Summarising notes from the webinars

Prescribed burning in protected forest areas: containing risks while maintaining biodiversity

September 10th and 11th 9.30 – 13.00 CET time

These webinars were arranged by the Life2Taiga-project in Sweden and Finland, together with the Biogeographical Process within the Natura 2000-network in Europe and the European Commission.

The aim was to highlight the role of prescribed burning in the management of forest ecosystems to a wider audience of participants across Europe – both practitioners and policy makers who are implementing prescribed fire as a management method or who are interested in starting up such activities. Speakers from many parts of Europe, as well as from the United States, were invited to present and discuss prescribed burning, both in terms of its importance for biodiversity and its potential to mitigate risk of catastrophic wildfires.

The programme of the first half-day was focused on providing an overview of the role of fire for European ecosystems and how prescribed fire is used in different parts of Europe and in the U.S.

The second half-day aimed to inspire on how to overcome policy obstacles when introducing prescribed fire as a management method, with case examples of policy shifts, success stories and lessons learned from previous processes in several countries.

The webinars where not recorded due to rules for accessibility in online publishing. However, these notes aim to provide a summary of the content and share parts of the presentations. The speakers have agreed to be contacted in case you have further questions or want to see more of their work and material.

The Life2Taiga-project will organise similar webinars for a wider European audience during the coming project years (the project is ongoing until 2028). The plan is also to arrange field trips in Sweden for foreign practitioners and policy makers, to demonstrate and exchange our management methods, experiences and knowledge on all kinds of practical performances and evaluation of goal achievement.

If you would like to contact the project, please send an e-mail to: life2taiga@lansstyrelsen.se

On behalf of the organising team:

Theo van der Sluis
Mart Külvik
The Biogeographical Process

Frank Vassen
Gonzalo Gonzales Jurado
DG Environment /EU Commission

Julia Carlsson
Erik Hellberg Meschaks
Life2Taiga project

List of content

Programme Tuesday September 10th

Time	Topic	Speaker	Organisation
9.30	Welcome	Julia Carlsson Humberto Delgado Rosa	Project Manager for Life2Taiga Director Natural Capital, at Directorate- General Environment
9.40	Introduction on fires; boreal perspective	Erik Hellberg Meschaks	Swedish Environmental Protection Agency
10.10	Prescribed fire for biodiversity and fire management in the Mediterranean context	Francisco Moreira	Research Centre in Biodiversity and Genetic Resources (CIBIO-BIOPOLIS)
10.30	The ecological and evolutionary significance of wildfires with a focus on Europe	Juli Pausas	The Desertification Research Centre at the Spanish Research Council (CIDE-CSIC)
10.50	BREAK – 20 minutes		
11.10	Overview of wildfires in Europe	Jesús San Miguel	Joint Research Centre at the European Commission
11.30	Prescribed fire management for biodiversity and wildfire risk reduction; the US experience on policy and practice	Marek Smith	The Nature Conservancy, the Unites States of America
12.10	Fire as a landscape management tool and to improve social resilience in Chios, Greece	Miltiadis Athanasiou	Ellinikos Georgikos Organismos, Greece (Agricultural organisation, ELGO-DIMITRA)
12.30	Resistance towards fire management in Europe		Joint discussion in plenum
- 13.00	Closure		

Opening talk and welcoming

Julia Carlsson, project manager of the Life2Taiga-project, was the chair of the first day and welcomed the audience. In total, 120 persons participated during the first day. Using a Mentimeter interactive map, the participants could show their location (96 responses), visualising that almost all parts of Europe were represented among the participants.

Mr. Humberto Delgado Rosa, Director of Natural Capital at Directorate-General Environment of the European Commission, gave an opening speech to set the frame of forest management in a European perspective. Referring to the new EU Forest Strategy for 2030 as well as the EU Biodiversity Strategy, both instruments aim to promote sustainable management and active restoration of Europe's forests and their associated biodiversity through an active engagement of all relevant actors.

It is necessary to increasingly protect and restore forest biodiversity some of which, as we will also learn during the webinar, depend to a varying extent on the regular existence of natural fires. Over the last decades, thanks to various scientific disciplines, we have also become increasingly aware that natural fires are (and have probably always been), an important component of the natural dynamics of European ecosystems. At the same time, we can all see that climate change affects forest fire regimes, leading to conditions under which the extent and intensity of forest fires in the EU are increasing and will increase even more in the next years.

These combined threats lead to the dual need to build robust approaches to wildfire risk reduction which are compatible with the conservation and restoration of biodiversity. Prescribed burning, when adequately planned and implemented in suitable forests areas, is a powerful tool to optimize both goals in a feasible, efficient and affordable way. This has been demonstrated extensively by practitioners in places like North America, some of which will share their knowledge with us here, and also in Europe, with the hosts of this event, the Swedish Environmental Protection Agency and the colleagues in Life 2 Taiga, being prime examples.

Together with other practises such as keeping sufficient quantities of large deadwood, grazing, the establishment of set aside areas in production forests, protection of old-growth forests and integrated landscape fire management, well-planned prescribed burning schemes can help ensure the long-term environmental and socio-economic viability of forests, while strengthening their resilience against disastrous large wildfires and, last but not least, ensure the conservation and recovery of those components of Europe's biodiversity that depend on fires.

Mr. Delgado Rosa therefore welcomed this initiative to bring together academics, expert practitioners and forest managers from different places in Europe, North America, and elsewhere, and he wished that, beyond the sharing of knowledge, this online event results in the forging of long-lasting networks and partnerships that promote sustainable management practices for the sake of nature and people.

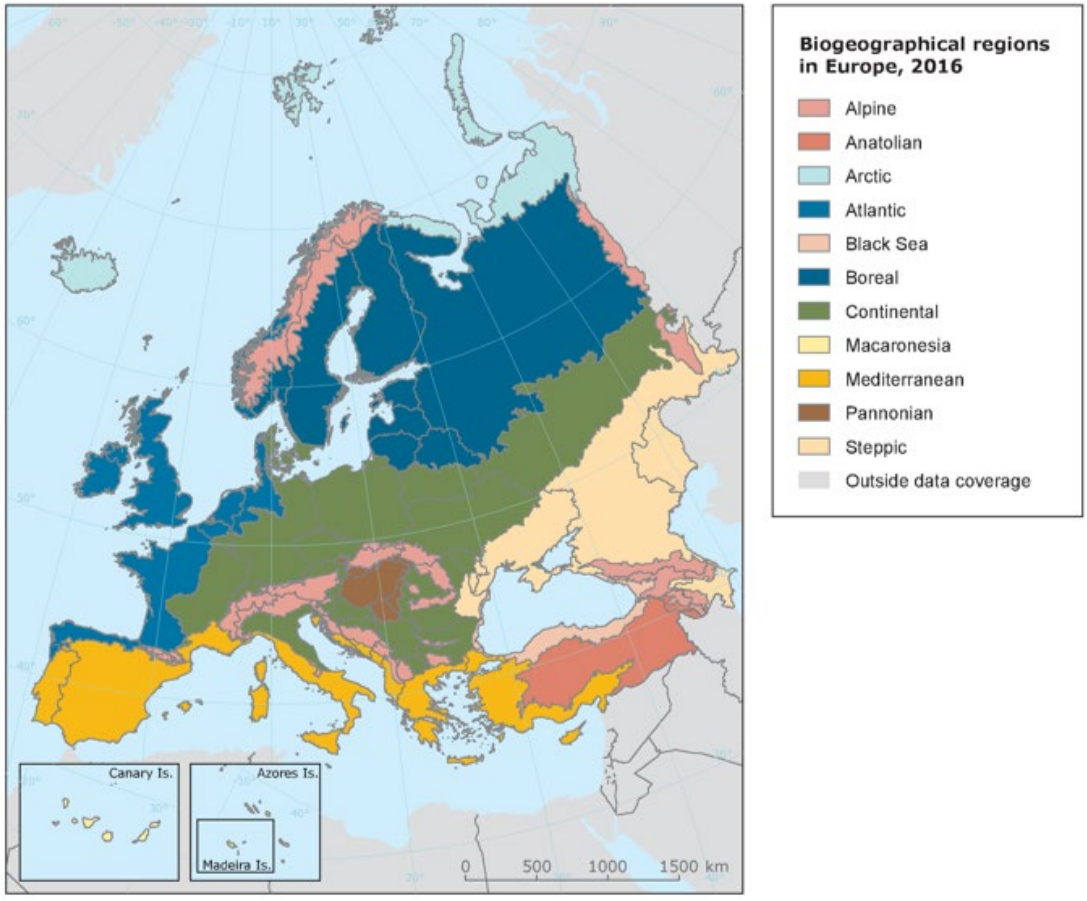
Photo: Life2Taiga

Introduction on fires: the boreal perspective

Erik Hellberg Meschaks, from the Swedish Environmental Protection Agency

The first presentation of the webinar introduced forest fire from a boreal perspective. Erik Hellberg Meschaks, described forest history, vegetation characteristics and fire fuels.

The boreal region is marked in dark blue, being the circumpolar biogeographical region which is dominated by coniferous forest. Among the EU member states, Sweden, Finland and the Baltic states Estonia, Latvia and Lithuania are part of this region.



Source: European Environment Agency (EEA)

The main fire dependent forest habitats covered in the Habitats Directive in the boreal region are Western taiga (9010) and Coniferous forests on, or connected to, glaciofluvial eskers (9060) and Wooded dunes (2180). There are also a number of pyrophilic species and species favoured by fire found in Annex II of the directive. Fire disturbance is crucial for reaching favourable conservation status for these habitats and species.

Fire is a fundamental ecological process in the boreal region. There are records of fire during the Holocene (~ 10,000 years) revealed by occurrence of charcoal in lake sediments and peat. More detailed reconstructions in dendrochronology on fire frequency and sizes have mapped fires since appr. 700 years. The fire dependent (pyrophilic) species are the evidence for the evolutionary role of fire in these ecosystems. The natural state of the boreal forest consists of multi-cohorted pine forests and successional forests. That is, a diversity of age classes in several tree layers, with continuous regeneration from beneath.

Historical records reveal fire cycles of approximately 50 – 150 years. The shorter interval for south-east of the region, and longest intervals in north-west. The variation of fire influence within the landscape depends on the site conditions. There have mainly been low intensity fires, but also influence by crown fires. In average, the annual burnt area in historical fire regimens in boreal Sweden is estimated to 1-2% of the forest land. Today, only 0.01% of forest land is burnt annually.

The fire regime describes the pattern, frequency, and intensity of fires that prevail in an area over long periods of time. These are usually a mix of natural processes, such as lightening ignition, and human activities. There are more or less distinct historic periods are found in Fennoscandia:

- Early period with dominance of natural factors
- Later period with anthropogenic use of fires for pasture and agriculture
- More recent period with fire suppression and strong decrease of fires

Photo: SLU Library

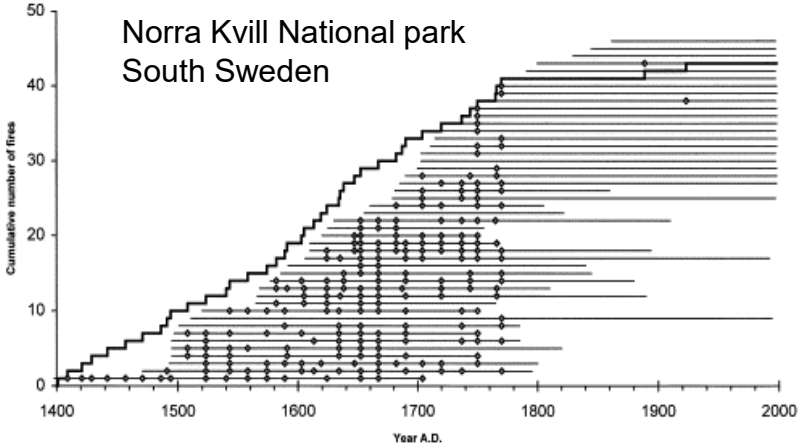
Prescribed burning was promoted as a silvicultural method in the 1940s, and widely used in both Sweden and Finland. On local scale, the frequency was covering areas similar to historic fire regimes. There was however a drastic decline in the late 1960s due to more efficient forest machines, but also because of resistance in the public opinion. Fire was used for improving regeneration after clear-cutting.

As seen in the following slides, the fire regime has been mapped and documented in two examples from Sweden and Finland.

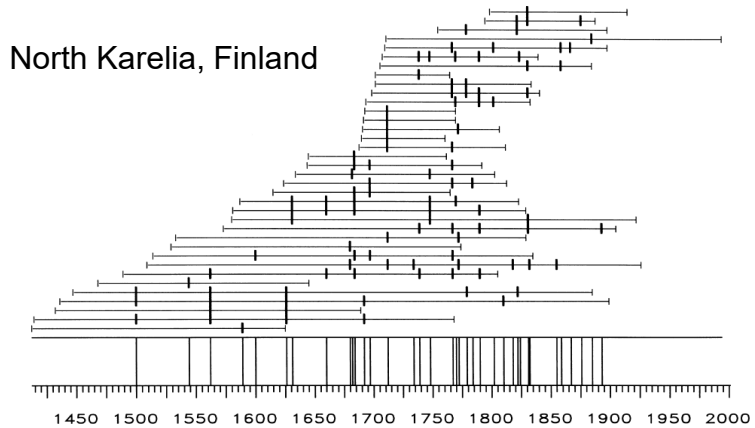
The ground fuel accumulation is site dependent. The densification of forests has resulted in a lateral build-up of fuel. But prescribed fires are seldom used for fuel-control, but rather for biodiversity objectives. Prescribed burning is considered as a necessary conservation measure to maintain and improve habitats and species. Support and capacity must be built over time. The use of fire for biodiversity purposes have increased the capacity to control wildfires, thanks to investments in equipment, trained staff for firefighting and mop-up, increased understanding of fuel and fire behaviour, and the use of backfire in fighting large wildfires.

Vegetation shaped by fire influence and succession

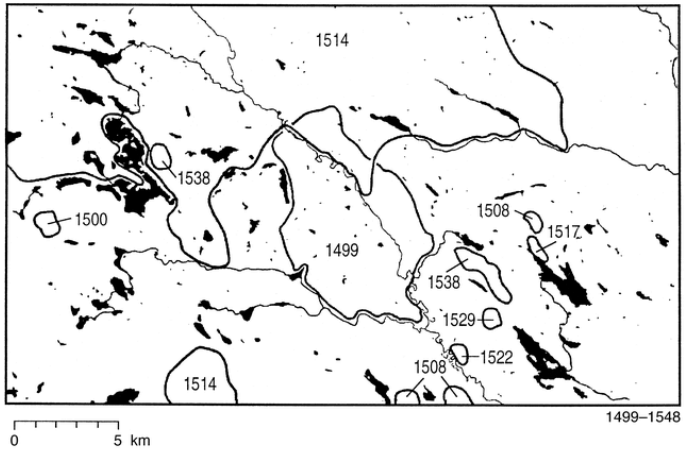
- Scots pine (*P. sylvestris*) and Norway spruce (*P. abies*) dominant species. Deciduous trees (mainly *Betula* and *Populus*, but also *Salix* and *Sorbus*) are found in patches or as part of coniferous stands. In hemiboreal region also *Quercus* is found.
- Field layer dominated by ericaceous dwarf-shrubs (*Vaccinium*, *Empetrum* and *Calluna*), herbs and grasses more apparent on nutrient rich sites.
- Bottom layer dominated by lichens (xeric to mesic conditions) and feather mosses (mesic to wet sites)

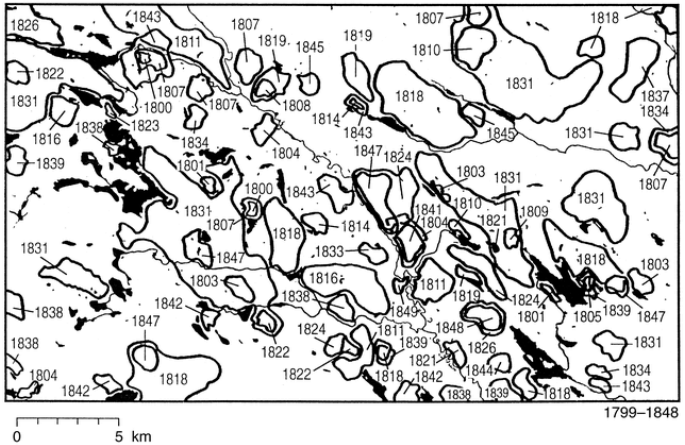


M Niklasson, B Drakenberg (2001) Conservation biology.



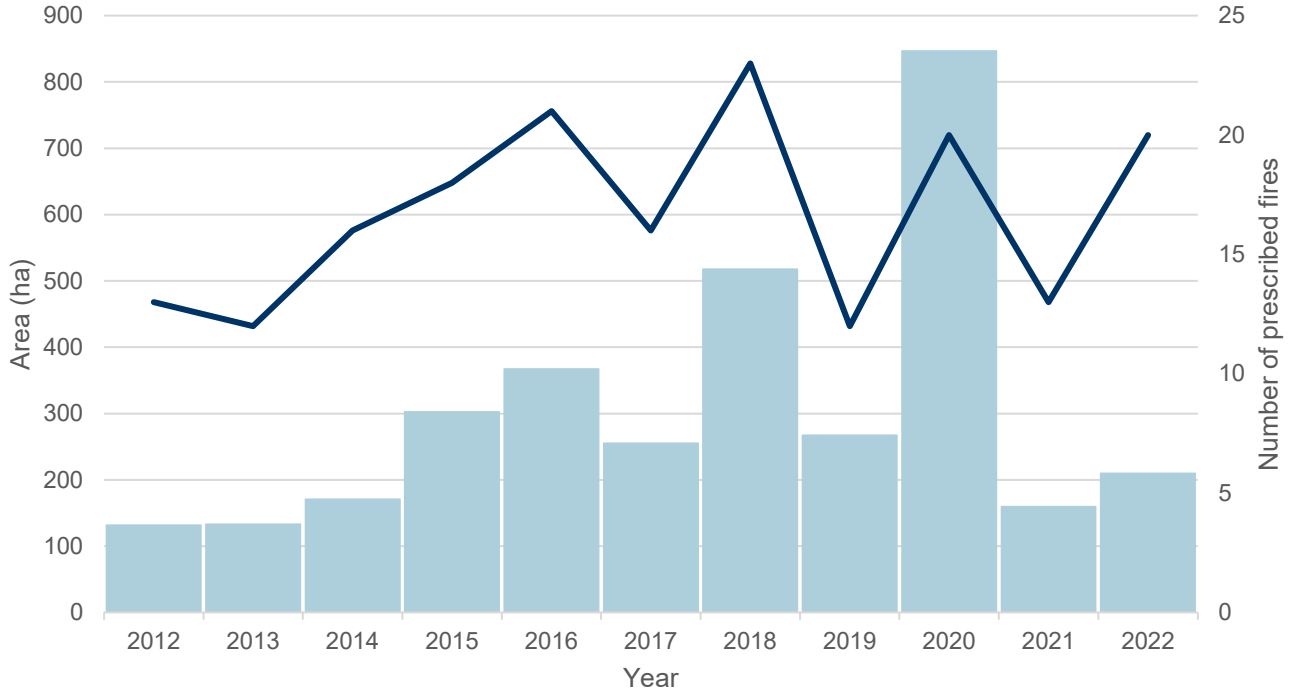
Lehtonen et al (1996). Ann. Bot. Fennici



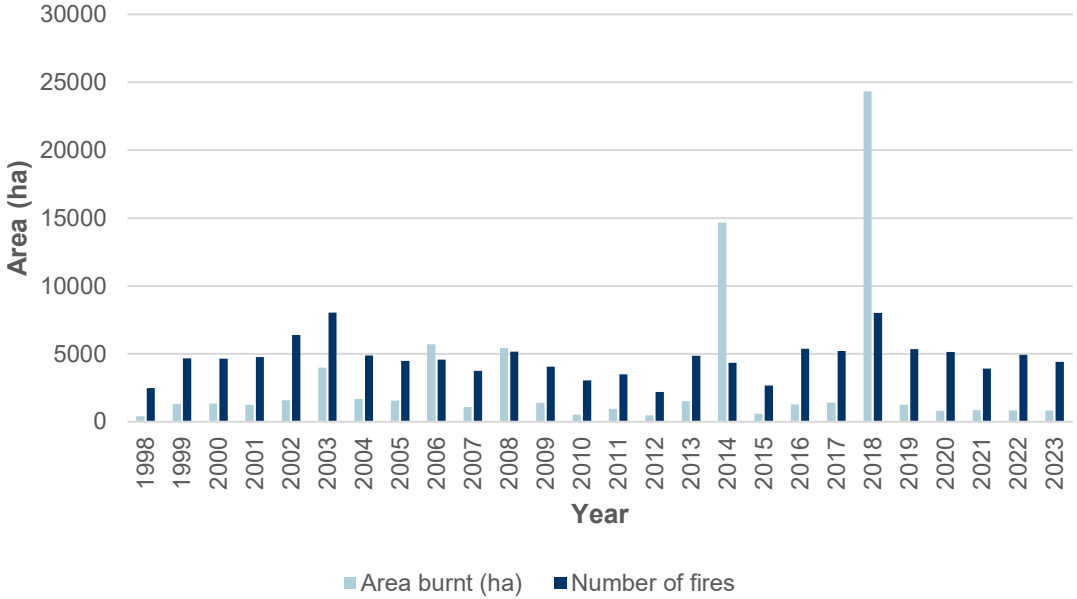


M Niklasson, A Granström (2000) Ecology.

Prescribed burning in protected areas 2012 - 2022



Wildfires in Sweden1999 -2023



Source: Swedish Civil Contingency Agency

Prescribed fire for biodiversity and wildfire management in the Mediterranean context

Fransisco Moreira, from Research Centre in Biodiversity and Genetic Resources (CIBIO-BIOPOLIS)

This presentation set the context for wildfire management in Mediterranean-type regions. Building on a paper from Environmental Research Letters, Fransisco Moreira summarized that:

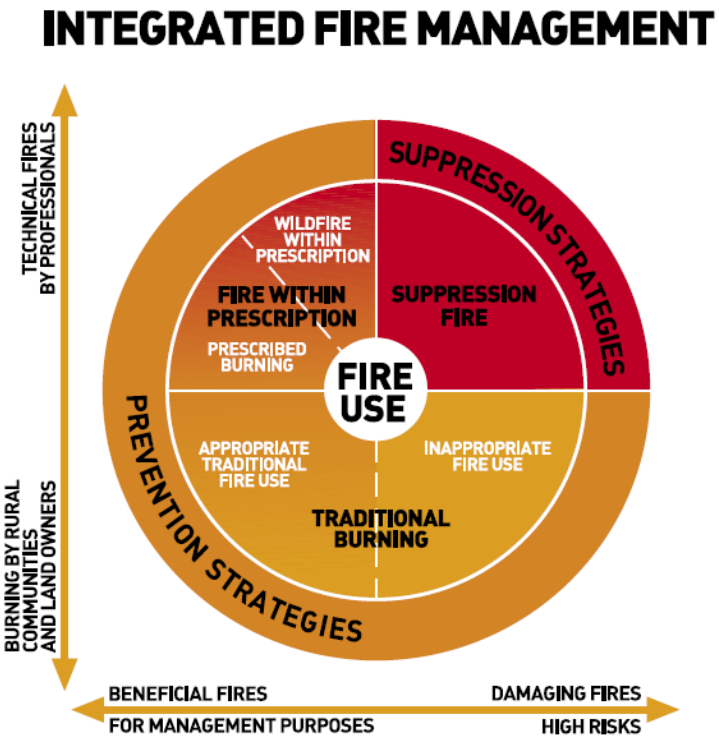
1. Annual burned areas are mostly driven by fire weather in the Mediterranean region.
2. Fire management policies are leading to a fire-fighting trap
3. The aim is at reducing damage, rather than area burned
4. The conclusion is that we need a policy shift from suppression to mitigation and adaptation where fire use is an important component.

