



Satellite-based Services for Disaster Risk Management

Direcció General dels Agents Rurals

Març 2025

agents rurals
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Generalitat
de Catalunya

Assessment of Areas Affected by Wildfires

Cos d'Agents Rurals

Introduction

The mission of the “Cos d’Agents Rurals” of Catalonia

Ensuring the **protection** of the environment of Catalonia

Carrying out activities of comprehensive monitoring

Control, protection and **prevention of the environment** and at the same time collaborating in the management, research, information and advice to the public

Jurisdiction over cause investigation and real-time assessment of the affected area during the emergency, including its distribution by land use and municipalities.

Assessment of Areas Affected by Wildfires

Start of the Emergency



Smoke column alert

- Process of assessing the affected area based on data received from the field units: initial coordinates.

Assessment of Areas Affected by Wildfires

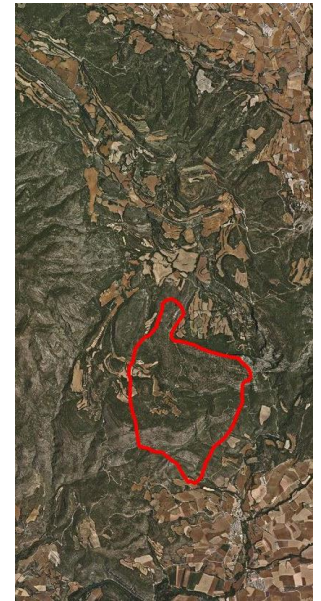
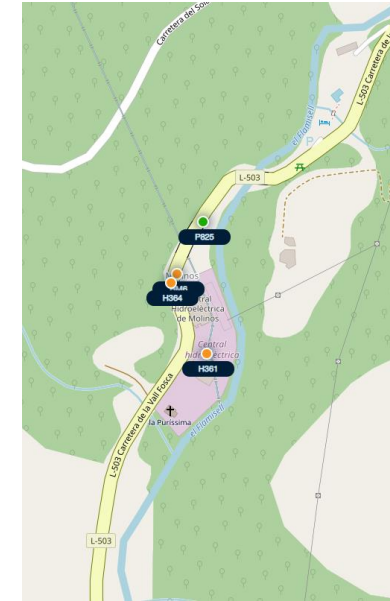
Assessment Progress: monitoring the wildfire perimeter

Estimation of the impact considering different aspects:

- Fire direction
- Evolution of the flanks

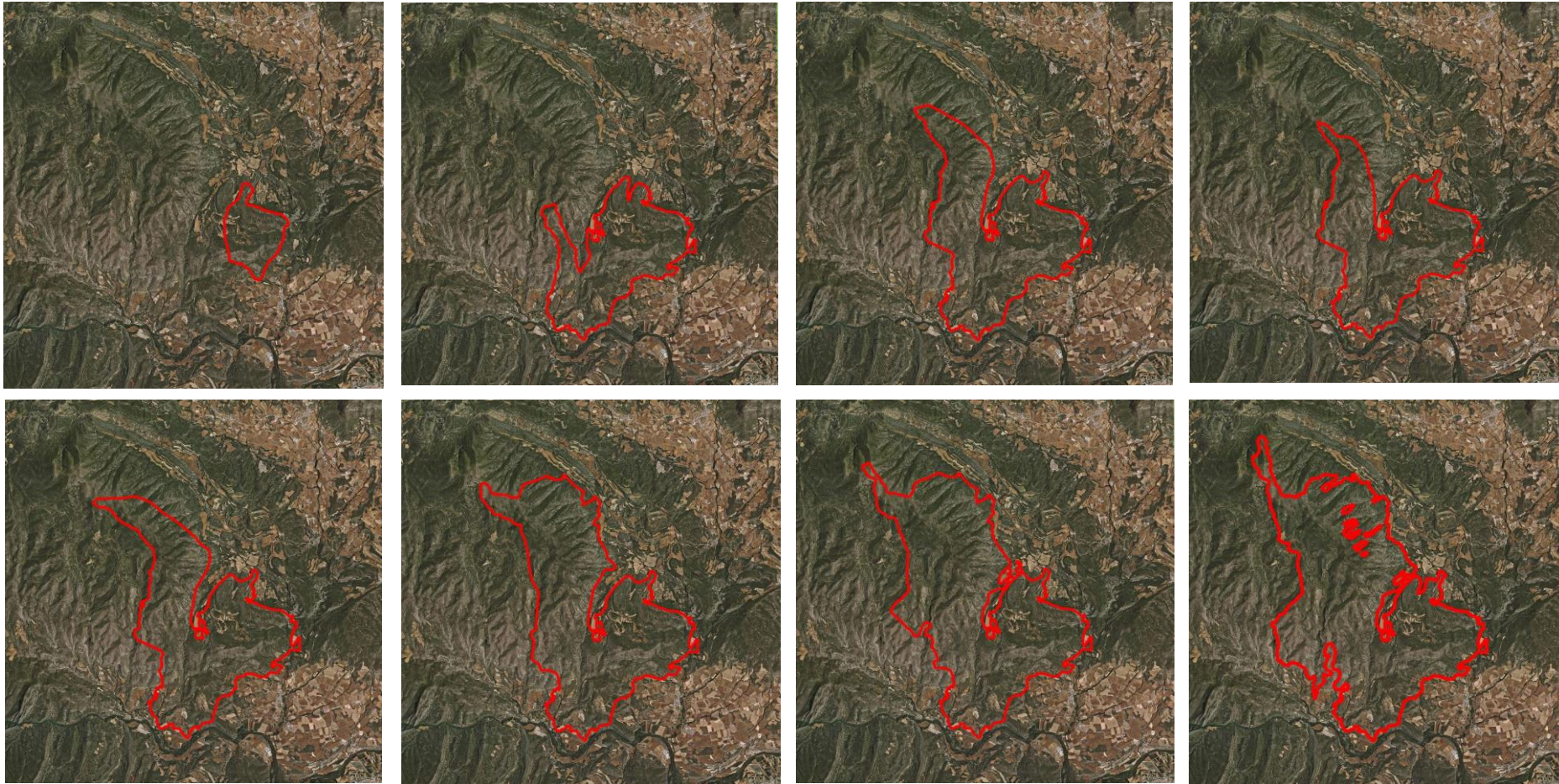
Tools used:

