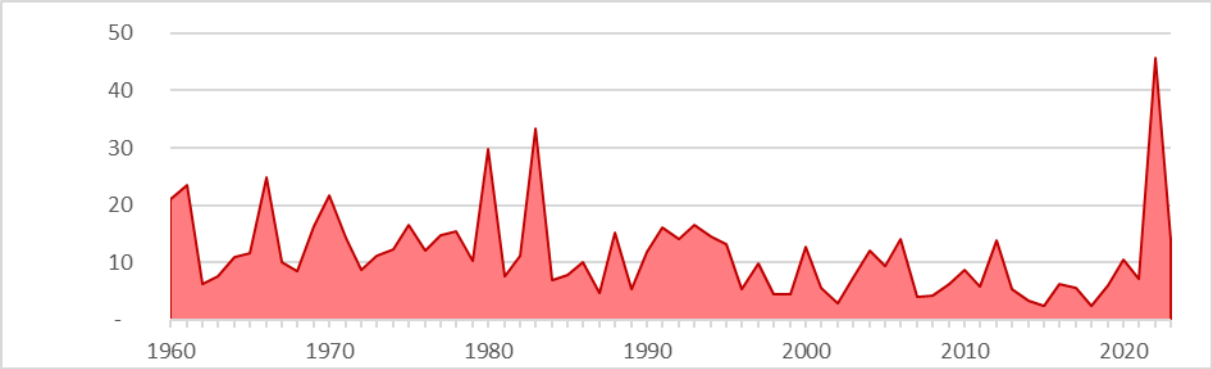


Figure 196. Evolution of area affected per fire from 1960-2023.

Distribution of fires

The distribution of fires recorded in 2023, based on the type of vegetation affected, is as follows:

- For wooded land formations, an area of 4 162 ha (65% of the total area burned in 2023) was affected by fires.
- The shrub and herbaceous covers were affected by fires that covered an area of 2 263 ha, equivalent to 35% of the total area burned in 2023.
- Thuya trees are in first place with an area of 1 097 ha affected, equivalent to 17% of the total area burned in 2023.

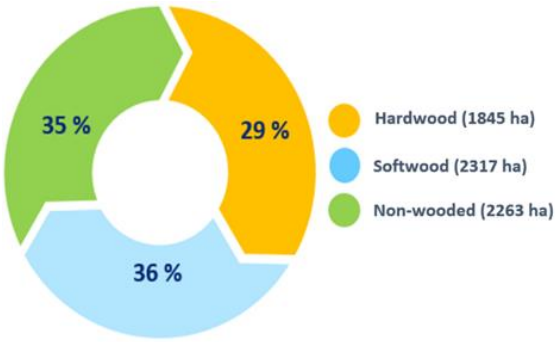


Figure 197. Burnt area distribution by affected vegetation type in 2023.

Large fires

In 2023, only five big fires (area >300 ha, 1% of the total number of fires) ravaged an area of 4 500 ha (70% of the total burnt area in 2023). Human and material resources for all partners concerned were mobilized to deal with these fires.

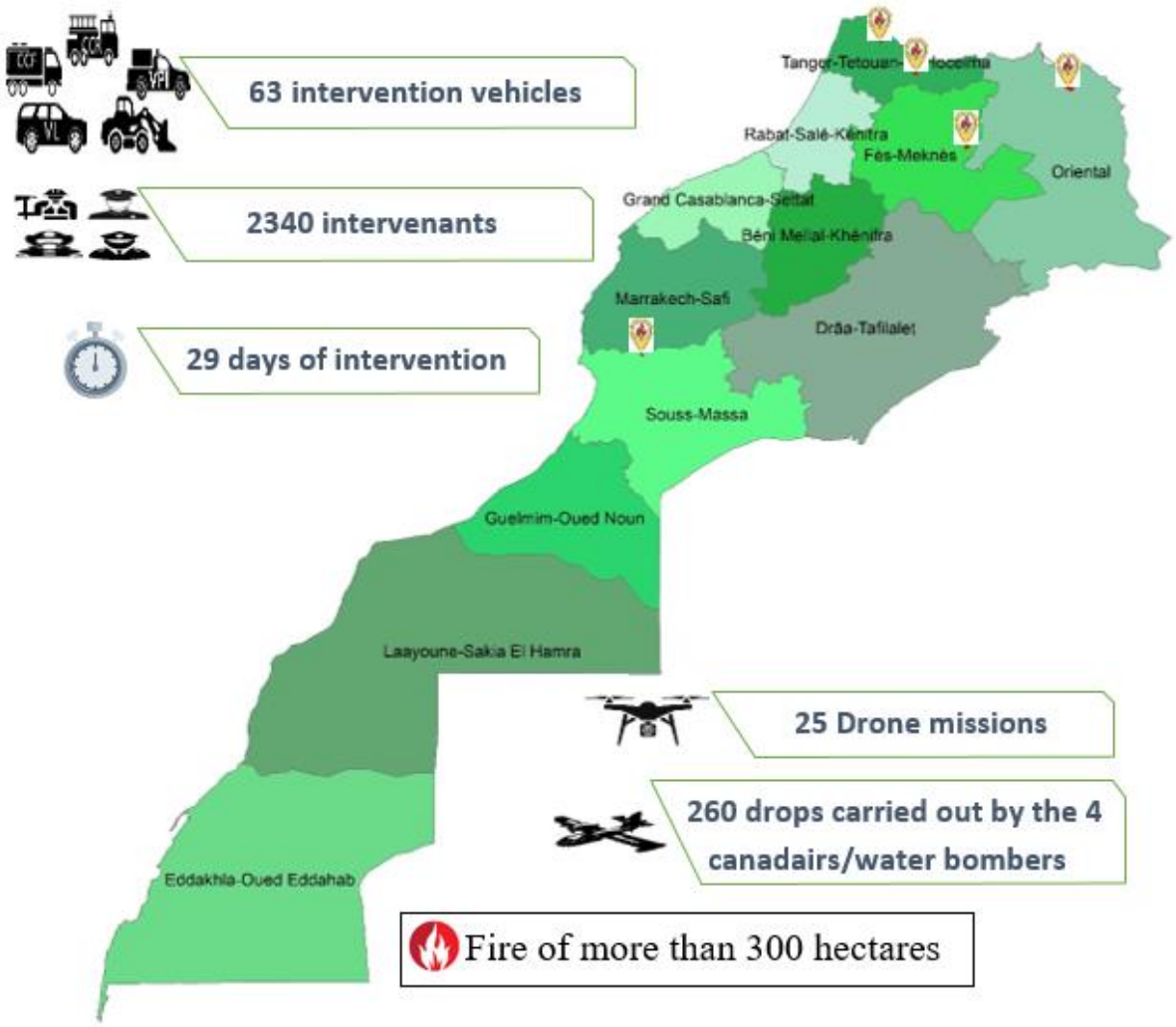


Figure 198. Spatial distribution of the 5 large fires recorded in 2023.

Main achievement of forest fire management in 2023:

A Launching a New Integrated forest fire management master plan in Morocco (2023-2033)

The National Agency for Water and Forests (ANEF), in cooperation with all relevant partners, has developed a new management plan for the integrated management of forest fires in the period from 2023 to 2033. The new Integrated Forest Fire Management Master Plan in Morocco (in French, *Plan Directeur de Gestion Intégrée des Incendies de Forêts*) was adopted with the participation of all institutional partners concerned by this issue. It includes the measures that will be implemented during the next decade, to prevent and combat forest fires, taking into account the expected effects of climate change. The main actions are as follow:

- Improving knowledge and assessment of risks and their consequences;
- Promoting research/development, valuing expertise, and encouraging innovation and technology transfer;
- Consolidating the achievements achieved in the field of prevention policy and proactive measures;
- Improving preparedness operations to effectively combat forest fires;
- Post-fire procedures and work to restore damaged forest areas;
- Strengthening the governance and legal framework, as well as the capabilities and competencies of those involved.

The new management plan aims to implement 17 inter-ministerial projects, requiring a total budget estimated at 1.5 billion dirhams, for a total period of 10 years (2023-2033), which must be mobilized by all concerned departments.

This plan aims to achieve tight and integrated coordination to combat the phenomenon among all concerned stakeholders. Its follow-up, implementation and activation of its provisions is supervised by a mixed committee consisting, in addition to this agency, of a number of concerned partners, including in particular the Ministry of the Interior and Civil Protection, the Royal Gendarmerie, the Royal Armed Forces, the Royal Air Force and the Auxiliary Forces.

B Community Engagement and Awareness Campaigns:

The National Agency for Water and Forests has designated, and for the first time, **May 21** as a **National Day** to raise awareness of forest fires dangers and to inform populations about fire prevention methods, the importance of maintaining fire-resistant landscapes, and procedures to follow in case of wildfires.

This specific environmental initiative aims to increase awareness of forest fire risks and the behaviors that must be adopted to avoid the outbreak of fires and maintain the environmental balance among various forest visitors and users, including residents of neighboring neighborhoods and villages, farmers, owners and exploiters of lands adjacent to forests, hunting associations and forest exploiters, as well as For campers, and sports practitioners.

C Updating laws related to forests fires

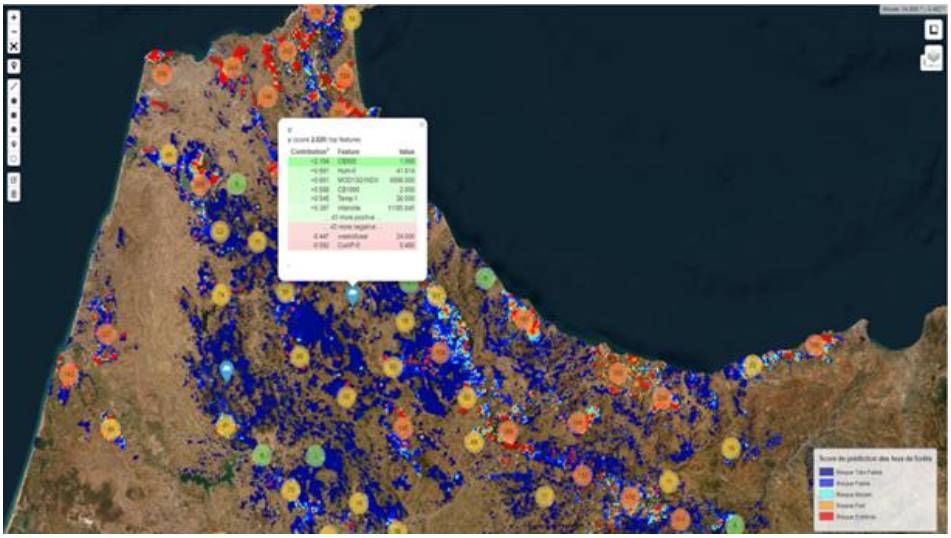
In light of the climate changes that the world is aware of and their expected effects on forest cover, the National Agency for Water and Forests has worked to launch workshops to update the laws related to forest fire, in order to preserve forest resources, as well as the lives and property of society in the face of the dangers of fires. These laws focus on imposing the regional and territorial measures, designs, and plans aiming to provide fire prevention infrastructure, as well as organizing and coordinating interventions and emergency measures during fires.

On the other hand, the law includes measures for regulating the use of fire, industrial facilities, purification works, and construction works in forest areas and their surrounding areas, so that it imposes a minimum set of measures to be taken in the neighborhood of forests, as well as the penalties that should be imposed on activities that may cause fires.

D Development of an AI-Model for predicting forest fire.

For improving the quality of forest fire prevention and proactive forecasting, the National Water and Forest Agency has strengthened the use of new technologies by developing a new information system based on artificial intelligence (AI) algorithms, big data and high-performance computing (HPC) to map forest fire risks and trigger alerts for appropriate interventions accordingly. This system, which is the first of its kind in the Mediterranean basin, provides a daily platform for forecasting forest fires for the Tangier-Tetouan Al Hoceima region as a reconnaissance and pilot area.

This system provides a daily map of the degrees of outbreak and spread risks with very high accuracy, accompanied by the possibility of interpreting the risks, to provide valuable information to the control teams already present in the field, taking into account factors such as climate changes, satellite imagery, social and economic information, and the fuel condition.



E Strengthening the land and air fleets to combat forest fires

The National Water and Forest Agency worked to strengthen the firefighting strategy by strengthening the fleet of Initial Intervention Vehicles, through the acquisition of 25 new vehicles (VPI) with a tank capacity of 600 liters

Regarding air attack, our country has worked to strengthen its air fleet by acquiring 2 new "Canadair" aircraft, bringing the total number to 7 aircraft by 2024.

In parallel, dams, airports and strategic air bases (Tangier, Nador, Kenitra, Fez Sais, Agadir and Taza...) were equipped with infrastructure and basic equipment (platforms, aircraft hangar, fire hoses, water pumping equipment...) to ensure efficiency and safety. Air interventions to fight fires.

Source: National Centre for Forest Climate Risk Management, National Water and Forest Agency - Rabat,, Morocco).

2 The European Forest Fire Information System (EFFIS)

The European Forest Fire Information System (EFFIS) has been established jointly by the European Commission services (DG ENV and JRC) and the relevant fire services in the EU Member States and European countries (Forest Services and Civil Protection services). Research activities for the development of the system initiated at JRC in 1998 and the first EFFIS operations were in the year 2000.

In 2003, EFFIS was embedded in the new Regulation (EC) No 2152/2003 (Forest Focus) of the European Council and Parliament on monitoring of forests and environmental interactions until it expired in 2006. Since then, EFFIS operated as a voluntary system of information on wildfires until the end of 2015, when it became part of the EU Copernicus program, under the Emergency Management Services.

Acting as the focal point of information on forest fires, EFFIS supports the national services in charge of wildfire management. Currently, the EFFIS network is made up of 43 countries in Europe, Middle East and North Africa. EFFIS provides specific support to the Emergency Response Coordinating Centre (ERCC) (formerly Monitoring and Information Centre (MIC)) of Civil Protection as regards near-real time information on wildfires during the fire campaigns, and assists other DGs through the provision both pre-fire and post-fire information on wildfire regimes and impacts. It provides information that supports the needs of the European Parliament with regards to wildfire management, impact in natural protected areas and harmonized information on forest fires in the EU.

EFFIS also centralises the national fire data that the countries collect through their national forest fire programmes in the so-called EFFIS Fire Database. The EFFIS web services[6] allow users to access near-real time and historical information on wildfires in Europe, Middle East and North Africa.

EFFIS provides a continuous monitoring of the fire situation in Europe and the Mediterranean area, and regularly sends updates to EC services during the main fire season. The information about the on-going fire season is continuously updated on the EFFIS web site (up to 8 times, daily), which can be interactively queried[7]. EFFIS provides daily meteorological fire danger maps and forecasts of fire danger up to 9 days in advance, updated maps of the latest active fires, wildfire perimeters and post-fire evaluation of damage.

The EFFIS module for the assessment of meteorological forest fire danger is the EFFIS Danger Forecast. This module forecasts forest fire danger in Europe, part of North Africa and the Middle East, on the basis of the Canadian Fire Weather Index (FWI), allowing a harmonized evaluation to be made of the forest fire danger situation throughout Europe and neighbouring countries.

The damage caused by forest fires in Europe and neighbouring countries is estimated using the EFFIS Rapid Damage Assessment (RDA) module. Since 2000, cartography of the burnt areas is produced every year through the processing of satellite imagery. After 2003 the processing chain was further automated to process MODIS data in near-real time. Daily, two full image mosaics of the European territory are processed in EFFIS to derive burnt area maps, every day. Additionally, since 2018, Sentinel-2 imagery is used to map fires, which allows the mapping of fires smaller than 30 ha and refining the final perimeters of those fires initially mapped from MODIS 250 m imagery. The burnt area mapped by EFFIS corresponds, on average, to around 95% of the total area burnt in Europe each year. Further to the mapping of burnt areas, the analysis of which types of land cover classes are affected by fires is performed.

[6] http://effis.jrc.ec.europa.eu

[7] see http://effis.jrc.ec.europa.eu/current-situation

3 Wildfires in 2023: Country reports from EFFIS

The EFFIS Danger Forecast

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. From 2002, at the request of the Member States, operation of the EFFIS Danger Forecast was 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. From 2008 the EFFIS Danger Forecast system has run continuously throughout the year without interruption.

The geographic extent has been enlarged over the years from the initial extent that covered only the Mediterranean region. Now the system covers the whole of Europe and MENA (Middle East & North Africa) countries.

The meteorological data used to run the model has also changed during the years. At the beginning the system started using forecasted data provided by Météo-France[8] with a spatial resolution of around 50 km. Then over time other providers were included, such as DWD (Deutscher Wetterdienst)[9] and ECMWF (European Centre for Medium-Range Weather Forecast)[10] and the resolution has improved. Now the system runs with three different data sets from three providers: ECMWF (the primary), Météo-France and DWD; with a spatial resolution in a range from around 10 km to 25 km.

In the following chapters the fire danger trends assessed by EFFIS in the different countries during the 2023 fire season are presented, comparing them with long term trends. To make this analysis we use the Fire weather Index (FWI) calculated on the base of the ECMWF ERA5 reanalysis dataset. The link can be found here:

https://cds.climate.copernicus.eu/cdsapp#!/dataset/cems-fire-historical?tab=overview

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

In the charts we present fire weather index data for the current year, showing how it compares against the long-term minimum and maximum, the 10-90 percentiles, and the long-term average (measured from 1980-2022). This makes it possible to see whether and when extreme conditions occur in the current year.

The current methodology is based on the calculation of the FWI of each country day by day for the whole time series. Then for each country we calculate the statistics - min, max, average, the 10th percentile and the 90th percentile.

Mapped burnt areas

The country chapters also detail the burnt areas mapped in each country in 2023.

European countries (EU and non-EU) are listed alphabetically, followed by the MENA countries.

Burnt areas are split into different land cover types using the CORINE Land Cover (CLC) 2018 database unless otherwise specified.

The figures may also include agricultural and urban areas that were burned during the wildfires, or prescribed fires, which may not strictly be considered forest fires in the countries concerned. The breakdown of totals into the different land cover types gives some ideas of the different areas affected.

NOTE

In 2023, fires smaller than 30 ha were mapped. These figures are displayed in the tables of land cover types and the charts of monthly numbers of fires/burnt areas.

However, when comparing the latest data with the historic records of previous years, a filter has been applied excluding fires under 30 ha, in order to make consistent comparisons. This applies to the charts showing the annual time series of mapped numbers of fires/burnt areas.

It is also worth noting, however, that almost all burnt area results from fires larger than 30 ha.

[8] https://meteofrance.com/
[9] https://www.dwd.de
[10] https://www.ecmwf.int/

3.1 EFFIS Rapid Damage Assessment: 2023 results

The Rapid Damage Assessment module of EFFIS was set up to provide reliable and harmonized estimates of the areas affected by wildfires during the fire season. The methodology and the spatial resolution of the satellite sensor data used for this purpose, from the MODIS sensor, at 250 metre spatial resolution, allowed fires of about 30 ha or larger to be mapped. This methodology was enhanced in 2018 through the use of Sentinel 2 imagery, at 20 metre spatial resolution, which allowed the mapping of fires of about 5 ha or larger.

In order to maintain the comparability of the area burnt nowadays with the area mapped prior to 2018, when current results are compared with those of previous years, only the number and the area burnt by fires above 30 ha is used, while the higher resolution is reported for the 2023 season.

Although the number of fires mapped in EFFIS is only a fraction of the total number of fires in the countries, the area burned by these fires represent approximately 95% of the total burnt area reported by the countries.

The fires mapped in EFFIS include all those fires that burned natural land, including prescribed fires that are set for management or conservation purposes.. Non-wildland fires are excluded from the statistics published in the system. Accordingly, fires that burn grassland, shrub land and other wooded land are included in the EFFIS statistics. If a portion of a mapped fire includes agricultural or urban areas, these land covers are included in the estimation of the area of the event. Information on each type of land cover that is affected by the fires mapped in EFFIS is provided for each fire event. However, total figures of burnt areas may not correspond with national statistics that consider only areas burned in forest areas.

In order to obtain the statistics of the burnt area by land cover type, the data from the European CORINE Land Cover database were used. Therefore, the mapped burnt areas were overlaid with the CLC data, making it possible to derive damage assessment results comparable for all the EU countries.

The results for each of the countries affected by forest fires are given in the following paragraphs in alphabetical order, followed by a section on the MENA countries.

The total area burned in 2023, as shown by the analysis of satellite imagery, is shown in Table 49.

Figure 199 shows the scars caused by forest fires during the 2023 season. In 2023, fires were mapped in 43 countries and a total burnt area of 907 674 ha was mapped, around two thirds the area mapped in 2022.

Table 49. Areas mapped in 2023 estimated from satellite imagery.

Country	*Area (Ha)*	*Number of Fires*
Albania	6012	80
Algeria	73725	620
Austria	403	6
Belgium	240	2
Bosnia & Herzegovina	3543	50
Bulgaria	16828	148
Croatia	2873	24
Cyprus	2010	19
Czechia	22	1
Denmark	144	6
Estonia	219	8
Finland	531	48
France	27872	675
Germany	1194	39
Greece	175759	174
Hungary	161	3
Ireland	5203	117
Israel	706	15
Italy	107231	1378
Kosovo under UNSCR 1244	1341	47
Latvia	207	15
Lebanon	1889	90
Libya	417	11
Lithuania	342	12
Montenegro	624	29
Morocco	8127	92
Netherlands	53	2
North Macedonia	13322	87
Norway	1372	59
Palestinian Territory	480	2
Poland	214	27
Portugal	43049	938
Romania	17491	124
Serbia	2909	79
Slovenia	131	2
Spain	101184	1397
Sweden	641	61
Switzerland	68	1
Syria	11449	37
Tunisia	6805	130
Türkiye	35813	424
UK	9343	112
Ukraine	226421	2185
Total	**908368**	**9376**

Summary	**Total Area (Ha)**
EU27	504002
Other European countries	300768
Middle East and North Africa	103598
Natura2000/other protected sites	210237

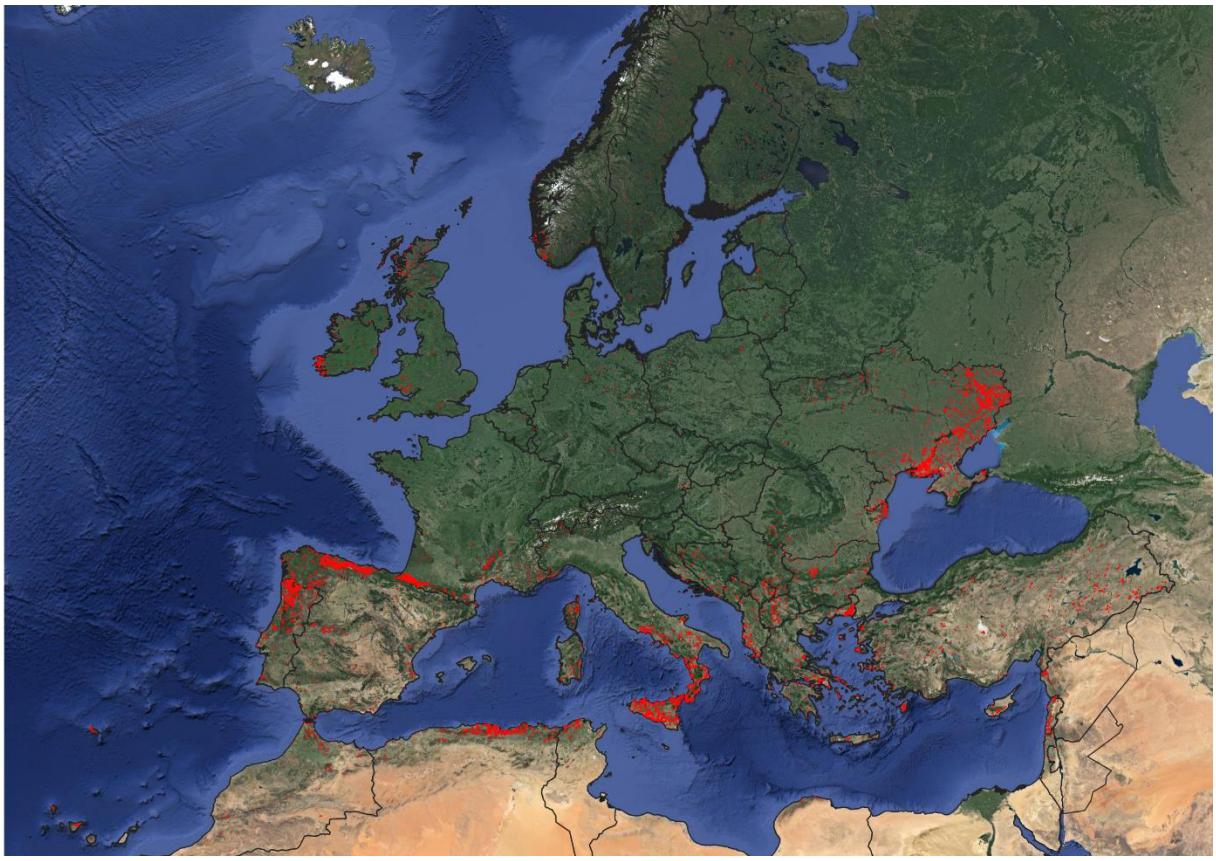


Figure 199. Burnt scars produced by wildland fires during the 2023 fire season.

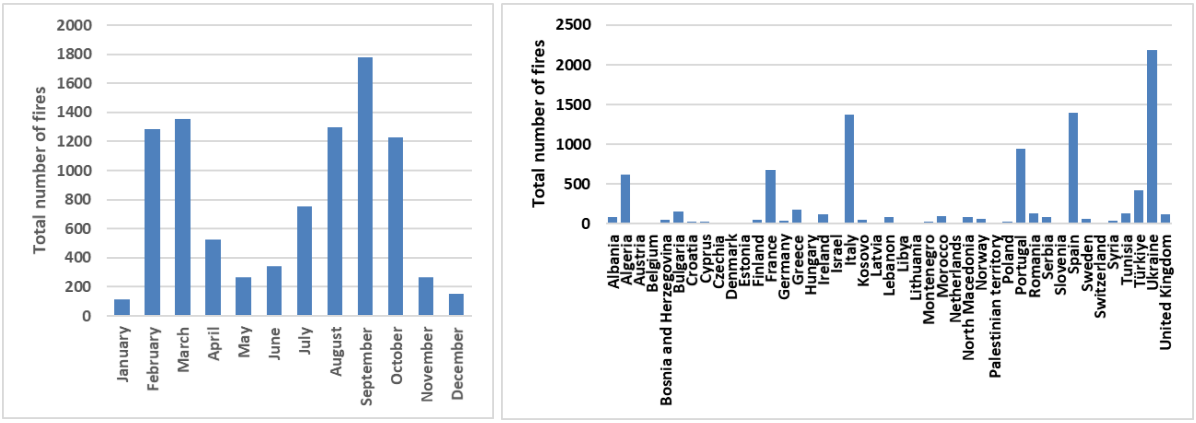


Figure 200. Total number of fires mapped by month and country in 2023.

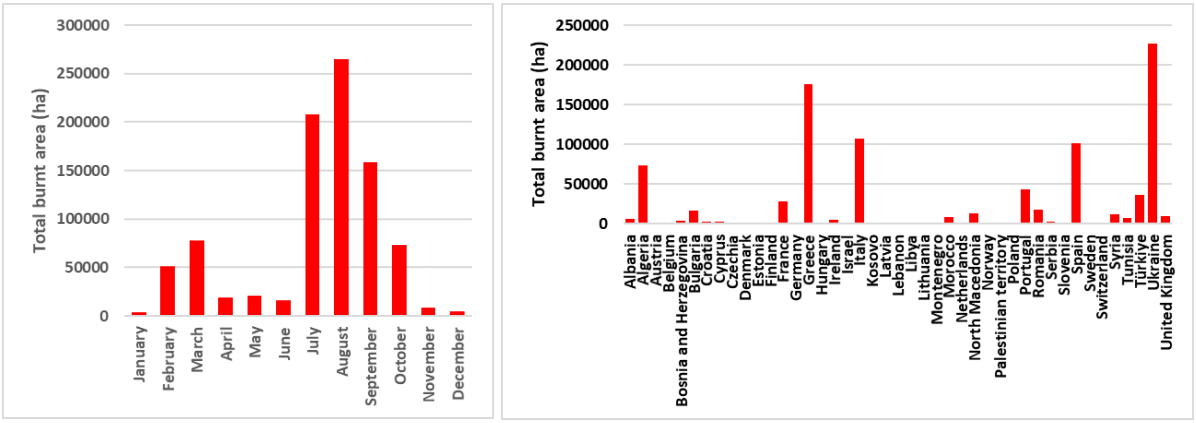


Figure 201. Total burnt area of fires mapped by month and country in 2023.

Damage to Natura2000 sites

Of particular interest is the analysis of the damage caused by fires to the areas protected within the Natura2000 network, as they include habitats of especial interest which are home for endangered plant and animal species.

The category of Natura2000 areas only exists in the countries of the European Union, but some other countries also report equivalent protected areas. The area burnt within the Natura2000 sites and other protected areas for which there is information is presented below.

Note: mapped burnt areas from all fires are presented, including also those that are prescribed for fire management or conservation purposes.

Country	Area (Ha)	% of Natura2000 Area	Number of Fires
Austria	403.0	0.026	6
Belgium	240.0	0.056	2
Bulgaria	11508.6	0.205	84
Croatia	629.9	0.019	15
Cyprus	544.8	0.229	4
Czechia	22.0	0.001	1
Denmark	144.0	0.024	6
Estonia	29.0	0.003	1
Finland	34.0	0.001	6
France	16367.4	0.175	403
Germany	1137.0	0.016	31
Greece	70640.3	1.467	84
Hungary	161.0	0.006	3
Ireland	1850.1	0.161	59
Italy	30680.3	0.419	398
Latvia	181.1	0.024	6
Netherlands	53.0	0.007	2
Poland	166.0	0.002	19
Portugal	14324.0	0.590	363
Romania	15707.5	0.202	78
Slovenia	131.0	0.011	2
Spain	42664.8	0.253	519
Sweden	69.7	0.001	7
EU27 total	**207688.5**		**2099**
Algeria	1484.4	0.892	11
Lebanon	23.9	0.088	5
Morocco	1.0	0.000	1
UK	1039.1	0.041	23
Non-EU total	**2548.4**		**40**
Total (all)	**210236.9**		**2139**

Fires were mapped in 23 of the 27 EU member states (all except Estonia, Luxembourg, Malta and Slovakia).