A paradigm change is needed because of the link between burnt areas and the weather conditions – less rain leads to more fires. The firefighting is leading to more severe wildfires because of the accumulation of fuel. The fire suppression accentuates impacts of climate change. Therefore, prescribed fires are needed as part of the fire management in many types of forests. Not only are there preventive gains by reducing wildfire consequences, but biodiversity is also benefited from prescribed fires in the Mediterranean area. But the total area that is burned is not a suitable indicator of success. It would be preferable to measure the reduced damage rather than the area.

There are several challenges:

- Prescribed burning areas are modest, the size of each area is usually around 2-3 ha.
- Prescribed burnings for biodiversity are relatively low compared to fuel reduction.
- Scientific knowledge of size, frequence time and so on is still small.

Another ongoing discussion is whether prescribed burnings should be carried out in the old forests. These areas are small and needs to be protected from wildfires, which can be done through prescribed burning and to plan so that the areas will be larger in the future.



Rego et al. (2010)

PERSPECTIVE

Wildfire management in Mediterranean-type regions: paradigm change needed

Francisco Moreira[1,2,24], Davide Ascoli[3], Hugh Safford[4], Mark A Adams[5], José M Moreno[6], José M C Pereira[7], Filipe X Catry[8], Juan Armesto[9], William Bond[10], Mauro E González[11], Thomas Curt[12], Nikos Koutsias[13], Lachlan McCaw[14], Owen Price[15], Juli G Pausas[16], Eric Rigolot[17], Scott Stephens[18], Cagatay Tavsanoglu[19], V Ramon Vallejo[20], Brian W Van Wilgen[21], Gavriil Xanthopoulos[22] and Paulo M Fernandes[23]

Article

https://doi.org/10.1038/s41467-024-46702-0

Fire suppression makes wildfires more severe and accentuates impacts of climate change and fuel accumulation

Received: 14 June 2023

Accepted: 7 March 2024

Published online: 25 March 2024

Check for updates

Mark R. Kreider[1], Philip E. Higuera[2], Sean A. Parks[3], William L. Rice[4], Nadia White[5] & Andrew J. Larson[1,6]

Fire suppression is the primary management response to wildfires in many areas globally. By removing less-extreme wildfires, this approach ensures that remaining wildfires burn under more extreme conditions. Here, we term this the "suppression bias" and use a simulation model to highlight how this bias fundamentally impacts wildfire activity, independent of fuel accumulation and climate change. We illustrate how attempting to suppress all wildfires necessarily means that fires will burn with more severe and less diverse ecological impacts, with burned area increasing at faster rates than expected from fuel accumulation or climate change. Over a human lifespan, the modeled impacts of the suppression bias exceed those from fuel accumulation or climate change alone, suggesting that suppression may exert a significant and underappreciated influence on patterns of fire globally. Managing wildfires to safely burn under low and moderate conditions is thus a critical tool to address the growing wildfire crisis.

Drivers	Med basin
Agricultural land abandonment	H
Expansion of mismanaged tree plantations	H
Expansion of the wildland-urban interface	M
Invasive species	L
Hindered use of fire	M
Lack of adequate post-fire management	M

Estimated relative importance (H=high; M=moderate; L=low) of major drivers the 'firefighting trap' across Mediterranean-type climate region. (Moreira et al. 2022)

The role of prescribed fire in the Mediterranean

FRONTIERS IN ECOLOGY and the ENVIRONMENT

Review | Free Access

Prescribed burning in southern Europe: developing fire management in a dynamic landscape

Paulo M Fernandes, G Matt Davies, Davide Ascoli, Cristina Fernández, Francisco Moreira, Eric Rigolot,

Table 1. Established PB practices, by vegetation type, in southern Europe

Broad vegetation type	*Species*	*Countries*	*Burn objective*
Mediterranean pine forest	*Pinus canariensis, Pinus halepensis, Pinus nigra, Pinus pinaster, Pinus pinea*	Portugal, Spain, France	Hazard reduction; range or biodiversity management as secondary objectives
Mediterranean shrubland	Variable, but usually dominated by *Cistus* spp or *Quercus coccifera*	France, Portugal	Hazard reduction; range and/or biodiversity management
Heathland	*Ulex* spp, *Erica* spp, *Calluna vulgaris, Pterospartum tridentatum, Cytisus* spp, *Genista* spp	Portugal, Spain	Hazard reduction; range management
Mountain shrubland and grassland	*Cytisus oromediterraneus, Cytisus scoparius, Spartium junceum*	France, Spain	Range management; biodiversity management and hazard reduction as secondary objectives
Eucalypt plantations	*Eucalyptus globulus*	Portugal	Hazard reduction; post-harvesting slash disposal

Fernandes et al. 2013

The role of prescribed fire in the Mediterranean

FRONTIERS IN ECOLOGY and the ENVIRONMENT

Review | Free Access

Prescribed burning in southern Europe: developing fire management in a dynamic landscape

Paulo M Fernandes, G Matt Davies, Davide Ascoli, Cristina Fernández, Francisco Moreira, Eric Rigolot, Cathelijne R Stoof, José Antonio Vega, Domingo Molina

Table 2. The potential role of PB in fire and landscape management in southern Europe

Situation	*Objective*	*Approach*
RUI	Protection of communities and assets from fire	PB used in fuel-break maintenance
Production forests	Forest protection from fire	PB used in shrubland and fuel breaks to isolate forests; in forests adapted to low-intensity fire to reduce surface fuels; and to manage post-harvest residues Spatial and temporal planning is critical, including integration with silviculture operations and schedules
Mountain rangelands	Grazing, with biodiversity as a byproduct; management of cultural landscapes; fire severity mitigation	Patch mosaic of PB and traditional pastoral burning Accommodation of unplanned fires
Forest reserves	Restoration of ecological processes (re-wilding); provision of diverse ecosystem functions (eg C storage, biodiversity, recreation)	Variable and adaptive response to fire PB to provide a diversity of fire regimes, from fire exclusion in areas undergoing succession and in fire-sensitive vegetation types, to low-intensity frequent fire in Mediterranean coniferous forest Management and use of naturally-ignited fires when "in prescription" (ie occurring within a predetermined range of conditions likely to produce beneficial results)
Abandoned farmland	Restoration of disturbance-dependent habitats and species; improving habitat quality for "open land" farmland species	Variable and adaptive response to fire, depending on habitat/species requirements Management and use of naturally ignited fires when "in prescription"

Fernandes et al. 2013

A focus on biodiversity

Main contexts of PB use for biodiversity objectives in the Mediterranean:

- Preservation and restoration of valued grasslands/shrubland habitats, by reintroducing fire where cessation of grazing and/or burning has resulted in tree encroachment;
- Re-establishment of longer fire-return intervals in areas where poorly managed grazing and frequent pastoral fires have caused habitat degradation;
- Improve habitat quality for species of conservation value (e.g. maintaining rabbit populations as a food source for vultures, lynx, and eagles);
- Means of creating open habitats that support species of conservation concern on abandoned farmlands;
- Protecting valuable fire-sensitive habitat patches from wildfire (buffers)

The ecological and evolutionary significance of wildfires with a focus on Europe

Juli Pausas, from the Desertification Research Centre at the Spanish Research Council (CIDE-CSIC)

Fire has always been present and is a natural phenomenon in many landscapes. Fires drive evolutionary changes and biodiversity. Fires open gaps generating opportunities for shade-intolerant and low competitive species. Fire decomposes organic material and move carbon and nutrients in the biogeochemical cycles.

Historically, oxygen content in the atmosphere has fluctuated through the years. High concentrations have led to more fires e.g. during the carboniferous and cretaceous periods.

Not all fires are the same, depending on vegetation and habitat types in the landscape. In wet, cold or very dry ecosystems, there are no fires. In boreal and mountain coniferous forests, the intensity is low resulting in surface fires with years-decades intervals. In the Mediterranean heathland ecosystems, the intensity is high leading to crown fires every decade. In peatlands, ground fires occur seldom with low intensity. Hence, there is a variability in across Europe on annual burned areas, fire sizes, intensity and season.

Fire has shaped vegetation frequently enough to cause evolutionary pressure. Juli Pausas then gave many examples of how plants have adapted to survive fires through various traits.

Traits for survival:

- Resprouting: Root, lignotubers or epicormic. Common for high intensity crown fires.
- Thick bark: cork oak, pines – common in areas with low intensity (surface) fires

Traits for postfire reproduction:

- Seed bank: soil (fire released seed dormancy) or canopy seed bank (serotiny)
- Fire-stimulated flowering: survive with a bulb

Flammability traits in fire-prone ecosystems:

- In low intensity (surface) fires the trait is survival.
- In high intensity (crown) fires, the trait is reproduction.

In the slides, you can see examples of species, and the trait divergence listed for different fire regimes. The aspect of microevolution was also exemplified. Fire can generate phenotypic divergence among populations, and thus result in higher biodiversity. Frequent fires select for high serotiny and early maturation. If there is high frequency of fires it leads to more serotinous cones and at what time the pine matures.

Today, we face an intensification in fire regimes in Europe. Anthropogenic climate and land use changes cause more intense, larger and more regular fires with longer duration. This has negative effects on biodiversity, carbon dioxide emissions and on societies.

But there are sustainable fire regimes. Prescribed fires are good as fire management measure for the conservation of many landscapes and maintenance of the evolutionary potential. Monitoring is important. It will however be more difficult to conduct burns in southern Europe as climate change decreases the number of optimal weather days for burning.

The ecological and evolutionary significance of wildfires

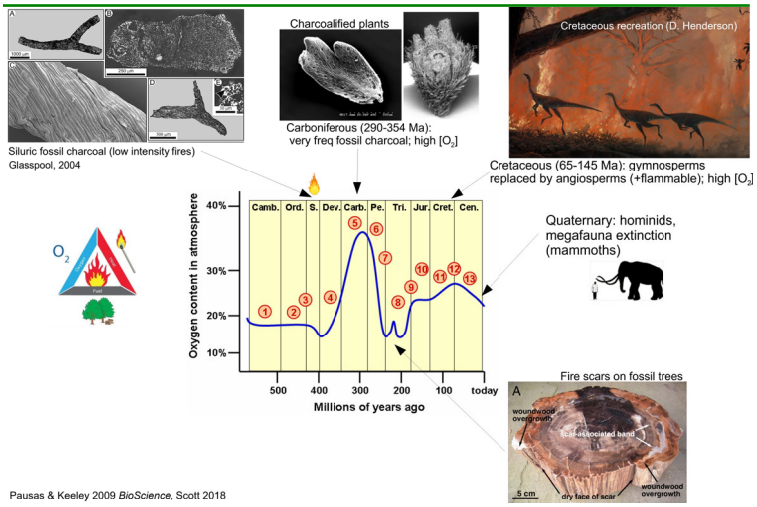
With European examples

Juli G. Pausas
CIDE, CSIC, Valencia, Spain
www.uv.es/jgpausas | jgpausas.blogs.uv.es | @jgpausas

EvoFire Lab — Evolutionary Fire Ecology Lab

10 September 2024

Fire history: fires are natural processes

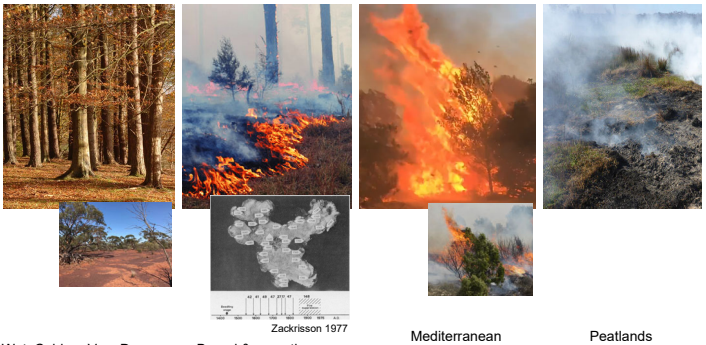


Pausas & Keeley 2009 *BioScience*, Scott 2018

Not all fire are the same: a range of fire regimes

Fire regime: The characteristic fire activity that prevails in a given area and period, defined by frequency, intensity, seasonality, size, spread type ...

No fires	**Surface fires**	**Crown fires**	**Ground fires**
Intensity: variable Interval: very long	Intensity: low Interval: year-decades	Intensity: high Interval: decades	Intensity: low Interval: long



Zackrisson 1977

Wet, Cold, or Very Dry ecosystems

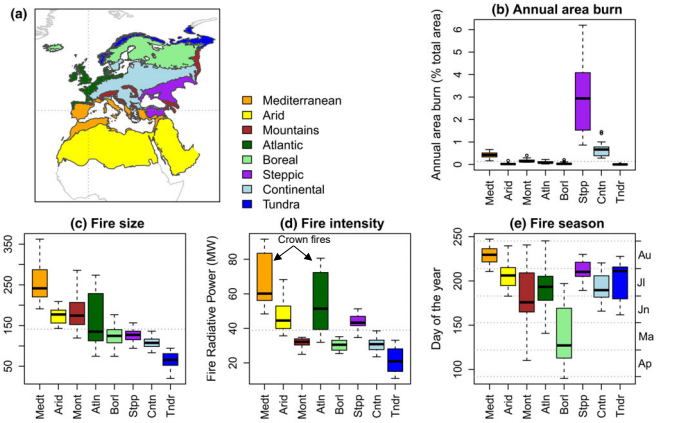
Boreal & mountian coniferous forests

Mediterranean Ecosystems

Heathlands

Peatlands

Variability in fire regimes across Europe

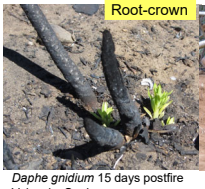


Pausas 2022 *GEB*

Traits for fire survival

Resprouting

High intensity (crown) fires

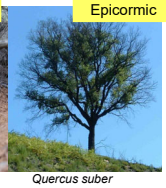


Daphne gnidium 15 days postfire
Valencia, Spain

Root-crown

Phillyrea angustifolia

Lignotubers

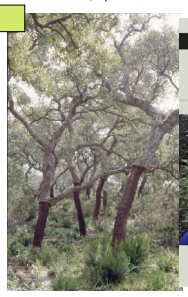


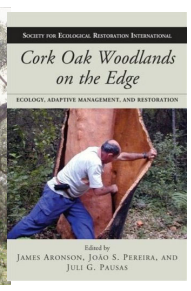
Quercus suber

Epicormic

Thick Bark

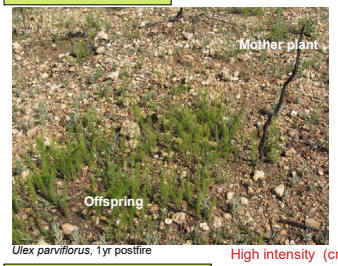
Low intensity (surface) fires





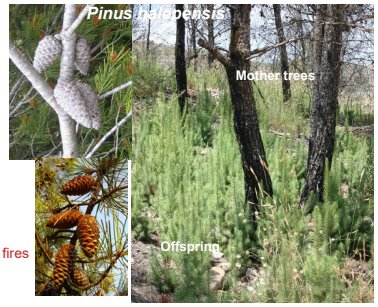
Traits for postfire reproduction

Seed bank — Soil (fire-released seed dormancy)



Ulex parviflorus, 1yr postfire

Canopy seed bank (serotiny)



High intensity (crown) fires

Fire-stimulated flowering

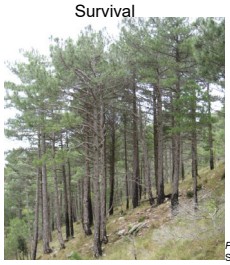
Narcissus assoanus
7 months postfire, E Spain
(IF Costur 8/2022, Castelló)

Narcissus triandrus pallidulus
Brezal Erica australis, (Guadalajara, ES)

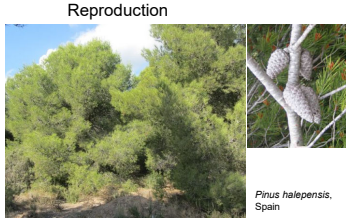
Flammability traits

Flammability strategies for living in fire-prone ecosystems

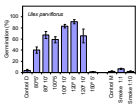
Low flammability	Low flammability
Survival	Reproduction



Pinus nigra, Spain



Pinus halepensis, Spain



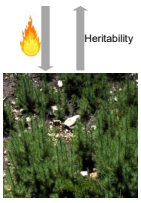
Ulex parviflorus, Spain

Low intensity (surface) fires

High intensity (crown) fires

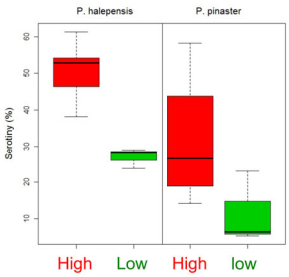
Microevolution: trait divergence

Serotinous pines

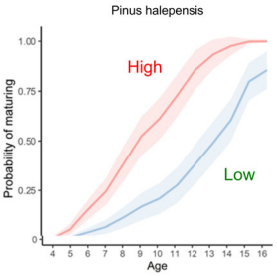


Heritability

Serotiny



Time to mature (produce seeds)



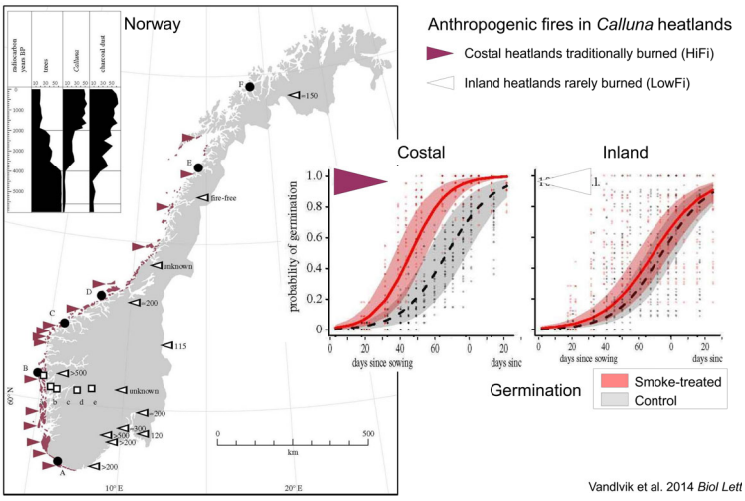
High vs Low frequency of crown (high intensity) fires

Frequent fires select for high serotiny & early maturation (precocity)

Fire can generate phenotypic divergence among populations, and thus biodiversity

Pausas 2005 *Trend Pl. Sci.*, Guiote & Pausas 2023 *Oikos*

Microevolution: divergence in smoke germination



Vandlvik et al. 2014 *Biol Lett*

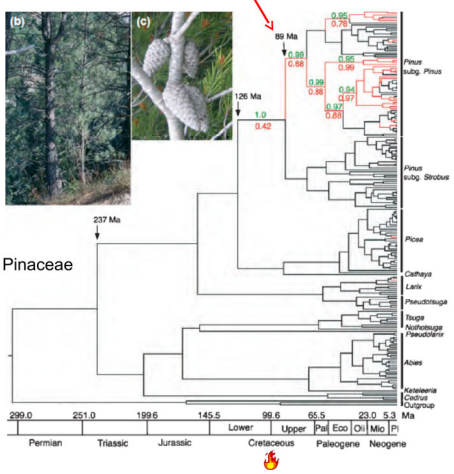
Trait divergence under different fire regimes

Species	Trait	Country	Ref
Helenium aromaticum (Asteraceae)	Seed shape, pubescence	Chile	Gómez et al. 2011
Ulex parviflorus (Fabaceae)	Flammability	Spain	Pausas et al. 2012
Pinus halepensis, P. pinaster (Pinaceae)	Serotiny	Spain	Hernandez et al. 2013, Pausas 2015
Calluna vulgaris (Ericaceae)	Smoke-germination	Norway	Vandlvik et al. 2014
Erica coccinea (Ericaceae)	Smoke-germination	S Africa	Leonard et al. 2018
Ceanothus leucodermis (Rhamnaceae)	Lignotuber (resprouting)	CA	Keeley 2023
Pinus radiata (Pinaceae)	Bark thickness	CA	Stephens & Libby 2006
Banksia attenuata (Proteaceae)	Lignotuber (resprouting)	Australia	He et al. 2014, 2019

Fire can generate phenotypic divergence among populations, and thus biodiversity

Macroevolution: Serotiny in pines

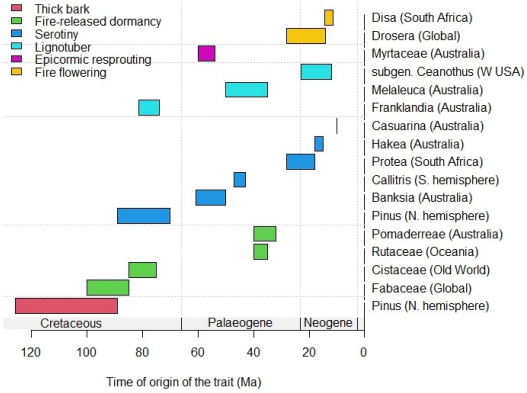
Ancestral reconstruction: Serotiny



He, Pausas, et al. 2012 New Phytol.