- Field agent reports
- Aerial photography
- Hotspot detection from the Fire Information for Resource Management System (NASA)
- Copernicus EMS



Assessment of Areas Affected by Wildfires

Assessment Progress: monitoring the wildfire perimeter



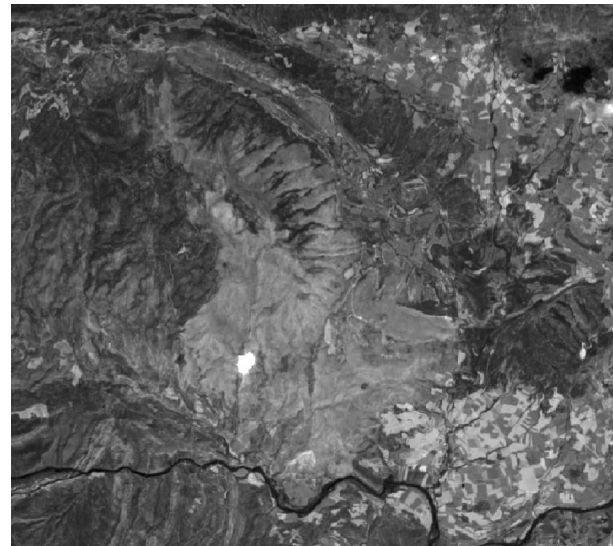
Assessment of Areas Affected by Wildfires