The total burnt area in Natura2000 and other protected sites in 2023 was 210 237 ha, around 60% of the amount recorded in 2022.

Greece was the most affected country in 2023, followed by Spain and Italy. These three countries accounted for two thirds of the total area burnt in protected areas in 2023 (Figure 202, Figure 203).

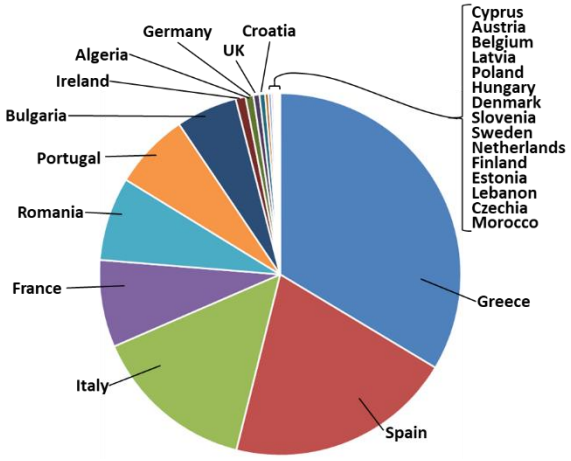


Figure 202. Total area burnt in Natura2000 sites and other protected areas in 2023.

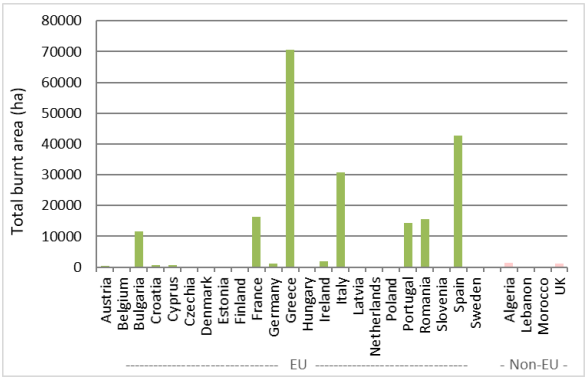


Figure 203. Total mapped burnt area in Natura2000 sites and other protected areas in 2023.

Affected land cover types

In 2023, across the whole region mapped by EFFIS, over half of the total burnt area occurred either in Other Natural Land or Agricultural Land as identified by the 2018 CORINE Land Cover Type classification system and the 2019 Copernicus Globcover classification in regions where Corine was not available (Figure 205).

A further 25% was mapped in forest (Broadleaf, Conifer or Mixed). (Figure 204, Figure 205).

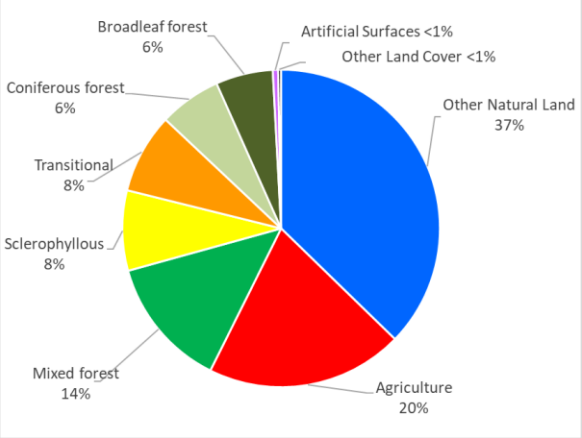


Figure 204. Proportions of land cover types affected in 2023 (all countries).

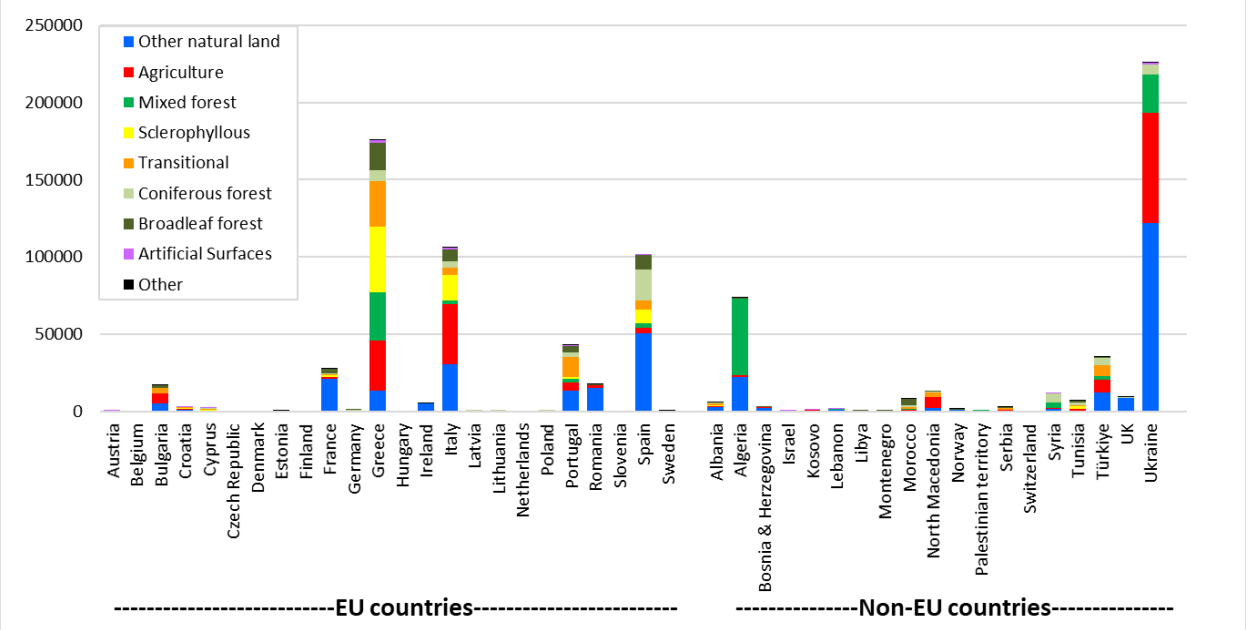


Figure 205. Burnt area in each country in 2023 by CORINE land class.

European countries

In 2023, fires were mapped in 24 of the EU27 countries (all except Luxembourg, Malta and Slovakia), burning 504 002 ha in total, less than the amount recorded in 2022 (837 202 ha).

The main peak occurred during the summer months when some extremely large fires were recorded, including the largest fire ever mapped in EFFIS in Greece in August.

Of this total, 207 689 ha occurred on Natura2000 sites, somewhat less than was recorded in 2022 (350 437 ha). This is equivalent to around 40% of the total burnt area in European countries. Two-thirds of the damage to protected areas came from three countries (Greece, Spain and Italy).

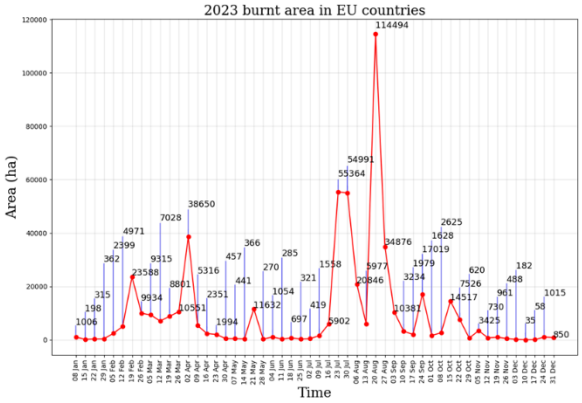


Figure 206. Burnt area weekly evolution in EU27 countries in 2023.

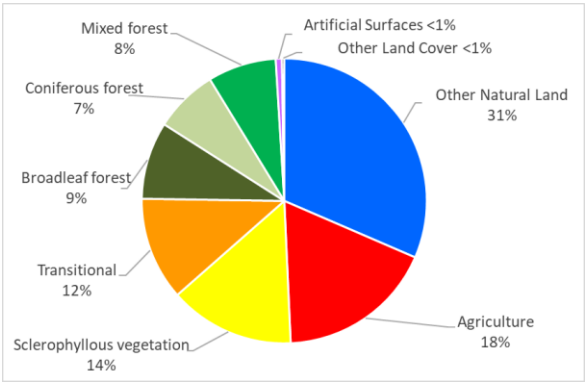


Figure 207. Proportions of land cover types affected in EU27 countries in 2023.

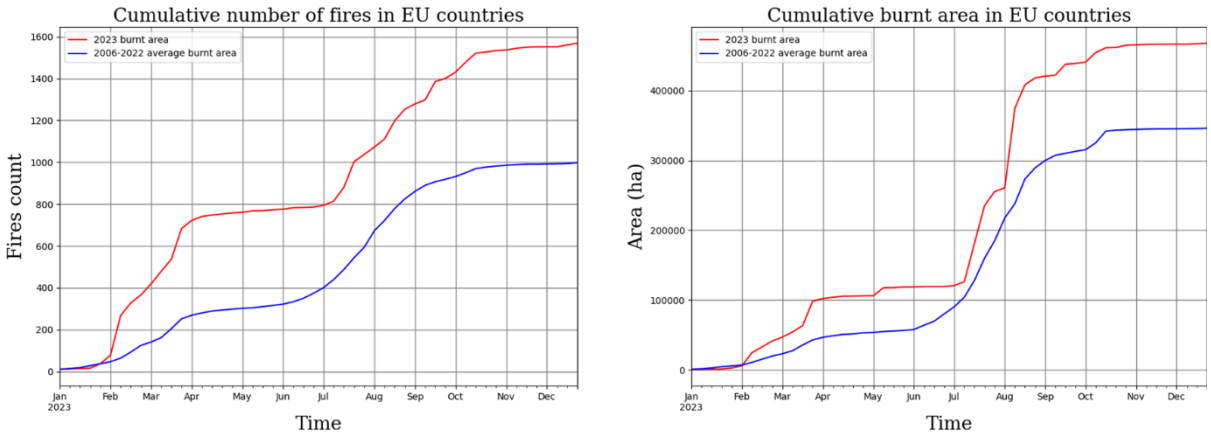


Figure 208. Cumulative number of fires and burnt area in 2023 in EU27 countries (red line) compared with 2008-2021 average (blue line). Fires are filtered to include only those ≥30 ha to allow the comparison with previous years.

3.1 Country reports

3.1.1 Albania

80 fires were mapped in Albania, resulting in a total burnt area of 6 012 ha, less than a third of the total mapped in 2022 and the lowest total since 2018 (Figure 211).

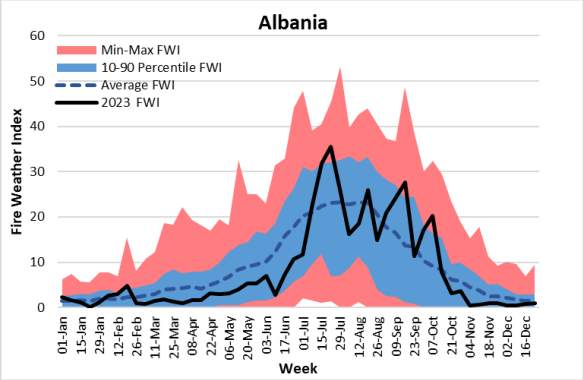


Figure 209. Fire weather Index information for Albania.

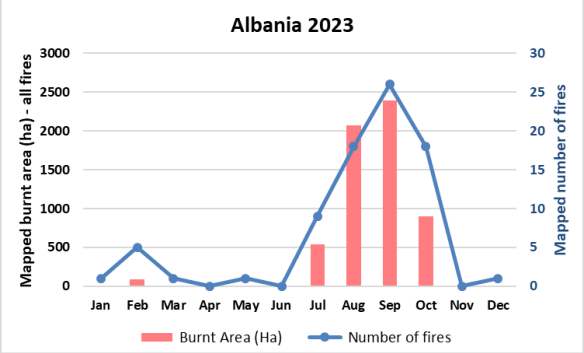


Figure 210. Monthly numbers of fires and burnt area in Albania in 2023.

Table 50. Distribution of burnt area (ha) in Albania by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	188	3.1
Coniferous forest	730	12.2
Mixed forest	9	0.2
Other Natural Land	2613	43.5
Sclerophyllous vegetation	650	10.8
Transitional	888	14.8
Agriculture	924	15.4
Artificial Surfaces	5	0.1
Other Land Cover	2	0.0
TOTAL	**6012**	**100**

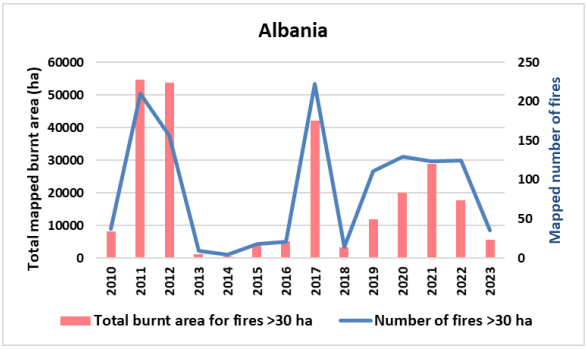


Figure 211. Annual mapped burnt area of fires ≥ 30 ha in Albania.

Almost all of the damage occurred in the summer months (Figure 210), including two fires over 500 ha.

Over 40% of the total was mapped in Other Natural Land (Table 50). Mapped locations of the fires in 2023 can be seen in Figure 212.

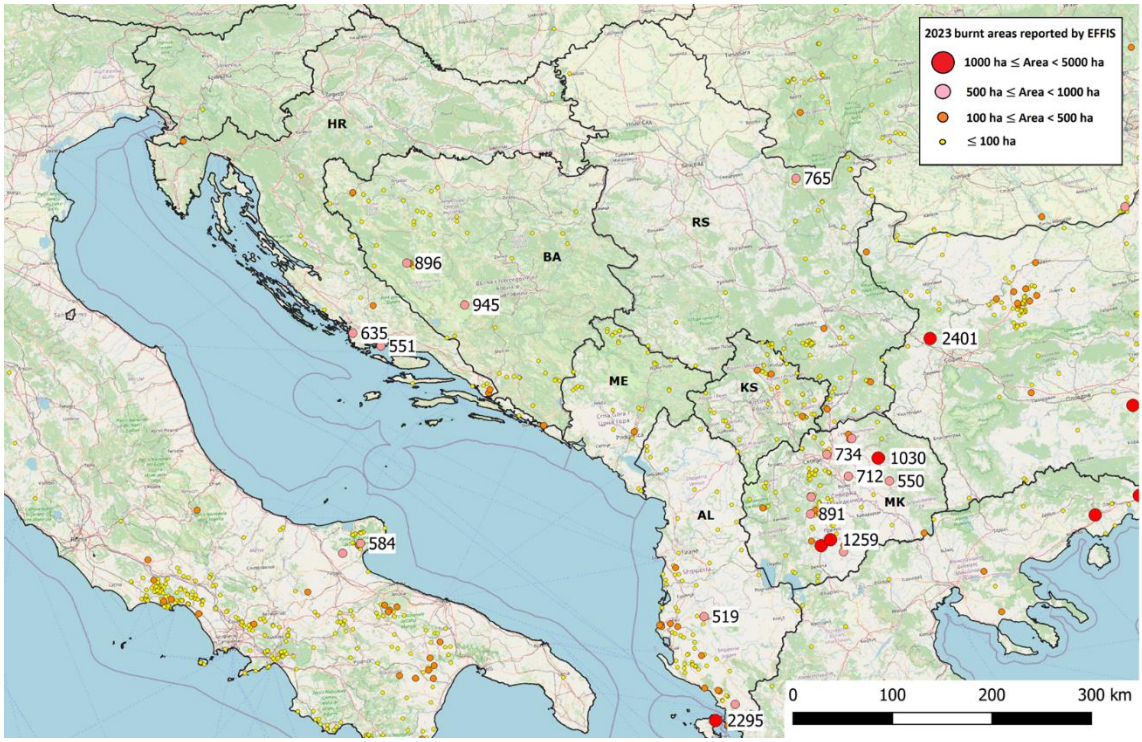


Figure 212. Locations of mapped fires in the Balkans in 2023. Largest fires are indicated in ha. AL=Albania; BA=Bosnia & Herzegovina; HR=Croatia; KS=Kosovo under UNSCR 1244; ME=Montenegro; MK=North Macedonia; RS=Serbia.

3.1.2 Austria

After a hard season in 2022, the total burnt area mapped in Austria in 2023 was significantly lower. 403 ha was mapped from six fires in February and March, all on Natura2000 sites and mostly affecting Other Natural Land (Table 51).

Table 51. Distribution of burnt area (ha) in Austria by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	2	0.5
Mixed forest	12	3.0
Other Natural Land	357	88.6
Agriculture	31	7.7
Artificial Surfaces	1	0.3
TOTAL	**403**	**100**

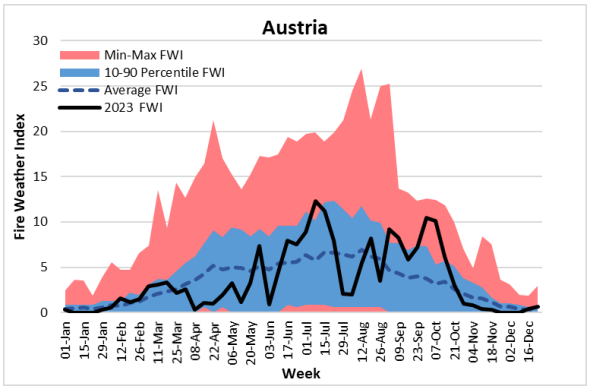


Figure 213. Fire weather Index information for Austria.

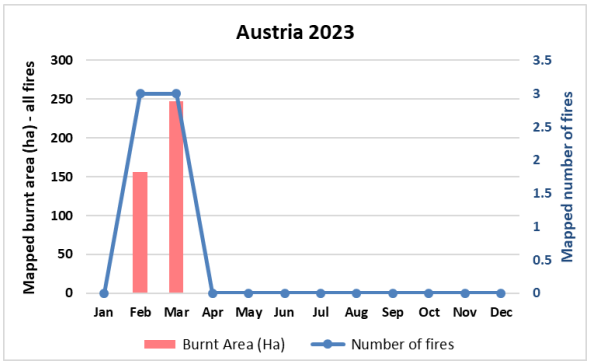


Figure 214. Monthly numbers of fires and burnt area in Austria in 2023.

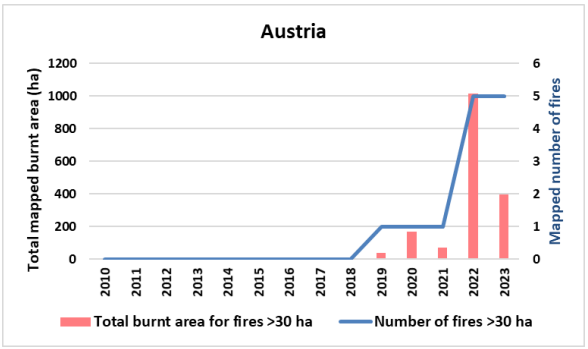


Figure 215. Annual mapped burnt area of fires ≥ 30 ha in Austria.

3.1.3 Belgium

Two fires were mapped in Belgium, in March and May and resulted in a total of 240 ha burnt. Both fires occurred on Natura2000 sites, representing 0.056% of the protected area in the country.

Table 52. Distribution of burnt area (ha) in Belgium by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Other Natural Land	166	69.2
Transitional	74	30.8
TOTAL	**240**	**100**

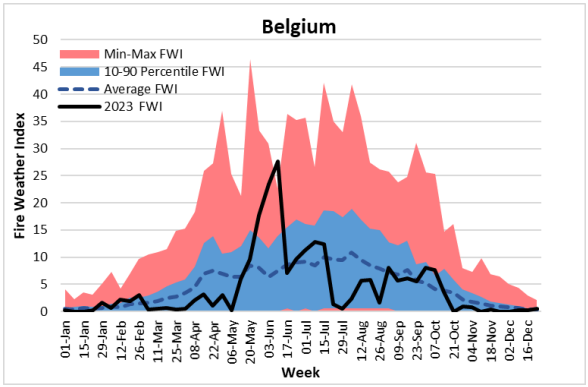


Figure 216. Fire weather Index information for Belgium.

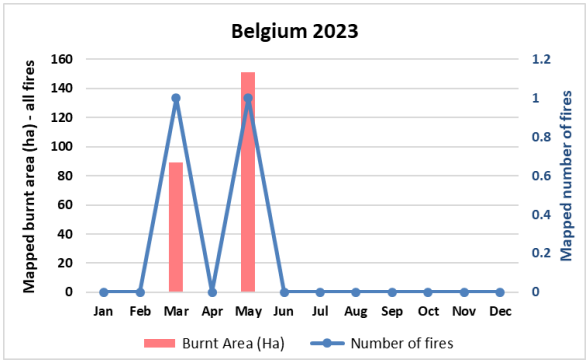


Figure 217. Monthly mapped burnt area and number of fires in Belgium in 2023.

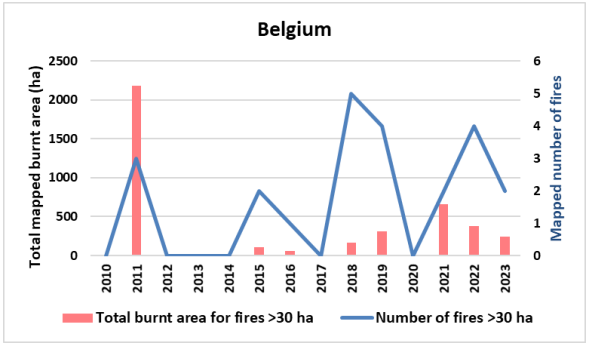


Figure 218. Annual mapped burnt area of fires ≥ 30 ha in Belgium.

3.1.4 Bosnia and Herzegovina

After several hard fire seasons in Bosnia, 2023 was very light in terms of the total mapped burnt area. 50 mapped fires resulted in a total burnt are of 3 543 ha, around 5% of the 2022 total. Much of the damage occurred early in the year, although there was a second peak of activity in December, mostly caused by a fire of 945 ha in Prozor-Rama region. One other fire of almost 900 ha was recorded in Glamoč region in March. Two-thirds of the annual total occurred in Other Natural Land.

Table 53. Distribution of burnt area (ha) in Bosnia-Herzegovina by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	461	13.0
Other Natural Land	2363	66.7
Sclerophyllous vegetation	125	3.5
Transitional	345	9.8
Agriculture	248	7.0
TOTAL	**3543**	**100**

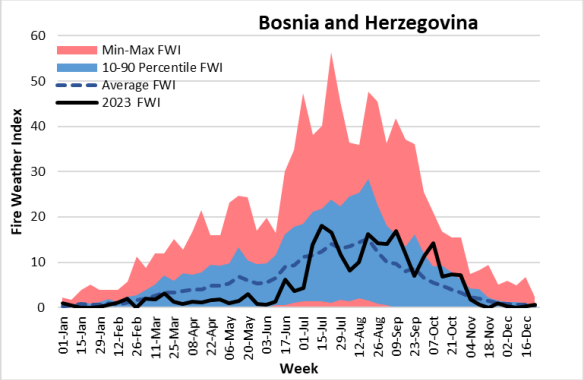


Figure 219. Fire weather Index information for Bosnia.

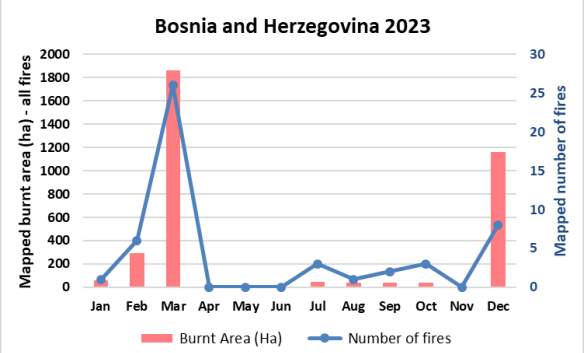


Figure 220. Monthly mapped burnt area and number of fires in Bosnia & Herzegovina in 2023.

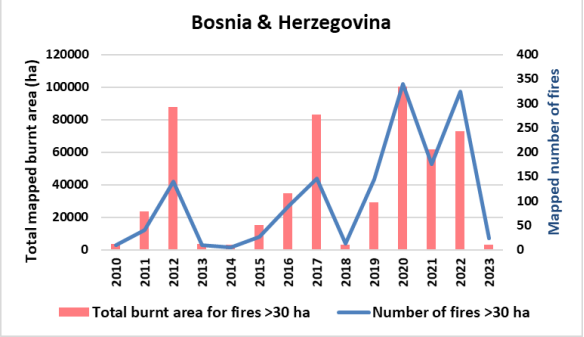


Figure 221. Annual mapped burnt area of fires ≥ 30 ha in Bosnia & Herzegovina.

3.1.5 Bulgaria

In Bulgaria 16 828 ha was mapped from 148 fires, making it the worst season for a decade. Large fires were mapped over a long summer season (Figure 223). and included a fire of 2 400 ha in October in Sofia region. Three other fires exceeded 1 000 ha and a further three were over 500 ha. Of the annual total, around two-thirds (11 509 ha) occurred on Natura2000 sites, amounting to 0.204% of the total protected land in Bulgaria.

Table 54. Distribution of burnt area (ha) in Bulgaria by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	1245	7.4
Coniferous forest	153	0.9
Mixed forest	352	2.1
Other Natural Land	5380	32.0
Transitional	3329	19.8
Agriculture	6245	37.1
Artificial Surfaces	37	0.2
Other Land Cover	88	0.5
TOTAL	**16828**	**100**

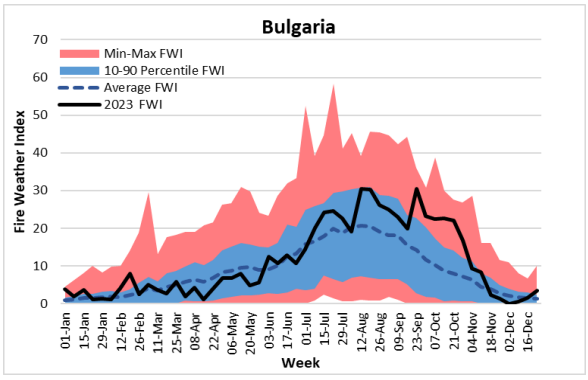


Figure 222. Fire weather Index information for Bulgaria.

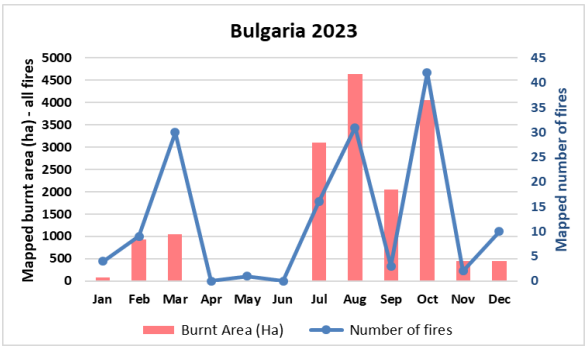


Figure 223. Monthly mapped burnt area and number of fires in Bulgaria in 2023.

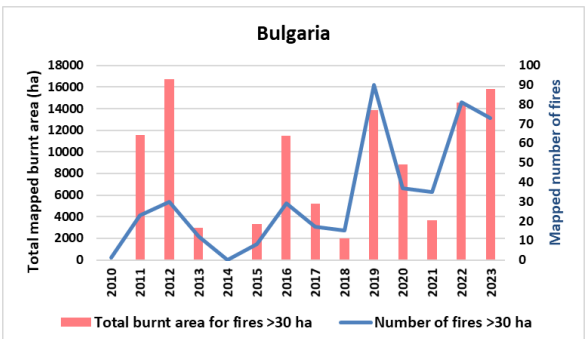


Figure 224. Annual mapped burnt area of fires ≥ 30 ha in Bulgaria.

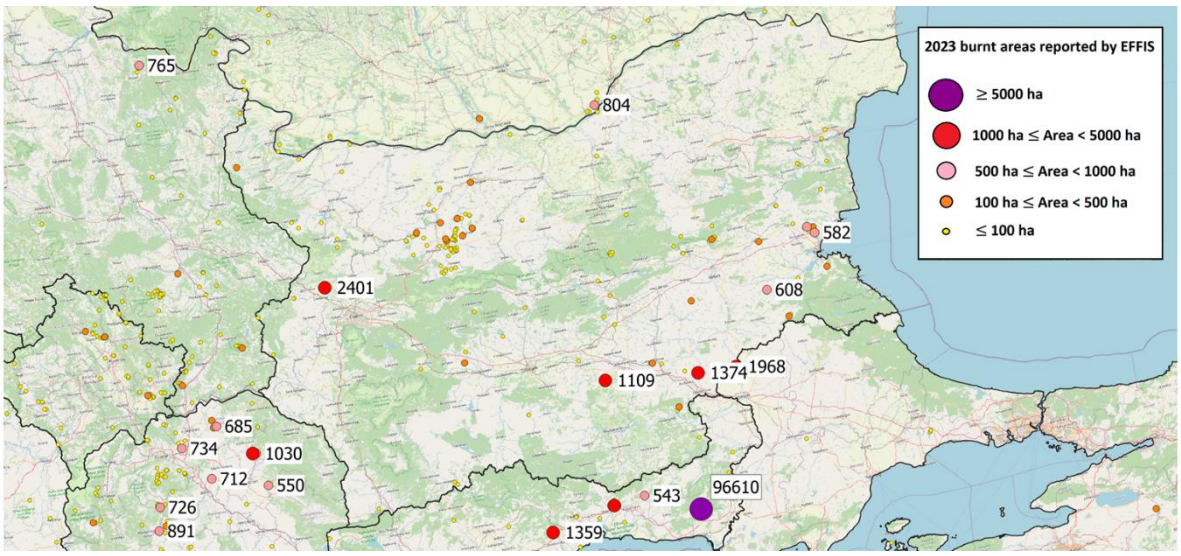


Figure 225. Locations of mapped burnt areas in Bulgaria in 2023.