Macroenvolution

Ancestral reconstructions

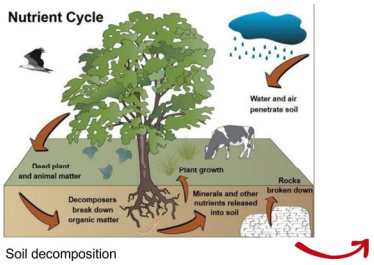


Fire has shaped plants for at least for more than 100 Ma (but probably more)
Independient of fossil charcoal

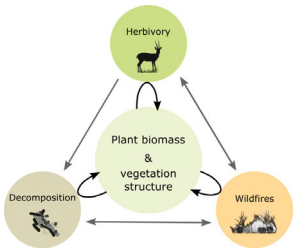
Keeley & Pausas 2022 *AREES*

Ecosystem processes

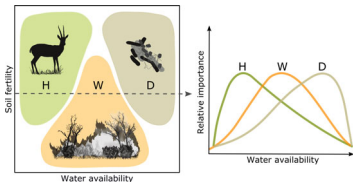
Fire & global biogeochemical cycles



Soil decomposition



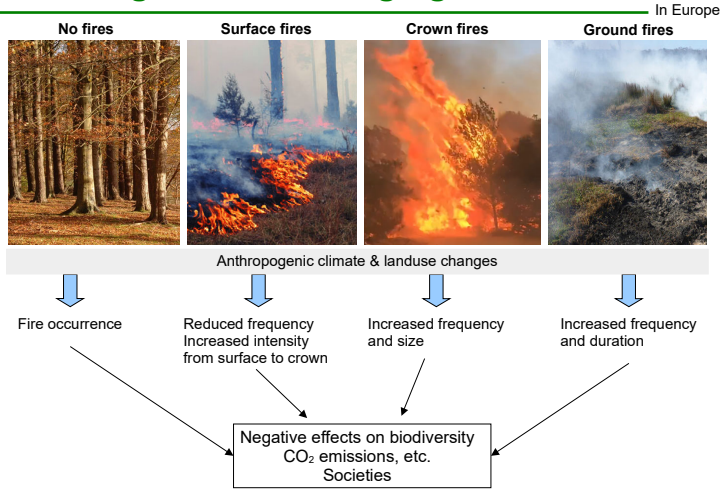
Niche partition



Pausas & Bond 2020. *Trends Ecol. Evol.*

Fire regimes are changing: intensification

In Europe



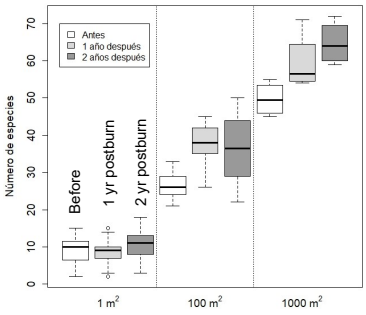
Prescribed burns in the Mediterranean

Prescribed fires in strategic parts of the landscape
To reduce fuel loads & generate sustainable fire regimes

Prescribed fire, Valencia, Spain

The importance of monitoring

Number of plant species
Before, 1yr, 2yr postburn

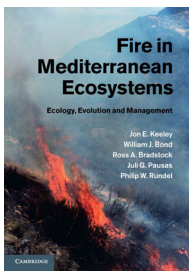


Mediterranean shrubland

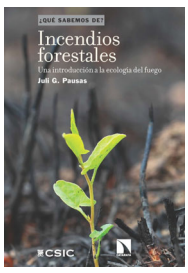
More studies are required ...

Concluding remarks

- Fire is a old and natural phenomena in many landscapes; there are sustainable fire regimes
- Total fire exclusion is impossible and unsustainable (fire paradox)
- Fire drives evolutionary changes and biodiversity; it explains a % of the variability in biodiversity
- Fires open gaps generating opportunities for shade-intolerant and low competitive species
- Fire decomposes OM & move C & nutrients (biogeochemical cycles)
- Fire needs to be considered for the conservation of many landscapes and for the maintenance of the evolutionary potential
- Prescribed fires is a low-aggressive tool for managing landscapes (but not so efficient in wind-driven fire regimes)
- The more we change the climate, the more difficult is to conduct burns in southern countries (limited windows)



Cambridge UP, 2012



Catarata-CSIC, 2024

Thank you!

Web: www.uv.es/jgpausas
Blog: jgpausas.blogs.uv.es
Twitter/Mastodon/Bsky: @jgpausas

Projects & funding

fireurisk
DISTEPIC
FocScales
GENERALITAT VALENCIANA

Overview of wildfires in the European Union

Jesús San Miguel, from Joint Research Centre at the European Commission

In this presentation, Jésus San Miguel gave an overview of the trends of burnt areas and number of fires in European regions. The general trend is that there is a lot of variability, but that the number of fires is increasing as well as the total burnt area since 2006. Recently critical years have been 2017, 2021, 2022 and 2023.

Most of the wildfires take place in the Mediterranean regions. But we can also see an increase in the Northern and Central Europe, since 2018. The large fires are few, but they result in large, up to enormous burnt areas, as we have seen in Greece and Portugal. Large fires only occur on days with high risk of fires, but these days are getting more due to global heating.

Looking outside of EU, there are many fires in Ukraine and the Balkan countries.

The length of the fire season has increased beyond the traditional months of July, August and September, with many wildfires and critical events outside that period. The fire consequences are worse in February and March, often started as escapes from the human induced fires. In fact, 94% of the fires are caused by humans, and have a huge economic cost. Even though these spring fires are smaller in size, they have a large impact. In July and August, the wildfires are larger. The annual economic loss due to wildfires in 2023 was estimated to above 2,5 billion Euro.

40% of the wildfires have important impact in protected areas. Some of them are prescribed burnings for biological values (the impact is low from these burnings).

The future climatic projections indicate higher fire danger levels in Europe; higher fire danger values will likely lead to more intense fires and larger burnt area.

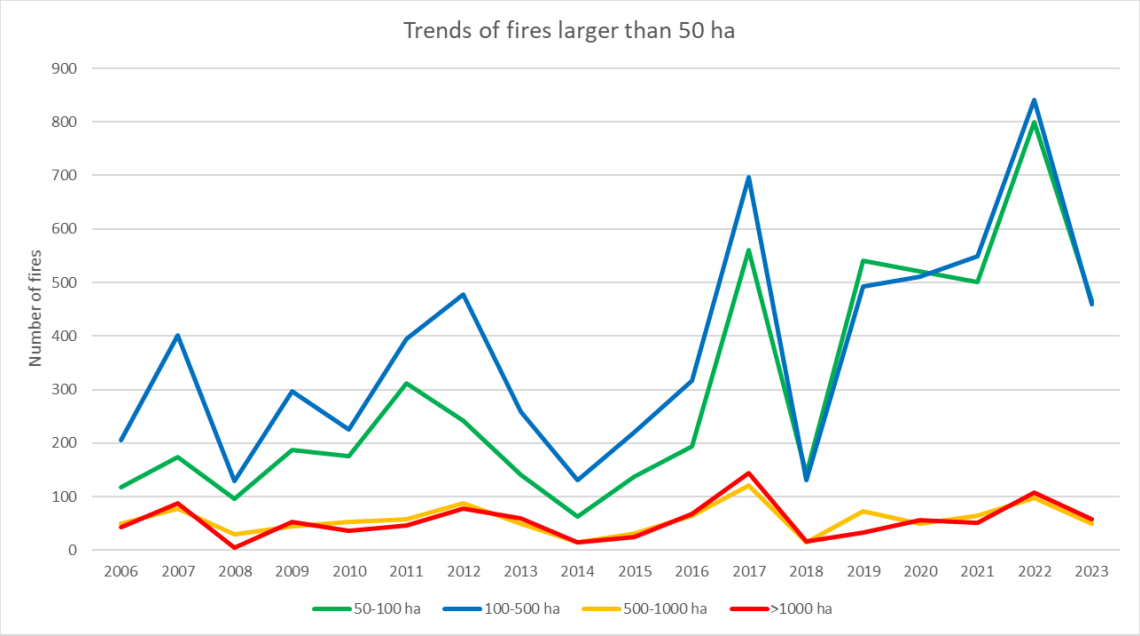
There is additional information to read at:

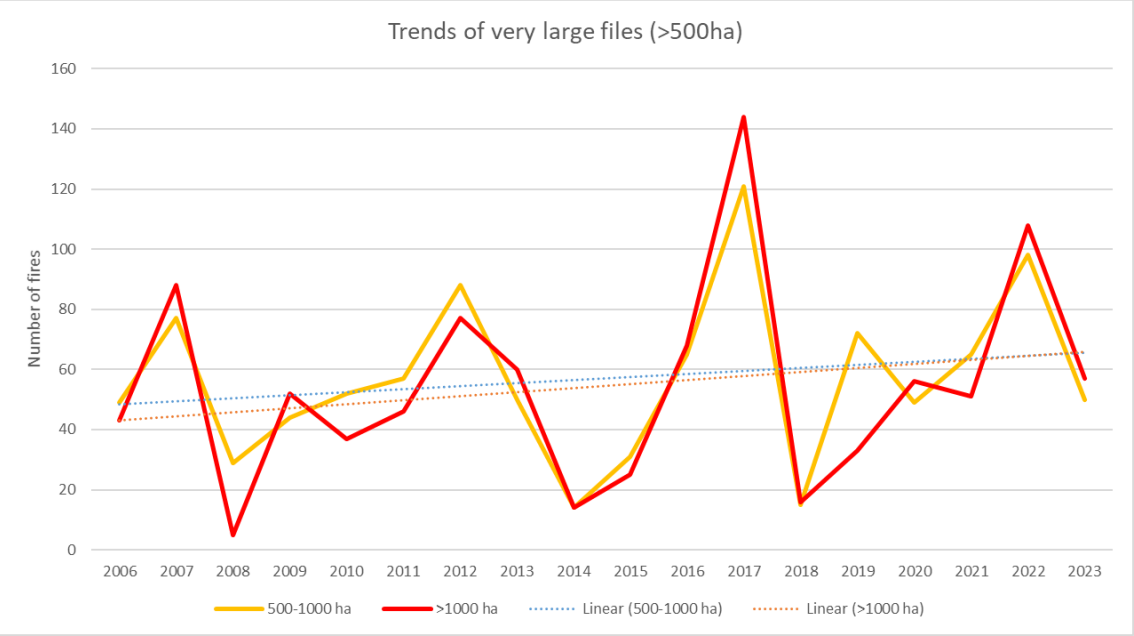
https://effis.jrc.ec.europa.eu

https://gwis.lrc.ec.europa.eu

Emails can be sent to: jrc-effis@ec.europa.eu

General trends in the period 2006-2023 – number of fires per fire size class

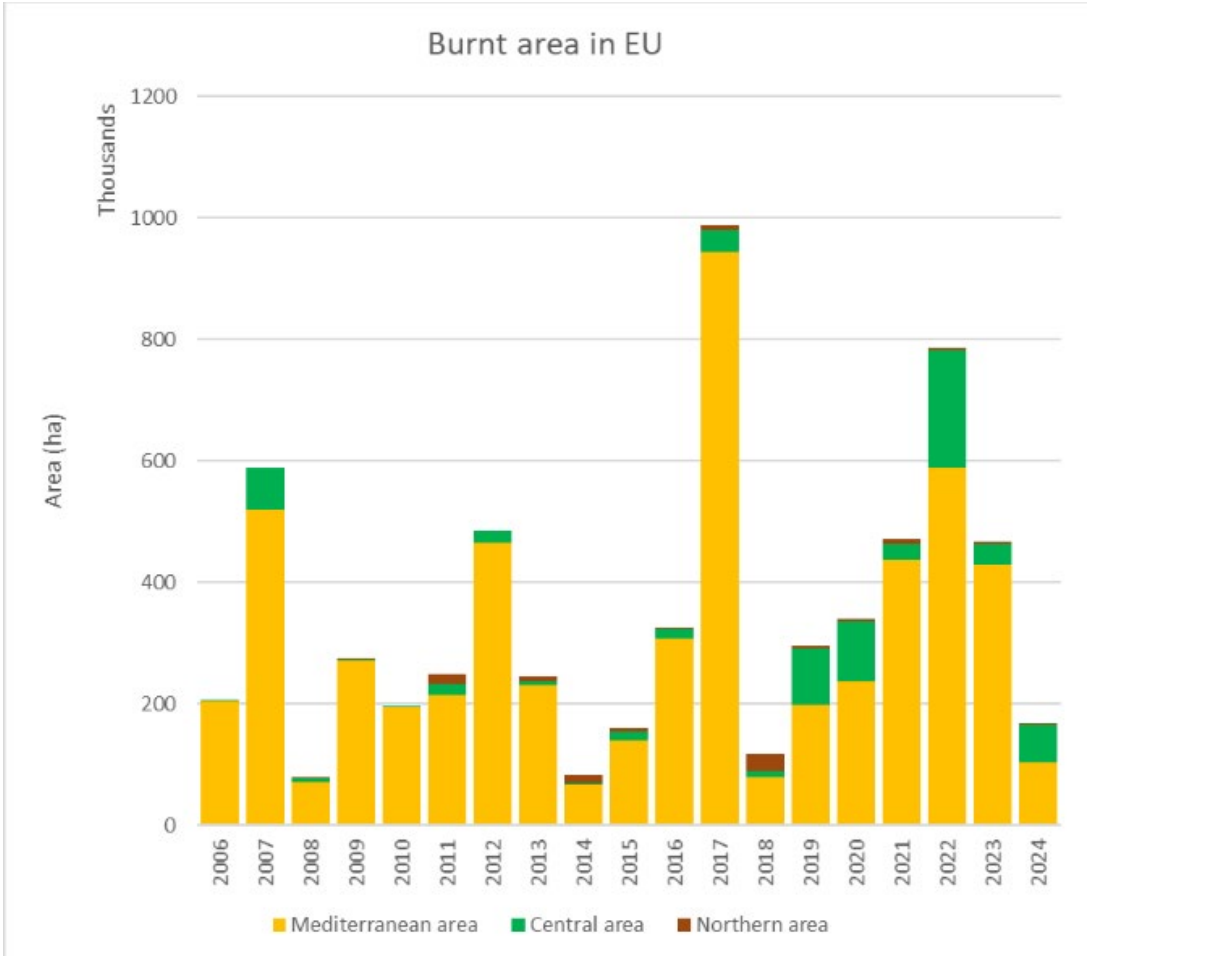


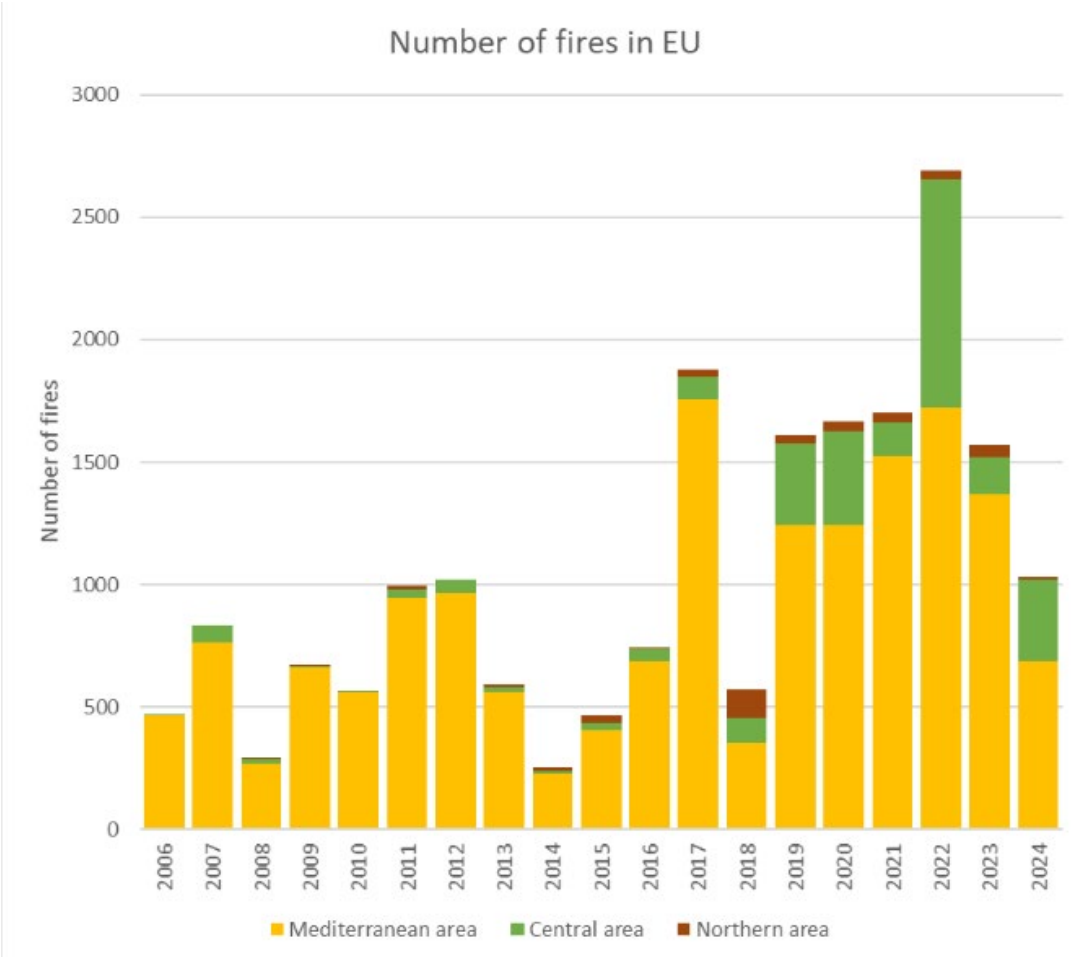


Source: Joint Research Center (JRC) / European Forest Fire Information System (EFFIS)

jrc-effis@ec.europa.eu

General trends by region in the period 2006-2024

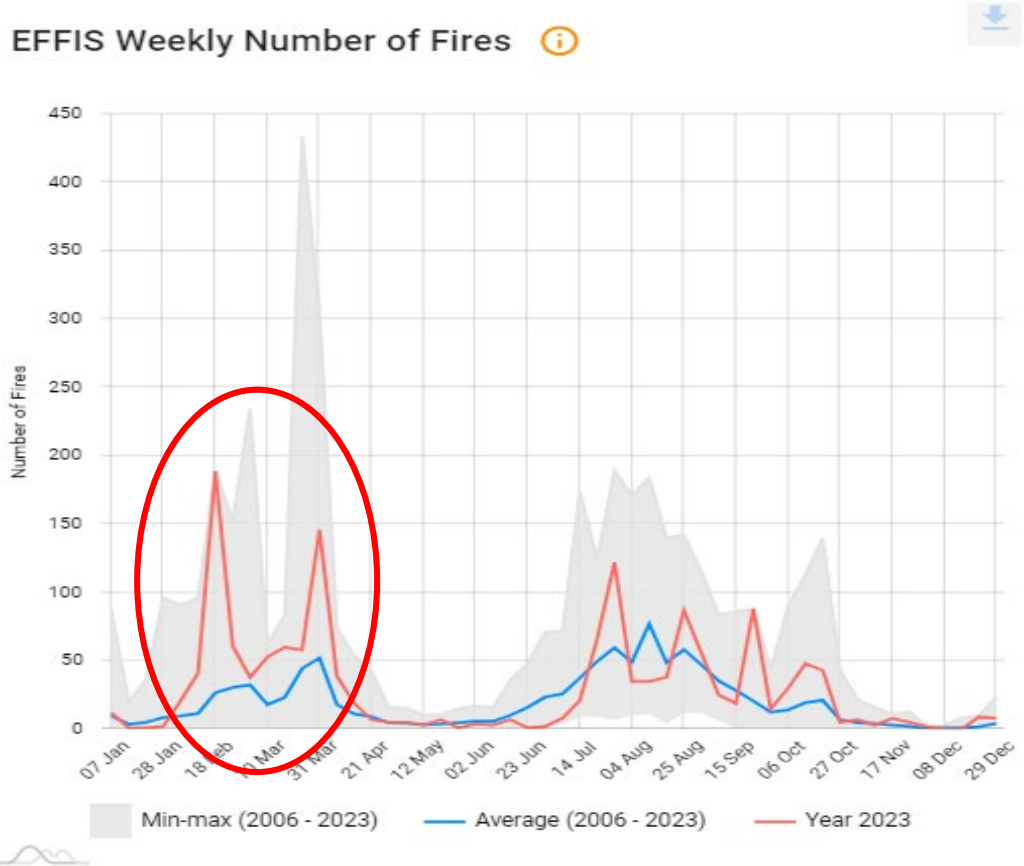


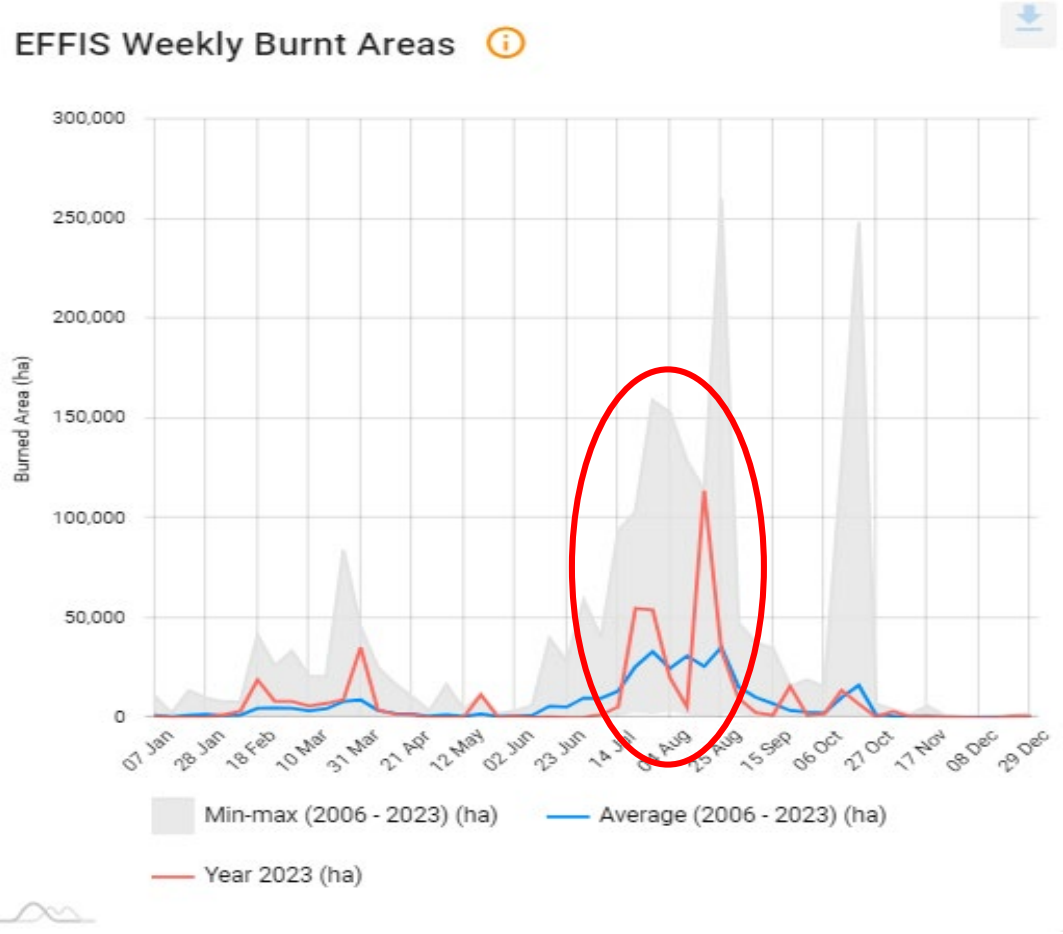


Source: Joint Research Center (JRC) / European Forest Fire Information System (EFFIS)