Final Assessment

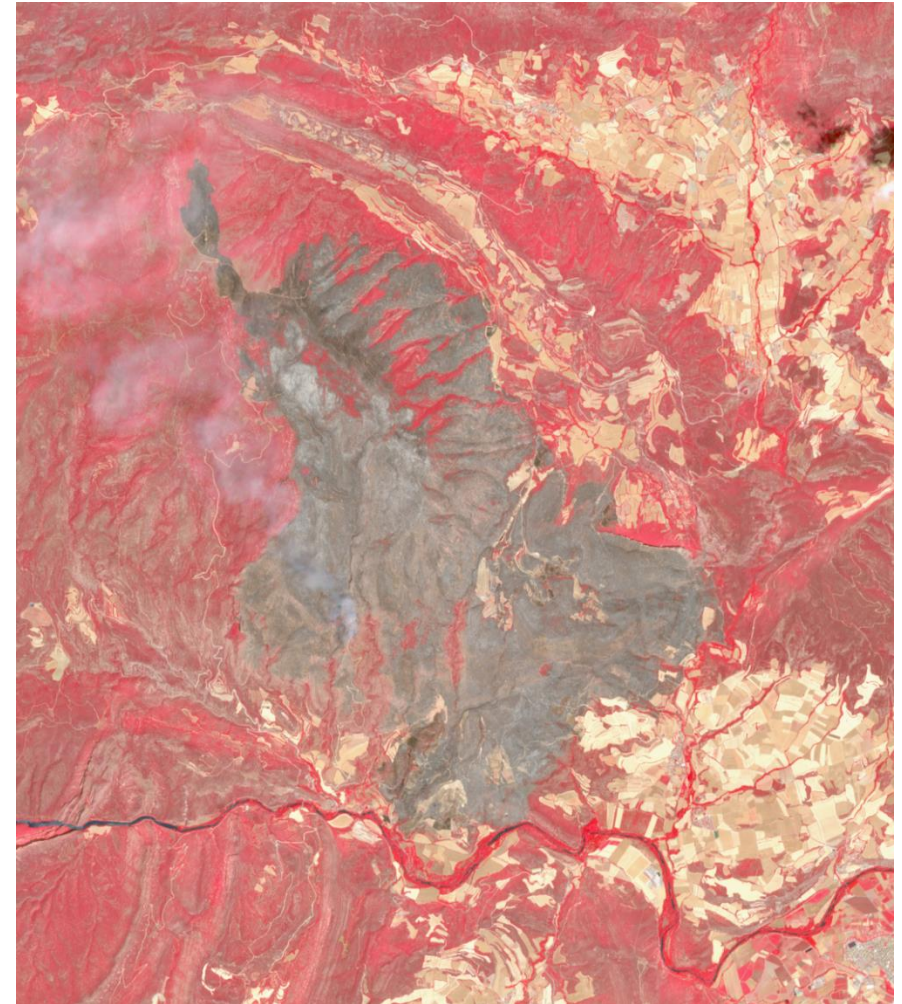
The **Direcció General dels Agents Rurals (DGAR)** carries out the calculation and verification of the final affected areas using **SENTINEL images** from the **Copernicus program**.



NIR - post-wildfire



SWIR – post-wildfire



False-Color Fire Image 19/06/2022 (Band Combination)

Assessment of Areas Affected by Wildfires

Normalized Burn Ratio (NBR)

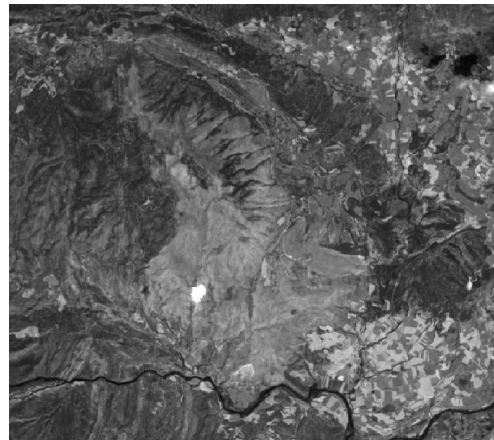
To perform these calculations, both pre-fire and post-fire images are used.

The **NIR (Near Infrared)** and **SWIR (Shortwave Infrared)** bands, from before and after the fire, are combined to derive the **pre-fire and post-fire NBR (Normalized Burn Ratio)**, ultimately obtaining the **final NBR**.

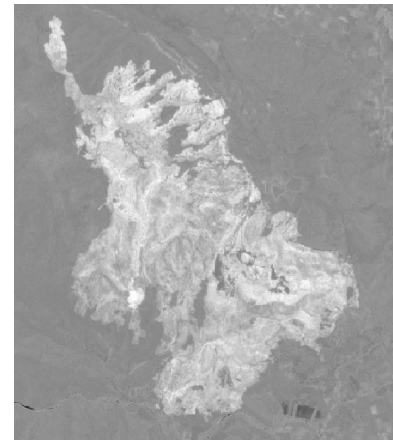
The **Normalized Burn Ratio (NBR)** is an index designed to highlight burned areas in large wildfire zones. Its formula is similar to the **NDVI (Normalized Difference Vegetation Index)** but specifically combines near-infrared (**NIR**) and shortwave infrared (**SWIR**) wavelengths.