3.1.6 Croatia

The total mapped burnt area in Croatia was 2 873 ha from 24 fires, only a tenth of the amount recorded in 2022 and one of the lowest amounts in recent years (Figure 228). 40% of this total came from two large fires over 500 ha in July in Sibenik and Split region. Of the total, 630 ha (22% of the total) occurred on Natura2000 sites, amounting to 0.019% of the protected areas in the country. The locations of these mapped fires can be seen in Figure 212 on page 154.

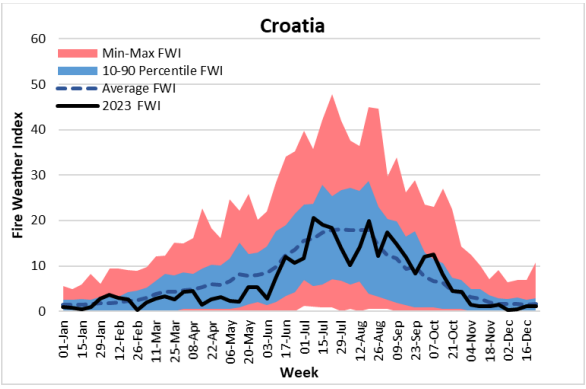


Figure 226. Fire weather Index information for Croatia.

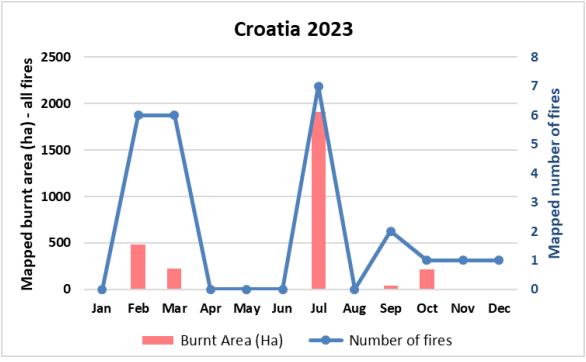


Figure 227. Monthly mapped burnt area and number of fires in Croatia in 2023.

Table 55. Distribution of burnt area (ha) in Croatia by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	84	2.9
Coniferous forest	97	3.4
Mixed forest	110	3.8
Other Natural Land	1237	43.0
Sclerophyllous vegetation	336	11.7
Transitional	623	21.7
Agriculture	345	12.0
Artificial Surfaces	39	1.4
TOTAL	**2873**	**100**

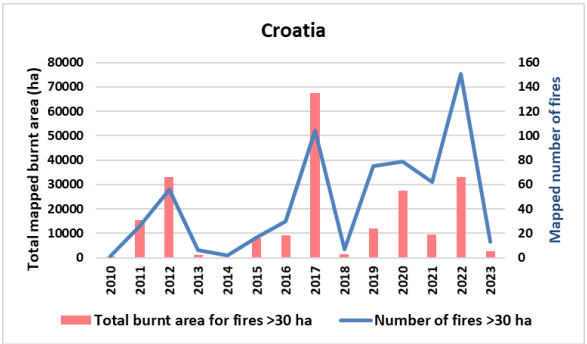


Figure 228. Annual mapped burnt area of fires ≥ 30 ha in Croatia.

3.1.7 Cyprus

The 2023 fire season in Cyprus was somewhat better than the previous three years. 19 fires were mapped, burning a total of 2 010 ha. 82% of the damage occurred in the months of August and September, including the largest fire of the season which covered over 650 ha in Limassol district. 545 ha burned on Natura2000 sites, accounting for a quarter of the total and 0.229% of the total protected land of the country.

Table 56. Distribution of burnt area (ha) in Cyprus by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	572	28.5
Other Natural Land	7	0.3
Sclerophyllous vegetation	691	34.4
Transitional	614	30.6
Agriculture	121	6.0
Artificial Surfaces	4	0.2
TOTAL	**2010**	**100**

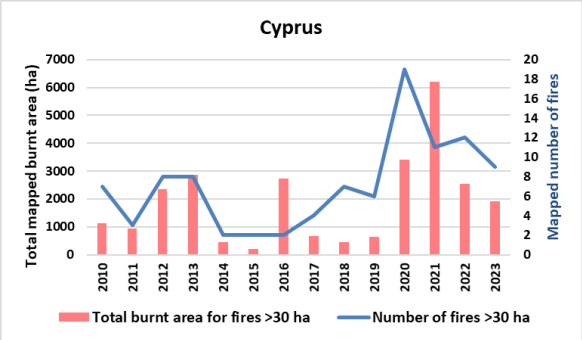


Figure 229. Annual mapped burnt area of fires ≥ 30 ha in Cyprus.

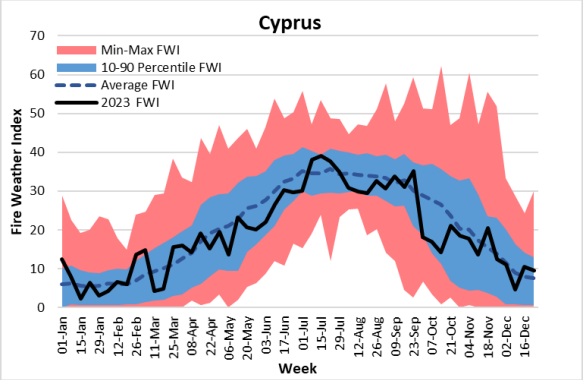


Figure 230. Fire weather Index information for Cyprus.

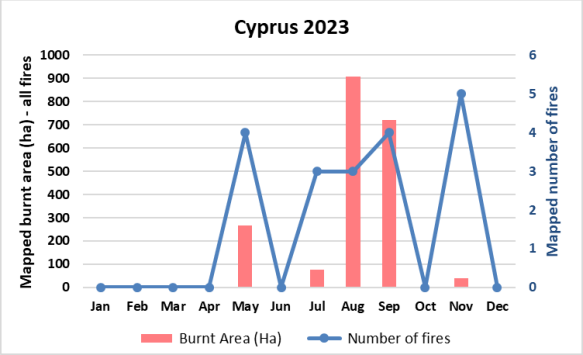


Figure 231. Monthly mapped burnt area and number of fires in Cyprus in 2023.

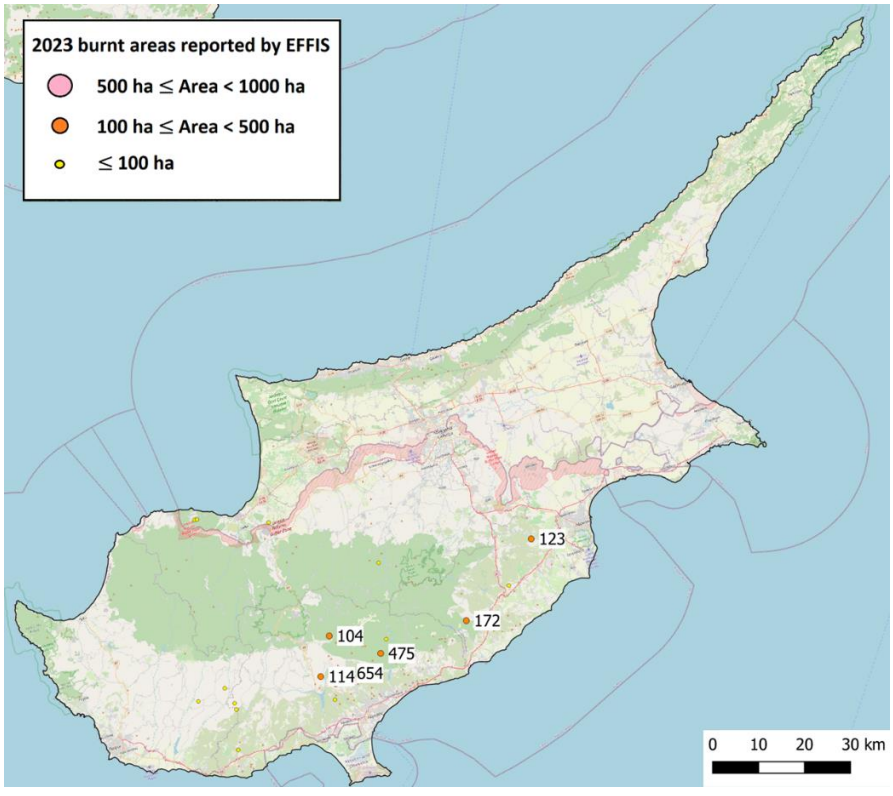


Figure 232. Mapped burnt areas in Cyprus in 2023.

3.1.8 Czechia

After a bad year in 2022, the 2023 fire season in Czechia was very light. A single fire of 22 ha was mapped in July, affecting Coniferous Forest in a Natura2000 site.

Table 57. Distribution of burnt area (ha) in Czechia by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	22	100.0
TOTAL	**22**	**100**

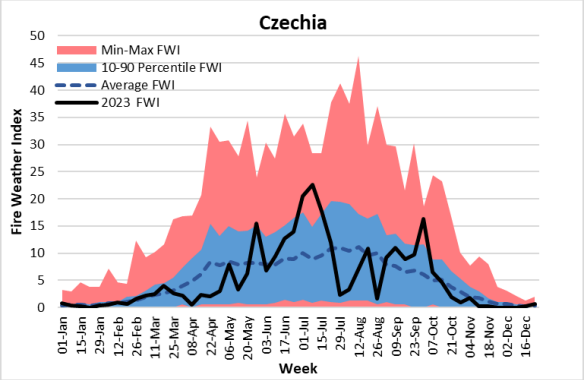


Figure 233. Fire weather Index information for Czechia.

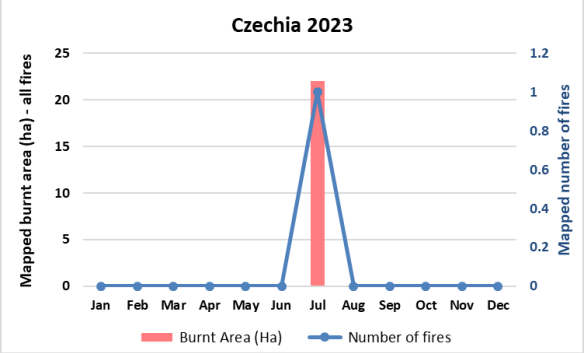


Figure 234. Monthly mapped burnt area and number of fires in Czechia in 2023.

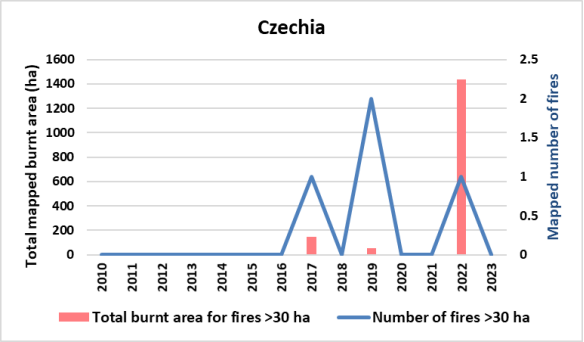


Figure 235. Annual mapped burnt area of fires ≥ 30 ha in Czechia.

3.1.9 Denmark

In Denmark, six fires burned 144 ha in Other Natural Land, mostly in March. All of the annual total was on Natura2000 sites, amounting to 0.024% of the total protected area in the country.

Table 58. Distribution of burnt area (ha) in Denmark by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Other Natural Land	144	100.0
TOTAL	**144**	**100**

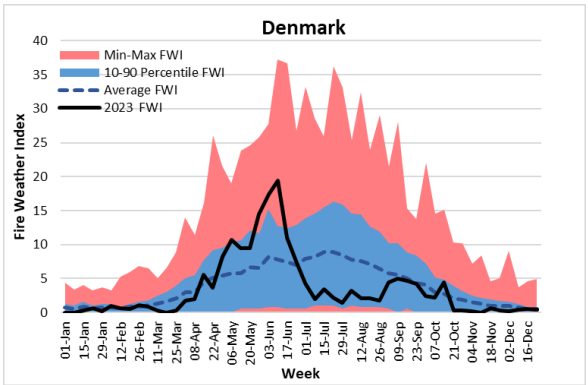


Figure 236. Fire weather Index information for Denmark.

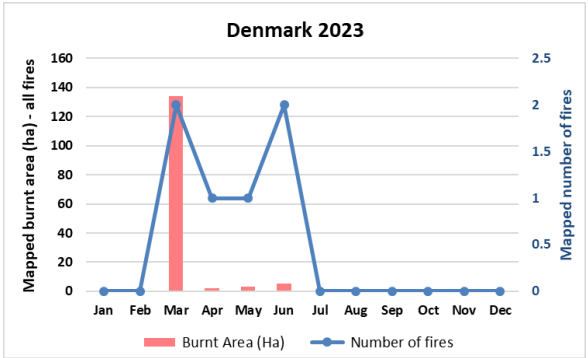


Figure 237. Monthly mapped burnt area and number of fires in Denmark in 2023.

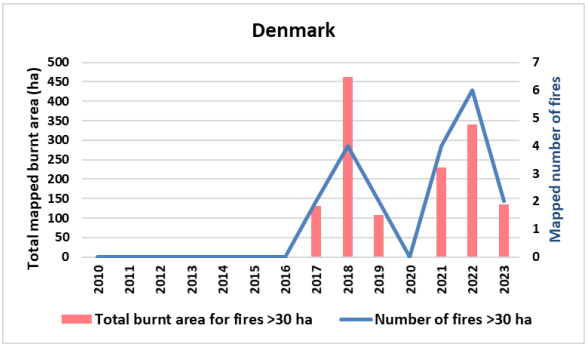


Figure 238. Annual mapped burnt area of fires ≥ 30 ha in Denmark.

3.1.10 Estonia

Eight fires were mapped in Estonia, covering 219 ha mostly in Transitional vegetation. Of this only 29 ha was in Natura2000 land (0.003% of the total protected area in the country).

Table 59. Distribution of burnt area (ha) in Estonia by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	4	1.8
Mixed forest	2	1.0
Other Natural Land	9	4.0
Transitional	201	92.0
Other Land Cover	3	1.3
TOTAL	**219**	**100**

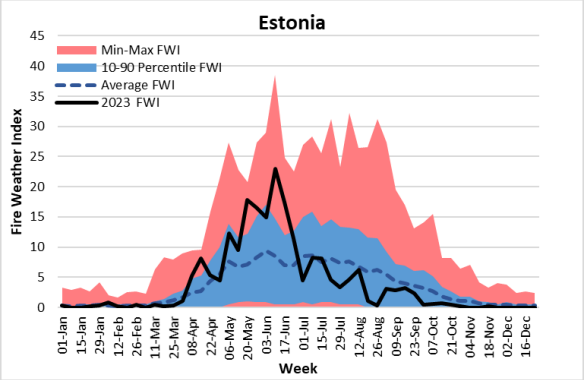


Figure 239. Fire weather Index information for Estonia.

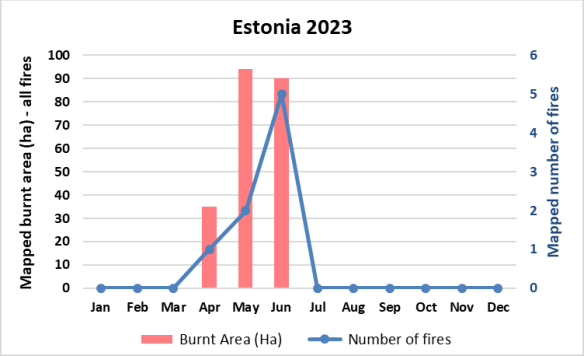


Figure 240. Monthly mapped burnt area and number of fires in Estonia in 2023.

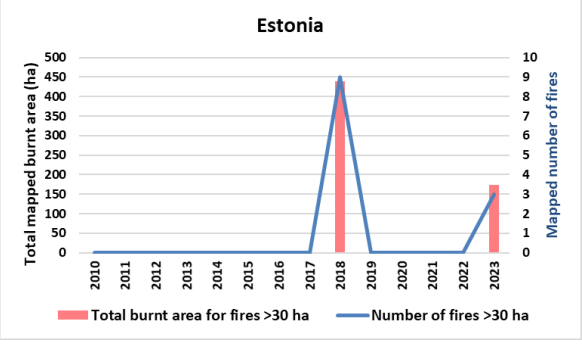


Figure 241. Annual mapped burnt area of fires ≥ 30 ha in Estonia.

3.1.11 Finland

The 2023 fire season in Finland was light and similar to that of 2022. A total burnt area of 531 ha was mapped from 48 fires, of which only 34 ha was on Natura2000 land. Similar to 2022, the 2023 fire season ran from May to August (Figure 243).

Table 60. Distribution of burnt area (ha) in Finland by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	461	86.8
Mixed forest	28	5.2
Other Natural Land	23	4.4
Transitional	19	3.7
TOTAL	**531**	**100**

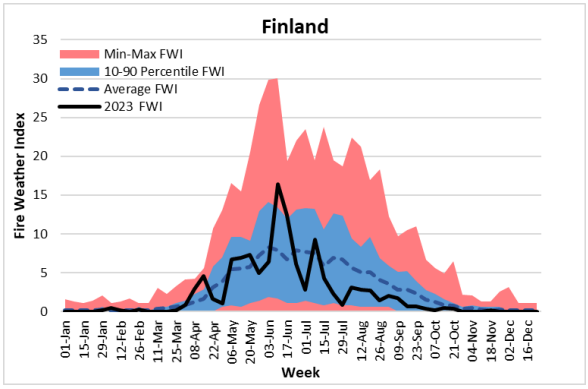


Figure 242. Fire weather Index information for Finland.

Figure 243. Monthly mapped burnt area and number of fires in Finland in 2023.

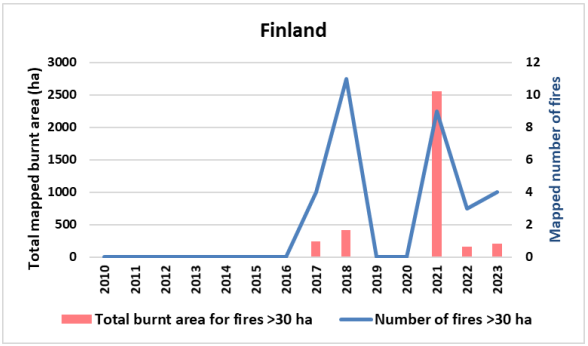


Figure 244. Annual mapped burnt area of fires ≥ 30 ha in Finland.

3.1.12 France

After a bad year in 2022, the 2023 fire season in France was much less severe. A total of 27 872 ha was mapped from 675 fires, less than 40% of the 2022 season total. The three largest fires of the season, all over 500 ha, occurred in the early part of the year in the Pyrenees region as is usual, but the summer was quiet.

16 367 ha (59%) of the annual total occurred on Natura2000 sites, which corresponds to 0.175% of the total Natura2000 areas in the country.

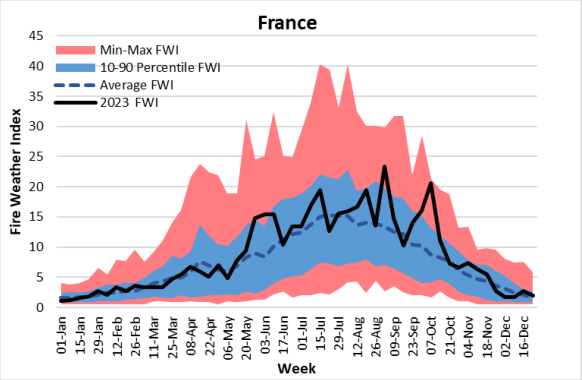


Figure 245. Fire weather Index information for France.

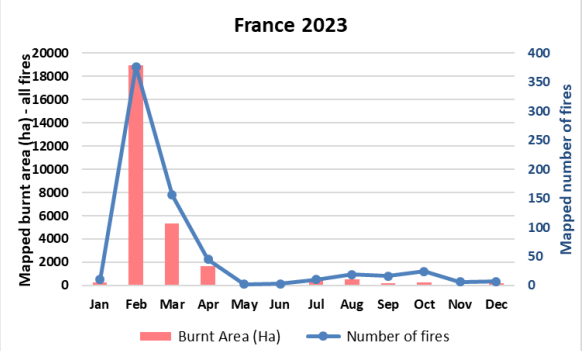


Figure 246. Monthly mapped burnt area and number of fires in France in 2023.

Table 61. Distribution of burnt area (ha) in France by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	3428	12.3
Coniferous forest	231	0.8
Mixed forest	176	0.6
Other Natural Land	21094	75.7
Sclerophyllous vegetation	817	2.9
Transitional	892	3.2
Agriculture	1204	4.3
Artificial Surfaces	25	0.1
Other Land Cover	3	0.0
TOTAL	**27872**	**100**

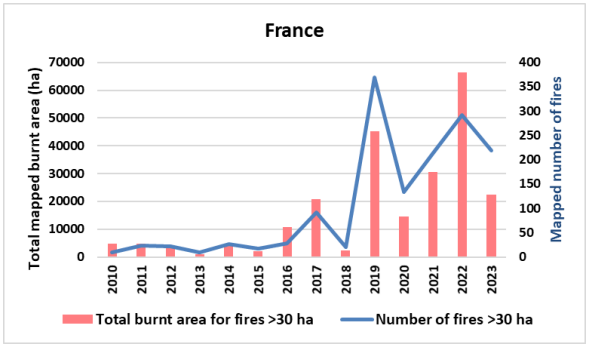


Figure 247. Annual mapped burnt area of fires ≥ 30 ha in France.

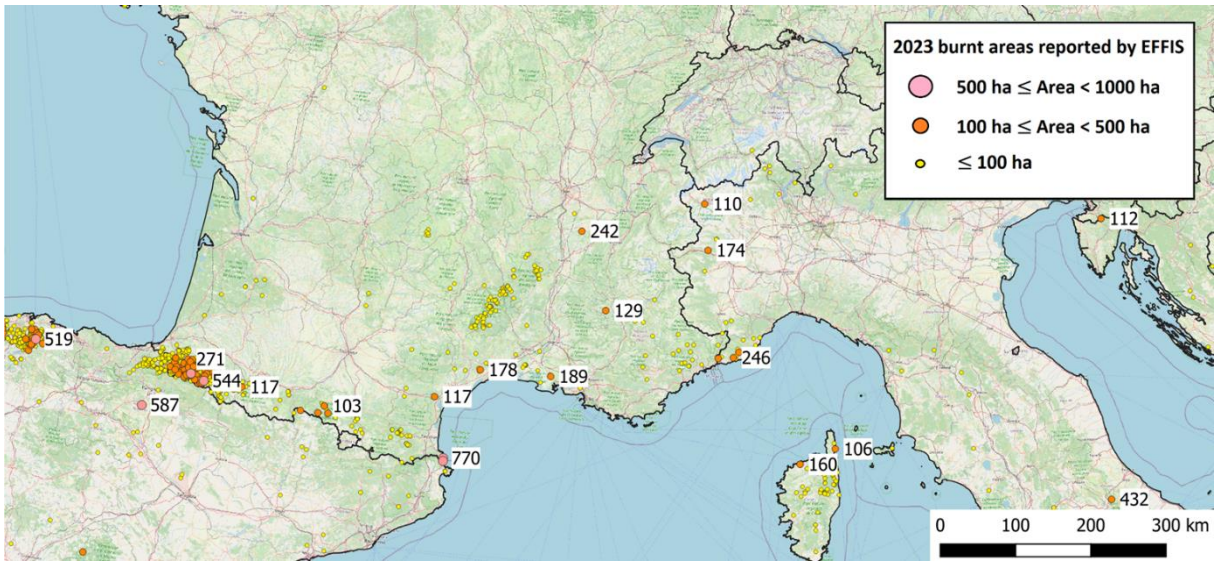


Figure 248. Locations of the mapped burnt areas in the south of France and Corsica in 2023.

3.1.13 Germany

The 2023 fire season in Germany was relatively light after the extreme year of 2022. 39 fires were mapped, burning a total of 1 194 ha. Half of this total came from a single fire in June which covered over 600 ha. Most of the year's total (1 137 ha, 95%) occurred on Natura2000 sites, amounting to 0.016% of the protected area in the country.

Table 62. Distribution of burnt area (ha) in Germany by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	228	19.1
Coniferous forest	312	26.1
Mixed forest	91	7.6
Other Natural Land	416	34.8
Transitional	145	12.2
Agriculture	2	0.2
TOTAL	**1194**	**100**

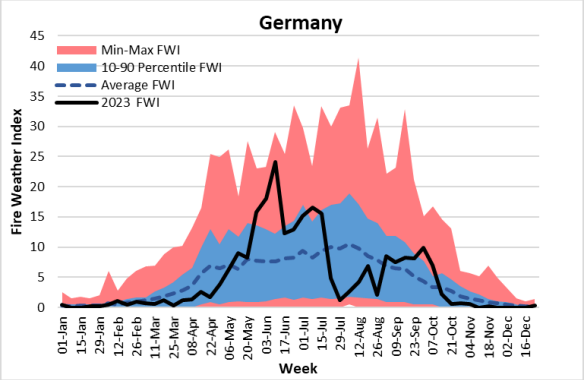


Figure 249. Fire weather Index information for Germany.

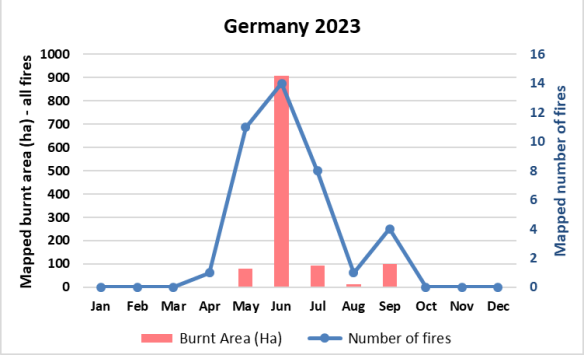


Figure 250. Monthly mapped burnt area and number of fires in Germany in 2023.

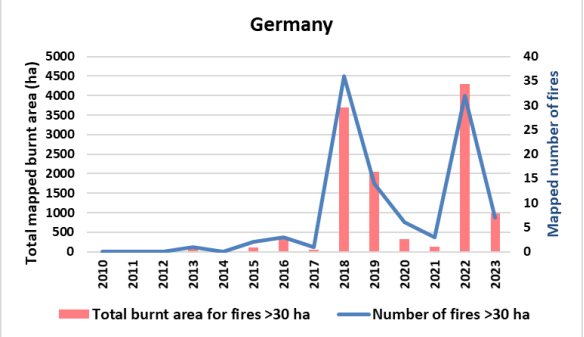


Figure 251. Annual mapped burnt area of fires ≥ 30 ha in Germany.

3.1.14 Greece

It was the most extreme season in Greece for many years. Although the number of mapped fires was lower than in the previous three years, the size of some of the fires was exceptionally high, resulting in a total burnt area of 175 759 ha, the highest recorded since the extreme year of 2007 and making Greece the most affected European country in terms of burnt area in 2023. Practically all of the damage occurred during July and August, including the largest fire ever mapped in EFFIS at over 96 000 ha. Another two fires were mapped over 10 000 ha and there were a further 18 that exceeded 5 000 ha.

Of the total, 70 640 ha occurred on Natura2000 sites, amounting to 40% of the total and 1.467% of the total protected area of Greece.

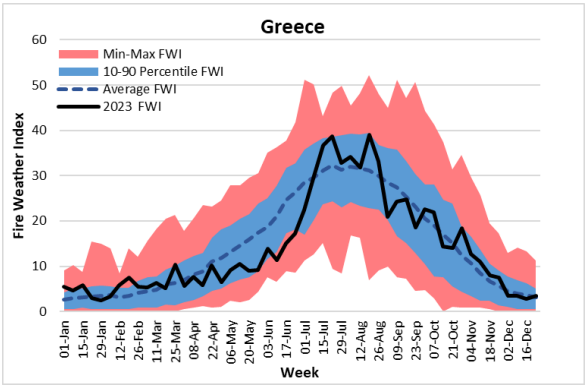


Figure 252. Fire weather Index information for Greece.

Figure 253. Monthly mapped burnt area and number of fires in Greece in 2023.

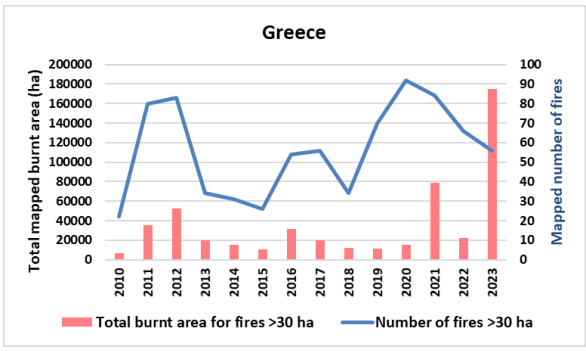


Figure 254. Annual mapped burnt area of fires ≥ 30 ha in Greece.

Table 63. Distribution of burnt area (ha) in Greece by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	17646	10.0
Coniferous forest	6855	3.9
Mixed forest	31021	17.7
Other Natural Land	13744	7.8
Sclerophyllous vegetation	42586	24.2
Transitional	29457	16.8
Agriculture	32357	18.4
Artificial Surfaces	1722	1.0
Other Land Cover	369	0.2
TOTAL	**175759**	**100**

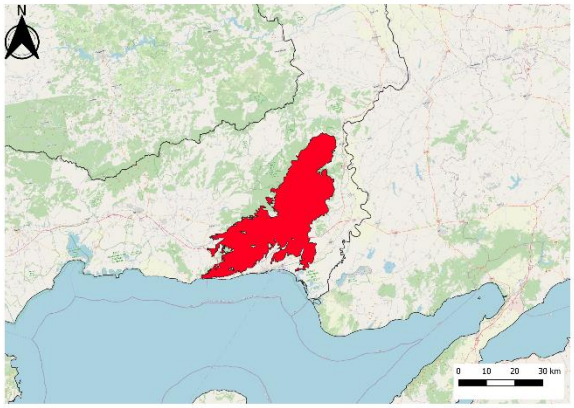


Figure 255. Mapped perimeter of the largest fire in Greece in 2023.