jrc-effis@ec.europa.eu

Weekly trends in 2023

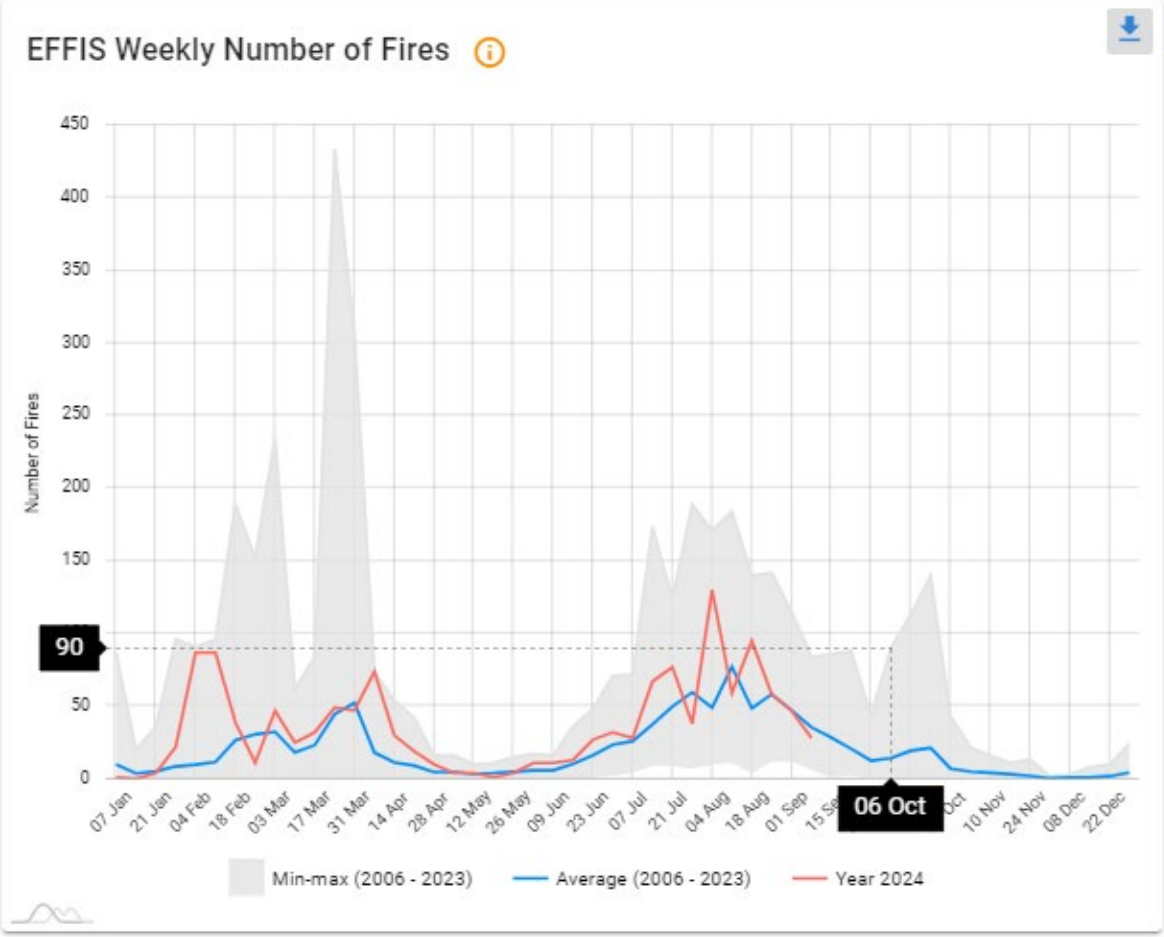


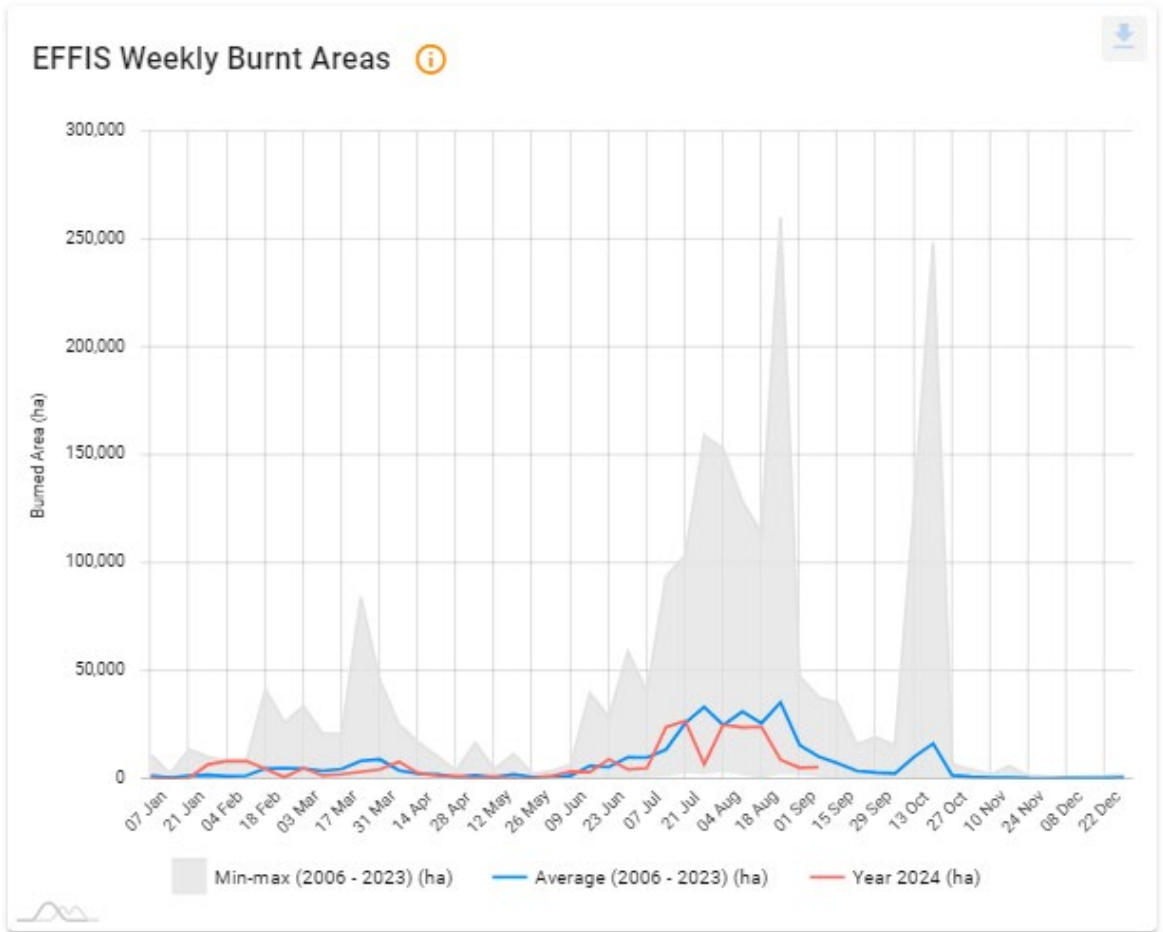


Source: Joint Research Center (JRC) / European Forest Fire Information System (EFFIS)

jrc-effis@ec.europa.eu

Weekly trends in 2024





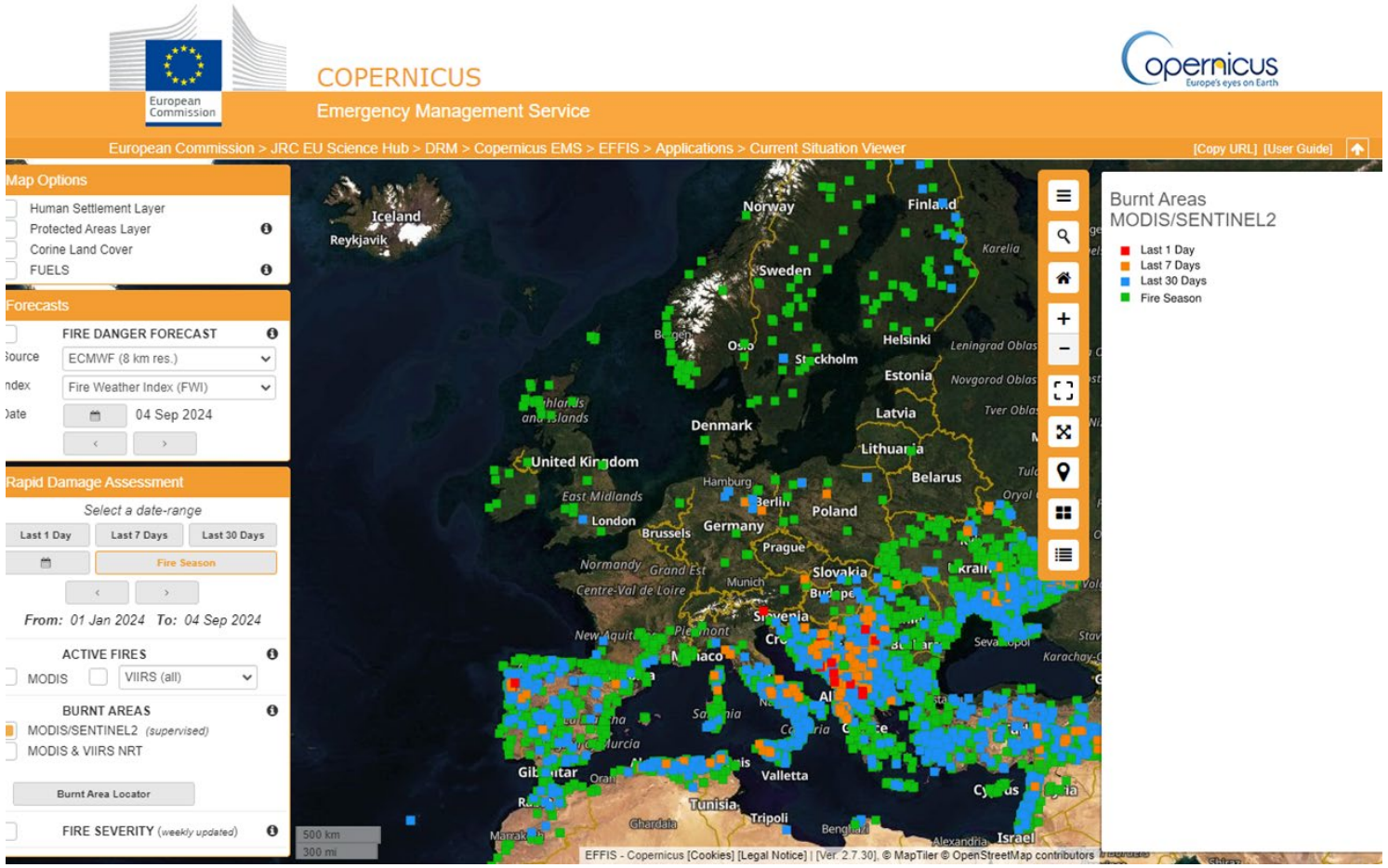
Source: Joint Research Center (JRC) / European Forest Fire Information System (EFFIS)

Prescribed burning in protected forest areas: containing risks while maintaining biodiversity, 10-11.09.2024

jrc-effis@ec.europa.eu

European Commission

Wildfires mapped in 2024



Source: Joint Research Center (JRC) / European Forest Fire Information System (EFFIS)

Prescribed burning in protected forest areas: containing risks while maintaining biodiversity, 10-11.09.2024

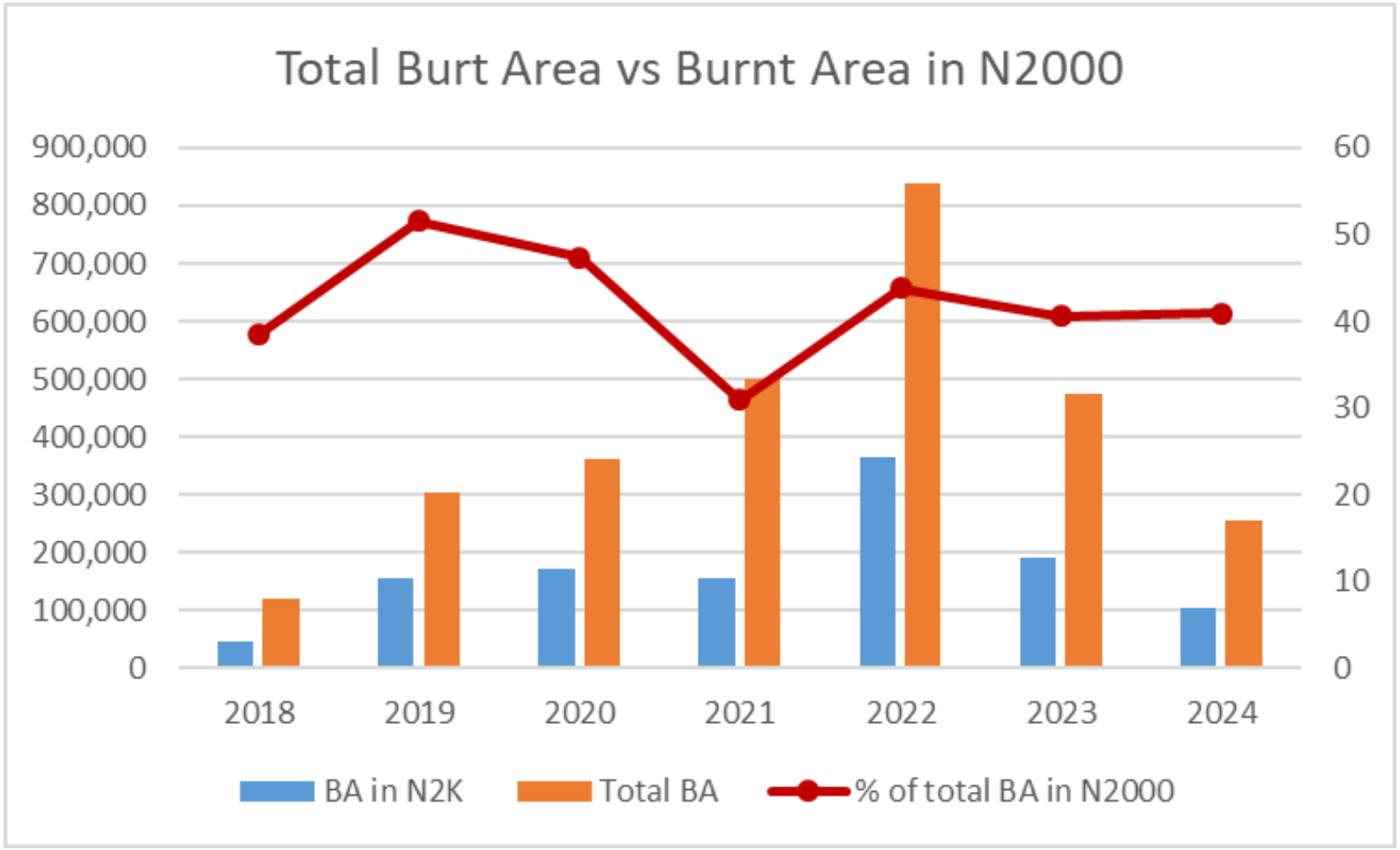
Joint Research Centre

jrc-effis@ec.europa.eu

Copernicus Europe's eyes on Earth

European Commission

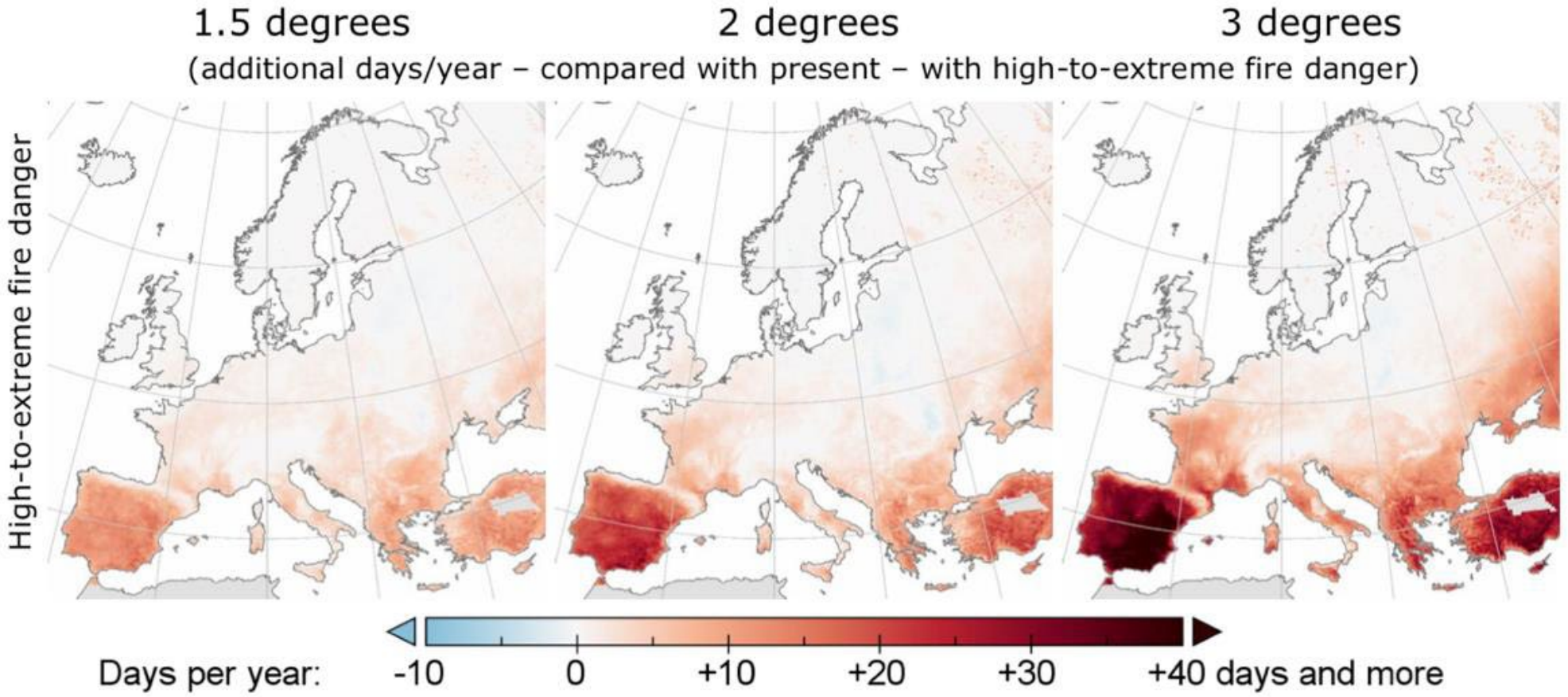
Trends of burnt areas in Natura2000



Source: Joint Research Center (JRC) / European Forest Fire Information System (EFFIS)

jrc-effis@ec.europa.eu

Fire Danger and Climate Change



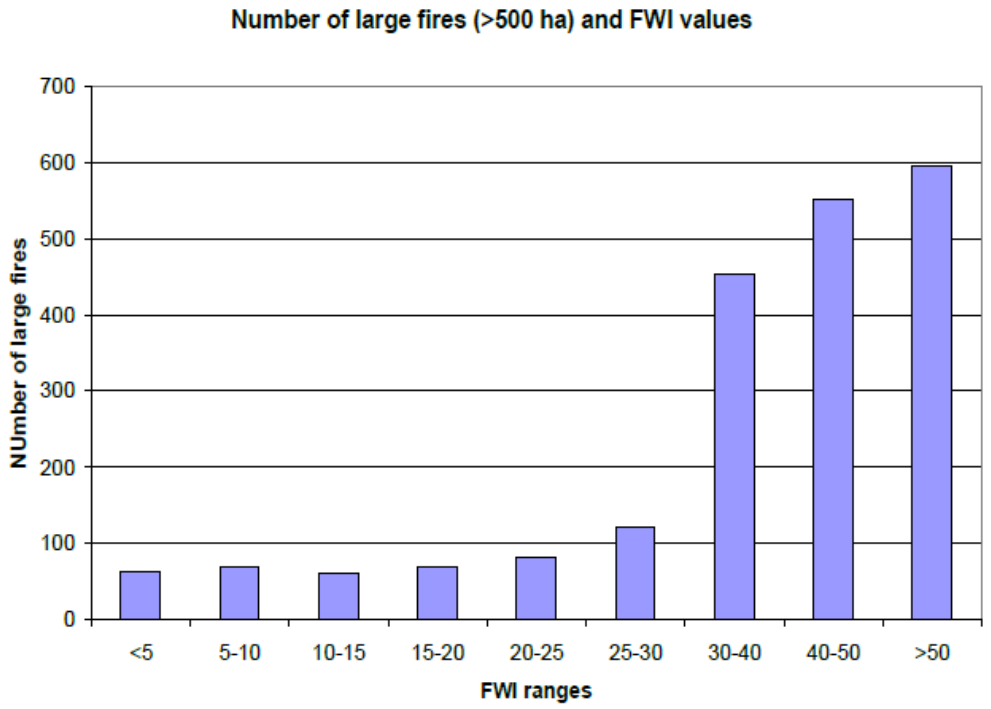
Peseta IV report - Costa, H., de Rigo, D., Libertà, G., Houston Durrant, T., San-Miguel-Ayanz, J., ***European wildfire danger and vulnerability in a changing climate: towards integrating risk dimensions***, EUR 30116 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN: 978-92-76-16898-0, doi:10.2760/46951, JRC119980

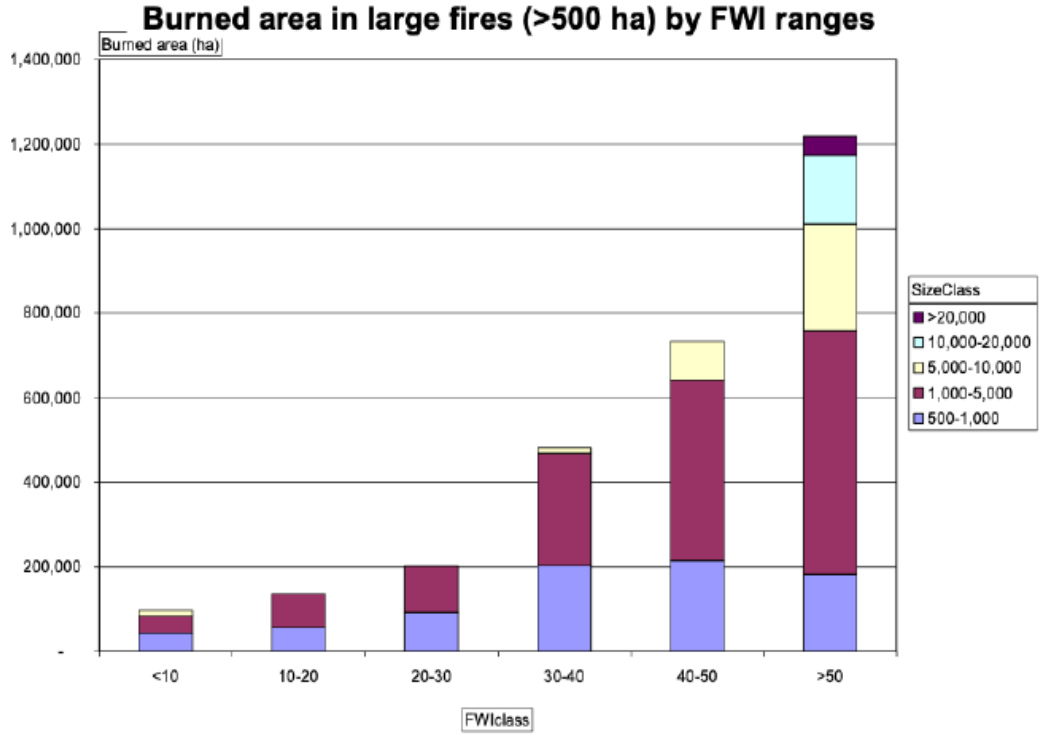
Source: Joint Research Center (JRC) / European Forest Fire Information System (EFFIS)

jrc-effis@ec.europa.eu

Fire Danger and Climate Change

Fire Weather Index (FWI) vs Burnt Areas & fire size





Peseta IV report - Costa, H., de Rigo, D., Libertà, G., Houston Durrant, T., San-Miguel-Ayanz, J., ***European wildfire danger and vulnerability in a changing climate: towards integrating risk dimensions***, EUR 30116 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN: 978-92-76-16898-0, doi:10.2760/46951, JRC119980

Source: Joint Research Center (JRC) / European Forest Fire Information System (EFFIS)

jrc-effis@ec.europa.eu

Prescribed fire management for biodiversity and wildfire risk reduction; the US experience on policy and practice

Marek Smith, from The Nature Conservancy, the United States of America

Marek Smith is the North America Fire Director at The Nature Conservancy (TNC), a wide-ranging nonprofit organization assembling staff and over 900 scientists with conservation impact in 79 countries and territories. It has recently celebrated 60 years, starting as one of the first environmental NGOs with the initial focus on using fire to managing biodiversity. Today the approach has widened to developing policy, elevating the leadership of indigenous fire practitioners, growing skilled and diverse fire management workforces and helping communities develop ways to live more safely with wildfire. TNC has more than 400 qualified prescribed fire staff today, burning about 120,000 acres every year in the U.S. Marek Smith is also the co-director of the Fire Networks partnership, which supports people and place-based efforts trying to change their relationships with fire.