NIR - post-wildfire



SWIR – post-wildfire



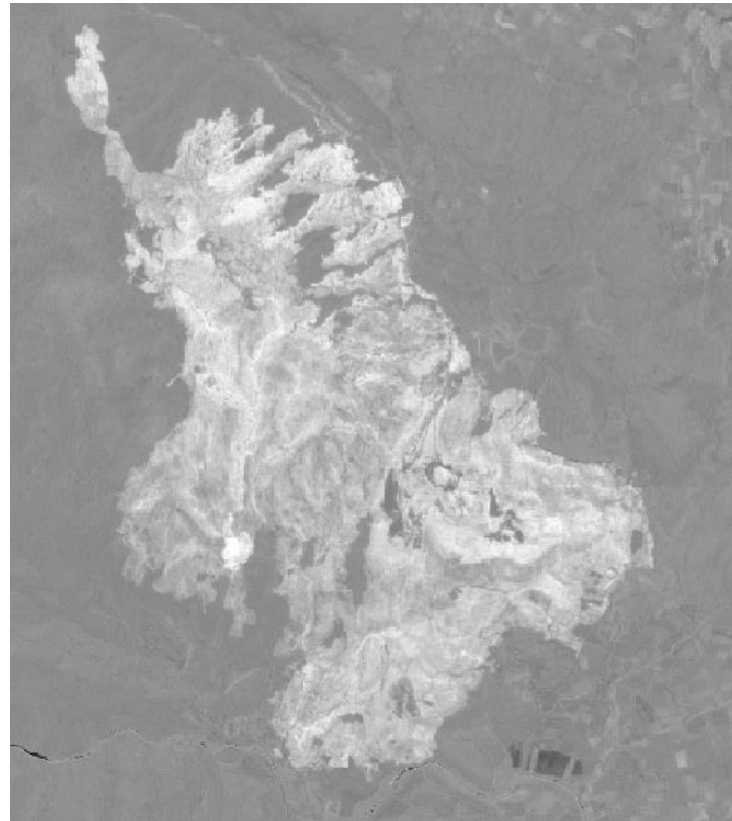
NBR – post-wildfire

Assessment of Areas Affected by Wildfires

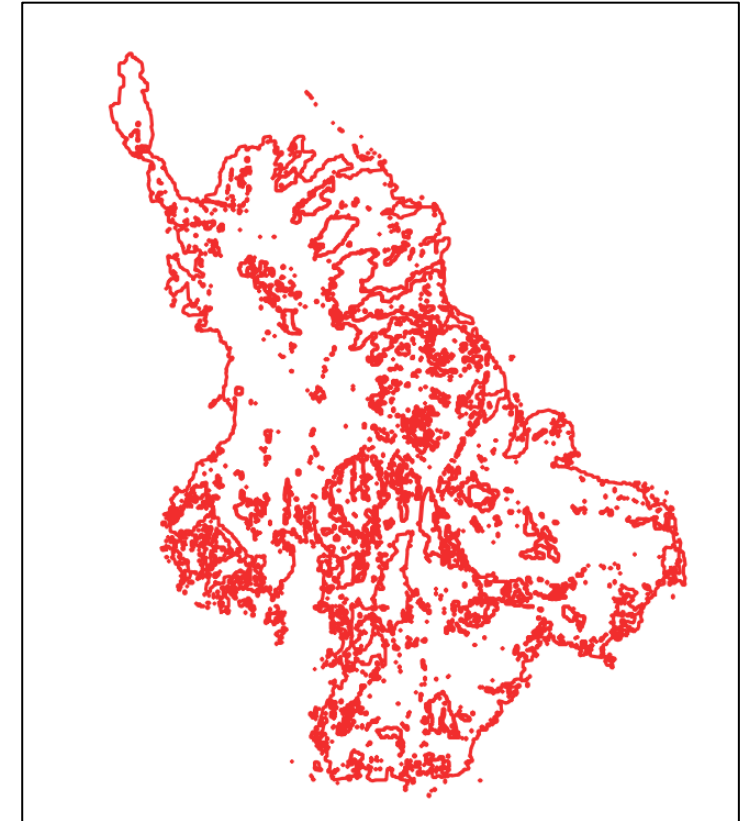
Normalized Burn Ratio (NBR) and final assessment of the Cos d'Agents Rurals

Based on this **NBR**, the affected polygon is extracted.

Based on the results obtained from the process of defining the perimeter using satellite imagery, the actual affected areas are refined by considering various factors, such as those previously mentioned: **aerial images** (helicopter, RPAS...), **GPS perimeters**, **field agent reports**, **CAR unit locations**, and other relevant data.