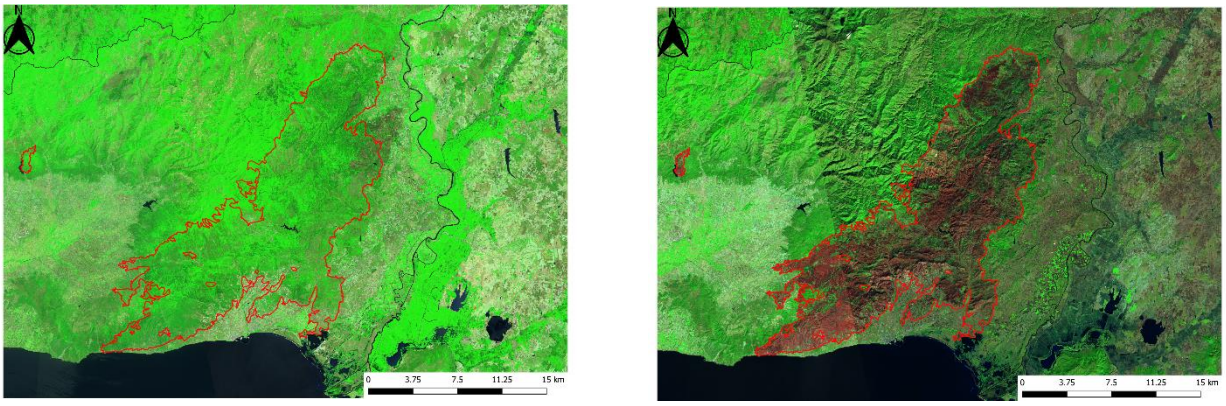


Figure 256. Pre- and post-fire images of the largest fire in Greece in 2023.

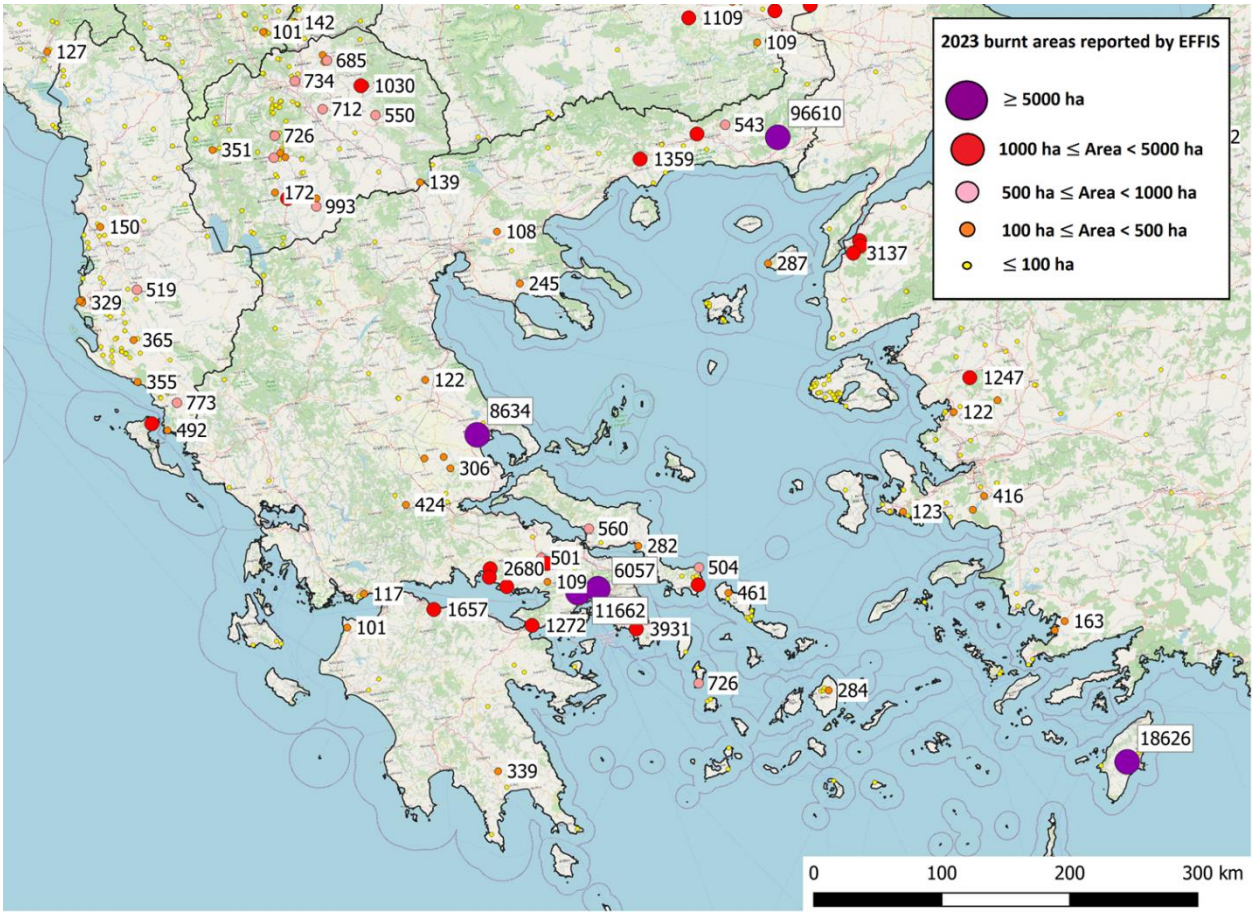


Figure 257. Locations of mapped fires in Greece in 2023.

3.1.15 Hungary

After a bad season in 2022, 2023 was very quiet for Hungary. Only three fires were mapped giving a total of 161 ha burnt, all in Natura2000 land and mostly covering Other Natural Land.

Table 64. Distribution of burnt area (ha) in Hungary by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	3	1.9
Other Natural Land	158	98.1
TOTAL	**161**	**100**

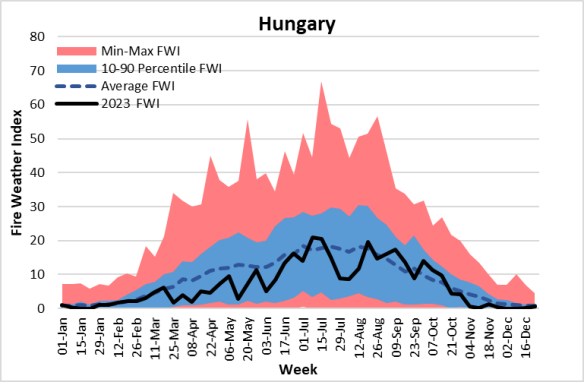


Figure 258. Fire weather Index information for Hungary.

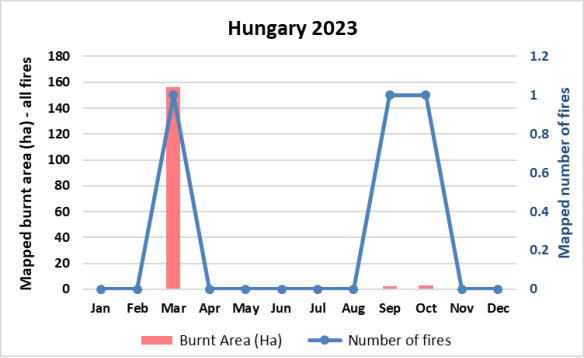


Figure 259. Monthly mapped burnt area and number of fires in Hungary in 2023.

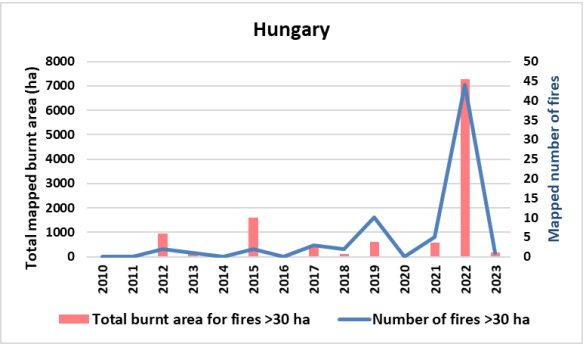


Figure 260. Annual mapped burnt area of fires ≥ 30 ha in Hungary.

3.1.16 Ireland

117 fires were mapped in Ireland, covering 5 203 ha, slightly above recent years. The main peak of activity was in February. Around 36% of the burnt area (1 850 ha) was recorded in Natura2000 sites, which corresponds to 0.161% of the total Natura2000 land in the country. Locations of the burnt areas can be seen in Figure 325 on page 176.

Table 65. Distribution of burnt area (ha) in Ireland by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	4	0.1
Coniferous forest	28	0.5
Mixed forest	1	0.0
Other Natural Land	4975	95.6
Transitional	92	1.8
Agriculture	98	1.9
Other Land Cover	6	0.1
TOTAL	**5203**	**100**

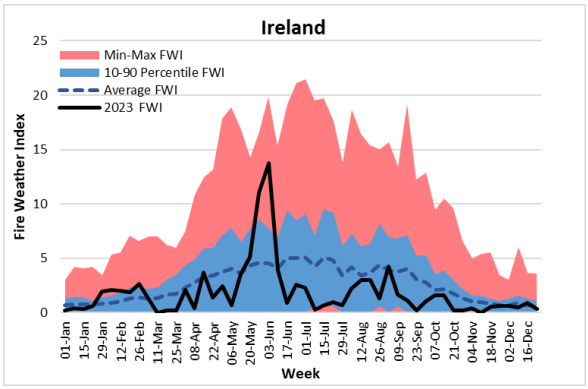


Figure 261. Fire weather Index information for Ireland.

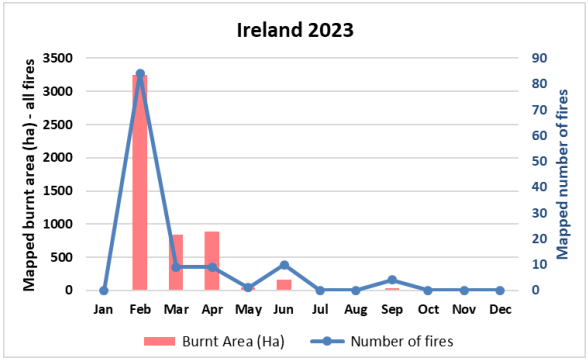


Figure 262. Monthly mapped burnt area and number of fires in Ireland in 2023.

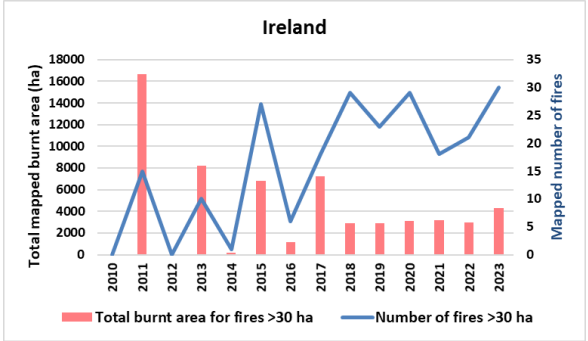


Figure 263. Annual mapped burnt area of fires ≥ 30 ha in Ireland.

3.1.17 Italy

The 2023 fire season in Italy was somewhat worse than last year and resulted in it being the second most affected European country in terms of burnt area (after Greece), although the total was still well below the extreme year of 2021. The season started late, reflected in average or below average values of the Fire Weather Index until July, after which they were mostly above average until the end of the year. The total burnt area at the end of the year was 107 231 ha from 1 378 fires.

Most of the total came from fires in Sicily, including three quarters of the 36 fires mapped over 500 ha, although the largest fire of the year (over 3 000 ha) was in Reggio di Calabria (Figure 267).

30 680 ha of the total occurred on Natura2000 sites, corresponding to 29% of the total and 0.419% of the Natura2000 land in Italy.

Table 66. Distribution of burnt area (ha) in Italy by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	7420	6.9
Coniferous forest	4407	4.1
Mixed forest	1866	1.7
Other Natural Land	30614	28.5
Sclerophyllous vegetation	16867	15.7
Transitional	4740	4.4
Agriculture	39354	36.7
Artificial Surfaces	1276	1.2
Other Land Cover	686	0.6
TOTAL	**107231**	**100**

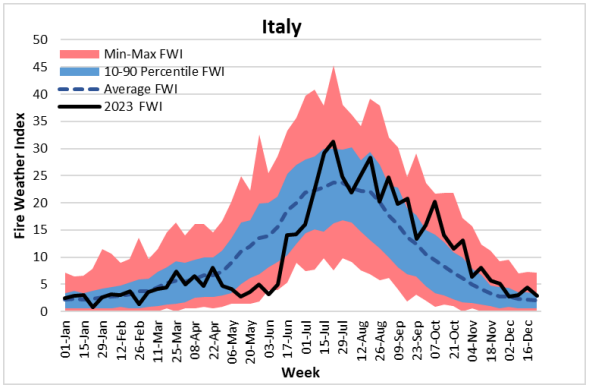


Figure 264. Fire weather Index information for Italy.

Figure 265. Monthly mapped burnt area and number of fires in Italy in 2023.

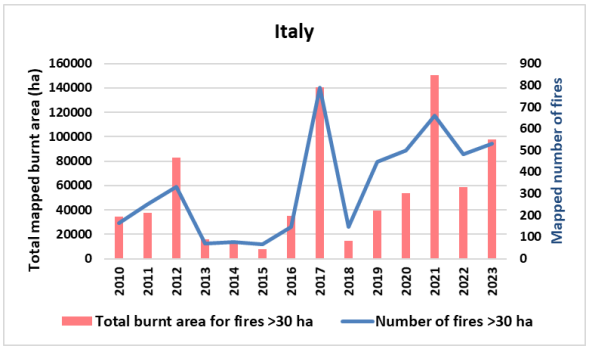


Figure 266. Annual mapped burnt area of fires ≥ 30 ha in Italy.

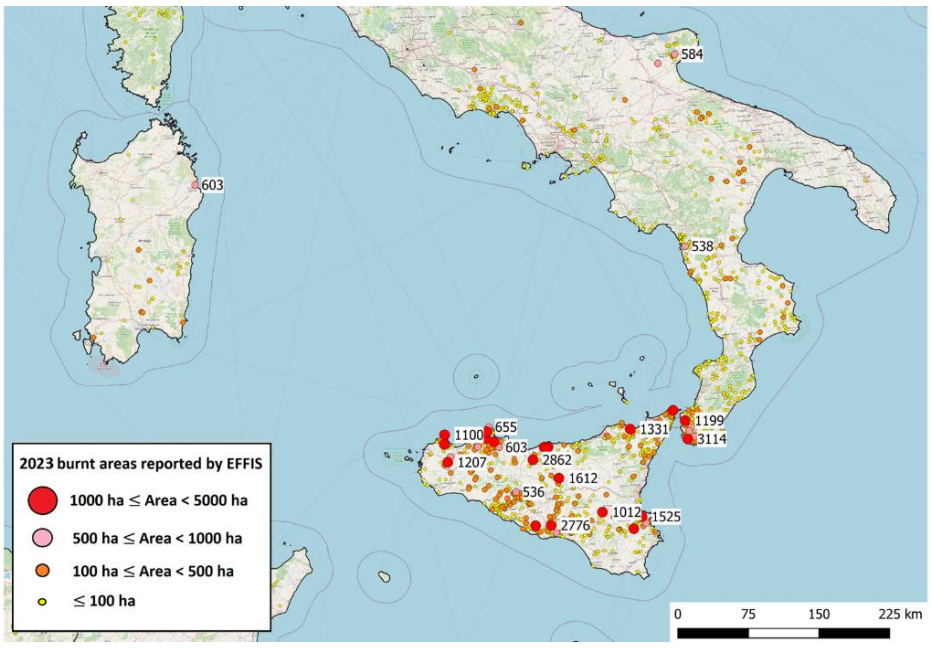


Figure 267. Major fires mapped in southern Italy, Sicily and Sardinia in 2023.

3.1.18 Kosovo under UNSCR 1244

A total of 47 fires were mapped in Kosovo resulting in a total mapped burnt area of 1 341 ha, the lowest amount in recent years (Figure 270). The season started late and most of the damage (90%) was seen in September and October. Locations of the fires can be seen in Figure 212 on page 154.

Table 67. Distribution of burnt area (ha) in Kosovo by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	131	9.8
Other Natural Land	549	40.9
Transitional	347	25.9
Agriculture	313	23.3
Artificial Surfaces	1	0.1
TOTAL	**1341**	**100**

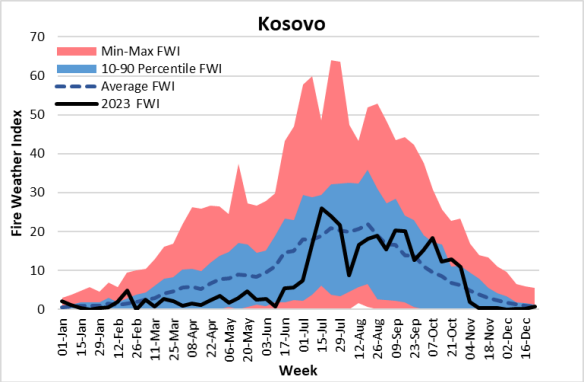


Figure 268. Fire weather Index information for Kosovo.

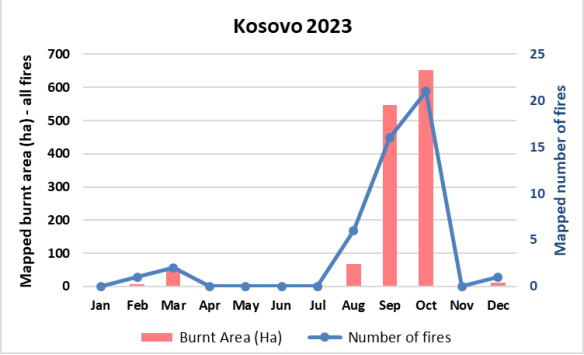


Figure 269. Monthly mapped burnt area and number of fires in Kosovo in 2023.

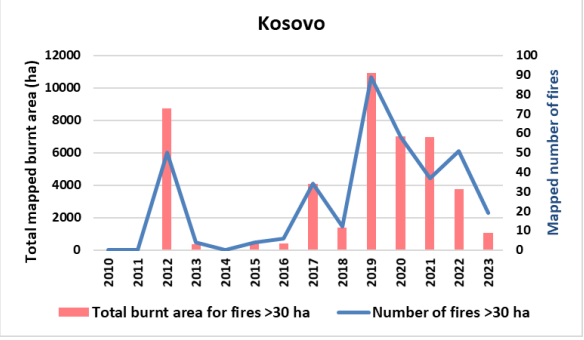


Figure 270. Annual mapped burnt area of fires ≥ 30 ha in Kosovo.

3.1.19 Latvia

A short fire season from April to June covered Latvia's fire season, when 207 ha were mapped from 15 fires, a similar result to 2022.

181 ha of this total occurred in Natura2000 sites, corresponding to 88% of the total burnt area and 0.024% of the total protected area in the country.

Table 68. Distribution of burnt area (ha) in Latvia by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	10	4.8
Mixed forest	2	1.0
Other Natural Land	169	81.6
Sclerophyllous vegetation	0	0.0
Transitional	26	12.6
TOTAL	**207**	**100**

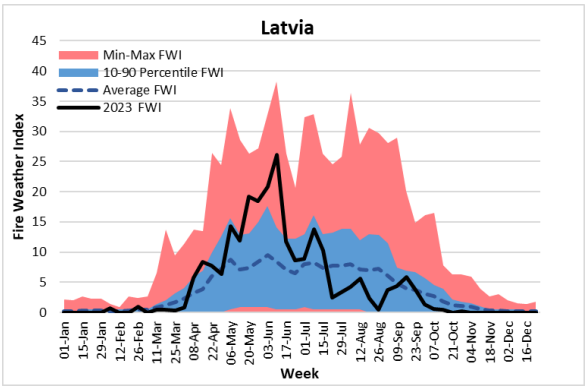


Figure 271. Fire weather Index information for Latvia.

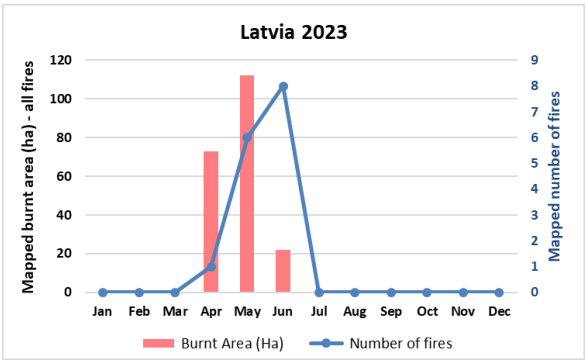


Figure 272. Monthly mapped burnt area and number of fires in Latvia in 2023.

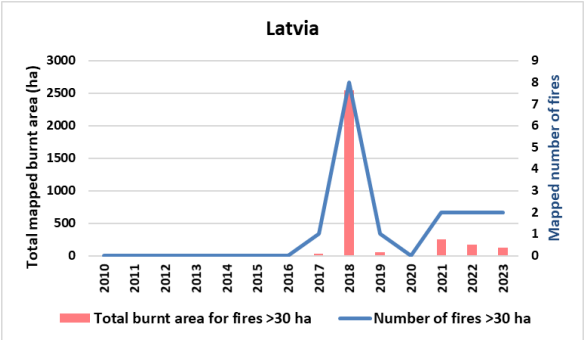


Figure 273. Annual mapped burnt area of fires ≥ 30 ha in Latvia.

3.1.20 Lithuania

12 fires were mapped in Lithuania, burning a total of 342 ha, the highest amount for several years. Most of the damage occurred in May and Other Natural Land was the most affected land type. No Natura2000 land was affected.

Table 69. Distribution of burnt area (ha) in Lithuania by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	23	6.7
Mixed forest	3	0.9
Other Natural Land	294	86.0
Transitional	22	6.4
TOTAL	**342**	**100**

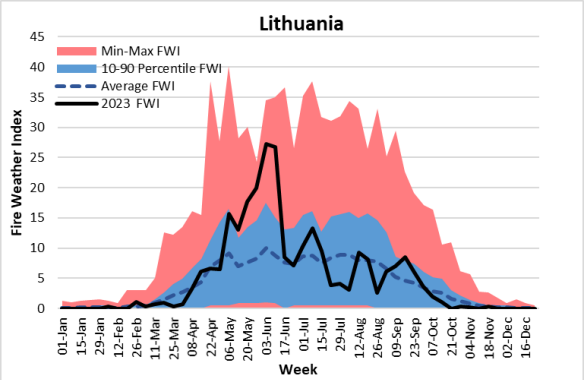


Figure 274. Fire weather Index information for Lithuania.

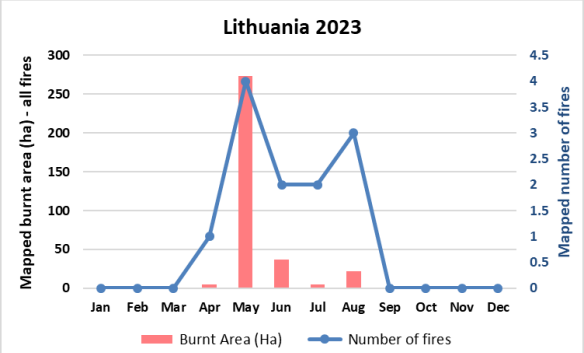


Figure 275. Monthly mapped burnt area and number of fires in Lithuania in 2023.

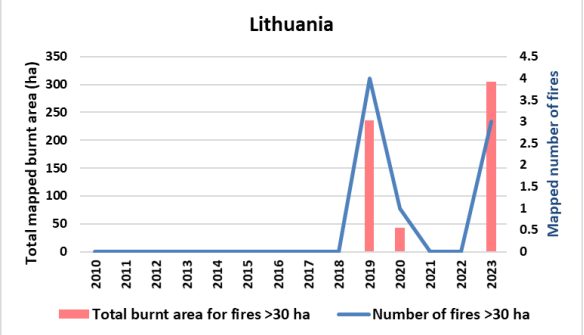


Figure 276. Annual mapped burnt area of fires ≥ 30 ha in Lithuania.

3.1.21 Montenegro

The 2023 fire season in Montenegro was the lightest in nearly a decade. 624 ha were mapped from 29 fires, mostly from two bursts of activity in March and July (Figure 278). Locations of the fires can be seen in Figure 212 on page 154.

Table 70. Distribution of burnt area (ha) in Montenegro by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	174	27.8
Coniferous forest	5	0.8
Mixed forest	1	0.2
Other Natural Land	263	42.2
Transitional	163	26.1
Agriculture	18	2.9
TOTAL	**624**	**100**

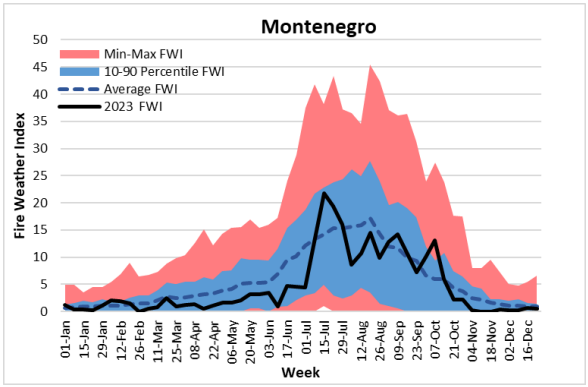


Figure 277. Fire weather Index information for Montenegro.

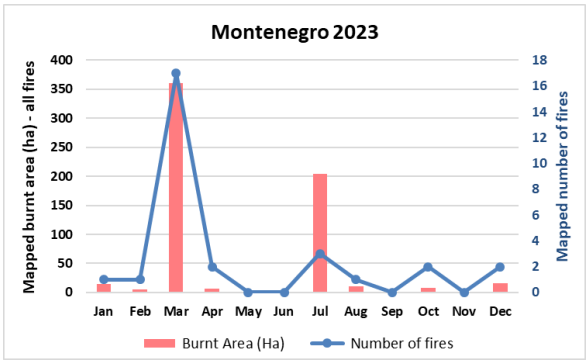


Figure 278. Monthly mapped burnt area and number of fires in Montenegro in 2023.

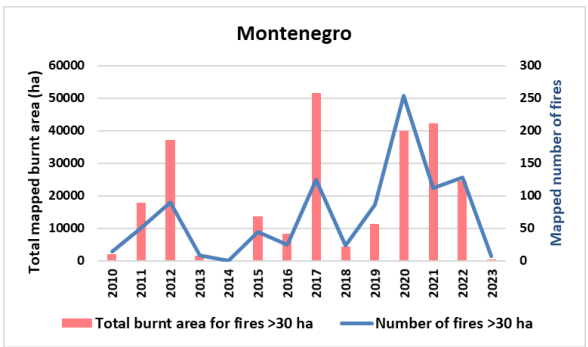


Figure 279. Annual mapped burnt area of fires ≥ 30 ha in Montenegro.

3.1.22 The Netherlands

2023 was a quiet year in the Netherlands. Only 2 fires were mapped in March, resulting in a total burnt area of 53 ha, all of which occurred on Other Natural Land on Natura2000 sites, amounting to 0.007% of the total protected area of the country.

Table 71. Distribution of burnt area (ha) in the Netherlands by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Other Natural Land	53	100.0
TOTAL	**53**	**100**

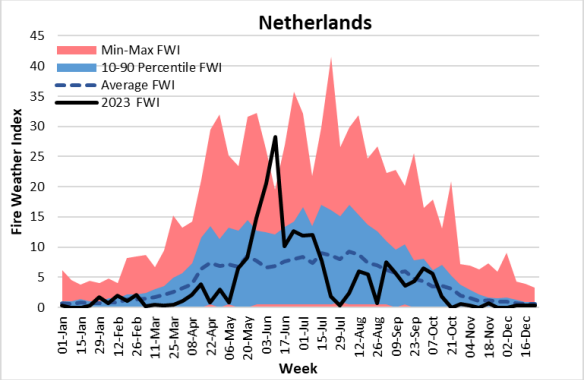


Figure 280. Fire weather Index information for the Netherlands

Figure 281. Monthly mapped burnt area and number of fires in the Netherlands in 2023.

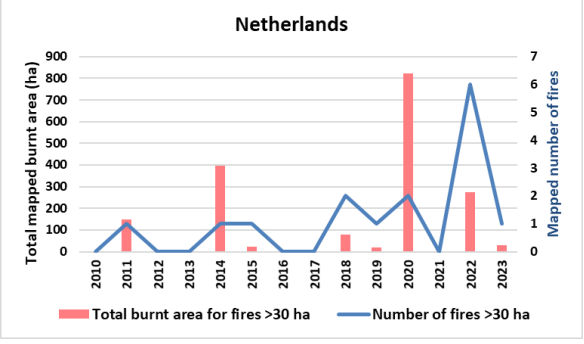


Figure 282. Annual mapped burnt area of fires ≥ 30 ha in the Netherlands.

3.1.23 North Macedonia

North Macedonia continued to follow a pattern of alternating good and bad years. 13 322 ha were mapped from 87 fires, over three times the amount recorded in 2022 but less than was mapped in 2021. Locations of the fires can be seen in Figure 212 on page 154.

Table 72. Distribution of burnt area (ha) in North Macedonia by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	609	4.6
Coniferous forest	161	1.2
Mixed forest	27	0.2
Other Natural Land	2145	16.1
Sclerophyllous vegetation	5	0.0
Transitional	3040	22.8
Agriculture	7336	55.1
TOTAL	**13322**	**100**

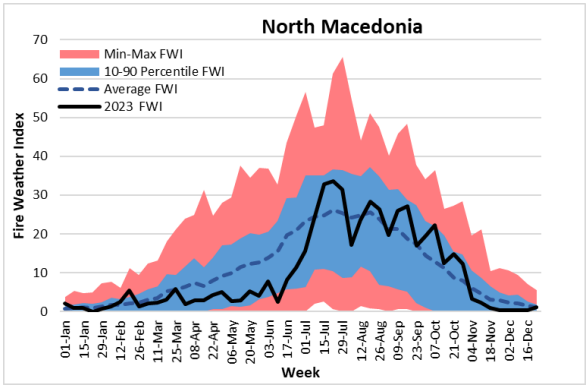


Figure 283. Fire weather Index information for North Macedonia.

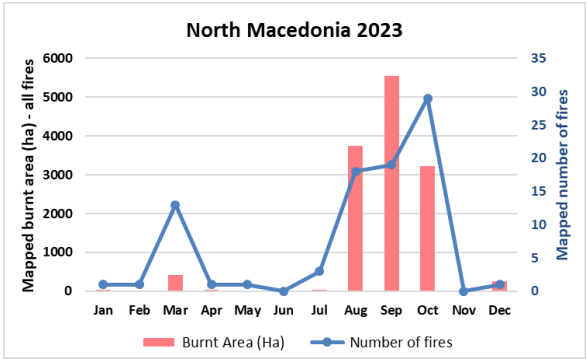


Figure 284. Monthly mapped burnt area and number of fires in North Macedonia in 2023.