Fire history in the United States

A majority of the terrestrial ecosystems in North America are fire adapted or fire dependent, including forests, woodlands and shrublands, and grasslands. There has been a long evolutionary history of fire (lightening ignited) as well as human use of fire. In pre-historic times to the 1600s, indigenous peoples used fire for thousands of years prior to Euro-American colonisation.

During the 1600s-1800s, the devastation of indigenous people led to fire exclusion and losses of indigenous fire practices and cultures. Burning practices later adopted by colonists and settlers.

Between 1890s-1930s, fires were criminalized in some states. During the 1940s to early 1950s, the Smokey Bear Wildfire Prevention Campaign begins, serving to prevent forest fires.

In the late 1950s to 1960s, academics landowners and NGOs starts to recognize the importance of fires for wildlife habitat and ecosystem restoration. Organisations like Tall Timbers, The Nature Conservancy and University of California Berkely advanced fire ecology and burning for biodiversity. In the late 1960s-1980s, National Park Service revised its fire management policies to include prescribed fire, recognizing the ecological role of fire.

During the 1990s-2010s, burning is conducted for endangered species in Southeastern U.S. There is a national fire plan and national cohesive wildland fire management strategy launched to embrace prescribed fire for fuels reduction. Prescribed burning associations of private ranchers are formed in the Great Plains.

Today, the national narrative and movement concern beneficial fire. The Wildfire Commission calls for a “dramatically increasing amount of beneficial fire on our landscapes”. Headings and slogans are used, like “setting ‘good fires’ to reduce the West’s wildfire risk”, and that “fire is medicine” for

saving Californian forests, saving forests by burning them. There are 38 Prescribed Fire Councils in 34 states.

Challenges to expanding prescribed fire

The most common barrier is the workforce capacity. Other issues cited are:

- Landowner liability
- Insurance availability
- Permitting restrictions
- Different certification standards across the states, not one joint standard
- Weather constraints (limited burn windows)
- Smoke management and air quality impacts
- Public perception. A recent survey showed that people broadly agree (88%) that controlled burns are beneficial, essential and make forests healthier.

Fire law in the United States derived primarily from English laws relating to concerns over harms caused by escaped fire. Every state has different laws and requirements regarding prescribed fire. Because of this variability, the liability associated with burning differs from one state to the next. 22 states have "right to burn" laws, but there are four categories of liability.

Strict liability: the burner is responsible for any damages regardless of the circumstances or precautions taken.

Simple negligence: The burner is only liable if they can be proven negligent and if they failed to demonstrate reasonable care.

Gross negligence: The burner is only liable if they acted recklessly and disregarded the consequences of their actions.

A fourth category, **uncertain liability**, is when a state has no clear legal language regarding prescribed fire liability. This is the most common category.

41 states always or sometimes require a burn permit or authorization prior to prescribed fire implementation. The requirements typically include:

- Burn prescription, plan and map
- Landowner consent
- Description of personnel and equipment
- Smoke management plan
- Public notifications

Prescribed fire training

The National Interagency Prescribed Fire Training Center (NIPFTC) offers unique programs that blend prescribed burning experience with flexible curricula covering foundational topics for prescribed fire practitioners and fire and fuels program managers. Their head quarter is located in Florida, expanding westbound. The core programs include 20-day field sessions, leadership modules for men and women and agency administrator workshop.

The Prescribed Fire Training Exchanges (TREX) originated in Fire Learning Network (FLN) landscapes in the Great Plains in 2008. Typically, it is two weeks of hands-on training, treatments, and community engagement. The course is designed to meet local needs, including capacity building and burns focused on ecological, cultural and community safety objectives. In total there have been more than 150 TREX events organized in the U.S, Canada, Spain, Portugal and Mexico

providing training to 4,500 practitioners.

In recent years, there have been a number of women in fire initiatives. In the U.S., the majority of professional fire workers today are white, male and agency-based —and largely out of parity with affected populations, or with the groundswell of young, inspired people who want to work in fire management. Efforts to increase diversity in fire have grown in recent years, but many agencies have problems retaining female and other under-represented fire professionals. The challenges these groups face range from feelings of isolation and being undervalued, to overt harassment and even assault.

Women-in-Fire Prescribed Fire Training Exchanges (WTREX) are modelled after the Prescribed Fire Training Exchanges (TREX) and typically assemble diverse participants for two weeks of hands-on training, treatments and outreach; it melds live-fire training with deeper learning on fire ecology, policy and social dynamics. WTREX reframes this model around women and other under-represented fire practitioners, bringing together people from all genders and backgrounds to burn and learn together in a supportive, positive environment.

WTREX events had been hosted in four U.S. states and in South Africa, Canada and Portugal. Participants have come from almost every U.S. state, from dozens of Tribes, and from more than 30 countries on every continent except Antarctica.

One of the latest workforce development programs, supported in part by new funding from the US Forest Service, is development of roving prescribed fire crews, or modules. These are comprised of practitioners who live across the country, are trained in prescribed fire and related activities, are willing to travel for short-term assignments, and can provide critical support for TNC chapters and partners who need extra help on their local projects, all the while building their own skills and experiences.

PRESCRIBED FIRE TRAINING

Women-in-Fire Prescribed Fire Training Exchanges (WTREX)

Reframes the TREX model around women and underrepresented fire practitioners, in a supportive, inclusive environment

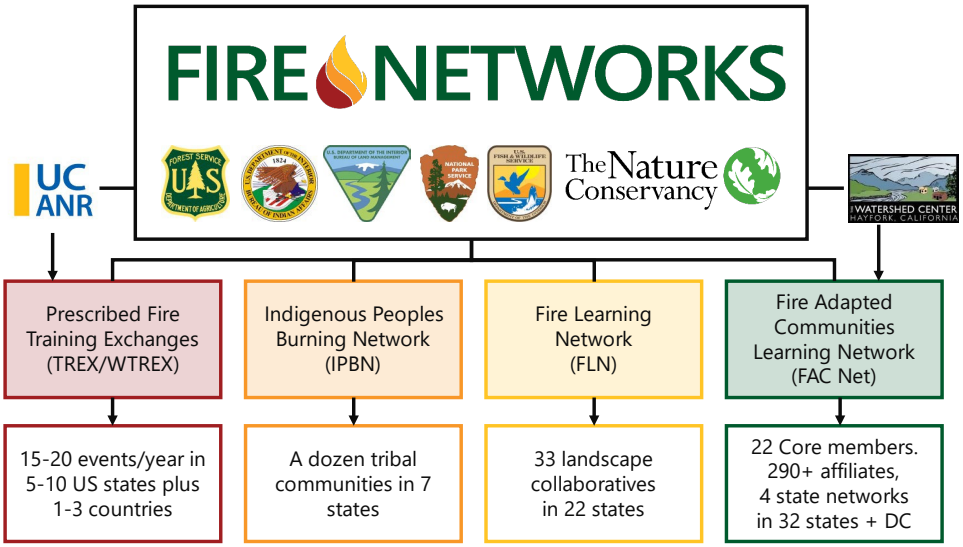
Men included as allies, but 90% of participants are women; demand far exceeds opportunities

Since 2016, events have been held in California, Florida, Virginia, North Carolina, Nebraska, South Africa, Canada and Portugal

Around that same time in the United States, a long-time partnership between TNC, the USDA Forest Service, and the US Department of Interior agencies was also started. Now known as the Fire Networks partnership, the work is facilitated at the national level by staff from four organizations – TNC, the Watershed Research and Training Center, the University of CA Cooperative Extension and the US Forest Service.

The Fire Networks, through a family of learning networks, programs and strategies, supports the people who are creating change on the ground. Our work empowers local people to navigate their own pathway toward a better relationship with fire. We connect them with other people, and with programs, tools and ideas that they can adapt and use to help their communities live better with fire. We work with people over a period of years, making small, sustained investments as they tackle their challenges. And we learn from their work—carrying their lessons to other people and other places to advance change at larger scales.

Today, our work through the Fire Networks partnership takes place in 37 U.S. states, and we have 2,500 partners in the U.S. and over a dozen other countries.



The Fire Networks are supported, in part, by the Promoting Ecosystem Resilience and Fire Adapted Communities Together (PERFAC T III) Cooperative Agreement.

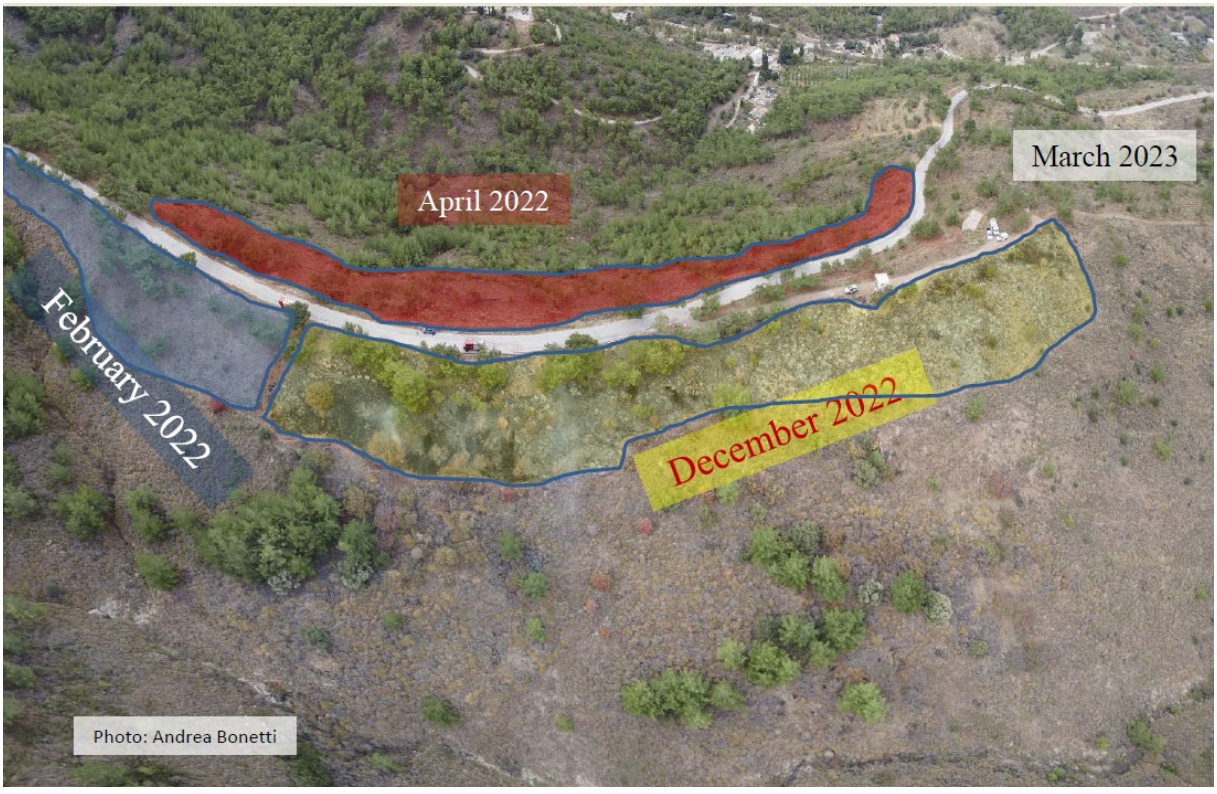
Our partnership's vision is one of viable fire cultures all across the country. Landscapes and communities that are resilient to wildfire. Where fire once again plays its fundamental role as an ecological and cultural process. Where communities are empowered and prepared for wildfire. Where the workforce welcomes diverse viewpoints, skills and life experiences to address the complexity of the challenge. Where people who live within and depend on fire-adapted ecosystems have a role and voice, shared ownership, and where power and responsibility are distributed equitably.

Fire as a landscape management tool and to improve social resilience in Chios, Greece

Miltiadis Athanasiou, from Ellinikos Georgikos Organismos, Greece (Agricultural organisation, ELGO-DIMITRA)

The last presentation of the first day gave a view of the introduction of prescribed fire as a tool to prevent forest fires in Greece, which began in the 1970s. In 1976, members of the Greek forest scientific community and the Hellenic Forest Service applied prescribed burning experimentally. Unfortunately, stable funding, legal support, logistics and clearly formulated objectives were lacking, so the sporadic attempts (1980, 1987, 1989 and 2004) did not manifest any establishment with the forest and fire management community, and the endeavour was soon abandoned. Therefore, prescribed burning is not used in Greece, even though the benefits are known. There is a general reluctance to adopting this method, which often comes from a lack of familiarity with its use. In addition, there are often legitimate questions about its effects, which can vary from one ecosystem to another.

The pilot project on the island Chios aimed to overcome both of these drawbacks. On the one hand, it demonstrated the feasibility and parameters for the effective use of prescribed burning. On the other hand, it evaluated the ecological effects through carefully planned and detailed monitoring, trying to identify potential problems. The project was ongoing for two years 2021-2023, with prescribed burnings performed in February, April and December 2022 and March 2023. Throughout the project, prescribed burning was experimentally applied to surface fuels (9 out of 21 available plots), with the aim of maintaining fire and fuel breaks by reducing fuel loads and controlling regeneration. The surface fuels have varied from *Pinus brutia*, pine litter and Phryganic vegetation.



A large group of stakeholders participated in the kick-off meeting, which included a training seminar and initial briefing. Citizen science has also been applied. The knowledge gained from this

work can help to institutionalise prescribed burning in Greece, following specific application standards that are currently being developed. These standards will include carefully planned reporting practices that will help to build knowledge, evaluate results, improve effectiveness and efficiency, and identify any undesirable consequences early on.

Several parameters have been monitored before, during and after the burning. These have been soil properties, such as

- infiltration
- soil temperature in various depths
- erodibility
- soil texture, nutrients and carbon in the soil
- soil respiration
- organic matter decomposition
- soil enzyme and microbial activity

Plant biodiversity and sap flow and fuel cover has also been documented. The flame lengths and rate of fire speed was traced to describe the fire behaviour. All these measurements gained lots of knowledge.

The project results provided strong evidence that prescribed burning can be a very effective fuel management tool for many forest ecosystems in Greece. There is now a good basis for applying the method in the country, although further research is needed (e.g. under different conditions and in additional ecosystems) before it can be fully adopted and included in the toolbox of forest fire managers. Some considerations to study further are how to combine prescribed fire with grazing, and what season that is optimal for burning. Standards and procedures for the application of prescribed burning in Greece are being developed following the successful paradigm shift on Chios. The official adoption of this method by the Hellenic Forest Service will strengthen its role and effectiveness in fuel management and improve cooperation between state agencies and local stakeholders. The use of fire is not legally recognized yet, but under introduction under well specified terms and defined specifications.

Rates of Fireline construction ($m \cdot h^{-1}$) using hand tools

Photos: Andrea Bonetti

plant biodiversity,

sap flow ($cm \cdot h^{-1}$),

water potential (MPa),

https://www.researchgate.net/publication/365871986_Pilot_project_aims_to_change_policy

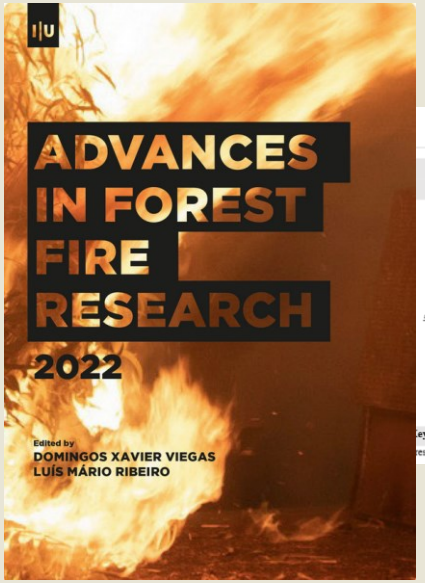

PRESCRIBED BURNING

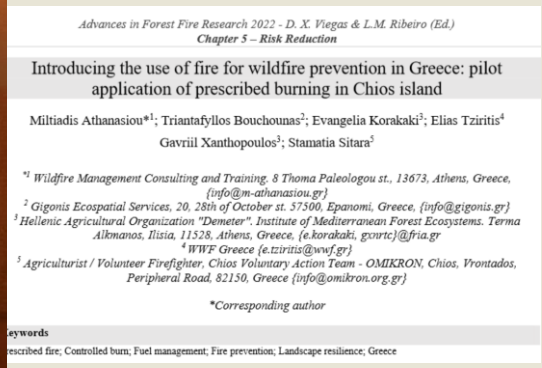
GREECE

PILOT PROJECT AIMS TO CHANGE POLICY

BY MILTIADIS ATHANASIOU, TRIANTAFYLLOS BOUCHOUNAS, EVANGELIA KORAKAKI, ELIAS TZIRITIS, STAMATIA SITARA, AND GAVRIIL XANTHOPOULOS

https://www.researchgate.net/publication/364764199_Introducing_the_use_of_fire_for_wildfire_prevention_in_Greece_pilot_application_of_prescribed_burning_in_Chios_island




Advances in Forest Fire Research 2022 - D. X. Viegas & L.M. Ribeiro (Ed.)

Chapter 5 – Risk Reduction

Introducing the use of fire for wildfire prevention in Greece: pilot application of prescribed burning in Chios island

Miltiadis Athanasiou*[1]; Triantafyllos Bouchounas[2]; Evangelia Korakaki[3]; Elias Tziritis[4] Gavriil Xanthopoulos[3]; Stamatia Sitara[5]

[1] Wildfire Management Consulting and Training. 8 Thoma Paleologou st., 13673, Athens, Greece, {info@m-athanasiou.gr}

[2] Gigonis Ecospatial Services, 20, 28th of October st. 57500, Epanomi, Greece, {info@gigonis.gr}

[3] Hellenic Agricultural Organization "Demeter". Institute of Mediterranean Forest Ecosystems. Terma Alkmanos, Ilisia, 11528, Athens, Greece, {e.korakaki, gxvrtc}@fria.gr

[4] WWF Greece {e.tziritis@wwf.gr}

[5] Agriculturist / Volunteer Firefighter, Chios Voluntary Action Team - OMIKRON, Chios, Vrontados, Peripheral Road, 82150, Greece {info@omikron.org.gr}

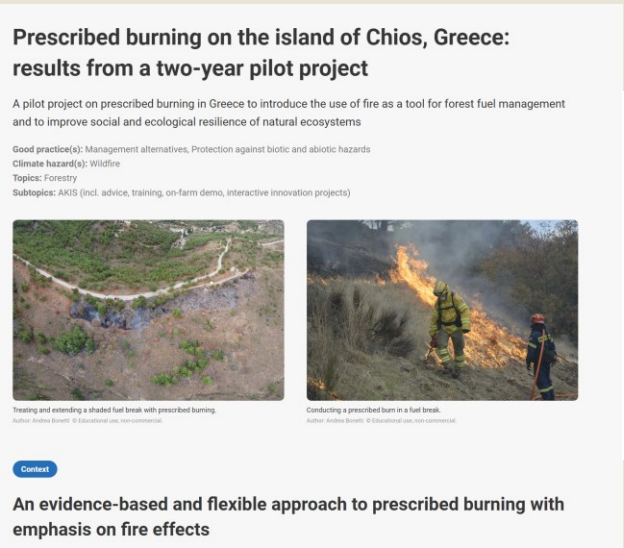
**Corresponding author*

Keywords

Prescribed fire; Controlled burn; Fuel management; Fire prevention; Landscape resilience; Greece

https://books.uc.pt/chapter?chapter=9789892622989227

https://resalliance.info/factsheet/introducing-prescribed-burning-in-greece/


Prescribed burning on the island of Chios, Greece: results from a two-year pilot project

A pilot project on prescribed burning in Greece to introduce the use of fire as a tool for forest fuel management and to improve social and ecological resilience of natural ecosystems

Good practice(s): Management alternatives, Protection against biotic and abiotic hazards
Climate hazard(s): Wildfire
Topics: Forestry
Subtopics: AKIS (incl. advice, training, on-farm demo, interactive innovation projects)

Treating and extending a shaded fuel break with prescribed burning.

Conducting a prescribed burn in a fuel break.

Context

An evidence-based and flexible approach to prescribed burning with emphasis on fire effects

Through these efforts,
prescribed burning
was successfully demonstrated

Dr. Miltiadis Athanasiou
Researcher at the Institute of Mediterranean Forest Ecosystems in Athens Greece
https://www.fria.gr/EngPage/athanasiou.html

https://www.researchgate.net/profile/Miltiadis-Athanasiou

https://www.linkedin.com/in/miltiadis-athanasiou-38513b29/

https://www.facebook.com/miltiades.athanasiou/

Thank you!