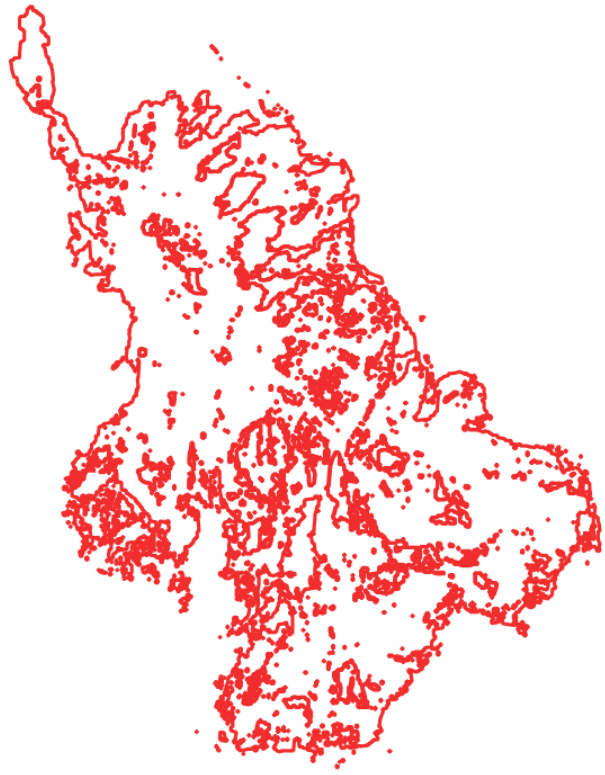
Final NBR



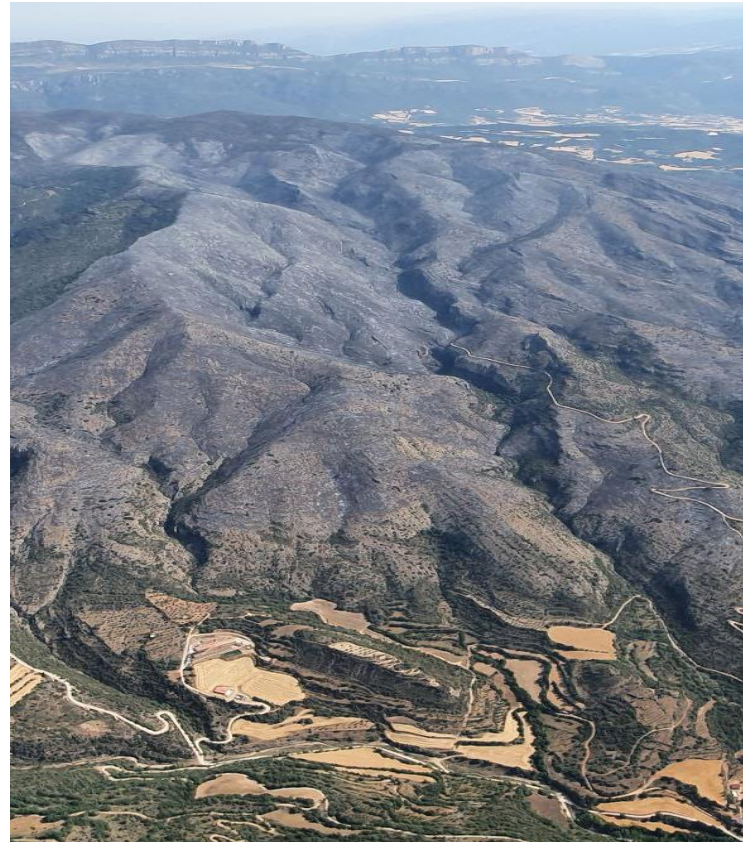
Resulting polygon from satellite image

Assessment of Areas Affected by Wildfires

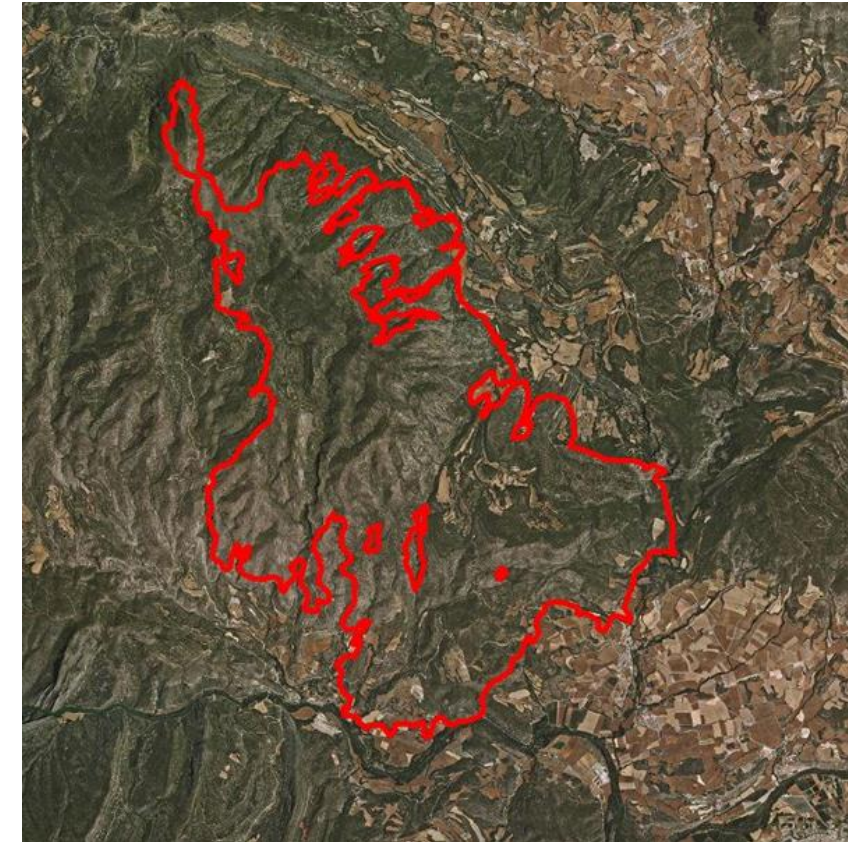
Final assessment of the Cos d'Agents Rurals