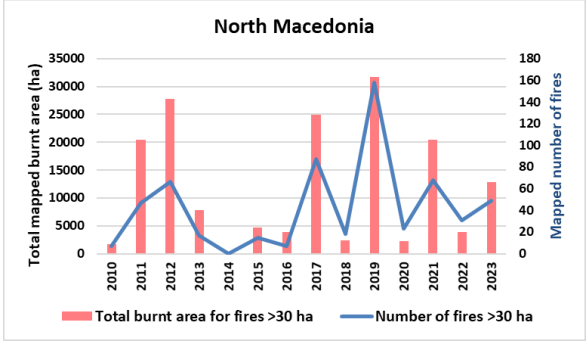


Figure 285. Annual mapped burnt area of fires ≥ 30 ha in North Macedonia.

3.1.24 Norway

In 2023 there were 1 372 ha mapped from 59 fires in Norway, around half that recorded in 2022. The season lasted from March to May, with over half of the damage occurring in April (Figure 287). Other Natural Land was the most affected land cover type (Table 73).

Table 73. Distribution of burnt area (ha) in Norway by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	44	3.2
Coniferous forest	38	2.8
Mixed forest	14	1.0
Other Natural Land	1259	91.8
Agriculture	13	0.9
Artificial Surfaces	3	0.2
Other Land Cover	1	0.1
TOTAL	**1372**	**100**

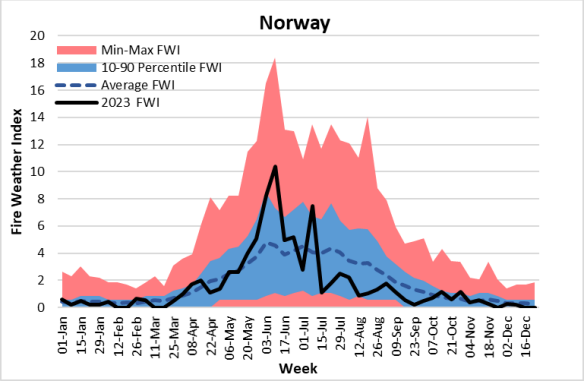


Figure 286. Fire weather Index information for Norway.

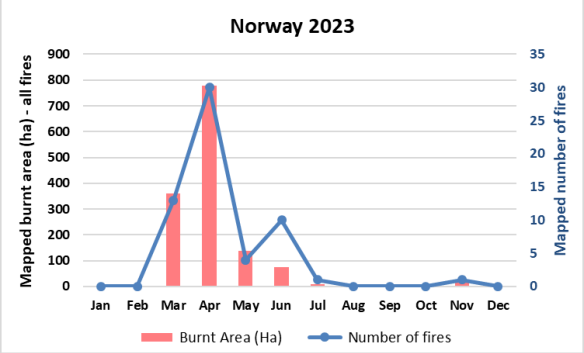


Figure 287. Monthly mapped burnt area and number of fires in Norway in 2023.

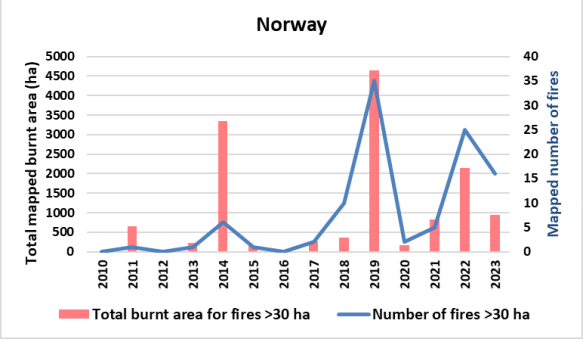


Figure 288. Annual mapped burnt area of fires ≥ 30 ha in Norway.

3.1.25 Poland

It was a quiet year in Poland. 27 fires were mapped, resulting in a total burnt area of only 214 ha, of which 166 ha (78%) was on Natura2000 land, amounting to 0.002% of the Natura2000 area of the country.

Table 74. Distribution of burnt area (ha) in Poland by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	4	1.6
Mixed forest	7	3.3
Other Natural Land	198	92.5
Transitional	5	2.6
TOTAL	**214**	**100**

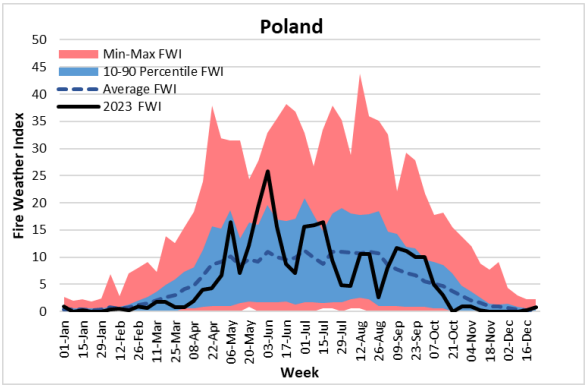


Figure 289. Fire weather Index information for Poland.

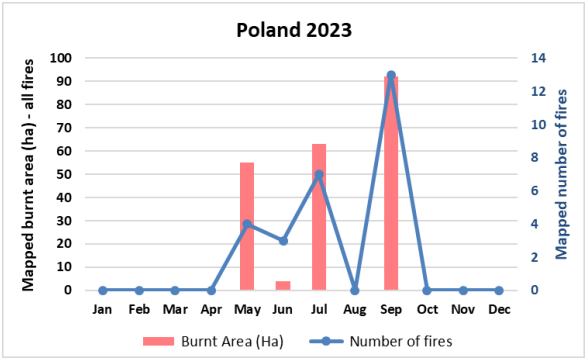


Figure 290. Monthly mapped burnt area and number of fires in Poland in 2023.

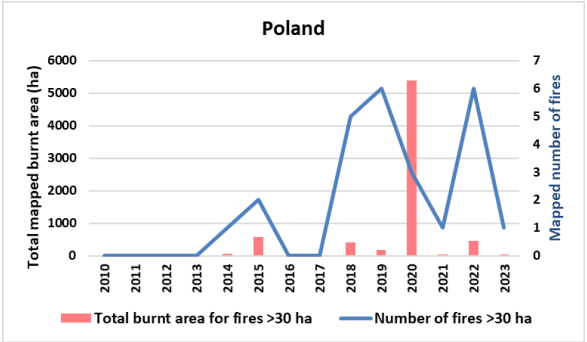


Figure 291. Annual mapped burnt area of fires ≥ 30 ha in Poland.

3.1.26 Portugal

The total burnt area of 43 049 ha from 938 fires was one of the lowest recorded in recent years (Figure 294). Although fires were mapped in every month, half of the damage occurred in August, when the largest fires of the year occurred. These include two of over 5 000 ha that broke out on the same day. The island of Madeira was also affected by a fire of almost 5 000 ha in October (Figure 296).

14 324 ha of the mapped total occurred on Natura2000 sites, corresponding to 33% of the total area burnt, and 0.59% of the total Natura2000 areas in Portugal.

Table 75. Distribution of burnt area (ha) in Portugal by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	4245	9.9
Coniferous forest	3112	7.3
Mixed forest	2376	5.5
Other Natural Land	13418	31.2
Sclerophyllous vegetation	1412	3.0
Transitional	12872	30.0
Agriculture	5291	12.3
Artificial Surfaces	319	0.7
Other Land Cover	4	0.0
TOTAL	**43049**	**100**

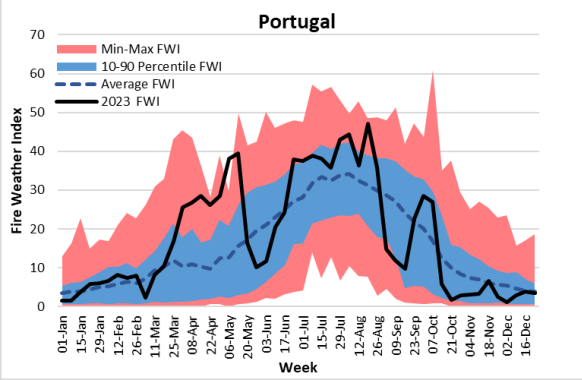


Figure 292. Fire weather Index information for Portugal.

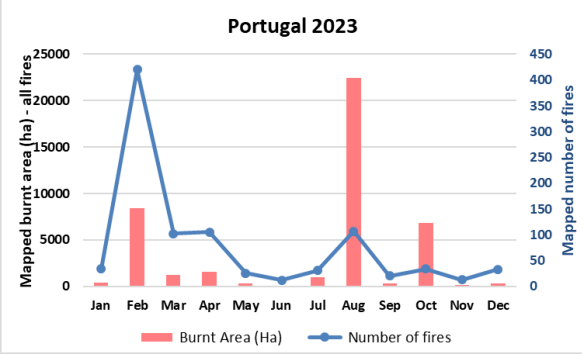


Figure 293. Monthly mapped burnt area and number of fires in Portugal in 2023.

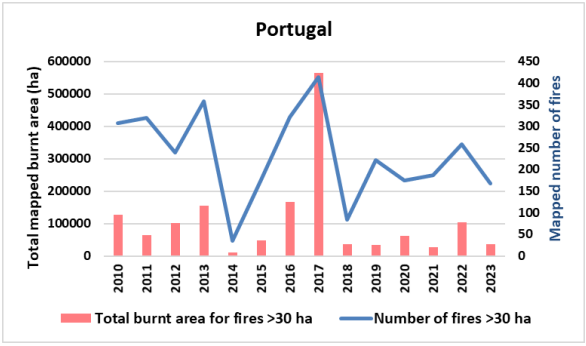


Figure 294. Annual mapped burnt area of fires ≥ 30 ha in Portugal.

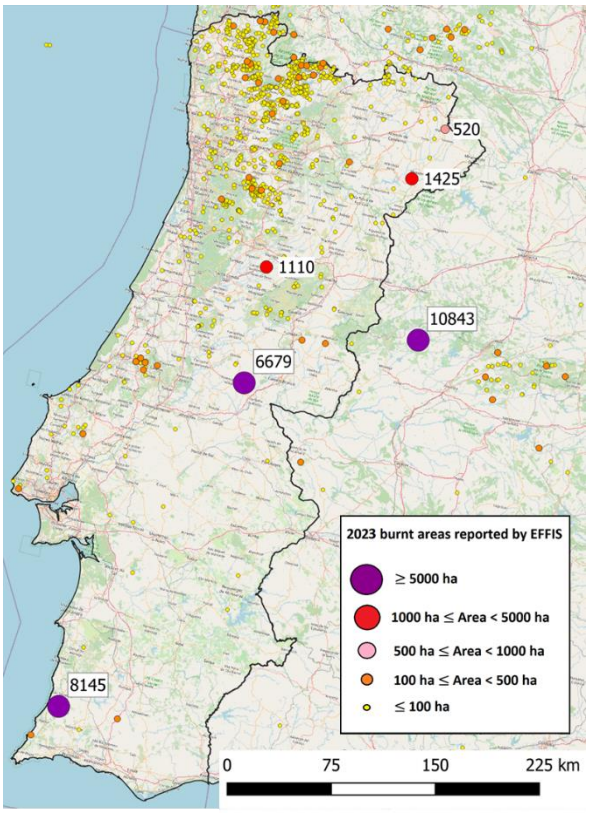


Figure 295. Locations of mapped burnt areas in Portugal in 2023.

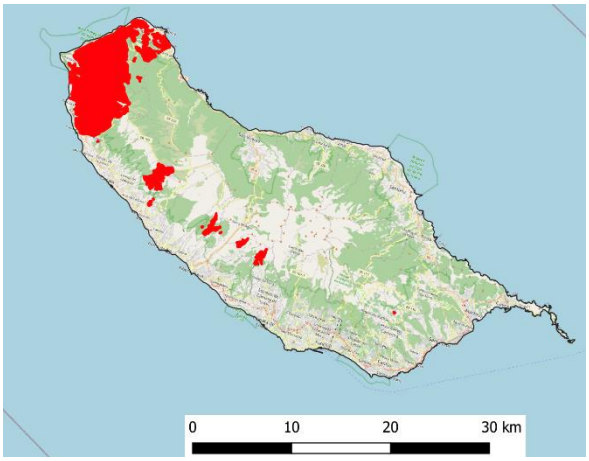


Figure 296. Mapped perimeter of the large fire in Madeira in 2023.

3.1.27 Romania

After several hard years, the 2023 fire season in Romania was light. 17 491 ha was mapped from 124 fires, around 11% of the 2022 total. Most of the damage occurred in February and March when the largest fires of the year occurred, including one over 3 500 ha, two others over 1 000 ha and a further 6 exceeding 500 ha, all in the east of the country and mostly affecting Other Natural Land. 15 708 ha (90%) of the total mapped burnt area was on Natura2000 sites, representing 0.202% of the total protected area of Romania.

Table 76. Distribution of burnt area (ha) in Romania by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	518	3.0
Other Natural Land	15425	88.2
Transitional	72	0.4
Agriculture	1291	7.4
Artificial Surfaces	3	0.0
Other Land Cover	184	1.1
TOTAL	**17491**	**100**

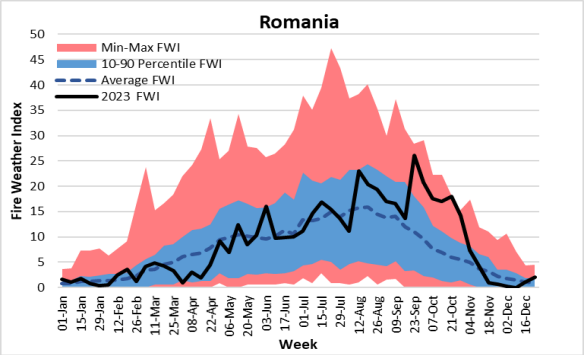


Figure 297. Fire weather Index information for Romania.

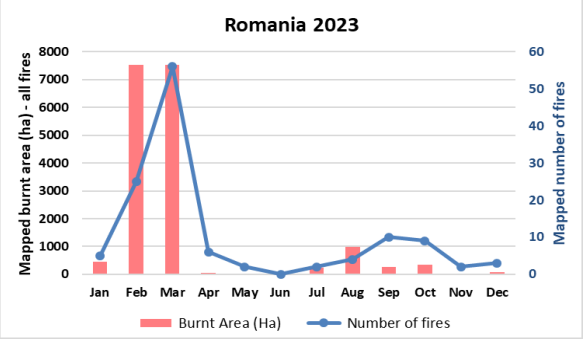


Figure 298. Monthly mapped burnt area and number of fires in Romania in 2023.

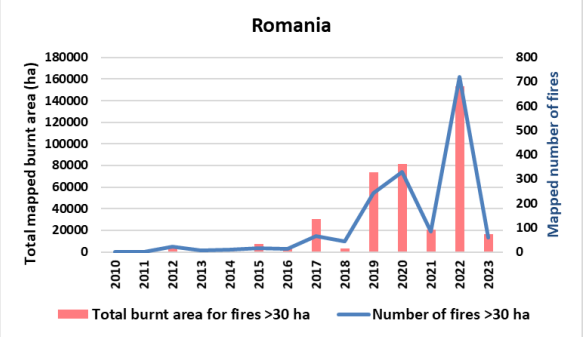


Figure 299. Annual mapped burnt area of fires ≥ 30 ha in Romania.

3.1.28 Serbia

It was the lightest fire season in Serbia for six years (Figure 302). A total of 79 fires were mapped, burning 2 909 ha. There were two main peaks in the season, one in March when the largest fire of the season occurred (over 750 ha in Braničevski region), and the other in the autumn. Locations of the fires can be seen in Figure 212 on page 154.

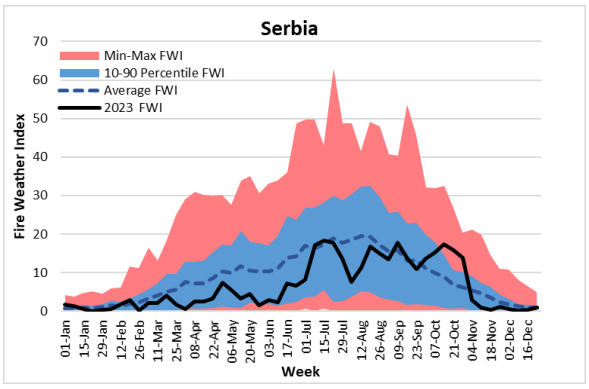


Figure 300. Fire weather Index information for Serbia.

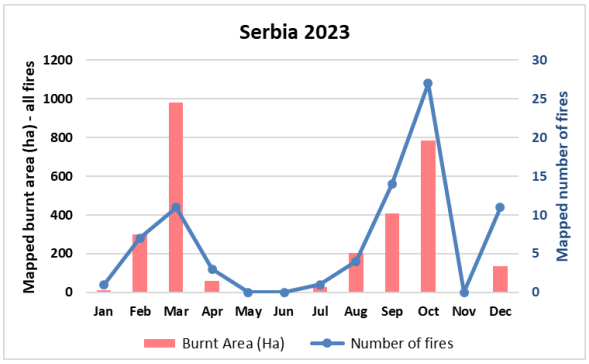


Figure 301. Monthly mapped burnt area and number of fires in Serbia in 2023.

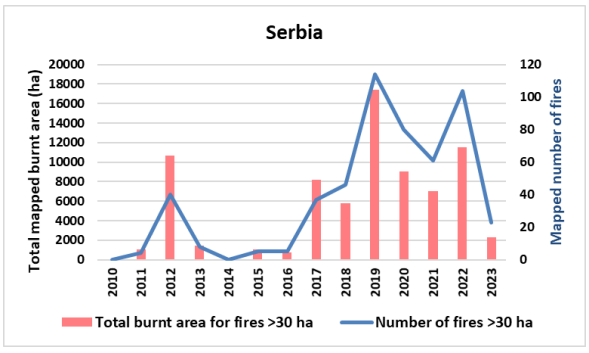


Figure 302. Annual mapped burnt area of fires ≥ 30 ha in Serbia.

Table 77. Distribution of burnt area (ha) in Serbia by land cover type in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	515	17.7
Coniferous forest	1	0.0
Mixed forest	3	0.1
Other Natural Land	650	22.4
Transitional	1077	37.0
Agriculture	657	22.6
Artificial Surfaces	1	0.0
Other Land Cover	2	0.1
TOTAL	**2909**	**100**

3.1.29 Slovakia

No fires were mapped in Slovakia in 2023. The Fire Weather Index was mostly at or below average levels except for a short period in the summer.

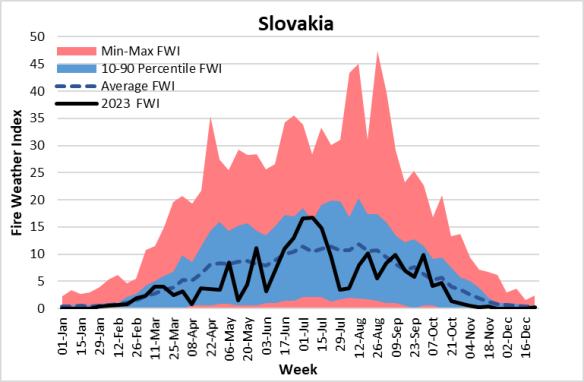


Figure 303. Fire weather Index information for Slovakia.

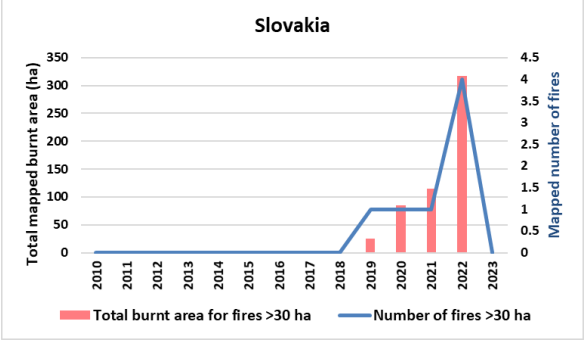


Figure 304. Annual mapped burnt area of fires ≥ 30 ha in Slovakia.

3.1.30 Slovenia

Just two fires were mapped in Slovenia in 2023, covering a total of 131 ha, all in Natura2000 sites and mostly affecting Other Natural Land.

Table 78. Distribution of burnt area (ha) in Slovenia by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	6	4.6
Other Natural Land	119	90.8
Transitional	6	4.6
TOTAL	**131**	**100**

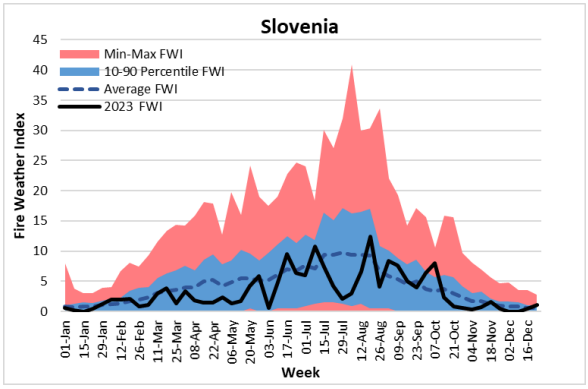


Figure 305. Fire weather Index information for Slovenia.

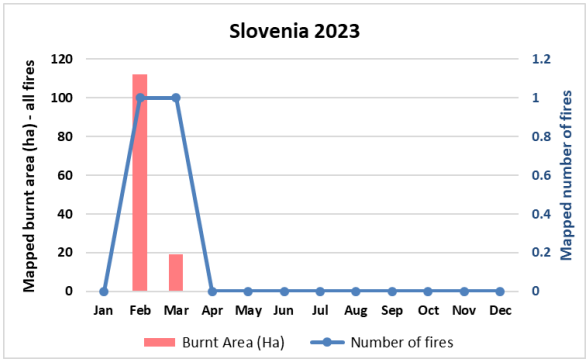


Figure 306. Monthly mapped burnt area and number of fires in Slovenia in 2023.

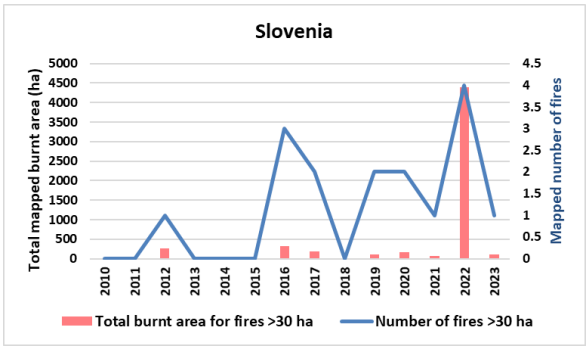


Figure 307. Annual mapped burnt area of fires ≥ 30 ha in Slovenia.

3.1.31 Spain

The 2023 fire season in Spain was relatively light after a bad year in 2022. A total of 101 184 ha was mapped from 1397 fires, one third of the amount recorded in 2022. March was the most affected month, coinciding with high values of the FWI, although the largest fire of the year (nearly 12 000 ha, in Tenerife) occurred in August. A second fire was mapped at over 10 000 ha and there were a further 10 fires over 1 000 ha and 11 exceeding 500 ha.

Table 79. Distribution of burnt area (ha) in Spain by land cover type in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	9440	9.3
Coniferous forest	19711	19.5
Mixed forest	3066	3.0
Other Natural Land	50511	49.9
Sclerophyllous vegetation	9147	9.0
Transitional	5828	5.8
Agriculture	3359	3.3
Artificial Surfaces	111	0.1
TOTAL	**101184**	**100**

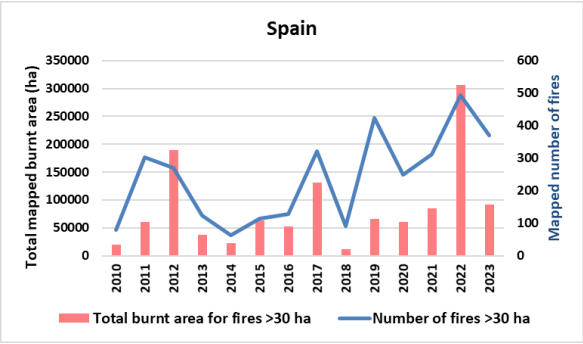


Figure 308. Annual mapped burnt area of fires ≥ 30 ha in Spain.

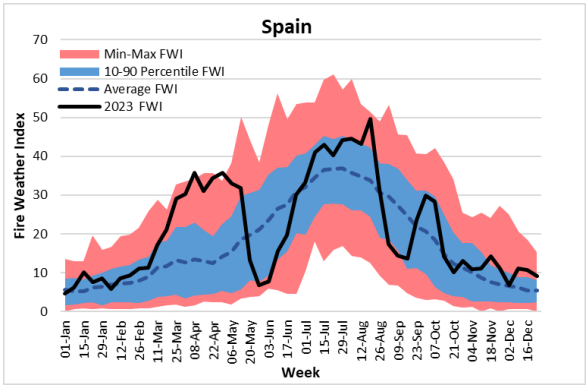


Figure 309. Fire weather Index information for Spain.

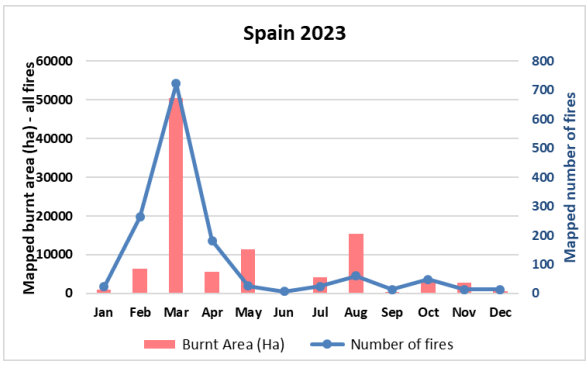


Figure 310. Monthly mapped burnt area and number of fires in Spain in 2023.

Of the total, 42 665 ha occurred on Natura2000 sites, the second highest amount recorded after Greece. This corresponds to 42% of the total area burned and 0.253% of the Natura2000 areas in Spain.

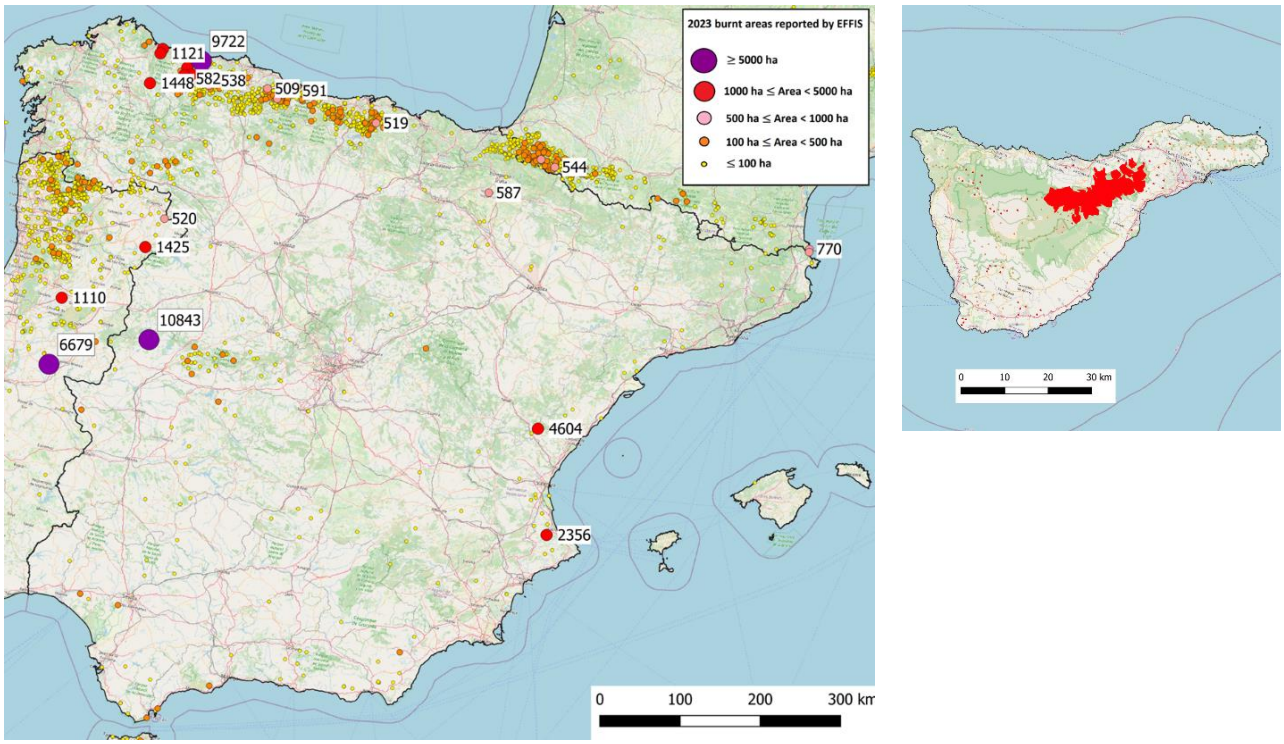


Figure 311. Locations of the mapped burnt areas in Spain in 2023 and the mapped perimeter of the large fire in Tenerife.

3.1.32 Sweden

It was a light year for fires in Sweden. 61 fires were mapped in 2023, resulting in a total mapped burnt area of 641 ha, similar to the total recorded in 2022. June was the most affected month. Only 70 ha (11%) of the total was in Natura2000 sites.

Table 80. Distribution of burnt area (ha) in Sweden by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	2	0.3
Coniferous forest	417	65.0
Mixed forest	48	7.5
Other Natural Land	127	19.8
Transitional	23	3.5
Agriculture	19	3.0
Other Land Cover	5	0.8
TOTAL	**641**	**100**

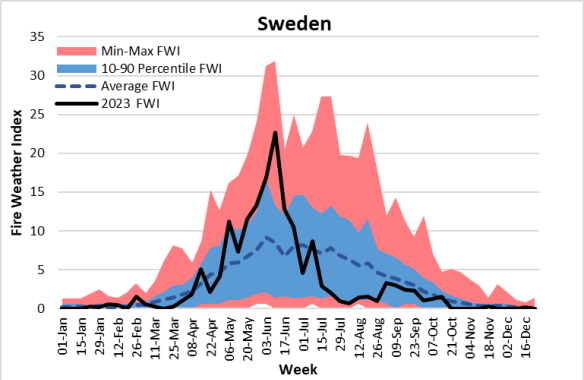


Figure 312. Fire weather Index information for Sweden.