Questions and answers

There were some questions posed during the presentations and at the end of the webinar during the first day. Some of them (where we took notes on the replies) are presented here.

The Mediterranean receives a lot of attention of course for fire, with the land abandonment and climate change often cited as the main drivers. Would you say that the main drivers are fire suppression from forest industry activities in northern Europe? (and climate change)

Yes, the protection of the timber production is highly prioritized. The forest road network in Sweden is dense, so the fire services can often reach close to wildfires and suppress them in short time. During the driest days with high risk of wildfire, planes are sent up daily in several counties in Sweden to discover wildfires. The argument to decrease fire dispersion to neighbouring populated areas is also important for fire suppression. /Julia Carlsson

Who is applying the prescribed fires (in Sweden)? Foresters, firefighters, accredited personnel or companies?

In forestry, it is foresters and contracted companies with specialists. We don't have a standardised accreditation system, but normally clear requirements of skills and education are assigned in contracts. In protected areas it is authorities: County Administrative Boards and the Swedish Forest Agency. /Erik Hellberg Meschaks

Is there any difference of timber prices between postburn areas and areas with suppressed fire? How local market is reacting to fire scared logs?

Yes, there is a big difference. Most sawmills don't accept charred wood. Those who does have reduced prizes compared to non-charred. But in many forest areas, all charred wood from salvage cuts is used for energy (low prize compared to timber). /Erik Hellberg Meschaks

Erik, what do you think about prescribed burning in 91T0 habitats?

I have little experience of that specific habitat. But concerning its similarities with Wooded dunes and parts of Western taiga and its geographical distribution it seems relevant to consider prescribed burn for conservation. Possibly it could provide habitats for Annex 2 species. /Erik Hellberg Meschaks

Question for Swedish colleagues in this case - what are official statements from Södra and Sveaskog? How are forestry associations reacting to this situation?

Sveaskog has an active work for prescribed fires, mostly driven by FSC-certification. SÖDRA (association for smaller landowners) is positive towards biodiversity prescribed burns but their associated landowners are rarely conducting burns. /Erik Hellberg Meschaks

What are the main factors which private forest owners point out, while hesitating to apply prescribed fire?

There are several: you normally need to hire professional contractors, insurance costs and possibilities, neighbouring forest owners' attitudes on the risk of disperse, and that natural borders usually are harder to find in smaller estates compared to large, to control the fire and keep it within the planned area. /Erik Hellberg Meschaks

A question till Francisco Moreira - Do you combine burning and grazing in forests for biodiversity purposes? Do you have species of conservation concern that respond positively to this combination in forests?

I don't know of any project that uses this combination for biodiversity purposes in the Mediterranean. And I don't know if any of the species of conservation concern will be favoured by this combination. /Fransisco Moreira

Ok, thanks. I think this is an important research question in many parts of Europe. In parts of Sweden this combination has been quite common for a long time, but we have quite little knowledge on species responses with a few exceptions /Magnus Magnusson, Swedish Forest Agency

Although prescribed fire has been used again in the United States for more than 50 years, we still see regular / weekly reports in the media about large uncontrolled wildfires. Where are the efforts still falling short?

Like other speakers today have mentioned, many of the most extreme wildfire events are driven by weather conditions. With hundreds of years of primarily fire suppression in many areas, we still have an abundance of dense, fire-prone vegetation that is ripe to burn under these conditions. So, some of these events are "baked into the system" for decades to come. But we do need to do a better job of reporting and sharing the success stories, where prescribed fire and cultural burning has mitigated fire behaviour and led to better outcomes from wildfire. /Marek Smith

What can be done to decrease malicious human behaviour? Increase surveillance? Increase penalties? Use drones? Raising awareness is not enough. Is a punitive approach needed?

My personal view is that we need to educate people because the big part of the problem is not “arson” (crime of intentionally starting a fire) but negligence. /Miltiadis Athanasiou

I think that enforcement of penalties would help but setting an example. It is difficult to identify the arsons when they set fires and drones would not be of much use, unless they are surveying continuously. Education is the only approach, and we hope next generations will behave better as regards fire prevention. /Marek Smith

Photo: Erik Hellberg Meschaks

Which 3 words describe your take-homes the webinars?

80 responses

Programme Wednesday September 11th

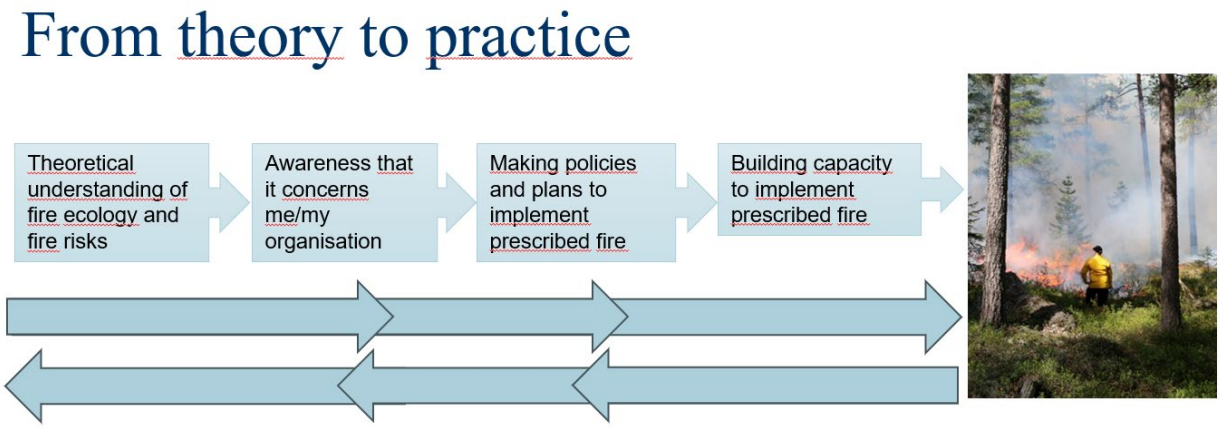
Time	Topic	Speaker	Organisation
9.30	Opening, re-cap of Day 1 – policy shifts and challenges	Erik Hellberg Meschaks	Swedish Environmental Protection Agency
9.50	Fire as forest management tool in Swedish and Finnish forests – a paradigm shift	Julia Carlsson	Project manager Life2Taiga
10.10	Long term experiences in fire management in military areas and its effects on biodiversity	René Dahmen	Department of Nature and Forests in Wallonia, Belgium (SPW)
10.30	Fire management programme in Andalucía, Spain	Fransisco Senra Rivero	The Regional Government of Andalusia (Junta de Andalucía), Spain
10.50	BREAK – 20 minutes		
11.10	Building a burning team: developing a communities' prescribed fire skills and capacity	Jeremy D. Bailey	The Nature Conservancy, the Unites States of America
11.30	Discussion in smaller groups	Breakout rooms	
12.20	Reporting Back	Plenum	
12.50 – 13.00	Closure		

Re-cap of day 1 – Policy shifts and challenges

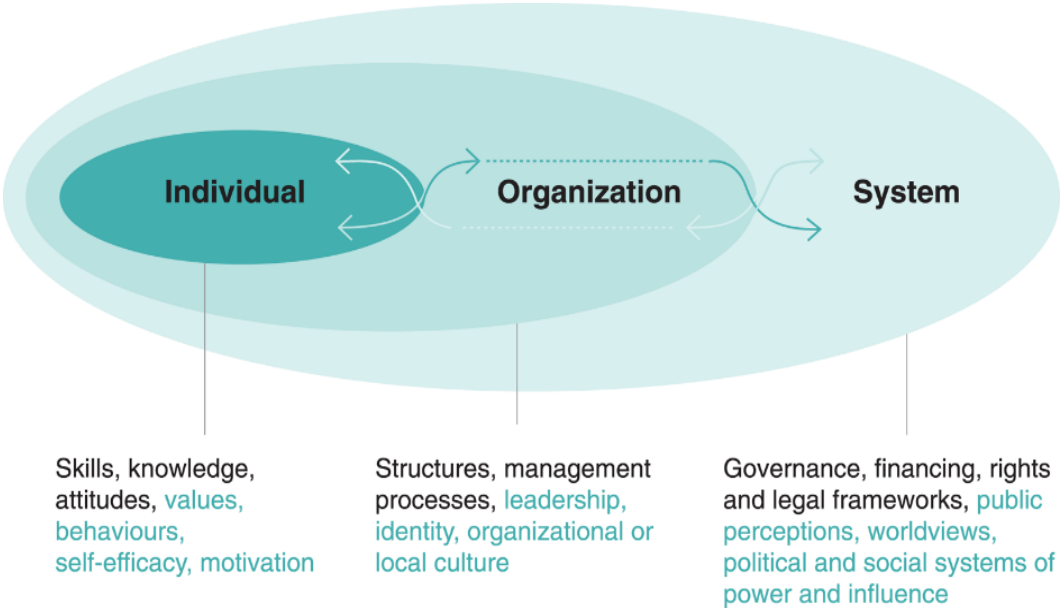
Erik Hellberg Meschaks, from the Swedish Environmental Protection Agency

The second day had a focus on giving examples of successful policy shifts as inspiration for introducing prescribed fire in areas around Europe where resistance and unawareness is prevalent.

As an introduction, the chair Erik Hellberg Meschaks, made a short re-cap and reflection of the first day's presentations, connecting them to the topic of day 2 by describing the process on going from theory to practice when introducing prescribed fire as a management measure.

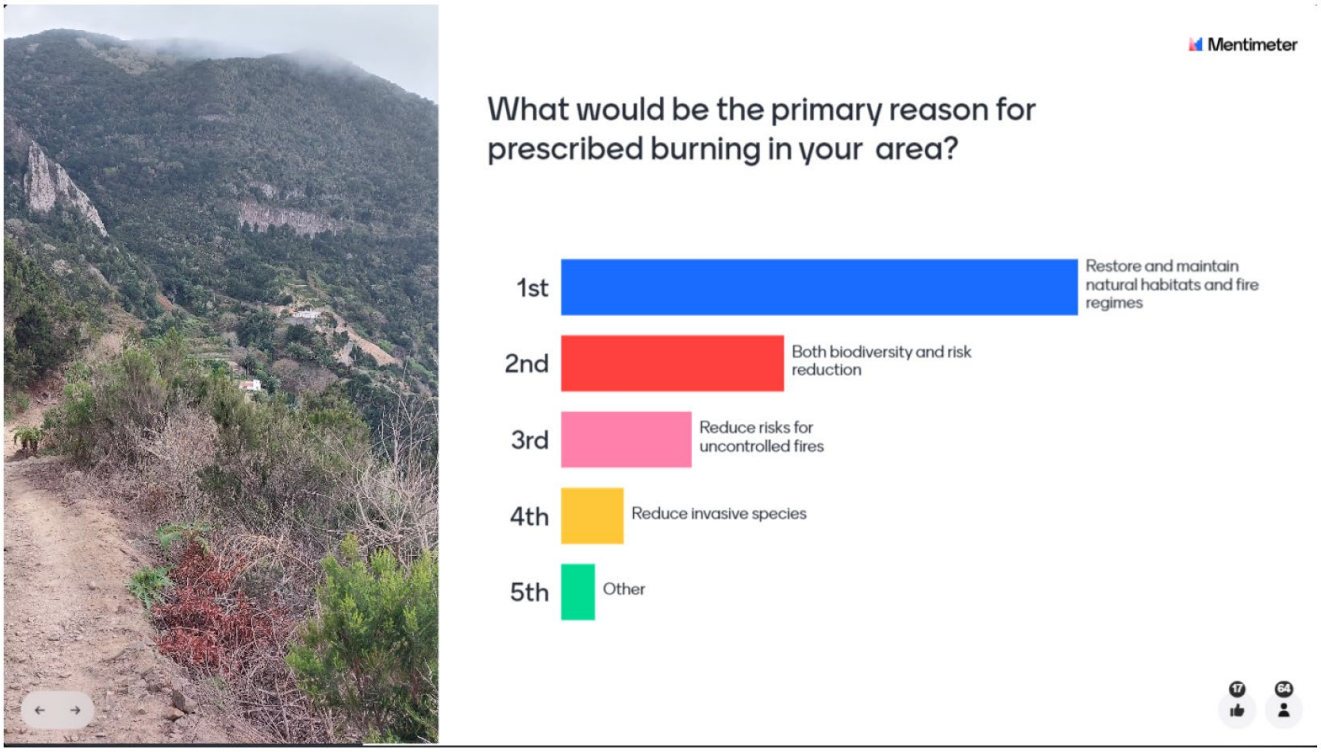


In connection to identifying barriers (see next page), Erik referred to a systems framework (Porzecanski et al 2022) for linking levels of capacity development in the task to make a change in policy and achieving a change in practice.

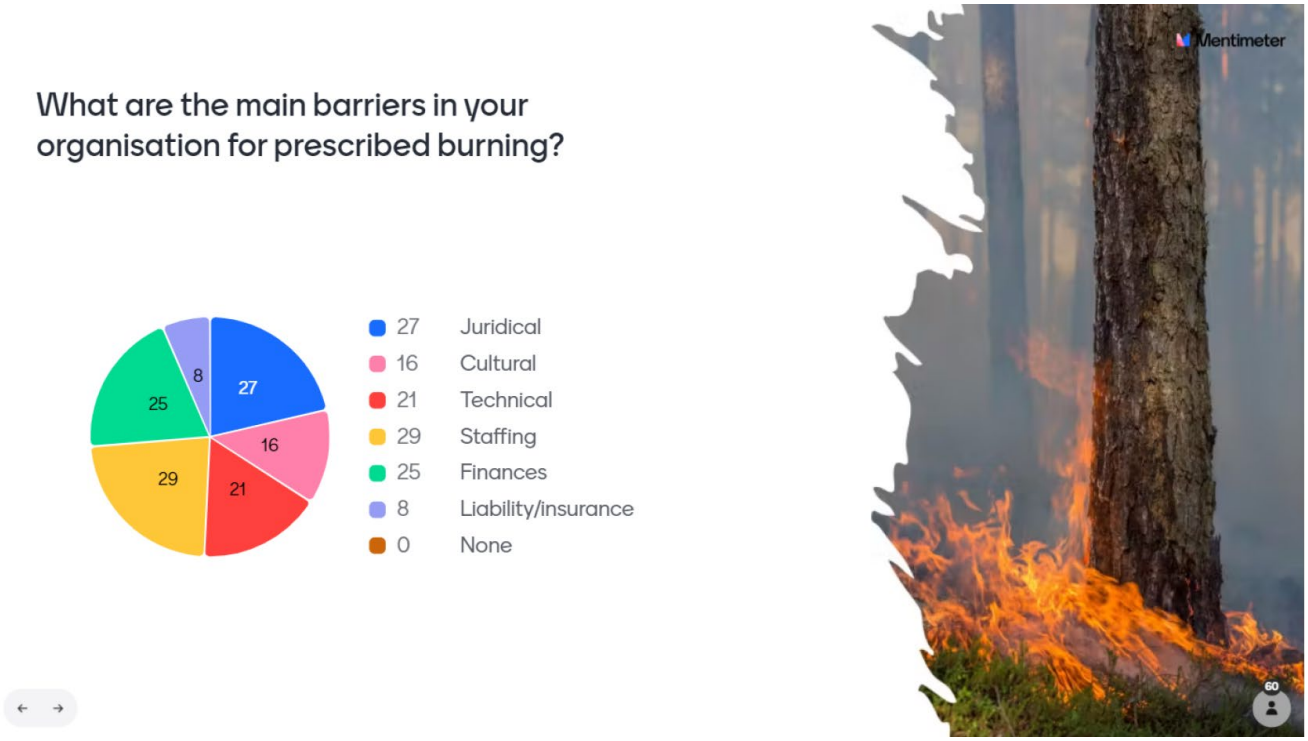


Porzecanski et al. 2022. A systems framework for planning and evaluating capacity development in conservation: recommendations for practitioners. Oryx, 56(5), 671–680

During the second day, 50-80 participants attended the webinar. As part of the introduction, we posed a few questions to the audience, mapping the reasons for using prescribed burning and what barriers that are met. We believe that the audience had a large representation from restoration practitioners, explaining the responses of the first question.



The responses to the second questions on barriers, imply a wide spread of type of constraints. Interestingly, it seems that staffing and financing reasons are considered equally high to juridical ones.



Fire as forest management tool in Swedish and Finnish forests – a paradigm shift

Julia Carlsson, Project manager of Life2Taiga

In Fennoscandian boreal forests, the nature type Western Taiga (9010*) has developed its characteristics partly thanks to frequent wildfires and storms. The conservation status of this priority habitat is however unfavourable in all regions. A sizeable portion of 9010* is the *natural old pine forest* subtype which has been largely shaped by a continuous fire regime. Today, only a fraction of the formerly widespread fire-adapted subtype of natural old pine forest remains.

Modern forestry practices have drastically reduced heterogeneity in the Western Taiga, not only through clearcutting and monocultural tree plantations, but perhaps even more importantly by counteracting natural disturbance regimes such as wildfires in both industrialised and natural forests. Current forestry practices seldom use fire for conservation purposes in set-aside areas to increase habitat values, but rather in terms of burning after clear-cutting to gain seed germination and the regeneration of new trees for timber production according to forest certification schemes. In Finland, some small patches of remnant trees in production forests were burnt a few decades ago, but this practice is seldom used today. The dense forest road network also has an important impact as the majority of the forest patches can be quite easily reached, allowing prompt suffocation of forest fires caused e.g. by drought or lightning. Therefore, naturally burned forest patches are lacking in the forest landscape today.

Introducing prescribed burning in Finland and Sweden

To improve the prevalence of fire in the landscape, authorities in Sweden and Finland started to introduce the use of prescribed burnings for nature conservation purposes in the end of 1980s. One of the first fires took place in Patvinsuo National Park in Eastern Finland, inspired by entomologists from the Unites States who stressed the importance of prescribed burnings in the first threat assessment on species in 1986. The aim was to preserve and increase the presence of insects and polypores and improve the habitat structures of young stands. In those first burnings in Finland, loggers were burning bosses, building on experiences from silvicultural burning of logging slash and humus layer to improve tree regeneration.

Even though knowledge about fire history and fire ecology were present for a long time, the establishment in nature conservation practices took its time, as the following schematic timeline describes. The use of fire as a restoration measure needed a shifted view on forest dynamics, from a standing point of non-intervention to active management for nature conservation, among policy makers and practitioners. There were many cultural and organisational barriers to overcome to achieve this paradigm shift.

In Sweden, the first strategy and guidance for burning in protected areas came from the Swedish Environmental Protection Agency (SEPA) in 2005. The Habitats Directive and the implementation of Natura 2000 emphasised the need of change. 2008-2012 are described as “peak years” of debate among nature conservation authorities. There were both “pioneers” and “conservatives” at regional and national authorities, advocating for their enthusiasm and hesitance respectively. A group of County Administrative Boards in southern Sweden made a joint investigation and report (project Eldskäl) on the important objectives of introducing fire as a management method from a biodiversity perspective, defining potential burning landscapes in their regions, where pine forests were suffering from lack of fire.

Prescribed burning for biodiversity in Sweden

1970s
Recognition of ecological role of fire in conservation

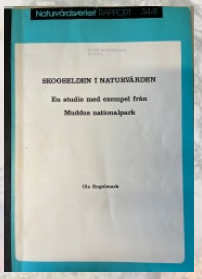
1980s
Emerging thoughts about prescried burning for nature conservation

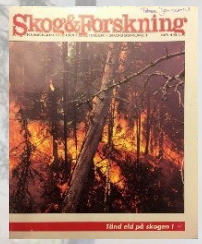
Early 1990s
First biodiversity oriented prescribed burns

1990:s – now
A phase for establishment and development

Future
Great need for further development of prescribed burning for biodiversity


Influence of forest fires on the North Swedish boreal forest





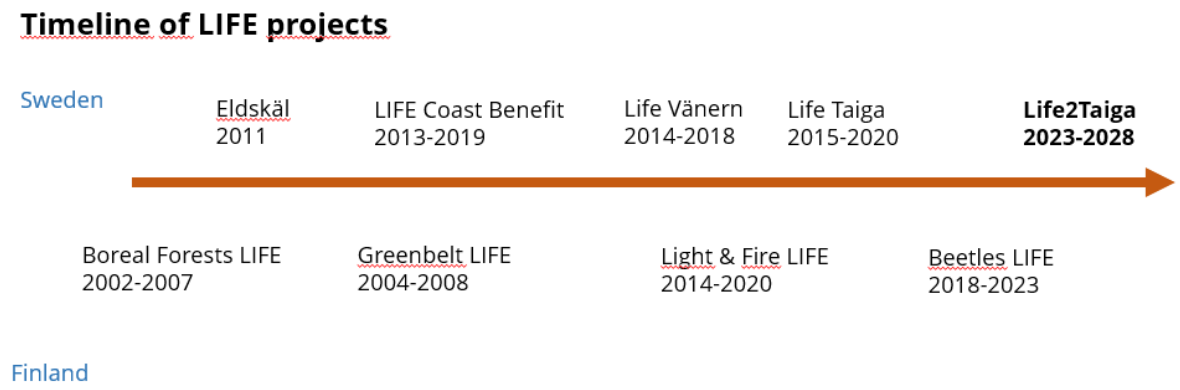
Protected areas:
- Paradigm shift and capacity building
- Gradual implementation
- Area burned multiplied over the years

Forestry sector:
- Certification scheme defining factor
- Stronger orientation towards high quality biodiversity outcome in later years

The importance of LIFE funding

In 2012, SEPA opened up for the opportunity to apply for funding through the LIFE fund for nature projects. The County Administrative Boards in 14 counties in Sweden decided to write an application for a project focused on introducing prescribed fires in protected areas, especially the natural old pine subtype of Western Taiga. This project *LIFE Taiga* enabled the transition from policy to practice, and a continuity of stable funding for six years, which improved the possibility for the regional authorities to focus on building up capacity, a good set of equipment and experience in conducting prescribed fire. Most likely, this development would not have occurred without the LIFE funding, as the regular budgets for nature conservation must cover a lot and seldom can be earmarked to expensive and resource demanding measures.

Prescribed burning has been part of management methods in several other LIFE funded projects in Sweden and Finland, where methods have been extensively tested and fine-tuned.



1) Life Taiga (2015-2021), with 14 beneficiaries in Sweden conducting prescribed burning at 132 sites within 104 Natura 2000 areas.

2) In more recent projects, such as Light & Fire LIFE (2014-2020) and Beetles LIFE (2018- 2023), prescribed burning has been the key action of the project. In addition, MHPWF has focused on training forestry sector actors on the role of fire and controlled burning measures.

3) Boreal Forests LIFE (2002-2007) and Greenbelt LIFE (2004- 2008), in which prescribed burning techniques and a best practice guideline were developed.

4) Prescribed burnings have also been carried out as best practice restoration actions in several other Swedish LIFE projects such as LIFE Vänern (2014-2018) and LIFE Coast Benefit (2013-2019).