Resulting polygon from satellite image



Aerial Images – CAR Air Unit



Final assessment

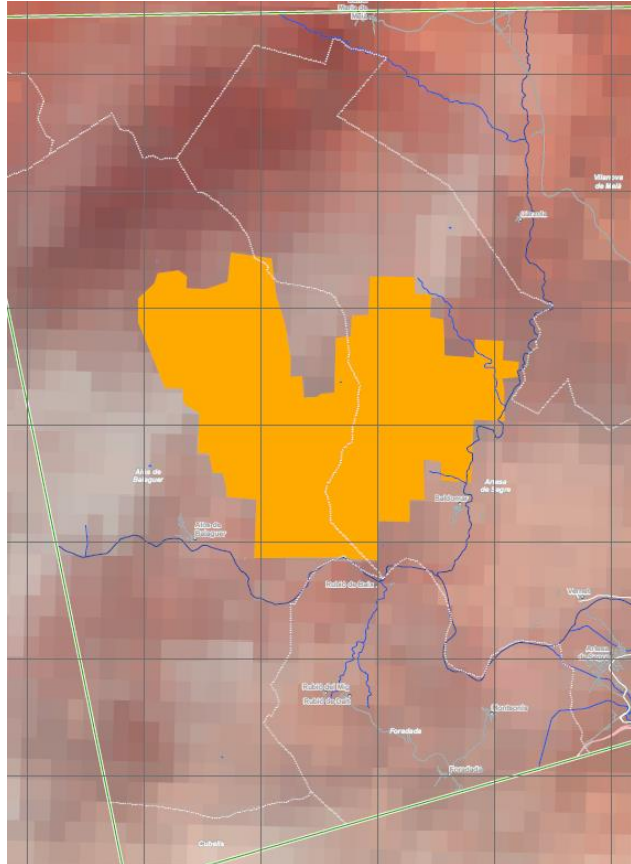
Assessment of Areas Affected by Wildfires

Emergency Management System

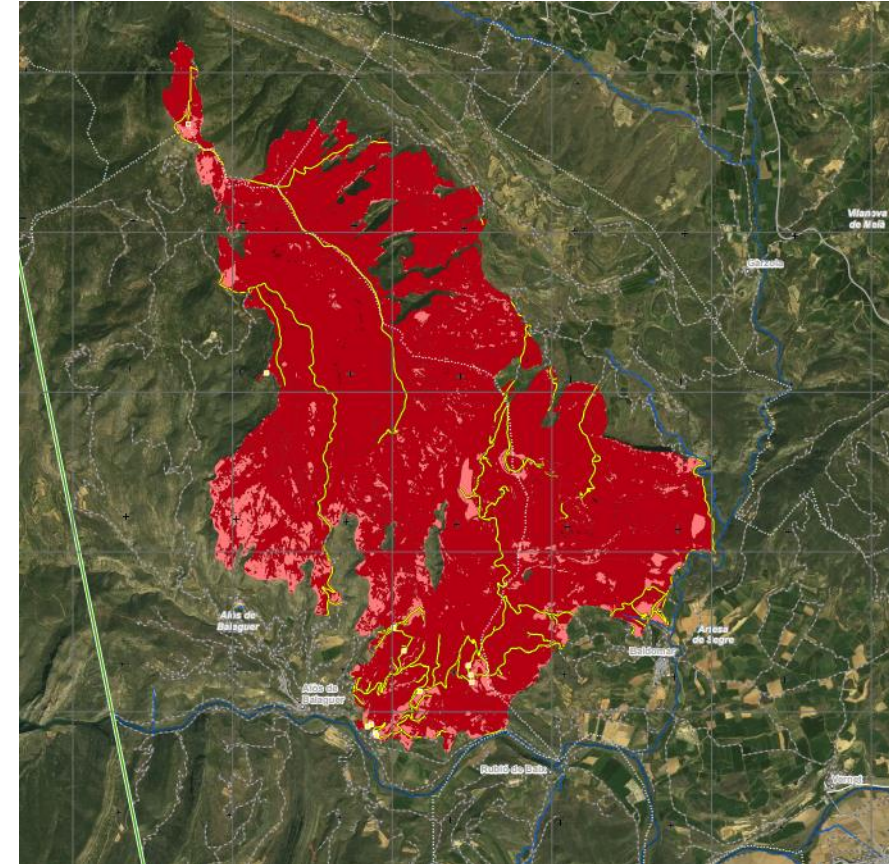
If the emergency is classified as severe, the **Emergency Management System (EMS)** of the **Copernicus program** is activated, providing initial impact assessments