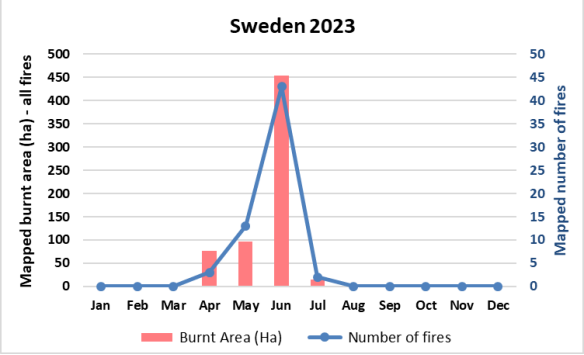


Figure 313. Monthly mapped burnt area and number of fires in Sweden in 2023.

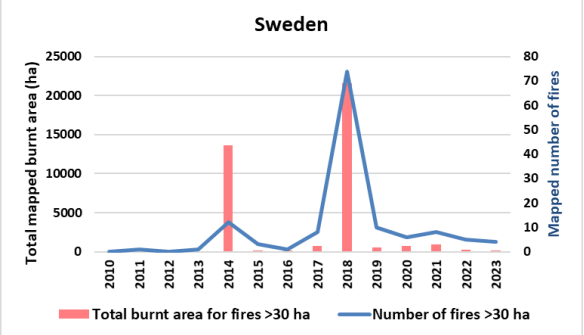


Figure 314. Annual mapped burnt area of fires ≥ 30 ha in Sweden.

3.1.33 Switzerland

A fire of 68 ha was mapped in July, affecting Coniferous Forest and Transitional Vegetation.

Table 81. Distribution of burnt area (ha) in Switzerland by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	36	52.9
Transitional	32	47.1
TOTAL	**68**	**100**

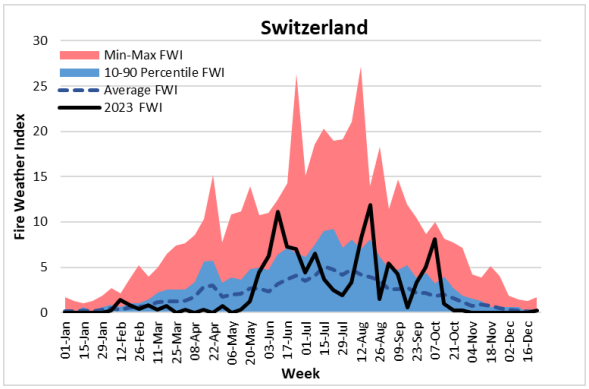


Figure 315. Fire weather Index information for Switzerland.

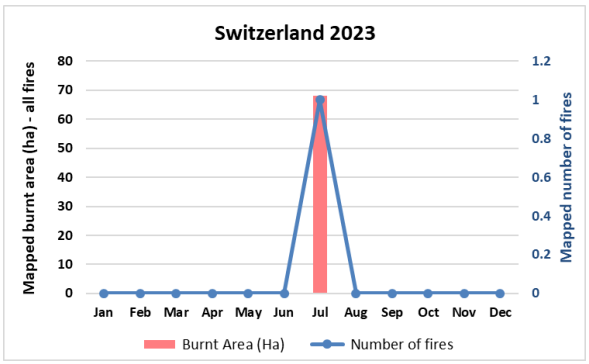


Figure 316. Monthly mapped burnt area and number of fires in Switzerland in 2023.

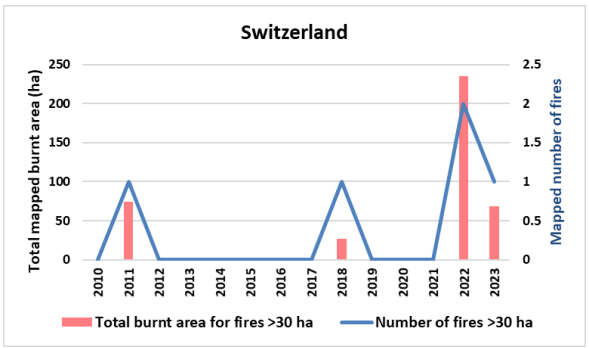


Figure 317. Annual mapped burnt area of fires ≥ 30 ha in Switzerland.

3.1.34 Türkiye

The 2023 fire season in Türkiye was light. The season started in July and resulted in 35 813 ha burnt from 424 fires, twice the amount recorded in 2022 but still below the average of the last few years.

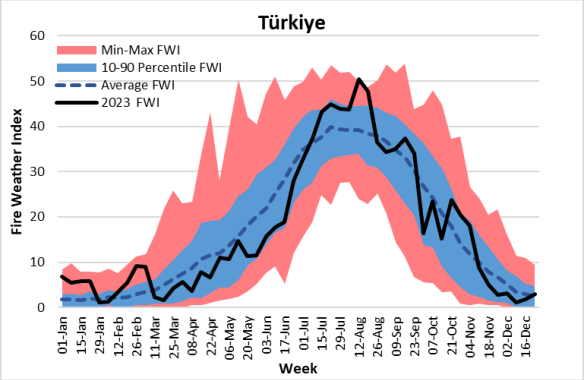


Figure 318. Fire weather Index information for Türkiye.

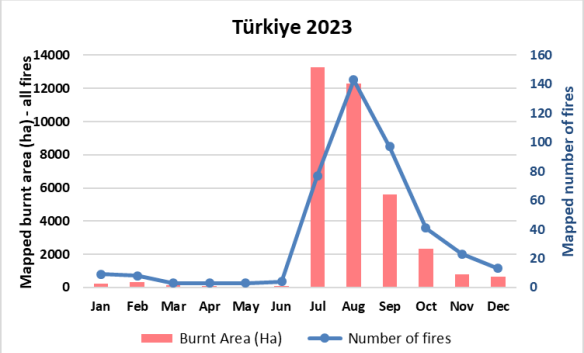


Figure 319. Monthly mapped burnt area and number of fires in Türkiye in 2023.

Table 82. Distribution of burnt area (ha) in Türkiye by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	756	2.1
Coniferous forest	4384	12.2
Mixed forest	2106	5.9
Other Natural Land	12359	34.5
Sclerophyllous vegetation	326	0.9
Transitional	7044	19.7
Agriculture	8337	23.3
Artificial Surfaces	57	0.2
Other Land Cover	448	1.3
TOTAL	**35813**	**100**

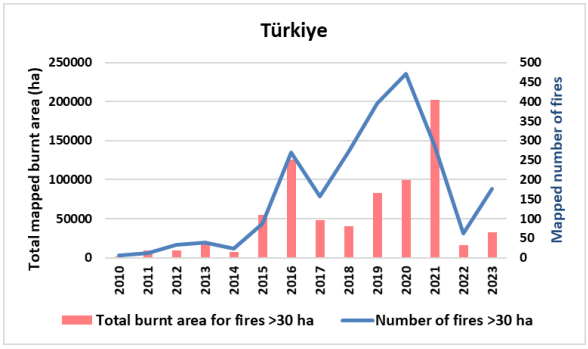


Figure 320. Annual mapped burnt area of fires ≥ 30 ha in Türkiye.

The largest two fires of the year were both around 3 000 ha in size and broke out in Çanakkale in July and August. Three others exceeded 1 000 ha and a further eight fires were over 500 ha (Figure 321).

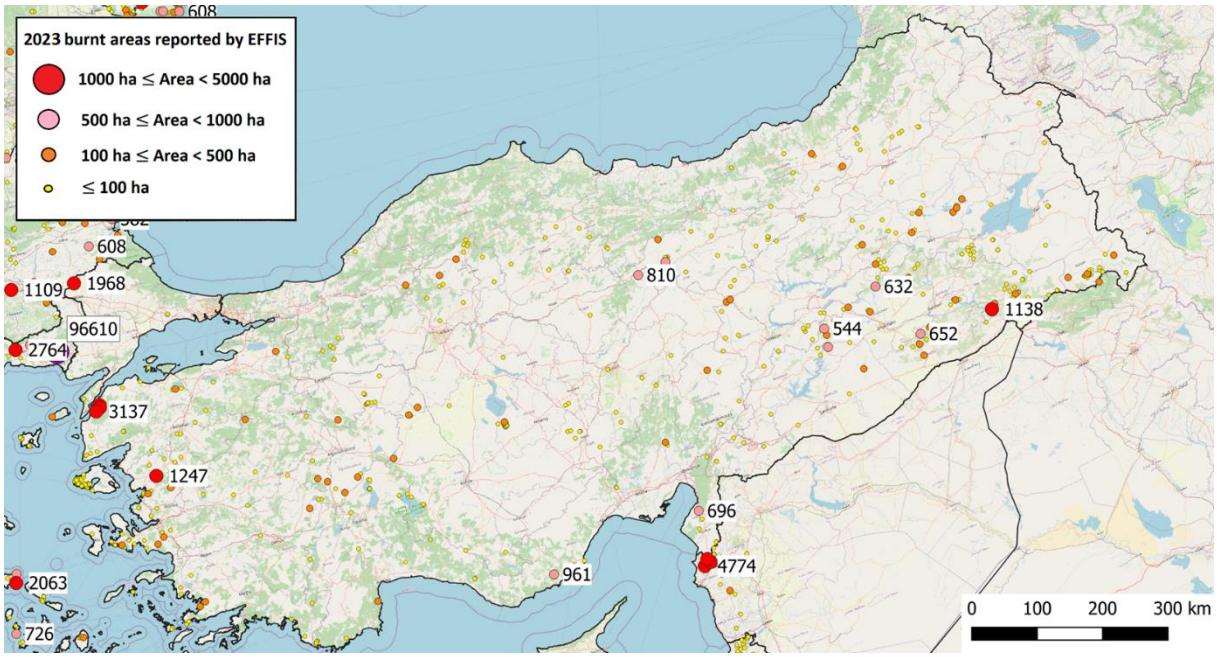


Figure 321. Locations of mapped burnt areas in Türkiye in 2023.

3.1.35 United Kingdom

The total burnt area in mapped in the United Kingdom was 9 343 ha from 112 fires, less than half that recorded in 2022. As usual, most of the damage occurred in the spring, including the largest fire of the year which covered nearly 3 500 ha in Scotland. Two other fires exceeded 500 ha.

1 039 ha of the total burnt area occurred in protected sites, amounting to 11% of the total and 0.041% of the total protected area of the country.

Table 83. Distribution of burnt area (ha) in the UK by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	171	1.8
Coniferous forest	196	2.1
Mixed forest	29	0.3
Other Natural Land	8486	90.8
Transitional	356	3.8
Agriculture	36	0.4
Artificial Surfaces	67	0.7
Other Land Cover	1	0.0
TOTAL	**9343**	**100**

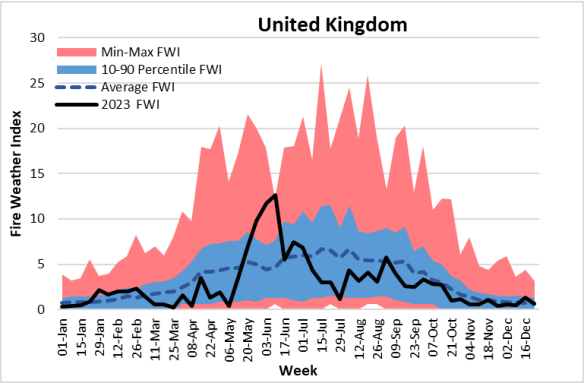


Figure 322. Fire weather Index information for the United Kingdom.

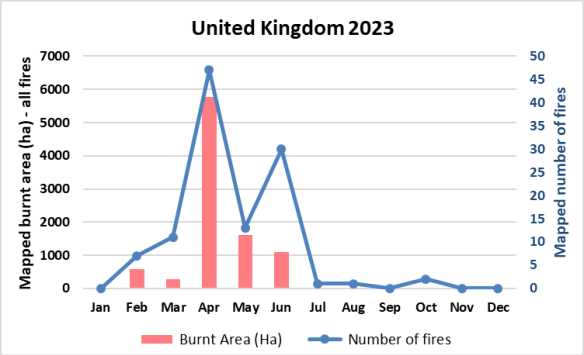


Figure 323. Monthly mapped burnt area and number of fires in the United Kingdom in 2023.

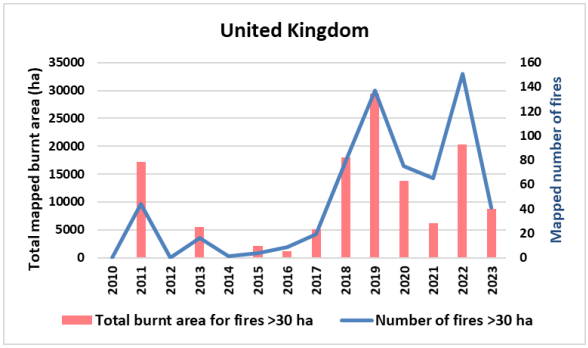


Figure 324. Annual mapped burnt area of fires ≥ 30 ha in the United Kingdom.

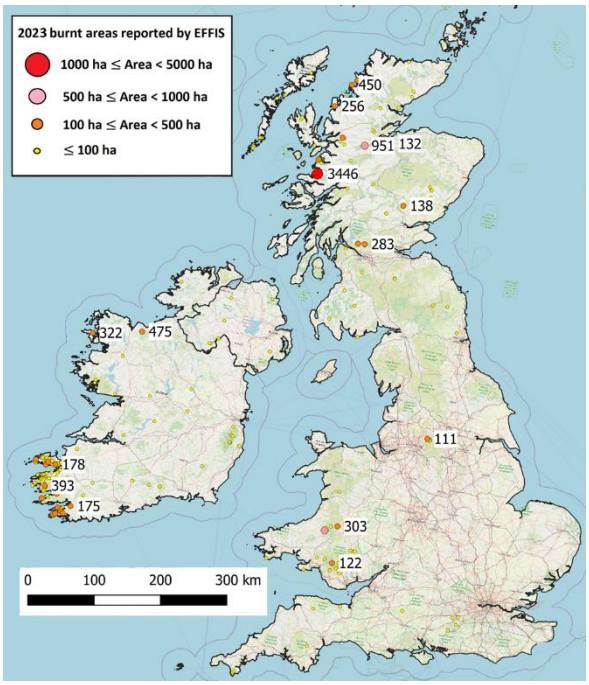


Figure 325. Locations of mapped burnt areas in the United Kingdom and Ireland in 2023.

3.1.36 Ukraine

Ukraine recorded the highest number of fires and mapped burnt area of the countries covered by EFFIS, although this total was significantly less than was mapped in 2022 (Figure 328). 2 185 fires were mapped resulting in a total of 226 421 ha burnt, mostly in late summer.

Table 84. Distribution of burnt area (ha) in Ukraine by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	158	0.1
Coniferous forest	6544	2.9
Mixed forest	24906	11.0
Other Natural Land	122109	53.9
Sclerophyllous vegetation	0	0.0
Transitional	0	0.0
Agriculture	71006	31.4
Artificial Surfaces	1132	0.5
Other Land Cover	589	0.3
TOTAL	**226421**	**100**

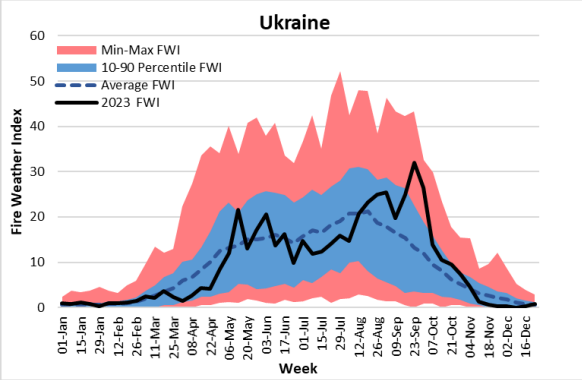


Figure 326. Fire weather Index information for Ukraine.

Figure 327. Monthly mapped burnt area and number of fires in Ukraine in 2023.

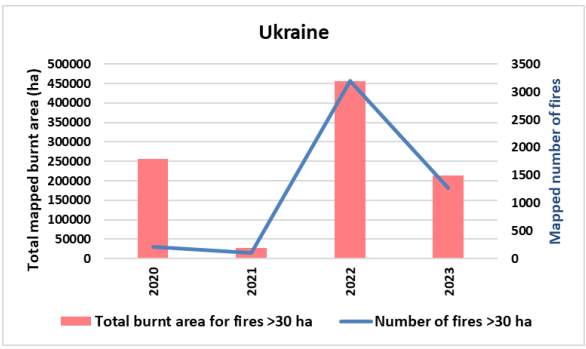


Figure 328. Annual mapped burnt area of fires ≥ 30 ha in Ukraine.

The largest fire occurred in Kherson region in September and covered over 4 000 ha, but there were many other large fires: 37 over 500 ha, 29 over 1 000 ha and seven that exceeded 2 000 ha. Most of these fires occurred in the east of the country, near the front line of hostilities.

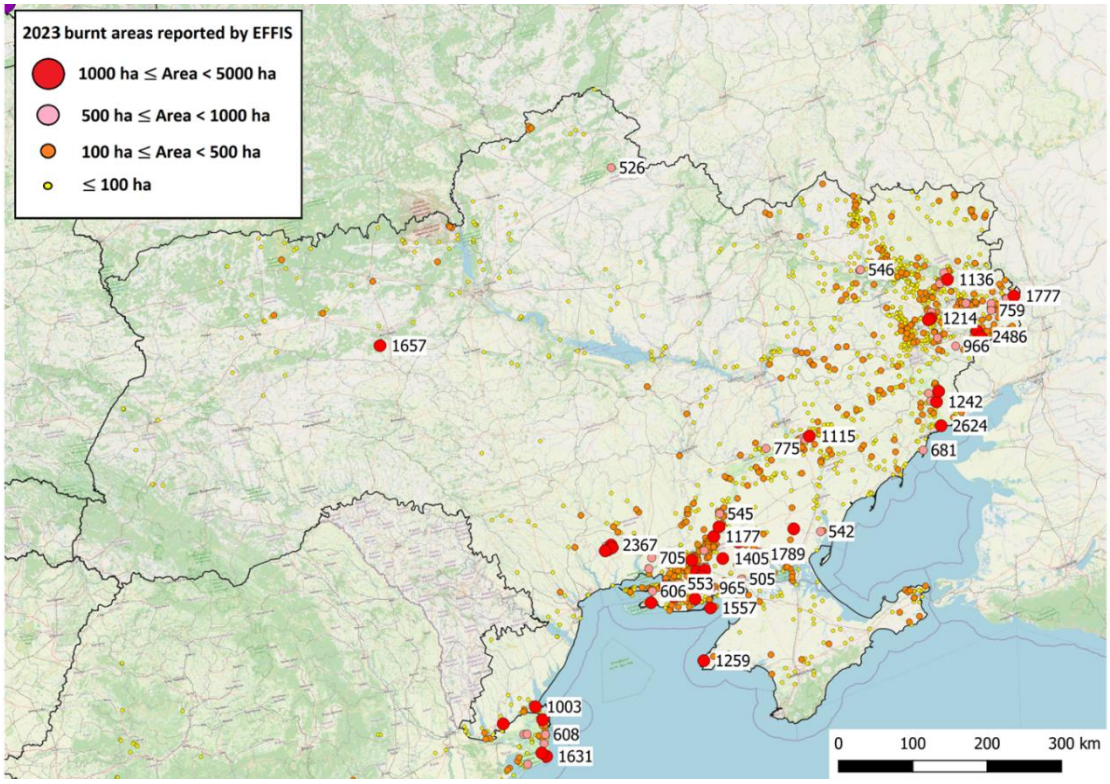


Figure 329. Locations of mapped burnt areas in Ukraine.

3.2 Middle East and North Africa

The total burnt area mapped across North Africa and the Middle East was similar to that of 2022 and slighter better than the long term average.

3.2.1 Algeria

The total burnt area mapped in Algeria in 2023 was higher than the 2022 season but around the long term average. A total of 73 725 ha was mapped from 620 fires. July was the most affected month, when several very large fires occurred, including the biggest of the year which covered over 14 000 ha in the Béjaïa region. Apart from this fire, there were 13 others greater than 1 000 ha and a further 9 over 500 ha.

A relatively small amount (1 484 ha, or 2% of the total) affected protected areas.

The Globcover land cover map from ESA was used to split the burnt area into different land type categories, harmonised with CLC terminology, and the distribution of burnt area by these land cover types is given in Table 85.

Table 85. Distribution of burnt area (ha) in Algeria by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	369	0.5
Coniferous forest	74	0.1
Mixed forest	49587	67.3
Other Natural Land	22523	30.6
Agriculture	826	1.1
Artificial Surfaces	96	0.1
Other Land Cover	243	0.3
TOTAL	**73725**	**100**

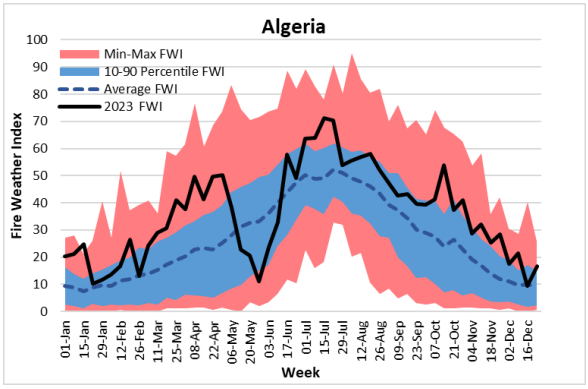


Figure 330. Fire weather Index information for Algeria.

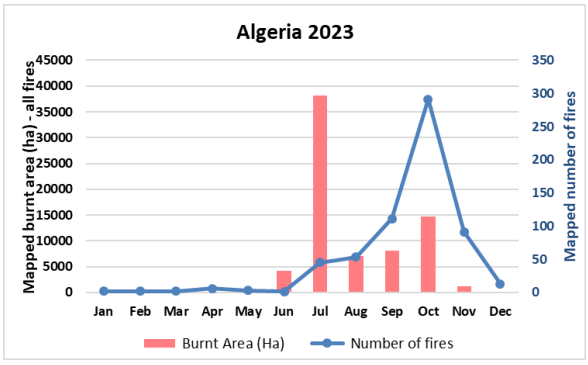


Figure 331. Monthly mapped burnt area and number of fires in Algeria in 2023.

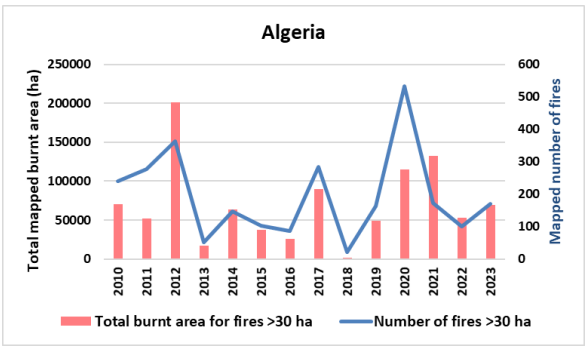


Figure 332. Annual mapped burnt area of fires ≥ 30 ha in Algeria.

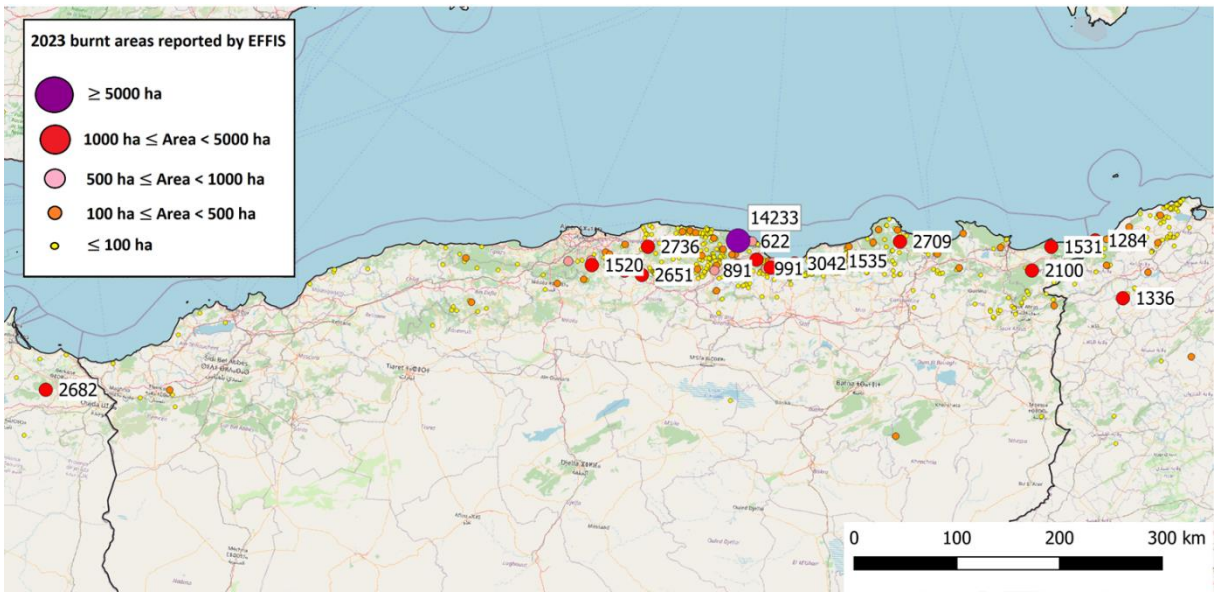


Figure 333. Locations of mapped fires in the north of Algeria in 2023.

3.2.2 Israel

Fifteen fires were mapped in Israel, burning a total of 706 ha.

Table 86 presents the affected land cover types using the Globcover land cover map, harmonised with CLC. Almost three quarters of the total burnt area was in Other Natural Land.

Table 86. Distribution of burnt area (ha) in Israel by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Mixed forest	34	4.8
Other Natural Land	510	72.2
Agriculture	156	22.1
Artificial Surfaces	4	0.6
TOTAL	**706**	**100**

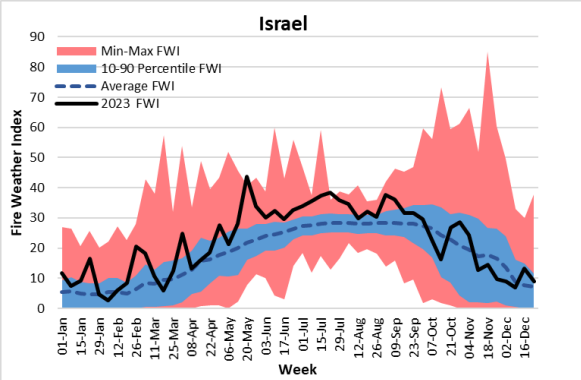


Figure 334. Fire weather Index information for Israel.

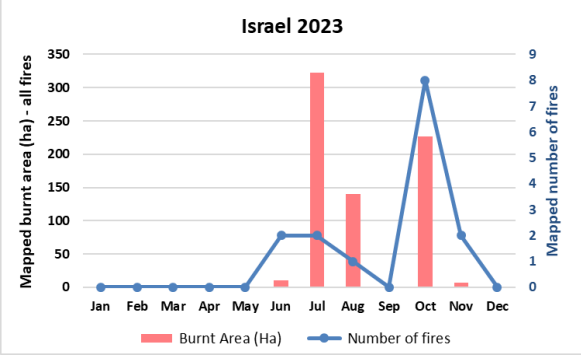


Figure 335. Monthly mapped burnt area and number of fires in Israel in 2023.

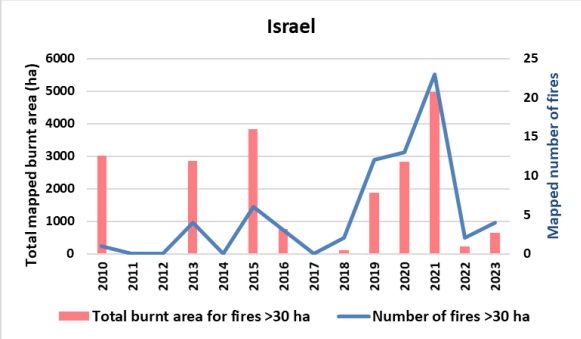


Figure 336. Annual mapped burnt area of fires ≥ 30 ha in Israel.

3.2.3 Lebanon

The 2023 fire season was worse than 2022, although still only covering around half of the area mapped in 2019-2021. 90 fires were mapped, resulting in a total burnt area of 1 889 ha. Of this total, only just over 1% (24 ha) affected protected areas.

Table 87 presents the affected land cover types using the Globcover land cover map, harmonised with CLC.

Table 87. Distribution of burnt area (ha) in Lebanon by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Coniferous forest	229	12.1
Mixed forest	308	16.3
Other Natural Land	1200	63.5
Agriculture	140	7.4
Artificial Surfaces	13	0.7
TOTAL	**1889**	**100**

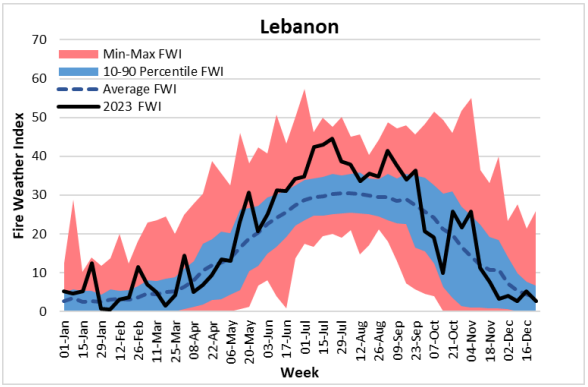


Figure 337. Fire weather Index information for Lebanon.

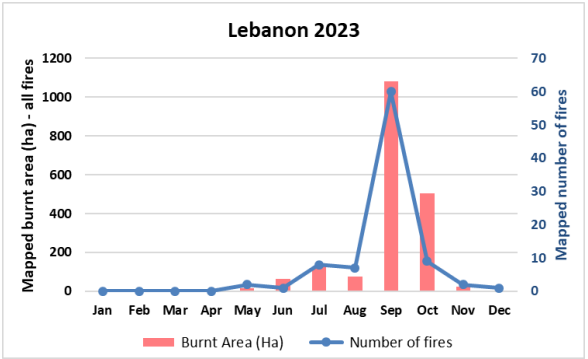


Figure 338. Monthly mapped burnt area and number of fires in Lebanon in 2023.