Challenges and barriers

The introduction of fire as a new management method did not come without barriers:

- Lack of skill and organised teams
- Lack of equipment – resource demanding
- Lack of acceptance – among authority leadership, landowners and the public

There has been a low degree of experience and knowledge on conducting prescribed fires among the staff that are managers of nature reserves, as well as in forest companies. The County Administrative Boards needed to build a storage of equipment of pumps, hoses and proper

workwear. The heads and governors of the authorities also needed to be convinced that working safety could be ensured. Last but not least, they and the landowners of the nature reserves selected for being burnt needed to be trustful that the risk of the fire spreading out of control to neighbouring forest areas was low. The public was also hesitant to fire in popular recreational forest and reserves – would it be a totally changed scenery along their favourite hiking paths?

Year by year, the practice of using fire has decreased the fears, showing great results in development of biodiversity and increasing conservation status of the Western Taiga habitats. Previous projects have developed planning strategies as well as knowledge and experience in implementing, assessing and improving prescribed burning methods. The beneficiaries have tested and applied a range of techniques for prescribed burning, set up a stable and sustainable organisational structure and invested in the necessary equipment. The assimilated knowledge and experience will enable the beneficiaries to step up their restoration efforts and conduct controlled burning at larger and more challenging sites than have been previously attempted.

Today, Metsähallitus Parks & Wildlife Finland and the County Administrative Boards conduct the majority of prescribed fires in Finland and Sweden. A smaller share is made by forest companies and private forest owners as part of the FSC scheme. The challenges that we are facing now concern:

- Limitation of weather windows – that only a few days per season are optimal for conducting prescribed fire
- Limitation of contractors taking on the special task on investing in equipment, insurance and stand-by readiness to travel for conducting burning as soon as the weather allows – without knowing how much work that can be conducted during a season due to the weather dependency
- Limitation of staff for burning and mop-up during vacation periods in the summer

In the present Life2Taiga-project (ongoing 2022 – 2008), we try to meet those challenges by preparing several sites to be ready for burning at the same time to make the best of the weather opportunities. We also offer to lend out equipment to contractors so that they do not need to invest in several sets for placement in several places where they have contracts.

As in the previous LIFE Taiga project, also Life2Taiga is focused on improved and efficient restoration by prescribed burning in boreal Western Taiga woodlands. The budget covers 23,5 million Euro, and burnings are planned to be performed in almost all parts of Sweden and Finland.

Conclusions: how to reach a successful paradigm shift

- Acceptance among leadership levels
- Building capacity in organisations – understanding and prioritising the needs
- From individual enthusiasts to stable organisations
- Education
- Joint learning
- Share challenges and experiences – being a network
- Development takes time and needs to be done together

Today, prescribed fire is a standard management method! There are still challenges and debates on leadership levels, with landowners, reindeer husbandry and local visitors to nature reserves, but the level of acceptance has a much higher starting point. Still, consolidation of policy and improvements of implementation are needed. The paradigm shift was clearly enabled through the listed dedicated management and LIFE funded projects. Also, the exchange between Sweden and Finland has reached an obvious level, as they are now partners in a joint prescribed burning project.

As Marek Smith said in his presentation, it is important to develop a relationship with fire - for individual staff, bosses, organisation leaders, and the general public.

Questions after the presentation:

In your opinion - how much significant is impact of traditions in case of societal acceptance of education in case of prescribed fire?

The impact of social acceptance is very important and something that we work with continuously, both towards fire rescue services, landowners, neighbouring residents and the general public. We invite people to information meetings the year before a planned burning site, to explain why and how we do the burnings. There is a lot of dialogue and consultations as part of the planning work.

Apart from weather conditions, do you take into account biodiversity considerations (bird and insect reproduction, flowering/fructification periods) when determining timing for the burnings?

We do consider birding nests in springtime, when we discover them while preparing the sites. Usually, the larger animals are disturbed when we do the preparatory work on site and moves away. We also take protective measurements for high-value-trees and dead wood, that we don't want to burn. But otherwise, we reason that the impact from our fire is similar to a natural fire, meaning that some animals and insects will die from the fire event, but in general the biodiversity will be strengthened. Since the opportunities and optimal weather conditions are so sparse during a season, we can't choose the timing too much. /Julia Carlsson

LIFE2 TAIGA

NATURA 2000

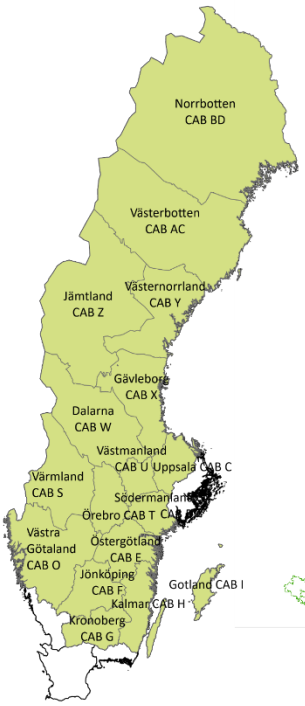
Regions for prescribed burning

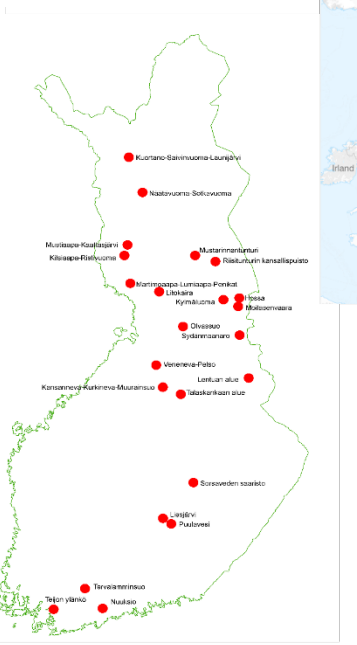
Project partners

Swedish Environmental Protection Agency

17 County Administrative Boards in Sweden

Metsähallitus Parks and Wildlife Finland





NATUR VÅRDS VERKET

Länsstyrelserna

METSÄHALLITUS

Life to the Taiga

- We will conduct 215 prescribed burnings on 3,400 hectares in total.
- We will perform fire-mimicking techniques on another 2,800 hectares.
- The forests are located in 165 Natura-2000 sites in Sweden and Finland.
- The restoration measures will create habitats for at least 40 fire-dependent species.
- The restoration measures will also benefit a wide range of species that need more lying and standing dead wood.
- The forests will become more open, diverse, and full of life!
- Life2Taiga is co-financed by the EU LIFE Nature programme.
- The project is coordinated by the County Administrative Board in Västmanland, Sweden.
- Life2Taiga started in the autumn of 2022, and ends in December 2028.

The responsibility for the content lies with the County Administration Boards and does not reflect the official position of the European Union.

Photo: Kjell Store and Ulrika Mogren

The project partners are:

The County Administrative Boards in Dalarna, Gotland, Gävleborg, Jämtland, Jönköping, Kalmar, Kronoberg, Norrbotten, Södermanland, Uppsala, Värmland, Västerbotten, Västernorrland, Västmanland, Västra Götaland, Örebro and Östergötland, Swedish Environmental protection Agency and Metsähallitus Parks and Wildlife Finland.

Länsstyrelserna

NATURVÅRDSVERKET

METSÄHALLITUS FORSTSTYRELSEN MEAHCIRÁÐÐEHUS

We Create Biodiversity!

There are many species in the Finnish and Swedish forests that are highly dependent on recurring forest fires. However, the undesirable and severe wildfires create more harm than good.

To help the fire-dependent species to survive, we use prescribed fires as a restoration method to create suitable habitats. We carefully select a forest area in a nature reserve where the fire will have the greatest impact and contribution to biodiversity. The prescribed burn is conducted with high safety standards.

Prescribed fires and fire-mimicking techniques are the main nature restoration methods in the EU-funded project Life2Taiga.

Join us on our journey!

Life2Taiga

life2taiga

Contact: life2taiga@lansstyrelsen.se

Life2Taiga

Western Taiga

The coniferous forest belt around the northern hemisphere is called taiga. In Sweden and Finland this habitat type is called Western Taiga.

The taiga forest is dominated by spruce and pine, with some deciduous trees such as birch and aspen. A natural old coniferous forest, that is not impacted by forestry, has living trees in several age classes and dead trees in various stages of decay.

Untouched natural forests have decreased in Sweden and Finland over the past 150 – 200 years, due to commercial forestry and the fact that wildfires are both discovered and extinguished quickly.

Prescribed Burning

For thousands of years, the taiga forests have burned at regular intervals. Many species are adapted to this, to such an extent that they risk becoming extinct if there are no fires and their habitat disappears.

A prescribed fire, which is what we call the fires started for nature conservation, creates similar positive effects, just like after a natural fire.

There are several differences between a wildfire and a prescribed one, however. The prescribed fire is conducted by trained staff within a limited area. The intensity is controlled from the start until the last flame is extinguished. A wildfire can start at any time or place, and burn intensely before it goes out or is extinguished by the fire brigade.

Mimicking a Fire

In some cases, it is not possible to undertake prescribed burning safely, due to limited access for the transport of water or challenging topography.

This is when we try to mimic the effects of the fire using other techniques. We create bare soil to encourage regeneration, thin out spruce trees to achieve more open forests, or ringbark the trees to create dead wood. The techniques to mimic fire are expensive, and it often takes repeated measures to achieve the same effects as from a prescribed fire. Some species also need the heat and smoke from the fire to germinate or mate. Therefore, a fire is preferable, but the second-best option can be to create forest structures with these alternative techniques.

Creating Life in the Taiga

The preparation for a prescribed fire is started several months before the fire is ignited. The site is carefully selected and studied to ensure the best possible impact on the landscape. The objectives are specified, such as what proportion of the conifer trees we want to affect.

A prescribed burning is performed on a day when the wind, ground and air humidity are favourable. It cannot be too moist, nor too dry. Optimal weather conditions are difficult to predict, so we need to be ready and prepared to act when the conditions are favourable.

The borders of the site to be burned are clearly defined. Water reservoirs, pumps and hoses are in place during the whole burning process. Around ten people are spread out to ensure that the fire does not spread to beyond the borders.

The fire is ignited along narrow lines within the defined area. The fire burns slowly against the wind direction. One flame line is allowed to burn out before the next one is ignited. In this way, we can steer the range, speed, and intensity of the fire.

When the last flame has burned out, we guard the site both day and night to make sure that the fire does not start up again. We remain in the area until no smoke has been sighted for three days and only then do we remove the hoses.

The site is black and sooty after the fire. Spruce and smaller pine trees usually die, whilst the larger pines survive. The ground becomes green again the following year.

Long term experiences in fire management in military areas and its effects on biodiversity

René Drahmen, from Department of Nature and Forests in Wallonia, Belgium (SPW)

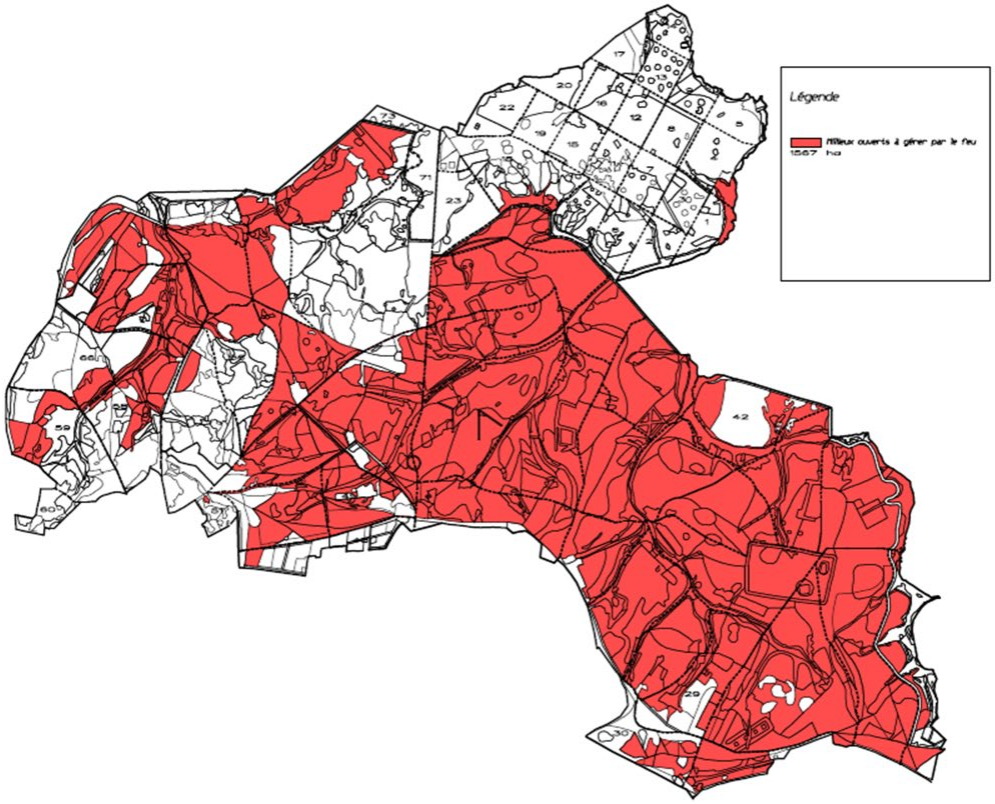
This presentation described the use of controlled fire in military training areas in Elsenborn, Belgium. The area holds 697 ha dry heathland and 485 ha of Nardus grasslands (*Meum athamanticum*). The area is important for many breeding and migratory birds. These areas were grazed and mowed up until 1940.The mowing continued more sporadically until 1960 but faced a long period of overgrowth thereafter. Many heathlands developed into forests. The conservation status of many habitats was poor. After the war, there has been spontaneous fires due to military activities. In 1995, the army was convinced to accept the use of controlled burning as management method. Especially hunters were resistant on the idea.

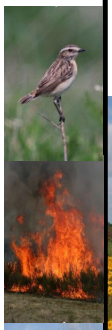
150 ha are burnt per year during March and April. The possibilities to burn are few. Regards need to be taken to the wind direction, avoiding smoke dispersion to villages, and of course to military troop exercises in the area. A smaller crew of 2-4 persons set the fire, assisted by a tractor with water barrel and fire-fighting vehicles. The safety strip (firebreak line) is crucial, watering the border, which takes time and patience. As soon as the firebreak line is secured, fire can be started with the wind.

Interestingly, lots of rare flowers germinates after the fire during the following year, for example *Arnica montana*. Botanical surveys show that the fire is more beneficial for rare flower species than mowing. Bird species are also gained, e.g. the whinchat (*Soxicola rubetra*).

Working with public relations is important, as their attitudes are negative seeing the severe fires in the Mediterranean region in the summers, and considering the risk for burning breeding birds and destroying plants. Therefore, they have installed information boards pointing out the importance of fires for preserving biodiversity, and also arranged visits for the public and school classes to the sites with species observations shortly after fire. René Drahmen stressed the importance to remind people that fire is not a new technique, but something conducted already by our ancestors for land management. In this military area, no other technique is applicable due to the presence of explosive devices and limited access options. Regular management by fire has the effect that there is no accumulation of material, which is very positive for the conservation of these habitats. It also means that spontaneous fires, which break out as a result of shooting, are less violent. Another advantage of fire compared to mechanised maintenance is that the micro-relief of the soil is preserved.

Management plan : Map of the zones maintained by fire (1.567 ha)





These massive flowering aspects of arnica in the heath can only be observed 1 year after the fire

June 2008 : 1 year after fire

June 2009 : 2 years after fire





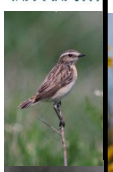

In the intact heaths: 4 to 6 weeks after the fire, the characteristic species develop, e.g. the rosette species that require a lot of light.

Nardus stricta

Arnica montana

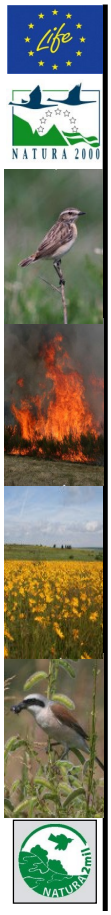
Platanthera bifolia

Dactylorhiza maculata

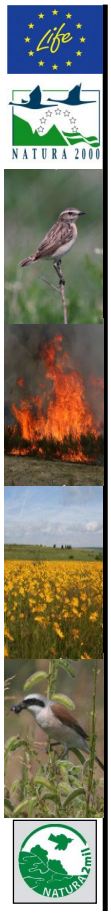


The most spectacular flowering is observed in the year after the fire, if no late frosts in June damage the buds



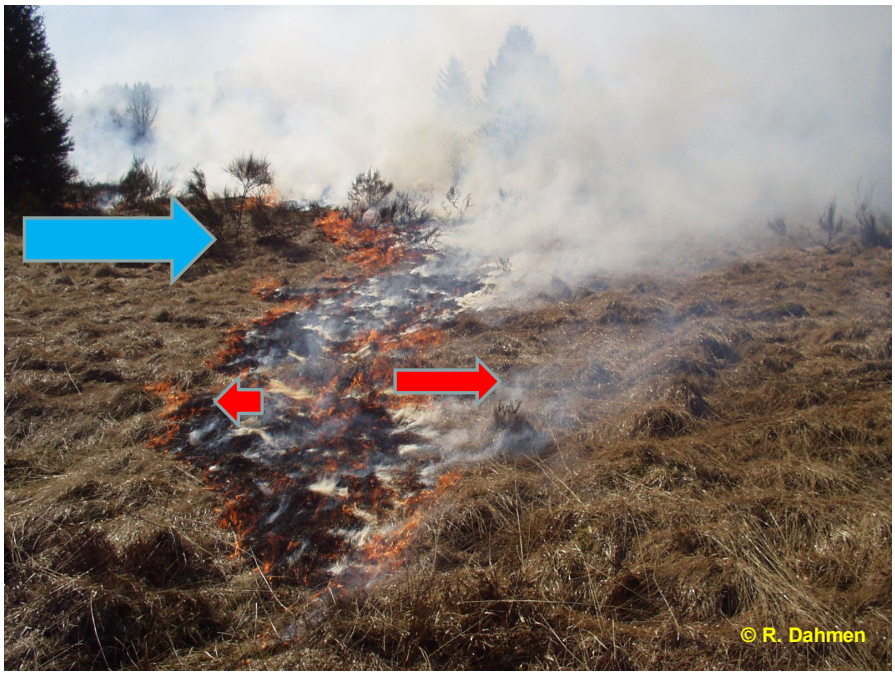
Most important aspect : The safety strip (firebreak line)

Line of fire against the wind, secured by the water barrel
Detailed planning : 1 hour before the fire (wind direction)



Setting fire near the water-maintened strip

- the fire burns slowly against the wind and runs towards the "water strip“
- so nobody has to stand in the smoke to supervise the upwind fire



The fire "dies" on the watered strip and continues to burn slowly against the wind

As soon as the firebreak line is secured:

starting with the fires with the wind

Fire management programme in Andalucía, Spain

Fransisco (Paco) Senra Rivero, from The Regional Government of Andalusia, Spain

This presentation described several training programs to re-introduce prescribed fire in the region of Andalucía in southern Spain. There are studies (J.A Vega 1991, 1999) on the fire history of *Pinus pinaster* and *Abies pinsapo* in Sierra Bermeja (Málaga) where fires occurred in a decreasing frequency between 1817-1997. During 1998-2000 prescribed fires for fuel management and fire suppression training were applied by the Junta de Andalucía, with Rxfire experimental plots.

During 2001 – 2013 the prescribed burning program shut down, due to:

- Lack of specific RxFire regulation
- Absence of support from inside and outside of INFOCA (forest fire prevention & suppression service of Andalusia Government)
- Global fire exclusion policy besides anthropic fire initiation causes were still very high
- General idea that INFOCA is powerful enough to manage the scenario without the need of relying on fire/Rxfire management.

In 2012 a Rxfire regional training fire started justified on INFOCA needs. In 2016 a workshop was held in Almería was held, with NGOs, researchers, managers and politicians "Climate and Global Change, Wildfires and Use of Fire in Mediterranean Ecosystems" which can be seen on Youtube: Seminario Cambio climático y global, incendios y uso del fuego en ecosistemas mediterráneos

In 2017 the Andalusian Parliament published a policy urging the need to improve the use of good fire in wildfire prevention and ecosystems management and the need of training practices. Experimental burnings were carried out the same year and a regional prescribed burn strategy for Andalucía was launched. In 2019 and in 2022, a TREX course was arranged with the goals to evaluate/validate instructors, standardize and test procedures, forms and documents as well as defining and test training courses contents.

The first conservation burning was performed in 2018 in Fuente de Piedra Lagoon Natural Park. The goal was to open *Phragmatites australis* structures to reduce wild boar predation over bird nesting.

Between 2018 and 2022, the project Open2preserve was ongoing in several parts of Spain. The objective was to create a model of sustainable management that minimizes fire risk and guarantees ecosystem services in order to offer innovative solutions that assure sustainability and long-term

Aknowlegdments: Phd. M. Robles & Phd. A. Robles

economic viability, through the creation of High Natural Value Open Spaces, created by fire and preserved by livestock. The project established a state of the art in prescribed burning in Andalucía, implemented and evaluated pilot experience and provided training of shepherds in prescribed burning implementation.

Another ongoing project is Pyriclab (2020-2025) and the subproject Bipymed. This project aims at determining the capacity for regeneration of biotic characteristics (soil microbiota, vegetation and entomofauna) after different burnings to deepen the knowledge of best practices of pyric herbivory. Establishing legal, social and technical frameworks in Spain for the use of pyric herbivory in preventive silviculture against fires and for environmental management is also the topic for the COMPAS project (2022-2025).

Lastly, Fransisco Senra Rivero presented the prescribed burns in Doñana National Park within the CILIFO Project and Interreg POCTEP. Here, fire is used to renew and opening shrub lands to increase rabbit populations and to test effects on insect biodiversity, biome, soil and fuel complex. There are also fire experiments to promote the regeneration of *Quercus suber* and tests of crown initiation and crown fire models in Mediterranean pine stands within the UCO-INFOCA project (2020-2024).