The activation of the EMS falls under the jurisdiction of Civil Protection.

At the **Direcció General dels Agents Rurals (DGAR)**, the EMS assessment serves as a guideline and is refined using the available aerial images and real-time information, which are continuously updated according to the wildfire's evolution



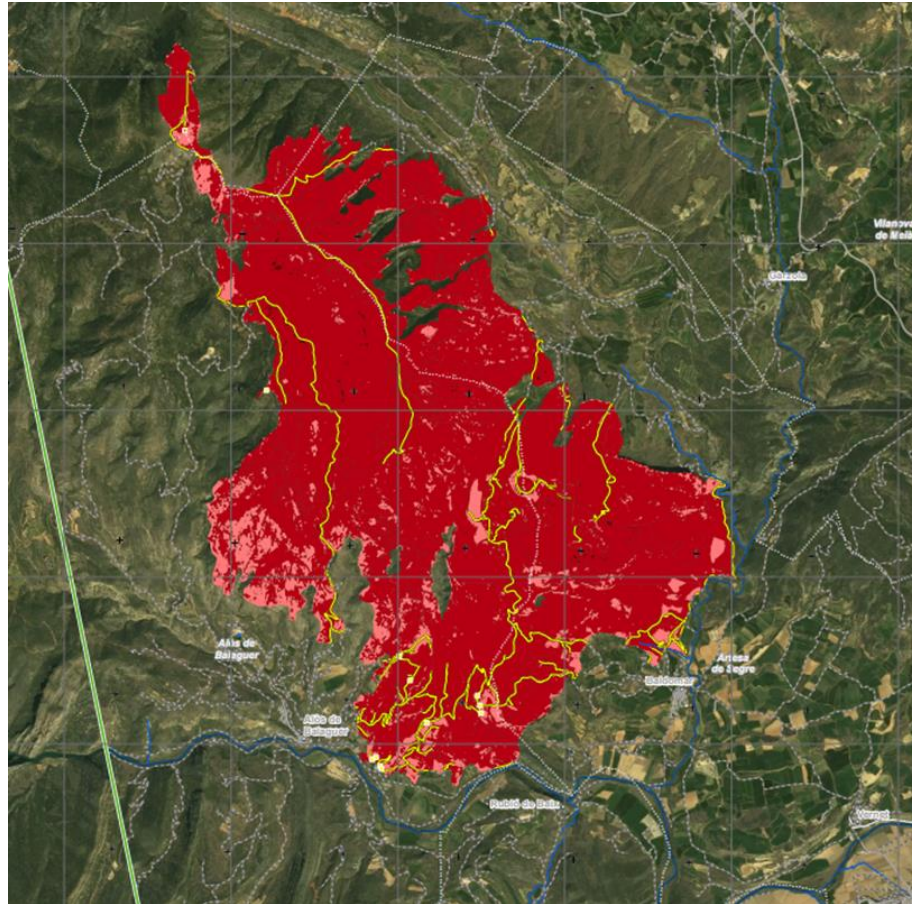
Initial assessment



Final assessment

Assessment of Areas Affected by Wildfires

Final assessment of the Cos d'Agents Rurals



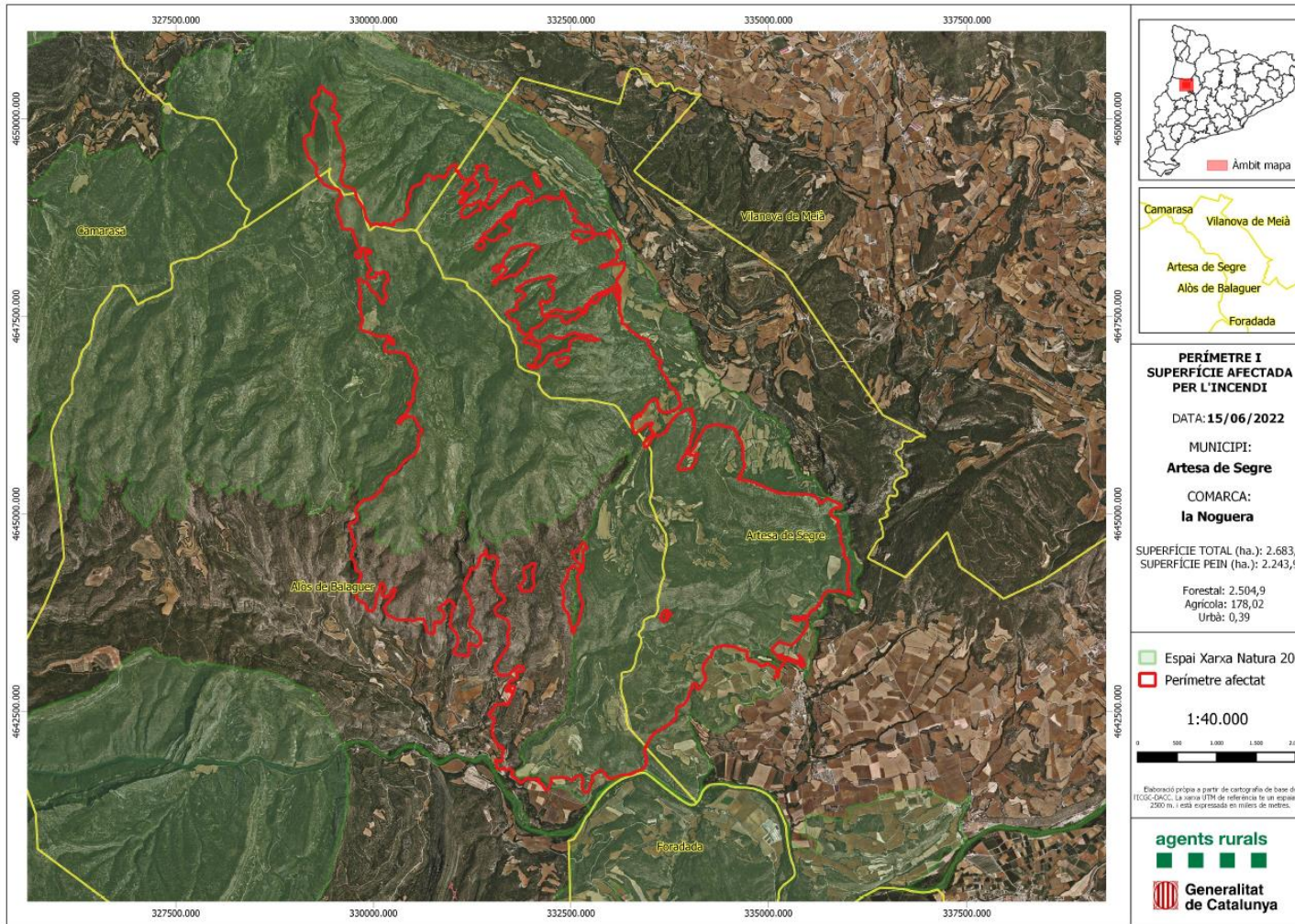
Valoració final EMS



Final Assessment – DGAR Calculation

Assessment of Areas Affected by Wildfires

Final assessment of the Cos d'Agents Rurals



Generalitat de Catalunya

SUPERFÍCIE AFECTADA PER L'INCENDI

Municipi i data de l'incendi: Artesa de Segre ; 15/06/2022

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Data i hora del report: 22/06/2022 18:12:21

MUNICIPIS AFECTATS (ha):

USOS / COBERTES AFECTATS	Alòs de Balaguer	Artesa de Segre	Vilanova de Meià	TOTAL	%
Airbrat	631,31	525,43	18,13	1.174,87	43,78
Conreus	124,77	53,25		178,02	6,63
Improductiu	18,89	21,10	0,12	40,11	1,49
Matollar	704,67	426,95	27,50	1.159,13	43,20
Pastures	75,04	36,24	19,52	130,81	4,87
Urbà/Artificial	0,39			0,39	0,01
TOTAL	1.555,06	1.062,98	65,28	2.683,31	100,00

Dades obtingudes a partir de la reclassificació del mapa de cobertes del sol del 2020 (CREAF-ACC) i del MUC (DVPDT)

Finally, automated processes are carried out to obtain assessments and determine the affected areas based on land use and municipalities

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de Catalunya**

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