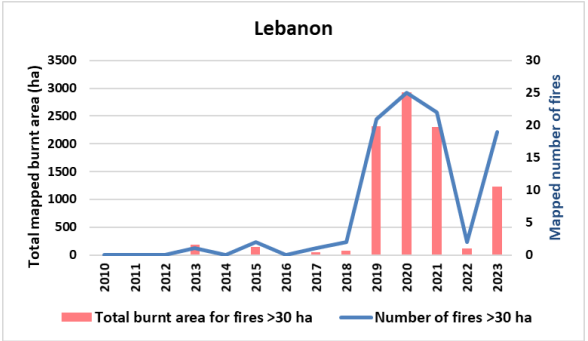


Figure 339. Annual mapped burnt area of fires ≥ 30 ha in Lebanon.

3.2.4 Libya

The 2023 fire season in Libya was quiet. 11 fires were mapped, resulting in a total burnt area of 417 ha between April and August. Table 88 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 88. Distribution of burnt area (ha) in Libya by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	22	5.3
Mixed forest	222	53.1
Other Natural Land	147	35.2
Agriculture	27	6.4
TOTAL	**417**	**100**

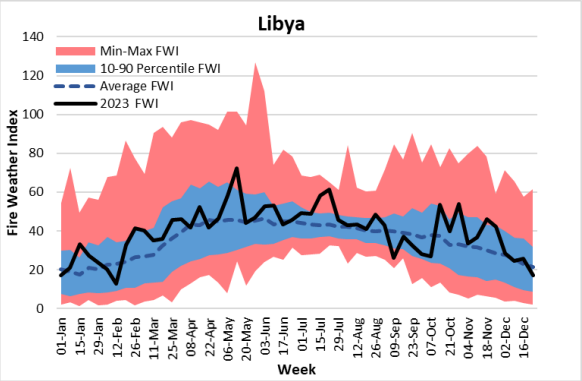


Figure 340. Fire weather Index information for Libya.

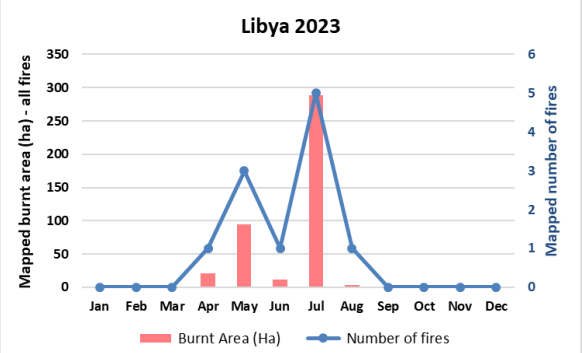


Figure 341. Monthly mapped burnt area and number of fires in Libya in 2023.

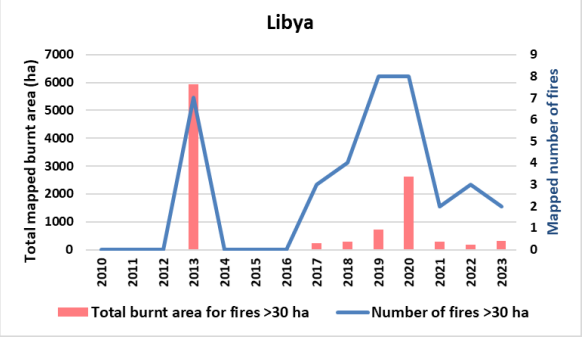


Figure 342. Annual mapped burnt area of fires ≥ 30 ha in Libya.

3.2.5 Morocco

After a hard season in 2022, the 2023 fire season was closer to average. 92 fires were mapped, resulting in a total of 8 127 ha burnt. Most of the fires occurred in July and August, including the largest of the year, over 2 500 ha in Aklim region. Three other fires exceeded 500 ha.

Table 89. Distribution of burnt area (ha) in Morocco by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	3858	47.5
Coniferous forest	1508	18.6
Mixed forest	453	5.6
Other Natural Land	265	3.3
Transitional	1299	16.0
Agriculture	733	9.0
Other Land Cover	10	0.1
TOTAL	**8127**	**100**

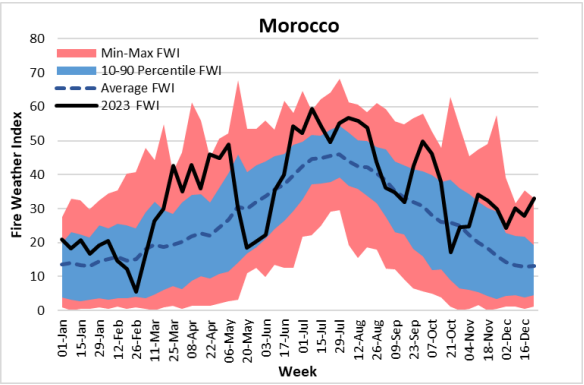


Figure 343. Fire weather Index information for Morocco.

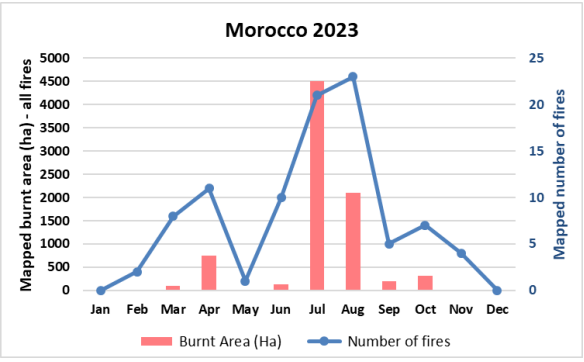


Figure 344. Monthly mapped burnt area and number of fires in Morocco in 2023.

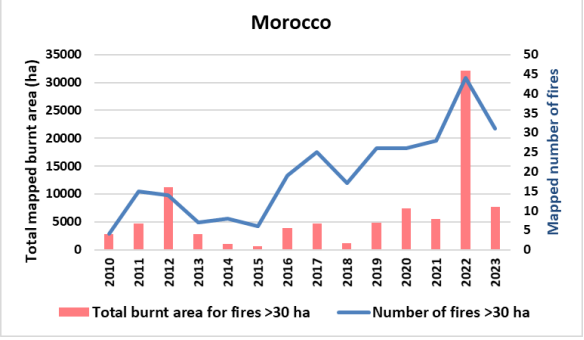


Figure 345. Annual mapped burnt area of fires ≥ 30 ha in Morocco.

3.2.6 Palestinian Territory

There were two fires mapped in Palestinian Territory in 2023, burning 480 ha in total. Table 90 presents the distribution of the mapped burnt area by land cover type using the Globcover land cover map, harmonised with CLC.

Table 90. Distribution of burnt area (ha) in Palestinian Territory by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Mixed forest	13	2.7
Other Natural Land	280	58.3
Agriculture	187	38.9
TOTAL	**480**	**100**

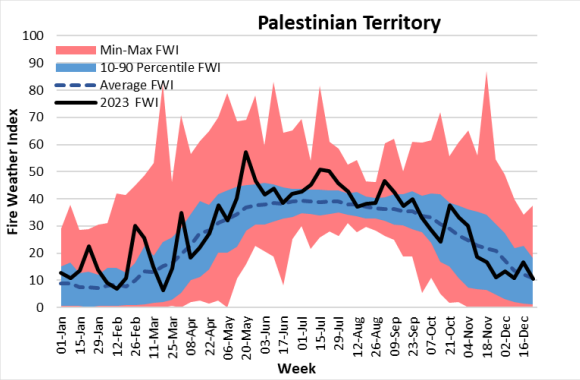


Figure 346. Fire weather Index information for Palestinian Territory.

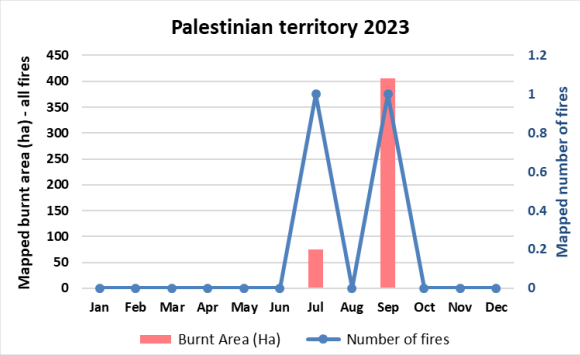


Figure 347. Monthly mapped burnt area and number of fires in Palestinian Territory in 2023.

3.2.7 Syria

It was a relatively light year for fires in Syria. There were 37 fires mapped, all but two in July, giving a total burnt area of 11 449 ha. Three of these were large; one was over 4 500 ha, a second over 3 000 ha and the third was nearly 2 000 ha, all in Lattakia region.

Table 91. Distribution of burnt area (ha) in Syria by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	5	0.0
Coniferous forest	5632	49.2
Mixed forest	3263	28.5
Other Natural Land	1917	16.7
Agriculture	616	5.4
Artificial Surfaces	17	0.2
TOTAL	**11449**	**100**

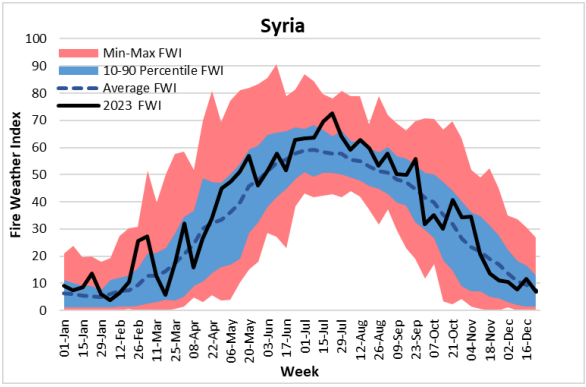


Figure 348. Fire weather Index information for Syria.

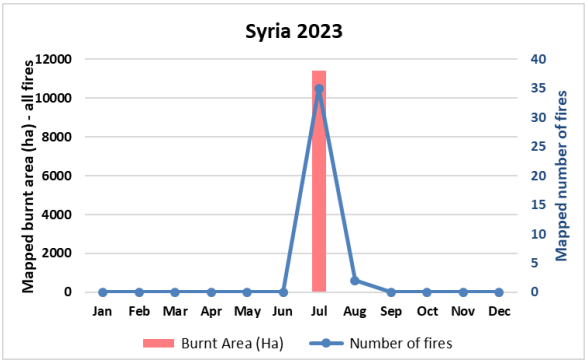


Figure 349. Monthly mapped burnt area and number of fires in Syria in 2023.

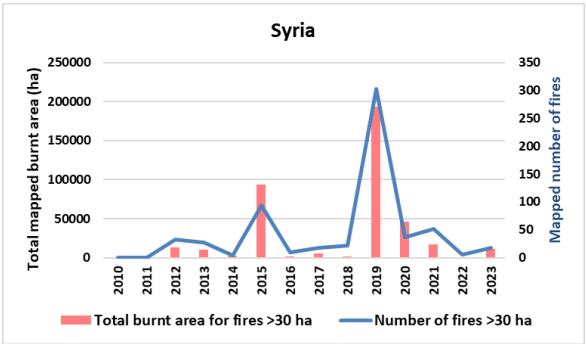


Figure 350. Annual mapped burnt area of fires ≥ 30 ha in Syria.

3.2.8 Tunisia

The 2023 fire season was fairly light in Tunisia. A total of 6 805 ha of burnt area was mapped from 130 fires between July and November (Figure 352), less than two-thirds the amount recorded in 2022. There were two fires over 1 000 ha, both occurring in July.

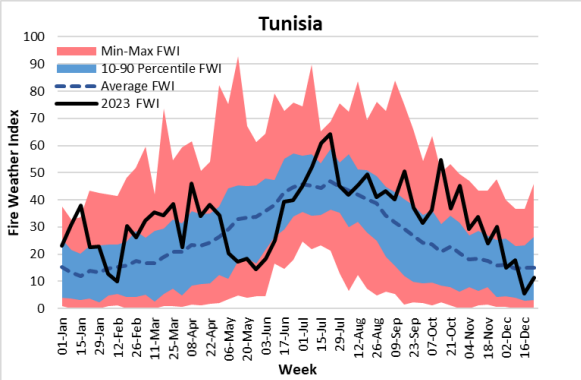


Figure 351. Fire weather Index information for Tunisia.

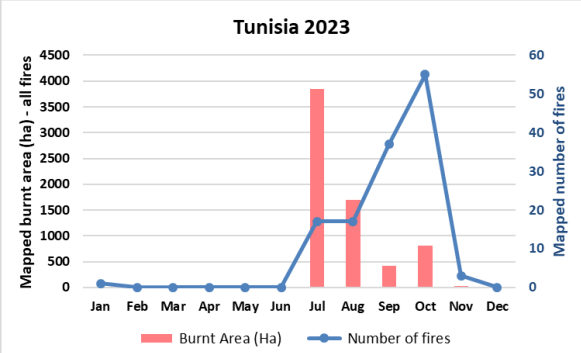


Figure 352. Monthly mapped burnt area and number of fires in Tunisia in 2023.

Table 92. Distribution of burnt area (ha) in Tunisia by land cover types in 2023.

Land cover	*Area burned*	*% of total*
Broadleaf forest	941	13.8
Coniferous forest	1715	25.2
Mixed forest	289	4.3
Other Natural Land	669	9.8
Sclerophyllous vegetation	1524	22.4
Transitional	810	11.9
Agriculture	788	11.6
Artificial Surfaces	16	0.2
Other Land Cover	53	0.8
TOTAL	**6805**	**100**

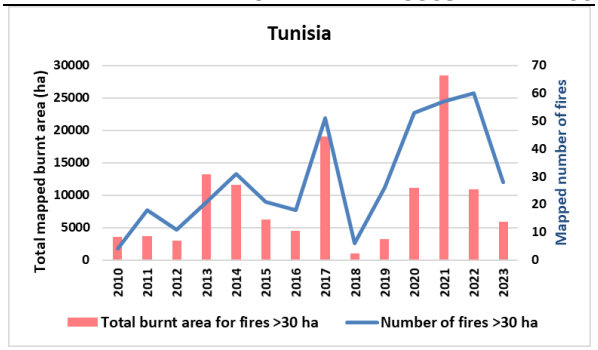


Figure 353. Annual mapped burnt area of fires ≥ 30 ha in Tunisia.

Figure 354 shows the burnt scars left by these fires.

Table 92 presents the distribution of burnt area by land cover types using Tunisia's own land cover map but with terminology harmonised with CLC.

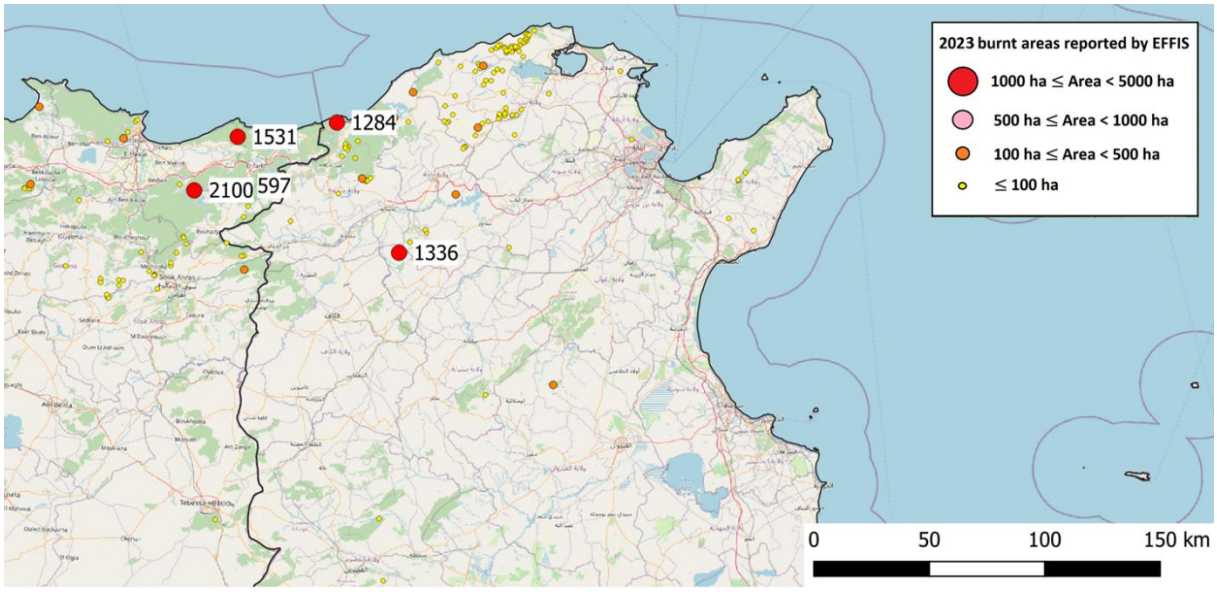


Figure 354. Locations of mapped burnt areas in northern Tunisia in 2023.

3.3 Conclusions

2023 was counted as another critical year in the European Union as regards area affected by wildfires, although at around 500 000 ha, the total damage was significantly less than that recorded in 2022. Around 41% of the total burnt area occurred within areas of special protection for biodiversity belonging to the Natura 2000 network, which is the EU's biodiversity reservoir. The year was also notable for a fire in the Greek region of East Macedonia and Thrace, which was the largest single wildfire recorded in the EU since EFFIS started tracking them in 2000. In order to tackle wildfires in Europe under the changing climatic conditions, in 2023, Europe doubled the rescEU firefighting air fleet, the reserve of collective EU capacities developed as a strategic safety net to be used in situations where the national resources are overwhelmed.

4 EFFIS Applications

4.1 The Current Situation Application

The current situation application allows the user to view and query map layers, with the most up to date information on the current fire season in Europe and in the Mediterranean area. This includes current date meteorological fire danger maps and forecast up to 9 days, daily updated maps of hot spots and fire perimeters. The application can also be used to view the situation in past years.

In the Fire Danger Forecast section ① two different sources and 8 different indices can be displayed, for the current day plus up to 8 days in the future.

The Rapid Damage Assessment ② allows the user to display active fire information and burnt area information for various time periods from two sources (Modis and VIIRS).

The Burnt area locator ③ shows the burnt area for the whole area or for a given country/region. A close-up view of the individual fire perimeter is shown if the user clicks on a specific fire ④.

A tool bar ⑤ has a number of controls for changing the view and displaying the legend.

This application can be accessed at https://effis.jrc.ec.europa.eu/apps/effis_current_situation/

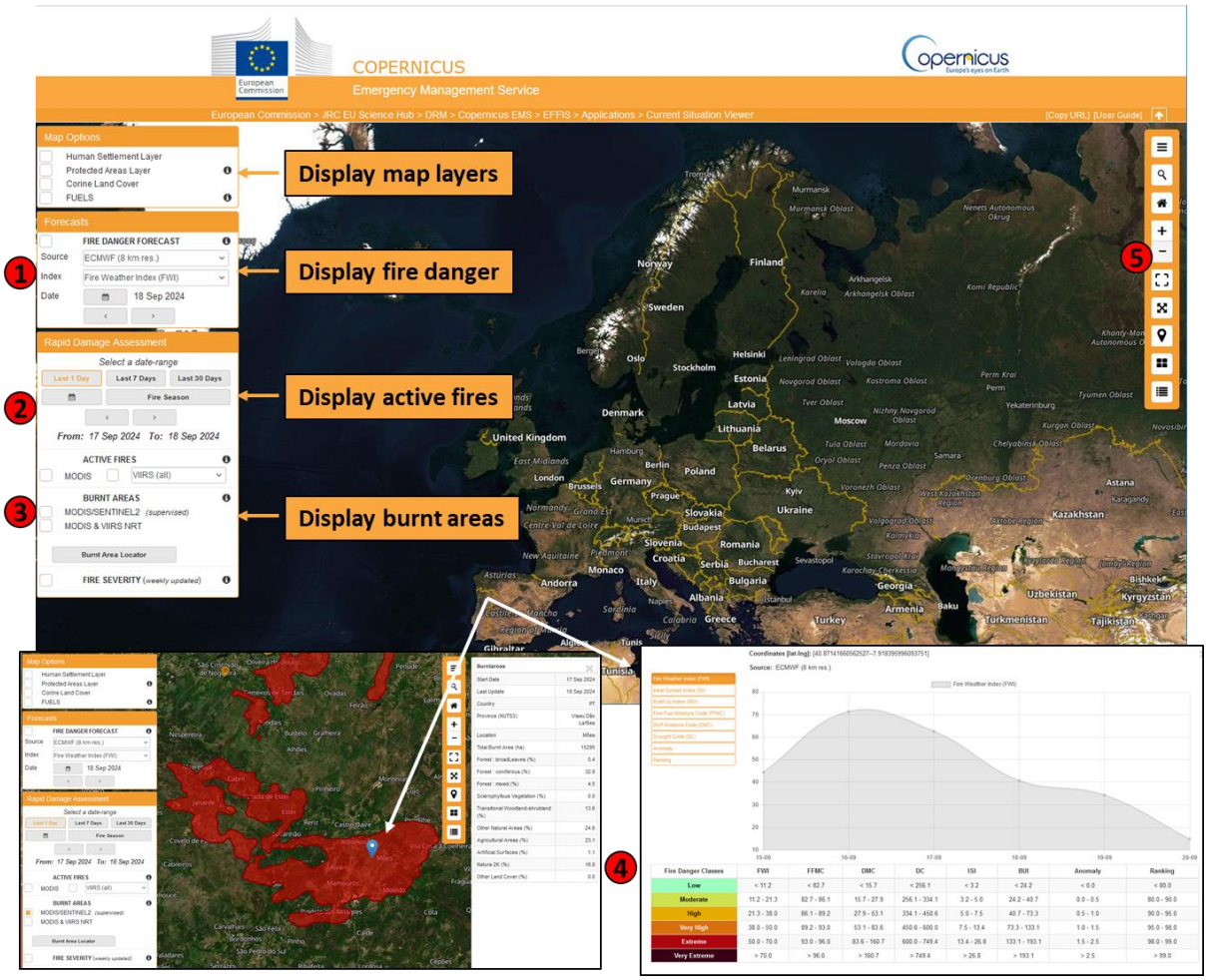


Figure 355. The Current Situation application.

4.2 The Fire News Application

The purpose of this application is to display geo-located news items about forest fires from a number of sources. News items are added to the map daily by team members during the fire season.

[**N.B.** *It is important to note that not all fires are displayed here: only those reported in the media with an identifiable location. Fires are not always reported individually (or at all) in the press, and the space devoted to them depends on other current world events*].

Clicking on a point on the map gives a link to the original news item associated with that point.

Clicking on the name in the list gives a table with details of the fire and a close-up of the map.

By default, the display shows fires occurring in the last week, but the **From** and **To** boxes can be used to select other times. The results can be filtered by country, and the Search box allows the user to narrow down the display to a specific location of interest.

This application can be accessed at https://effis.jrc.ec.europa.eu/apps/firenews.viewer/

Figure 356. Clicking on a specific fire will zoom in to that spot. Clicking on the spot will bring up all the news items linked to the fire.

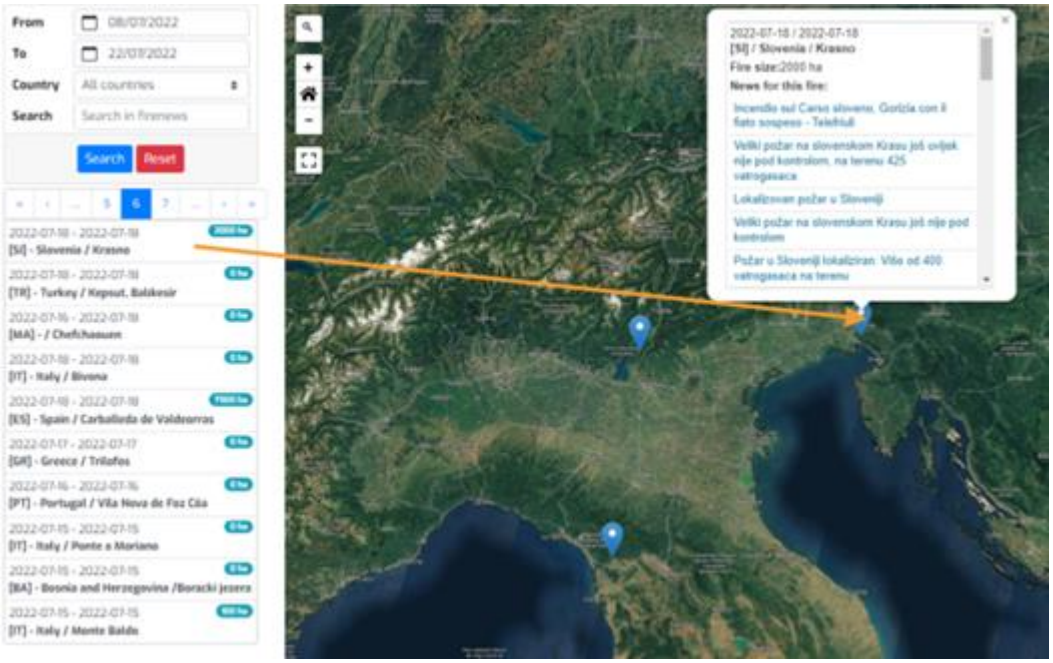


Figure 357. The Fire News application.

4.3 The EFFIS Statistics Portal

Statistics are provided at national level and for 3 groups: EU, European non-EU countries, and Middle East and North Africa countries. The portal provides information on the current fire season through the provision of the following information:

- Current statistics of burnt areas and number of fires, as compared to the average of the last 14 years. Statistics of the current year can be compared to a single year or a period in the past;
- Seasonal cumulative trend in burnt areas and number of fires as compared to the average of the last 14 years;
- Number of thermal anomalies detected by the VIIRS sensor as compared to the average of thermal anomalies for the last 10 years (2012-2021);
- Number of thermal anomalies detected by the MODIS sensor as compared to the average of the thermal anomalies for the last 10 years (2012-2021).

There are two parts to the Portal: EFFIS estimates and the Seasonal trend.

EFFIS Estimates

In this section the user can display the burnt area or numbers of mapped fires for two periods. The first is a single year (default is the current fire season), and the second can be defined by the user to be any range between 2006 and the year before the current season. The countries are grouped by region and displayed in alphabetical order in the graph.

The values displayed on the graph are provided in table format below the graph. Extra information is also provided when the "overview" option is selected, including the country size and the percentage of the total country area that has been burned.

In each case the statistics can be displayed for the entire region of interest, or for any of the individual countries in the group.

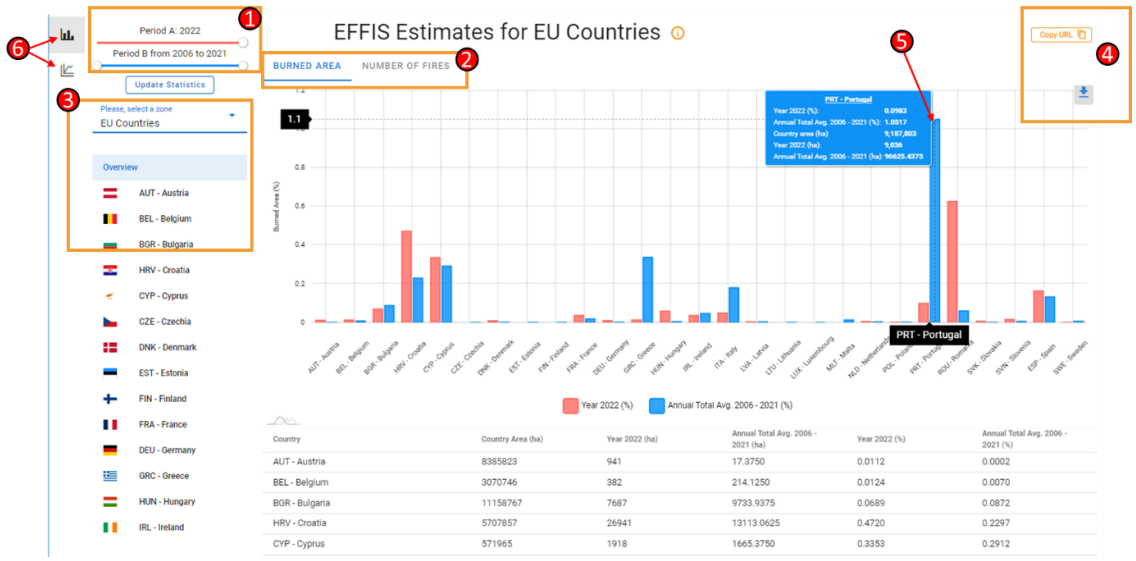


Figure 358. EFFIS estimates.

1. Use the sliders to select individual year of interest and period for comparison.
2. Choose Burned Area or Number of Fires.
3. Choose region of interest (EU countries, European Non-EU countries, Mena countries) and either the overview or an individual country.
4. Download the results or copy the url.
5. Hover the mouse over individual points to get their statistics.
6. Switch between the EFFIS Estimates and Seasonal Trends.

Seasonal Trends

In this section are 8 charts in 4 pairs. There are three main groups of countries (EU countries, European Non-EU countries, MENA countries) and the information can be displayed for the group as a whole or for individual countries in the same way as for the Estimates.

The first of each pair displays values comparing the current year's progress against the long term average (2006-2021) and the minimum/maximum values. The second displays the same information but displayed cumulatively through the year.