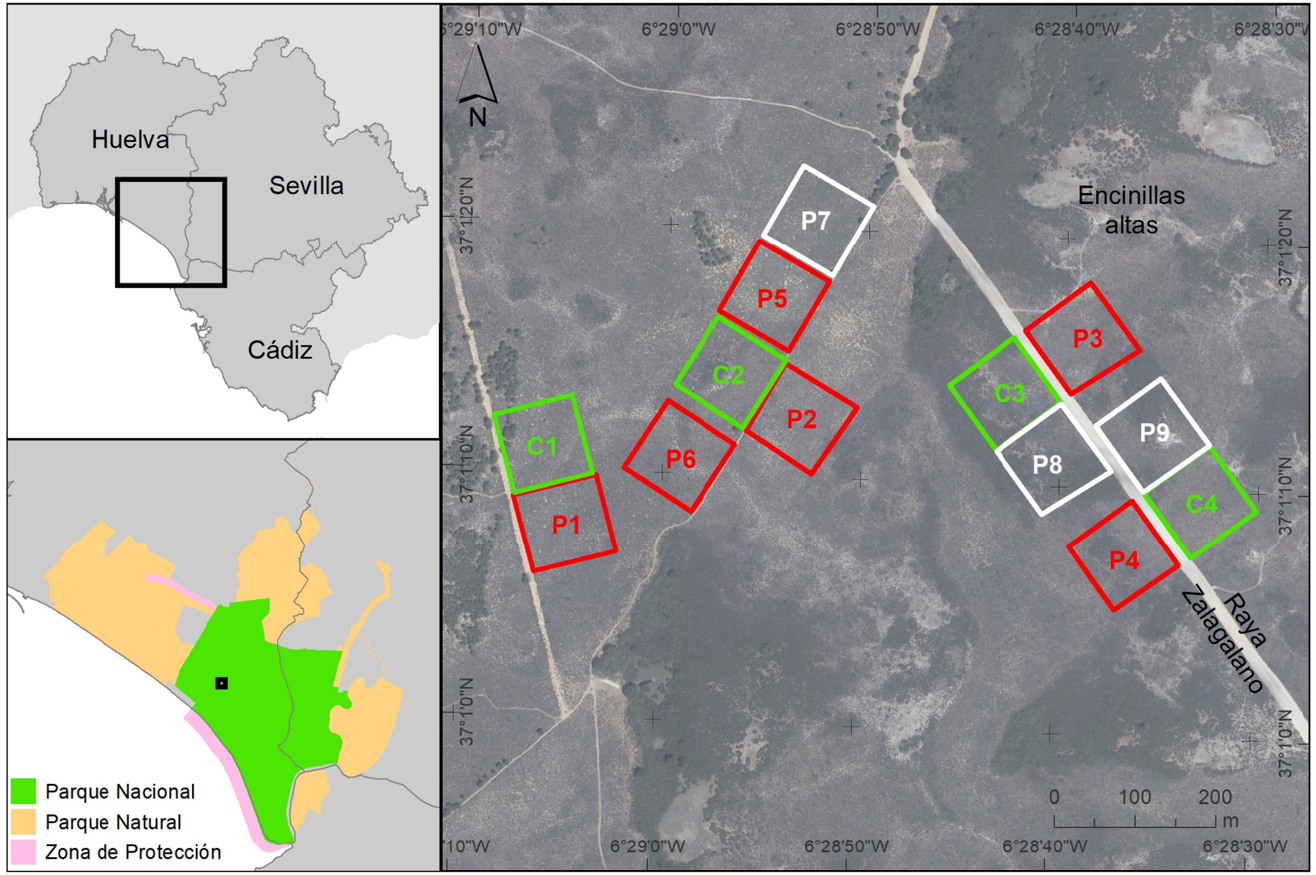
The projects have had cooperation with researchers to evaluate the burnings and adjust the burnings. Burnt areas have been compared with controls plots just next to the burnt areas.

Experimenting burnings with high intensity have been conducted together with the fire department. These various experiments have also had indirect advantages providing a lot of data about many species and how they react on fire. The results have been shared with citizens.

Fransisco Senra Rivero concluded that:

- Forest fire suppression resources and expertise provides a relevant background, however a RxFire qualification programme following international standards is essential because it provides exchange opportunities and better integration of both fire managers and researchers.
- Reinforcing collaboration between fire managers, local stakeholders and researchers is key.
- Specific Rxfire legislation is needed.
- Implementing a prescribed fire programme is a request for any (forest) fire suppression service just based on training needs, but also provides unique opportunities to monitor fire effects or adjust fire danger indexes among other outputs, besides being an efficient tool for fuel management and risk management.
- Still many steps must be done in Andalucía (and Spain) to improve our knowledge of fire effects on ecosystems so that both the scientific community and managers (foresters and fire fighters) accept that certain types of fire regimes are desirable in certain habitats, and consequently, that the actual total exclusion of fire in some of them may be counterproductive.

2020-22 Prescribed burns in Doñana National Park



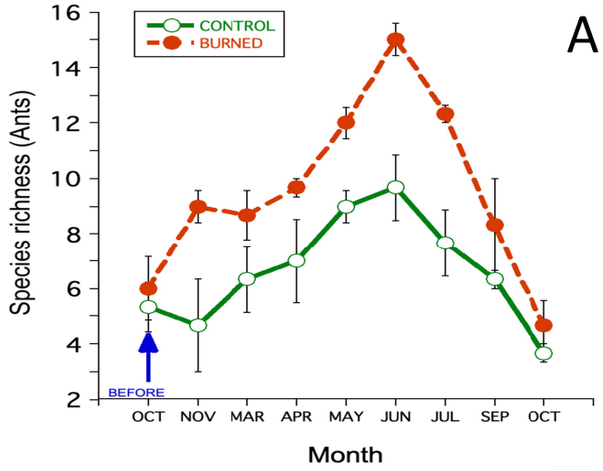
Aknowlegdments: Phd. Xim Cerdá & Phd. J.J. Vidal. EBD – CSIC.

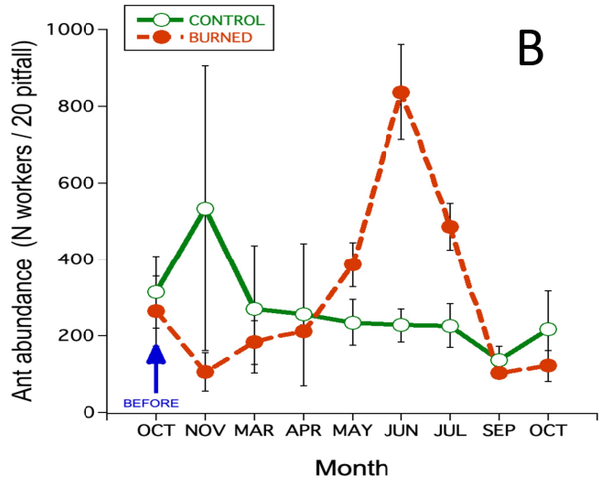
Prescribed burning experiences in protected areas: Doñana National Park

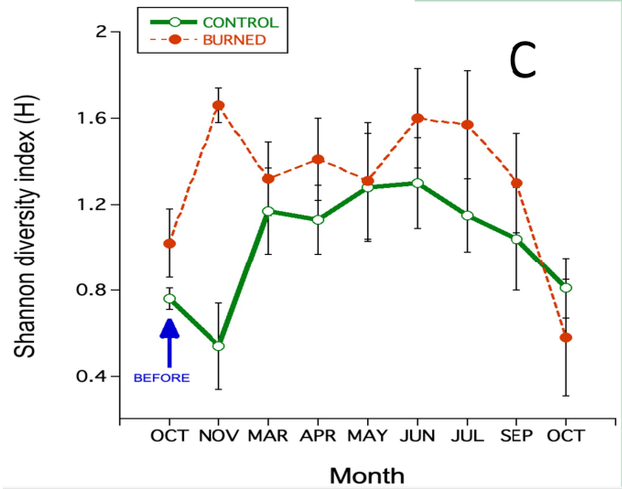
2020-22 Prescribed burns in Doñana National Park

Dr. Xim Cerdá & Dr. J.J. Vidal. EBD – CSIC.

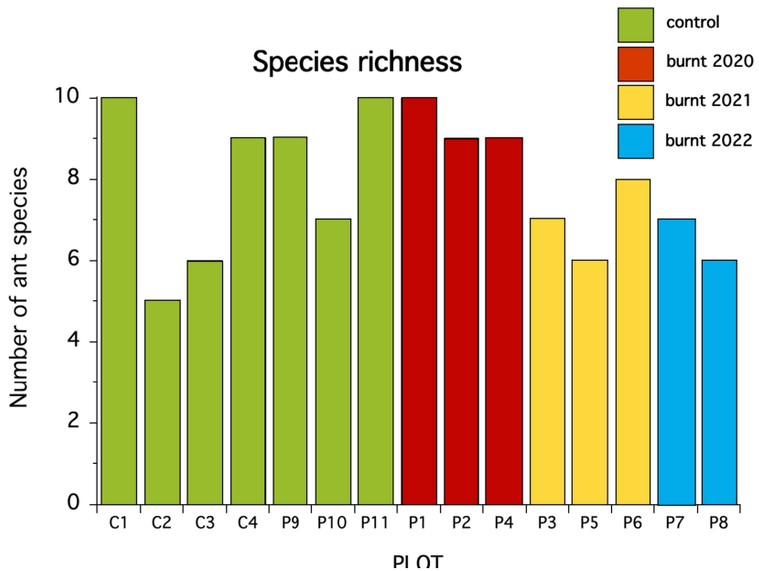
2020-21

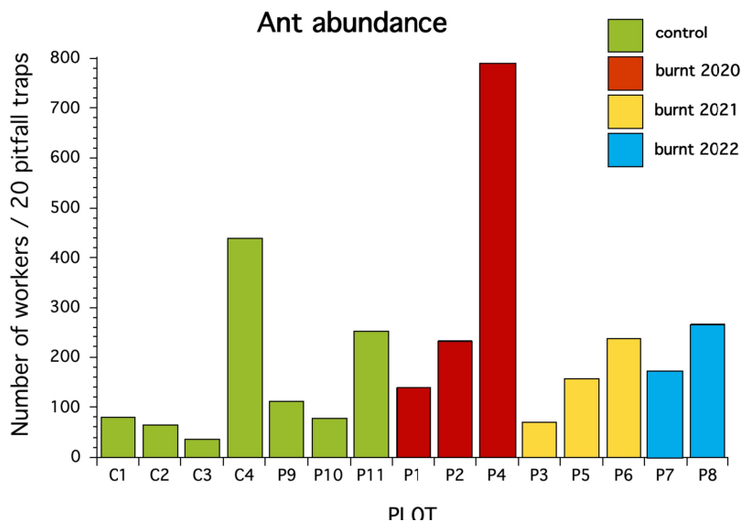


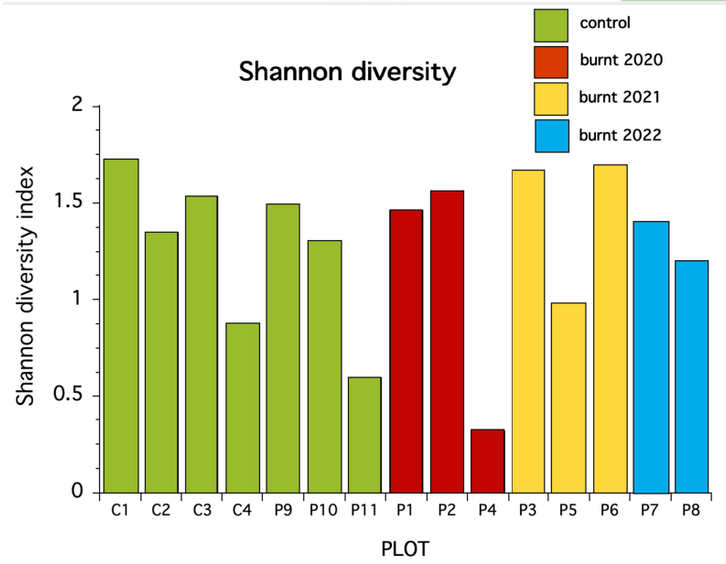




2024







2020-24 Prescribed burns experiences by UCO - INFOCA

High intensity experimental burnings to test crown initiation and crown fire models in Mediterranean pine stands

RESEARCH ARTICLE

OPEN ACCESS

Assessment of crown fire initiation and spread models in Mediterranean conifer forests by using data from field and laboratory experiments

Francisco Rodríguez y Silva[1], Mercedes Guijarro[2,3], Javier Madrigal[2,3], Enrique Jiménez[4], Juan R. Molina[1], Carmen Hernando[2,3], Ricardo Vélez[5], and José A. Vega[4]

Aknowlegdments: Prof. Francisco Rodríguez y Silva & Prof. Juan Ramón Molina

2020-24 Prescribed burns experiencies by UCO - INFOCA

Prescribed fires to identify optimal windows burn, ignition pattern, scorch heigh and useful life in Mediterranean pine stands

Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman

Fire ignition patterns to manage prescribed fire behavior: Application to Mediterranean pine forests

J.R. Molina *, M. Ortega, F. Rodríguez y Silva

Contents lists available at ScienceDirect

Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco

Scorch height and volume modeling in prescribed fires: Effects of canopy gaps in *Pinus pinaster* stands in Southern Europe

J.R. Molina *, M. Ortega, F. Rodríguez y Silva

forests

Article

Useful Life of Prescribed Fires in a Southern Mediterranean Basin: An Application to *Pinus pinaster* Stands in the Sierra Morena Range

Juan Ramón Molina *, Macarena Ortega and Francisco Rodríguez y Silva

Aknowlegdments: Prof. Francisco Rodríguez y Silva & Prof. Juan Ramón Molina

Building a burning team: developing a communities' prescribed fire skills and capacity

Jeremy D. Bailey, from the Nature Conservancy of the Unites States

Fire is Local, Show Up, Make Prescribed Fire a Priority

Fire is Local- The fire behavior and the fire's effect, and the community's interaction with fire is specific to the current local conditions of the physical and social environment.

Some examples these local conditions include the plant's phenology and growth cycles, and the daily and seasonal weather; also, the fire practitioner's knowledge, the legal agreements and the relationships between the participating organizations.

Show Up- An important and common best practice among successful burners is being there for one another. It's critical to request assistance from neighbors and partners on burn day, and it's critical to show up to assist neighbors and partners on their burn day. Every private landowner, every agency and organization planning and implementing burns needs help. The conditions required for a successful burn day limit the number of potential days; so when a team is burning, it's important to show up and help them.

Examples of how managers can support their employees **show up,** include, allowing workers pause what they are doing today so they can help their neighbors and partners accomplish the day's burn and trainings. Also, provide funding for work on partner lands, use volunteer agreements and standard operating procedures and other legal agreements, enabling the exchange of personnel and equipment.

Prescribed Fire must be a Priority- to accomplish stated goals for burning, a program, a community or an individual must make it a priority. Prescribed burning is not convenient and it's not easy. Barriers are innumerable- and they are always present. To accomplish burning, a community, an organization, agency must prioritize the work.

The barriers listed now which prevent us from burning, will be present a decade from now, and likely three decades from now. Overcoming barriers is not about eliminating the barriers, rather it is about prioritizing your burn and working through the very specific barriers for that burn day, and the next burn day, and the next.

10 Best Practices to Build Capacity within your Community:

- Understand and communicate to your community, the numerous benefits of fire on your lands.
- Learn from, and value your local burning experts, regardless of their affiliation or accreditation.
- Learn, know, and follow local laws, while also advocating for changes to better support prescribed burning.
- Develop and support your local burners. Include volunteers and partners from other organizations in your teams. Train and equip your workers.
- Create jobs and positions which prioritize prescribed burning.
- Don't charge others when you come over for a day or two to assist; rather, expect reciprocal assistance.
- Borrow and share equipment.
- Find and celebrate your inspired and motivated burners and fire practitioners. Empower them to build and develop community around them. Passionate, effective burners will continue to engage over the decades- they will become your stalwarts.
- Understand and work with legal documents and agreements which enable agencies and organizations to work together, share funding and share responsibility.
- Plan more than just one experimental burn. Instead, plan multiple burns during your season, and keep planning and burning for every subsequent season.

Jeremy Bailey (he/him)
The Nature Conservancy, North America Fire
Director, Prescribed Fire Training
+1 801 599 1394
jeremy_bailey@tnc.org
See listings of Upcoming TREX
Subscribe to the Networker

Discussions in smaller groups

In this session, the participants were divided into groups of 4-6 persons and had a few questions to discuss for 45 minutes.

1. What is your current situation on prescribed fires for biodiversity and risk management?
2. What are the greatest challenges in your organisation?
3. What can you learn from each other to take steps forward?

Each group had the opportunity to report back some highlights from their discussions during the plenary session. We heard both a number of challenges being exemplified, as well as encouraged conclusions on the importance of fire as a management tool.

In Austria, there is a prevalent perception that fire is destructive. There is a big challenge to receive permits for conducting prescribed fires. Fine particles and pollution, as well as CO_2-emissions are examples of arguments. In Lithuania, there are discussions on fuel accumulation and how to reach acceptance for managing fuels with fire.

In the Czech Republic, a small-scale experiment has been conducted in a national park, burning on dry grasslands and open woodlands with oak domination. They face legislative complications: they are allowed to conduct nature conservation burning, but the politicians try to change that legislation and avoid burning in general. There was a wildfire in the national park two years ago, which created a big fear of fires, focusing on strategy to suppress fire, not create any new ones. Local fire fighters have put up strict rules, and it is difficult to find a proper burning day. Local fire fighters will not join, only voluntary fire fighters that are available during the weekends. Other challenges are limitations in staff and equipment, they need large trucks with water tanks.

Some conclusions from a Swedish discussion group, was that they seem to have a good and privileged situation with high acceptance for prescribed burning. There are however obstacles such as the burning weather (few possible burning days) and a limited number of entrepreneurs. In the forest company Sveaskog, large wildfires have resulted in that so many hectares were certified in FSC after the fire, that the company did not continue to conduct prescribed fire themselves, and therefore lost capacity of staff and skills, due to that de-prioritization.

One group discussed how legislation varies between countries, and that there is a risk of ecological fragmentation due to that. The legislative structure seems to be more flexible in Northern Europe, whereas it is more restrictive in Southern Europe with needs of permits. The project we heard about from Greece on introducing prescribed burning as a legal tool are truly pioneers.

In the United Kingdom, burning is not used in forest lands but rather on heathlands. The group could see that many professions can meet around burning for different purposes.

It is important to learn from every burning occasion in the work of risk management. In the U.S, Sweden and Finland, there is no long-term analysis of risk management of biodiversity, but it is needed.

A good argument to use to politicians is the cost per hectare in comparison to other treatments. One fire can achieve beneficial effects for decades forward. Fire prevention or biodiversity objectives all need the same kind of management in practice.

It is important to build networks on prescribed fire and exchange contacts to create a stronger policy change platform. Fire is crucial!

Take-home tasks

As a concluding exercise of the webinar, we asked the audience to mention what they will do next when getting back to office?

- Share information
- Educate the decision/policy makers
- Introduce prescribed fire in the law
- Building organisation, build team
- Building network / Networking
- Networking with contacts within the regional fire management community
- Take contact with others in the region
- Improve communication both within and between different organisations
- Motivating prescribed burning as a management method in protected areas
- Promote prescribed burning as a tool for nature restoration and wildfire prevention
- Further reading on the scientific literature shared and share with others. Networking with international colleagues.
- Study examples
- Raise the cost study
- Field exchanges
- Planning new prescribed fire areas
- Preparing for the coming season
- Improve
- New insights in how fire favour some rare plants
- TREX

Concluding remarks of the webinars

The Biogeographical Process has supported the organisation of the prescribed burning event and promoted the outcome. We observe that prescribed burning has attracted a lot of attention, as demonstrated by the high attendance of participants, from all over Europe and beyond. In fact, the participation was much higher than expected. During the event itself there was also a lot of exchange of ideas and response on presentations. The active involvement of participants underlined their interest.

Northern or boreal Europe has been working on prescribed burning for some decades now and the Life2Taiga project is one of the key players in this process. In Southern Europe the attention towards prescribed burning, as improved fire management, has been developing over the past years, and has gained momentum. We have seen good examples of practice during this event. The workshop we believe has been instrumental in bringing the different perspectives and experiences together, and cross-fertilization and learning has taken place.

A challenge ahead is to improve our understanding of the requirements and planning of prescribed burning. And, perhaps most important, also ensuring that the decision makers are convinced of the need for prescribed burning, and do adopt it as part of integrated management of protected sites. Also in the light of climate change, burning is fundamental.

We believe that Natura 2000, and biodiversity as a whole will benefit from prescribed burning. We hope therefore that we can give this initial online workshop a follow-up in the coming year, with a live excursion and demonstration in the field.

Theo van der Sluis,

Project Leader Natura 2000 Biogeographical Process

http://ec.europa.eu/environment/nature/natura2000/platform/knowledge_exchange/index_en.htm

e-mail: Natura2000platform@wur.nl

If you would like to contact the project, please send an e-mail to: life2taiga@lansstyrelsen.se

Project webpage: Life2Taiga | Länsstyrelsen Västmanland

(The webpage is in Swedish, scroll down a bit to find the English section.)

Contact info to speakers

Erik Hellberg Meschaks Swedish Environmental Protection Agency, Östersund, Sweden	**E-mail: erik.hellberg-meschaks@naturvardsverket.se** Web: Naturvårdsverket
Francisco Moreira Research Centre in Biodiversity and Genetic Resources (CIBIO-BIOPOLIS) Vairão, Portugal	**E-mail: fmoreira@cibio.up.pt** http://cibio.up.pt/people/details/fmoreira http://www.webofscience.com/wos/author/record/B-2873-2008 https://scholar.google.com/citations?user=9WUUXXAAAAAJ&h
Juli G. Pausas The Desertification Research Centre at the Spanish Research Council (CIDE-CSIC) Valencia, Spain	**E-mail: juli.g.pausas@csic.es** Web: www.uv.es/jgpausas blog: jgpausas.blogs.uv.es
Jesús San Miguel Joint Research Centre at the European Commission	**E-mail: jesus.san-miguel@ec.europa.eu** https://effis.jrc.ec.europa.eu (European Forest Fire Information System) https://gwis.jrc.ec.europa.eu (Global Wildfire Information System)
Marek Smith Director, North America Fire Co-Director, Fire Networks Partnership The Nature Conservancy, Durham, North Carolina, U.S	**E-mail: marek_smith@tnc.org** Learn more about Why We Work With Fire Learn more about The Fire Networks
Miltiadis Athanasiou Associate Researcher, Ellinikos Georgikos Organismos, Greece (Hellenic Agricultural organisation, ELGO-DIMITRA) Institute of Mediterranean Forest Ecosystems Terma Alkmanos, Ilisia, 115 28 Athens	**E-mail: m.athanasiou@elgo.gr** https://www.researchgate.net/profile/Miltiadis_Athanasiou https://www.fria.gr/EngPage/athanasiou.html
Julia Carlsson Project manager Life2Taiga County Administrative Board of Västmanland, Västerås, Sweden	**E-mail: life2taiga@lansstyrelsen.se** Life2Taiga | Länsstyrelsen Västmanland
René Dahmen Department of Nature and Forests in Wallonia, Belgium (SPW)	**E-mail: rene.dahmen@spw.wallonie.be** Département de la Nature et des Forêts | Service public de Wallonie
Fransisco Senra Rivero Deputy Director INFOCA, AMAYA Forest Fire Suppression and Prevention Service for the Government of Andalusia, Spain	**E-mail: francisco.senra.rivero@juntadeandalucia.es**
Jeremy D. Bailey North America Fire Director, Prescribed Fire Training The Nature Conservancy, U.S.	**E-mail: jeremy_bailey@tnc.org** See listings of Upcoming TREX Subscribe to the Networker