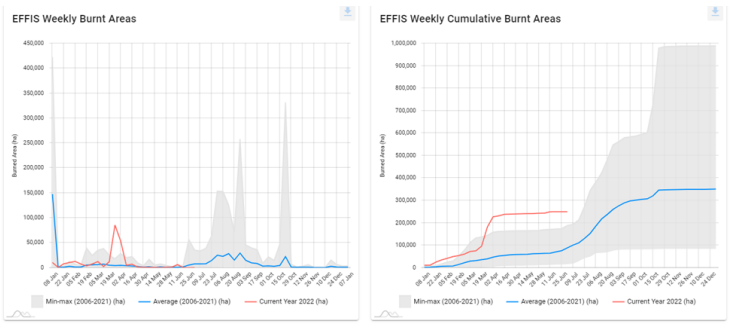
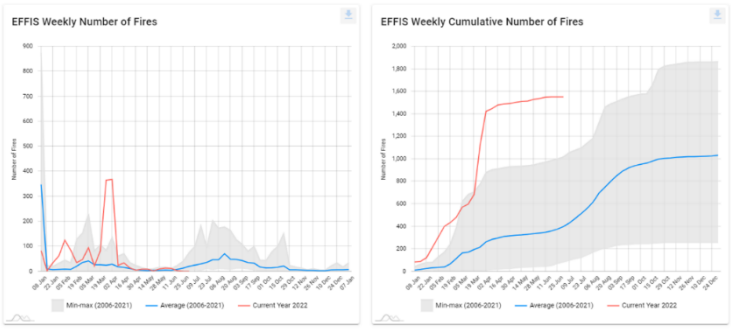
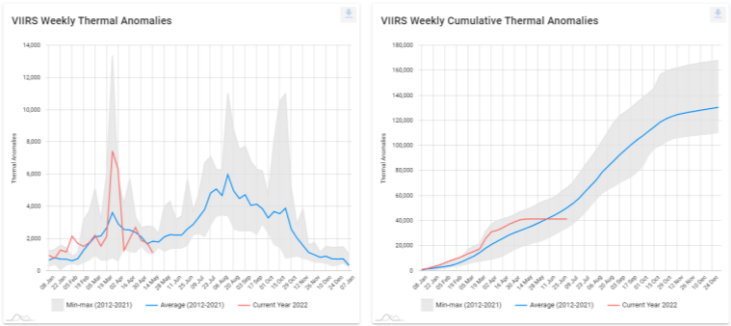
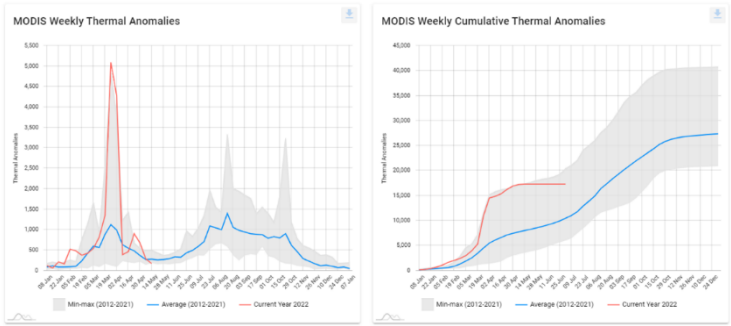
Burnt areas EFFIS weekly burnt areas comparing the current year's progress against the long term average (2006-2021) and the minimum/maximum values.	
Numbers of fires EFFIS weekly burnt areas comparing the current year's progress against the long term average (2006-2021) and the minimum/maximum values.	
VIIRS Weekly Thermal Anomalies VIIRS weekly thermal anomalies comparing the current year's progress against the long term average (2006-2021) and the minimum/maximum values.	
MODIS Weekly Thermal Anomalies MODIS weekly thermal anomalies comparing the current year's progress against the long term average (2006-2021) and the minimum/maximum values.	

Figure 359. Seasonal trends.

4.4 The EFFIS Fire Database

The Fire Database is an important component of EFFIS, containing the forest fire information compiled by countries in Europe, Middle East and North Africa.

The Regulation EEC No 804/94 [11] (now expired) established a Community system of information on forest fires for which a systematic collection of a minimum set of data on each fire occurring, the so called "Common Core", had to be carried out by the Member States participating in the system. This regulation was replaced by the Forest Focus regulation in 2003.

Following the Forest Focus regulation (EC) No 2152/2003 [7], concerning monitoring of forests and environment interactions in the Community, the forest fire common core data was continued to be recorded in order to collect comparable information on forest fires at Community level.

Since 2000 the forest fire data provided each year by individual EU Member States and other countries in Europe, Middle East and North Africa have been checked, stored and managed by JRC within EFFIS.

In 2012 the 4 MENA countries submitted data for entry into the database, bringing the number of countries now contributing at least once to 27: (Algeria, Bulgaria, Croatia, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Lebanon, Morocco, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tunisia and Türkiye). The database currently contains over 3 million individual fire event records (around 2.2 million forest fires).

Access to the information

The individual records are not made available as they are owned by the country authorities who supply the data; however, users can request custom annual or monthly summaries of burnt area or number of fires by country, NUTS2 or NUTS3 region from the point of contact.

More detailed information about the database can be found in the technical report "*The European Fire Database: Technical specifications and data submission*" EUR26546 EN [12], which can be downloaded from:

https://effis.jrc.ec.europa.eu/reports-and-publications/effis-related-publications

Table 93. Information requested for each fire event.

ID	Unique Fire identifier	FIREID
TIME OF FIRE	Date of first alert [YYYYMMDD]	DATEAL
	Time of first alert [HHMM]	TIMEAL
	Date of first intervention [YYYYMMDD]	DATEIN
	Time of first intervention [HHMM]	TIMEIN
	Date of fire extinction [YYYYMMDD]	DATEEX
	Time of fire extinction [HHMM]	TIMEEX
LOCATION OF FIRE	Province Code (national nomenclature)	PROVCODE
	NUTS3 code	NUTS3
	Commune Code (national nomenclature)	CODECOM
	Commune Name (national nomenclature)	NAMECOM
	Latitude [decimal degrees]	NORTH
	Longitude [decimal degrees]	EAST
SIZE OF FIRE (Ha)	Burnt Area FOREST	BAFOR
	Burnt Area OTHER WOODED LAND	BAOW
	Burnt Area OTHER NON WOODED NATURAL LAND	BAONW
	Burnt Area AGRICULTURE AND OTHER ARTIFICIAL LAND	BAAGR
CAUSE OF FIRE	Certainty of knowledge of Presumed Cause (New EU code)	CAUSE_KNOWN
	Presumed Cause (New EU categories code)	CAUSE_EU
	Presumed Cause (Country detailed categories code)	CAUSE_CO

General notes on Table 94: 2023 data are still undergoing validation checks and are not presented.

The totals given in this table do not always match the published number of fires for a number of reasons:

1. Purely agricultural fires are stored in the database if submitted by the country, but are excluded from forest fire calculations;
2. Some countries do not report detailed records for the whole of their territory and the information is only available in summary form.

Table 94. Summary of data records stored in the Fire Database.

	BG	CH	CY	CZ	DE	EE	ES	FI	FR	GR	HR	HU	IT	LT	LV	NL	PL	PT	RO	SE	SI	SK	TR	DZ	LB	MA	TN
1980		87																2349									
1981		153																6730									
1982		86																3626									
1983		120								945								4542									
1984		183								1184								7356									
1985		114					12235		3732	1417			12931					8441									75
1986		87					7514		2657	1088			6115					5036									89
1987		121					8816		2116	1234			8506					7705									207
1988		79					9440		2240	1798			9785					6131									158
1989		189					20250		3321	1203			8328					21896									70
1990		257					12914		3297	1283			11560					10745									118
1991		152					13529		2372	1036			7580					14327									97
1992		86					15956		2708	2008			10044					14954									182
1993		83					14253		4766	2707			14317					16101									183
1994		86			706		19249		4728	1955			7153				24361	19983									131
1995		96			525		25557		6539	1494			5505				23816	34116			44						13
1996		130			822		16586		6401	1527	2363		6064				23582	28626		4854	47						13
1997		179			276		22320		8001	2271	2648		11608				25068	23497		7057	55						98
1998		121			592		22003		6289	605	4096		9565				21342	34676		2503	143						-
1999		50			794		17943		4881	513	2592		6956				32646	25477		4707	55						-
2000		70	285		930		23574		4343	1469	5477		8609				31809	34109		4708	100						-
2001		67	299		373		19099		4259	1313	2505		7227				24511	28915		4831	60						-
2002		117	243		278		19929		4097	572	3428	429	4607				38154	28993		6490	64						-
2003		304	427		1238		18616		7023	622	4904	373	9716				79013	28087		8282	227						-
2004		94	221	957	300		21396		3767	739	1704	104	6341	430	647		36315	27829	34	4955	50	153					-
2005	251	110	185	653	299	65	25492	2631	4698	718	2180	150	7918	267	365		46542	41689	64	4573	74	287	1530				-
2006	393	110	172	697	717	248	16334	6314	4608	764	2210	97	5651	1444	1929		35630	24243	105	4618	106	238	2227			347	216
2007	1479	120	111	809	435	64	10932	2813	3382	1226	3759	603	10736	245	426		31303	25133	478	3787	129	463	2706			304	292
2008	582	63	114	470	560	71	11656	3161	2781	1071	228	502	6648	272	716		35786	18958	91	5420	68	182	2135			267	259
2009	314	103	91	520	575	47	15642	2746	4808	354	181	608	5423	471	890		30912	29783	190	4180	122	347	-			487	199
2010	222	88	133	731	525	30	11722	3100	3828	540	131	109	4884	106	319		24443	26113	70	3120	33	123	1861			597	264
2011	635	114	85	1341	515	24	16417	2871	4283	953	279	2021	8181	137	373		39011	29782	340	3534	114	303	-			568	262
2012	876	75	78	1555	451	5	15978	1050	3713	-	570	2657	10345	81	162		53907	25352	911	2213	168	517	2449	5036	99	484	493
2013	408	58	135	671	355	15	10797	2864	2061	-	137	761	2077	119	420		25652	23129	118	4907	75	233	3755	-	-	411	-
2014	151	60	68	870	251	91	9806	3637	1729	-	43	1042	1821	155	695		38115	9388	83	4374	35	153	-	-	-	460	-
2015	439	166	87	1738	594	67	11810	1644	2891	-	176	1069	5424	247	704		60176	19643	250	2700	93	242	-	-	-	425	-
2016	584	82	119	899	407	84	-	2101	2761	-	176	452	-	98	641		25791	16104	174	5454	90	136	-	-	-	422	-
2017	513	110	92	988	176	61	-	2263	3201	-	328	1454	-	80	423	321	25193	21006	447	5276	108	162	-	-	-	437	-
2018	222	153	131	2033	1216	230	-	4401	1616	-	57	530	-	211	972	949	33227	12273	158	8181	32	262	-	-	-	343	-
2019	668	-	99	1964	845	143	-	3046	2886	-	123	2088	-	280	1107	547	41488	10832	425	5483	84	-	-	-	-	529	-
2020	499	-	-	2079	684	24	-	2780	2658	-	-	1239	-	157	581	724	31061	9619	627	5305	120	-	-	-	-	514	-
2021	349	-	-	1515	293	32	-	2457	2295	-	-	1154	-	46	448	212	15605	8186	278	4086	73	-	-	-	-	434	-
2022	516	-	-	2469	1228	26	-	2370	4349	-	-	2733	-	81	369	-	33549	10380	1021	5189	217	-	-	-	-	499	-

5 References and background documentation

[1] European Commission, 2017. **Proposal for a DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Decision No 1313/2013/EU on a Union Civil Protection Mechanism**. No. COM(2017) 772 final in COM – legislative proposals, and documents related. *Publications Office of the European Union*, Luxembourg. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:0772:FIN

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All reports from past years can be found in

http://effis.jrc.ec.europa.eu/reports-and-publications/annual-fire-reports/

Annex – Summary Tables of Fire Statistics

Table 95. Number of forest fires in five Southern Member States (1980-2023)

Table 96. Burnt area (hectares) in five Southern Member States (1980–2023)

Table 97. Number of forest fires in other countries (1990-2023)

Table 98. Burnt area (hectares) in other countries (1990–2023).

Statistics on burnt area divided into forest and non-forest area are supplied in the individual country reports, where available.

NOTE

Every effort is made to ensure that the published figures are correct. However, at the time of printing some data are provisional and may be changed in the future. Where there is a discrepancy between figures published in different reports, the later report should be taken as the definitive version.

Table 95. Number of forest fires in five Southern Member States (1980-2023).

Year	*PORTUGAL*	*SPAIN*	*FRANCE*	*ITALY*	*GREECE*	*TOTAL*
1980	2 349	7 190	5 040	11 963	1 207	27 749
1981	6 730	10 878	5 173	14 503	1 159	38 443
1982	3 626	6 545	5 308	9 557	1 045	26 081
1983	4 539	4 791	4 659	7 956	968	22 913
1984	7 356	7 203	5 672	8 482	1 284	29 997
1985	8 441	12 238	6 249	18 664	1 442	47 034
1986	5 036	7 570	4 353	9 398	1 082	27 439
1987	7 705	8 679	3 043	11 972	1 266	32 665
1988	6 131	9 247	2 837	13 588	1 898	33 701
1989	21 896	20 811	6 763	9 669	1 284	60 423
1990	10 745	12 913	5 881	14 477	1 322	45 338
1991	14 327	13 531	3 888	11 965	858	44 569
1992	14 954	15 955	4 002	14 641	2 582	52 134
1993	16 101	14 254	4 769	14 412	2 406	51 942
1994	19 983	19 263	4 618	11 588	1 763	57 215
1995	34 116	25 827	6 563	7 378	1 438	75 322
1996	28 626	16 771	6 401	9 093	1 508	62 399
1997	23 497	22 320	8 005	11 612	2 273	67 707
1998	34 676	22 446	6 289	9 540	1 842	74 793
1999	25 477	18 237	4 960	6 932	1 486	57 092
2000	34 109	24 118	4 603	8 595	2 581	74 006
2001	28 915	19 547	4 309	7 134	2 535	62 440
2002	28 993	19 929	4 097	4 601	1 141	58 761
2003	28 087	18 616	7 023	9 697	1 452	64 875
2004	27 829	21 396	3 775	6 428	1 748	61 176
2005	41 689	25 492	4 698	7 951	1 544	81 374
2006	24 243	16 354	3 231	5 634	1 417	50 879
2007	25 133	10 936	2 690	10 639	1 983	51 381
2008	18 958	11 655	1 801	6 486	1 481	40 381
2009	29 783	15 643	3 012	5 422	1 063	54 923
2010	26 113	11 721	2 443	4 884	1 052	46 213
2011	29 782	16 414	2 774	8 181	1 613	58 764
2012	25 352	17 503	2 763	8 252	1 559	55 429
2013	23 129	10 626	1 510	2 936	862	39 063
2014	9 388	9 771	1 730	3 257	552	24 698
2015	19 643	11 928	2 898	5 442	510	40 421
2016	16 104	8 817	2 775	5 818	777	34 291
2017	21 006	13 793	3 220	7 855	1 083	46 957
2018	12 274	7 143	1 634	3 220	793	25 064
2019	10 832	10 883	2 949	4 351	657	29 672
2020	9 619	7 745	2 760	4 865	1 060	26 049
2021	8 186	8 780	2 332	5 989	1 250	26 537
2022	10 390	10 507	4 215	6 529	962	32 603
2023	**7523**	**7 748**	**2 666**	**4 265**	**941**	**23 143**
% of total in 2023	**33%**	**33%**	**12%**	**18%**	**4%**	**100%**
Average 1980-1989	7 381	9 515	4 910	11 575	1 264	34 645
Average 1990-1999	22 250	18 152	5 538	11 164	1 748	58 851
Average 2000-2009	28 774	18 369	3 924	7 259	1 695	60 020
Average 2010-2019	19 362	11 860	2 470	5 420	946	40 057
Average 2020-2023	8 930	8 695	2 993	5 412	1 053	27 083
Average 1980-2023	18 486	13 949	4 100	8 541	1 380	46 456
TOTAL (1980-2023)	813 391	613 734	180 381	375 821	60 729	2 044 056

Table 96. Burnt area (hectares) in five Southern Member States (1980–2023).

Year	*PORTUGAL*	*SPAIN*	*FRANCE*	*ITALY*	*GREECE*	*TOTAL*
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	117 420	93 297	20 642	76 427	18 221	326 007
2002	130 849	107 464	30 160	40 791	6 013	315 277
2003	471 750	148 172	73 278	91 805	3 517	788 522
2004	151 370	134 193	13 711	60 176	10 267	369 717
2005	346 718	188 697	22 135	47 575	6 437	611 562
2006	83 706	155 345	7 026	39 946	12 661	298 684
2007	36 413	86 122	7 057	227 729	225 734	583 055
2008	19 897	50 322	4 710	66 329	29 152	170 410
2009	92 126	120 094	14 612	73 355	35 342	335 529
2010	140 953	54 770	8 524	46 537	8 967	259 751
2011	77 104	102 161	6 800	72 004	29 144	287 213
2012	117 985	226 125	7 584	130 814	59 924	542 432
2013	160 388	58 985	2 735	29 076	46 676	297 860
2014	22 820	46 721	4 735	36 125	25 846	136 247
2015	67 200	103 200	8 169	41 511	7 096	227 176
2016	167 808	65 817	14 101	65 503	26 540	339 769
2017	539 921	178 234	23 093	161 987	13 393	916 628
2018	44 578	25 162	3 940	19 481	15 464	108 624
2019	42 085	83 963	13 394	36 034	9 153	184 628
2020	67 170	65 923	10 722	55 656	9 300	208 771
2021	28 360	87 880	12 779	151 964	108 418	389 401
2022	110 097	267 947	58 123	71 694	18 807	526 668
2023	**34 510**	**89 068**	**5 361**	**88 806**	**136 499**	**354 244**
% of total in 2023	**10%**	**25%**	**2%**	**25%**	**39%**	**100%**
Average 1980-1989	73 484	244 788	39 157	147 150	52 417	556 995
Average 1990-1999	102 203	161 319	22 735	118 573	44 108	448 938
Average 2000-2009	160 985	127 229	21 741	83 878	49 238	443 071
Average 2010-2019	138 084	94 514	9 308	63 907	24 220	330 033
Average 2020-2023	60 034	127 705	21 746	92 030	68 256	369 771
Average 1980-2023	113 357	154 303	23 100	102 345	44 837	437 942
TOTAL (1980-2023)	4 987 705	6 789 317	1 016 382	4 503 197	1 972 850	1 926 9449

Table 97. Number of forest fires in other countries (1990-2023).

Country / Year	Algeria	Austria	Bulgaria	Croatia	Cyprus	Czechia	Estonia	Finland	Germany	Hungary	Latvia	Lebanon	Lithuania	Morocco	Netherlands	North Macedonia	Norway	Poland	Romania	Serbia	Slovakia	Slovenia	Sweden	Switzerland	Türkiye	Ukraine
1990	-	-	-	-	-	-	-	-	-	-	604	-	-	179	-	-	-	5756	131	-	-	-	-	257	1750	-
1991	-	-	73	-	-	-	-	-	1846	-	225	-	-	247	-	-	-	3528	42	-	-	-	-	152	1481	-
1992	-	-	602	325	-	-	-	-	3012	-	1510	-	1180	182	-	-	-	11858	187	-	-	-	-	86	2117	-
1993	-	112	1196	372	-	-	-	-	1694	-	965	-	634	187	-	-	-	8821	159	-	-	-	-	83	2545	-
1994	-	105	667	181	-	-	-	-	1696	-	763	-	715	417	-	-	-	10705	121	-	366	-	-	86	3239	-
1995	-	54	114	109	-	1331	-	-	1237	-	582	-	472	528	-	-	-	7678	62	-	254	-	-	96	1770	-
1996	-	26	246	305	-	1421	-	1475	1748	-	1095	-	894	220	-	-	-	7923	72	-	662	-	-	130	1645	-
1997	-	42	200	305	-	1398	-	1585	1467	-	768	-	565	391	-	-	-	6817	37	-	535	-	-	179	1569	-
1998	-	71	578	441	-	2563	-	370	1032	-	357	-	258	416	-	-	-	6165	59	-	1056	-	2503	121	1932	-
1999	-	16	320	223	-	1402	-	1528	1178	229	1196	-	1022	385	-	-	-	9820	138	-	426	-	4707	50	2075	-
2000	-	42	1710	706	285	1499	158	826	1210	811	915	-	654	321	-	-	-	12426	688	-	824	-	4708	70	2555	-
2001	-	54	825	299	299	483	91	822	587	419	272	-	287	327	-	-	117	4480	268	-	311	-	4831	67	2631	-
2002	-	108	402	176	243	604	356	2546	513	382	1720	-	1596	202	-	-	213	10101	516	-	570	60	6490	117	1471	-
2003	-	238	452	532	427	1754	111	1734	2524	375	900	-	885	392	-	-	198	17087	203	-	872	224	8282	304	2177	-
2004	-	72	294	204	221	873	89	816	626	104	647	-	468	714	-	-	119	7006	34	-	153	51	4955	94	1762	-
2005	-	85	241	147	185	619	65	1069	496	150	365	-	301	662	-	-	122	12049	64	-	287	73	4573	110	1530	-
2006	-	133	393	181	172	697	248	3046	930	97	1929	-	1545	381	-	-	205	11541	105	-	237	112	4618	110	2227	-
2007	-	256	1479	345	111	805	64	1204	779	603	425	-	251	340	-	652	65	8302	478	-	463	140	3737	120	2829	5024
2008	-	185	582	275	114	470	71	1456	818	502	700	-	301	273	-	573	171	9090	91	-	182	74	5420	63	2135	3231
2009	-	138	314	181	91	514	47	1242	763	608	823	-	471	501	-	80	109	9162	190	67	347	120	4180	103	1793	4922
2010	-	144	222	131	133	732	30	1412	780	109	316	-	104	629	-	99	62	4680	70	3	127	32	3120	88	1861	2368
2011	2487	267	635	280	85	1337	24	1215	888	2021	360	-	142	606	-	523	49	8172	340	211	303	114	3534	114	1954	1761
2012	5110	259	876	569	78	1549	5	417	701	2657	162	-	81	484	-	483	24	9265	911	318	513	168	2213	75	2450	1743
2013	2443	199	408	137	135	666	15	1452	515	761	422	-	123	411	-	186	42	4883	116	46	233	75	4878	58	3755	806
2014	4629	146	151	43	68	865	91	1660	429	1042	698	-	155	460	-	62	133	5245	83	23	153	35	4374	60	2149	1486
2015	2383	280	429	177	87	1748	67	745	1071	1069	704	107	247	425	-	106	29	12257	250	68	242	93	2700	166	2150	2225
2016	3150	141	584	151	119	892	84	933	608	452	641	260	98	422	-	60	345	5286	174	45	136	90	5454	82	3188	945
2017	2992	278	513	329	92	966	61	881	424	1454	423	92	80	433	321	301	264	3592	447	222	162	108	5276	110	2411	2371
2018	797	174	222	54	131	2033	230	2427	1708	530	972	41	211	343	949	19	887	8867	158	62	262	32	8181	153	2167	1297
2019	2278	244	668	123	99	1963	143	1458	1523	2088	1107	194	279	529	548	251	261	9635	425	189	210	84	5483	79	2688	1261
2020	3493	234	499	142	108	2081	24	1260	1360	1239	581	251	157	514	724	48	609	6627	627	81	221	120	5305	78	3399	2598
2021	1631	164	349	116	111	1517	32	1231	548	1154	448	131	46	435	212	113	653	3295	278	75	101	73	4087	85	2793	659
2022	1607	217	516	245	89	2473	26	1129	2397	2731	369	22	81	499	916	50	1275	6999	1021	66	297	217	5189	115	2160	1098
2023		119	448	48	131	1512	33	1346	1059	675	571	23	167	466		104	1251	4908	170	33	55	40	4744	144	2579	593

Table 98. Burnt area (hectares) in other countries (1990–2023).

Country / Year	Algeria	Austria	Bulgaria	Croatia	Cyprus	Czechia	Estonia	Finland	Germany	Hungary	Latvia	Lebanon	Lithuania	Morocco	Netherlands	North Macedonia	Norway	Poland	Romania	Serbia	Slovakia	Slovenia	Sweden	Switzerland	Türkiye	Ukraine
1990	-	-	-	-	-	-	-	-	-	-	258	-	-	2118	-	-	-	7341	444	-	-	-	-	1723	13742	-
1991	-	-	511	-	-	-	-	-	920	-	69	-	-	3965	-	-	-	2567	277	-	-	-	-	96	8081	-
1992	-	-	5243	11131	-	-	-	-	4908	-	8412	-	769	2579	-	-	-	43755	729	-	-	-	-	65	12232	-
1993	-	85	18164	20157	-	-	-	-	1493	-	570	-	274	3078	-	-	-	8290	518	-	-	-	-	37	15393	-
1994	-	80	18100	7936	-	-	-	-	1114	-	326	-	279	6072	-	-	-	9325	312	-	-	-	-	408	30828	-
1995	-	43	550	4651	-	403	-	-	592	-	535	-	321	7018	-	-	-	5403	208	-	-	-	-	446	7676	-
1996	-	8	906	11214	-	2043	-	433	1381	-	927	-	478	1185	-	-	-	14537	227	-	-	-	-	293	14922	-
1997	-	28	595	11122	-	359	-	1146	599	-	448	-	226	3845	-	-	-	6766	68	-	-	-	-	1785	6517	-
1998	-	101	6967	32056	-	1132	-	131	397	-	211	-	93	1855	-	-	-	4222	137	-	-	-	422	274	6764	-
1999	-	6	8291	6053	-	336	-	609	415	756	1544	-	494	1688	-	-	-	8629	379	-	557	-	1771	30	5804	-
2000	-	32	57406	68171	8034	375	684	266	581	1595	1341	-	352	4064	-	-	-	7089	3607	-	904	-	1552	70	26653	-
2001	-	20	20152	16169	4830	87	62	187	122	-	311	-	113	1806	-	-	895	3466	1001	-	305	-	1254	21	7394	-
2002	-	112	6513	4853	2196	178	2082	590	122	1227	2222	-	746	593	-	-	221	5210	3536	-	595	161	2626	681	8514	-
2003	-	122	5000	27091	2349	1236	207	666	1315	845	559	-	436	2858	-	-	942	21551	762	-	1567	2100	4002	673	6644	-
2004	-	19	1137	3378	1218	335	379	358	274	247	486	-	253	8660	-	-	117	3782	124	-	157	138	1883	31	4876	-
2005	-	13	1456	3135	1838	227	85	495	183	3531	120	-	51	6198	-	-	346	5713	162	-	524	280	1562	67	2821	-
2006	-	54	3540	4575	1160	53	2638	1617	482	625	3387	-	1199	5360	-	-	3829	5657	946	-	280	1420	5710	127	7762	-
2007	-	54	42999	20209	4483	316	292	576	256	4636	272	-	38	1367	-	32665	128	2841	2529	-	679	128	1090	337	11664	12731
2008	-	20	5289	7343	2392	86	1279	830	539	2404	364	-	112	1127	-	5915	3174	3027	373	-	118	75	6113	68	29749	4521
2009	-	58	2271	2900	885	178	59	576	262	6463	646	-	287	3108	-	1307	1329	4400	974	712	510	177	1537	60	4679	4575
2010	-	36	6526	1121	2000	205	25	520	522	878	92	-	22	5511	-	737	769	2126	206	4	192	121	540	27	3517	1239
2011	13593	67	6883	15555	1599	337	19	580	214	8055	115	-	293	3460	-	17308	121	2678	2195	5003	403	288	945	225	3612	612
2012	99061	48	12730	24804	2531	634	3	86.5	269	14115	90	-	20	6695	-	10021	60	7235	6624	13226	1683	1006	483	30	10455	3311
2013	13396	102	3314	1999	2835	92	79	461.4	199	1955	217	-	25	2207	-	3027	47	1289	421	1132	270	66	1508	29	11456	220
2014	43125	92	916	188	669	536	77	881	120	4454	591	-	162	1540	-	846	770	2690	217	599	192	18	14666	46	3117	16677
2015	13010	114	4313	9416	652	344	83	143	526	4730	615	753	71	992	-	1798	143	5510	1671	1474	353	65	594	47	3219	2625
2016	18370	23	6340	7100	3205	141	123	310	283	974	467	1871	26	2585	-	450	1884	1451	675	843	175	526	1288	454	9156	1101
2017	53975	25	4569	48543	428	170	33	460	395	4933	265	264	53	2414	232	5619	525	1023	2459	4757	295	441	1433	118	11992	5474
2018	2312	19	1453	1506	1136	492	430	1228	2349	906	2864	643	110	841	639	95	3279	2696	1341	1502	248	20	24310	69	5644	1367
2019	21048	20	5620	2180	733	520	69	565	2711	6541	805	3155	200	3232	250	4834	3077	3572	2496	9872	462	154	1233	31	11332	1065
2020	43918	60	5258	23994	1305	484	191	719	368	2895	309	1851	64	5569	1072	68	363	8417	5152	1417	477	118	821	26	20971	74623
2021	100101	117	3143	6660	6612	411	33	785	148	2413	504	1508	11	3064	18	6796	653	894	2101	1630	159	124	731	35	139503	289
2022	27685	550	8126	24226	685	1715	20	267	3058	20947	217	79	53	22762	220	199	2455	2853	13153	1053	1210	4059	912	322	12799	18100
2023		21	6388	1837	2216	217	75	383	1240	911	622	132	60	6246		529	3059	1129	554	358	30	118	894	120	15520	907

List of acronyms

AEMET (Spanish) State Meteorological Agency

AGIF Agency for Integrated Rural Fire Management

ANEPC (Portuguese) Ministry of Internal Administration, National Authority for Emergency and Civil Protection

CLC CORINE Land Cover

CFVA Corpo Forestale e di Vigilanza Ambientale della Sardegna

CNVVF Corpo Nazionale dei Vigili del Fuoco

DEFRA (UK) Department for Environment, Food and Rural Affairs

ECHO European Civil Protection and Humanitarian Aid Operations

ECMWF European Centre for Medium Range Forecast

EFFIS European Forest Fire Information System

EGFF Expert Group on Forest Fires

EPADAP (Greek) National Forest Fire Observatory (*ΕπαΔαΠ - Εθνικό Παρατηρητήριο Δασικών Πυρκαγιών*)

ERCC Emergency Response Centre

EWWF England and Wales Wildfire Forum

FOEN (Swiss) Federal Office for the Environment

FWI Fire Weather Index

GWIS Global Wildfire Information System

ICNF Institute for Nature Conservation and Forests (*Instituto da Conservação da Natureza e das Florestas*)

LFMWB Landscape Fire Management in Western Balkans

MENA Middle East and North Africa

MIC Monitoring and Information Centre

MITECO (Spanish) Ministry for Ecological Transition and Demographic Challenge (*Ministerio para la Transición Ecológica y el Reto Demográfico)*

MODIS Moderate Resolution Imaging Spectroradiometer

MSB Swedish Civil Contingencies Agency

NRT Near Real Time

RDA Rapid Damage Assessment

RFDMS Remote Fire Detection and Monitoring System

UXO Unexploded ordnance

WSL (Swiss) Federal Institute for Forest, Snow and Landscape Research

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