EU Grassland Watch

Copernicus downstream application for monitoring grasslands in Natura 2000 sites

Results of the European Parliament Pilot Project
"Copernicus for Natura 2000 – COP4N2K"

5th Natura 2000 monitoring workshop - part 2

Bruno Combal and Frank Vassen, European Commission, DG ENV.D3, Nature Conservation Unit

Biodiversity of grasslands in Europe

Species-rich grasslands are **key habitats for biodiversity in Europe:**

- Of the 526 bird species regularly occurring in Europe, **152 (29%) are associated to some degree with grassland habitats**. All bird species with a preference for arable land also occur in grasslands.
- Of the 436 butterfly species in Europe, **274 (63%) species are supported by dry calcareous grasslands and steppe habitats**.

State of Nature in the EU (2019): Species-rich grasslands are amongst those habitats in the worst conservation status and with the highest share of deteriorating trends (together with bogs and dunes)

- Declines are a combined result of land use changes linked to **agricultural intensification, urbanisation** and **land abandonment**
- **Even in some of the Natura 2000 sites** designated for them, grassland habitats and their associated species **continue to decline!**

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Annex I of the Habitats directive lists 32 types of grasslands!

European Commission

Key questions on Natura 2000 grasslands

- Could we get a reliable overview of the actual coverage of species-rich grasslands in Natura 2000 sites ?
- Could we follow the evolution of these grasslands in Natura 2000 over time (in terms of quantity/area and quality) at relevant scales (land parcel/ Site/ Region/ Member State)?
- Could this information be made available in a way that promotes compliance with the non-deterioration requirement for species-rich grasslands listed in Annex I Habitats Directive?

Copernicus for Natura 2000 (COP4N2K)

- Service contract run by DG.ENV.D3 (Nature conservation), with funding the European Parliament Pilot budget (total budget 1 million €)
- Project consortium:

- Steering committee: DG ENV D3, DG ENV A4 (IT), DG AGRI, EEA, JRC
- Duration: 31 months (01/09/2019 - 31/03/2022)

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Objectives of the contract

- **Use freely available satellite data** (Landsat, Copernicus-Sentinel 1 & 2) to develop a service to support the monitoring of Natura 2000, with a focus on monitoring grassland cover in the sites.
- Create a user-friendly and intuitive web tool that **provides maps and indicators on grasslands in Natura 2000**, at a range of scales from the pan-European to site levels.
- **Enable users to easily explore** grassland cover and cover changes at land parcel, Natura 2000 site or regional/national levels.
- Covering the period from 1994 until the present, provide grassland cover and cover change information for a selection of Natura 2000 sites with grasslands in all 27 EU Member States.

What the project has done

Selected 3 689 grassland-rich Natura 2000 based on the EEA Copernicus Local land product for Natura 2000 (https://land.copernicus.eu/local/natura)

Satellite data used:	*Landsat (Optical)*	*(1994-2016)*
	Sentinel I and II (Optical & radar)	*(2016-2018)*

Created annual land cover maps and statistical indicators for each site

Set-up a website to explore land cover & land cover change information at land parcel, Natura 2000 and regional/national level ("EU Grassland Watch")

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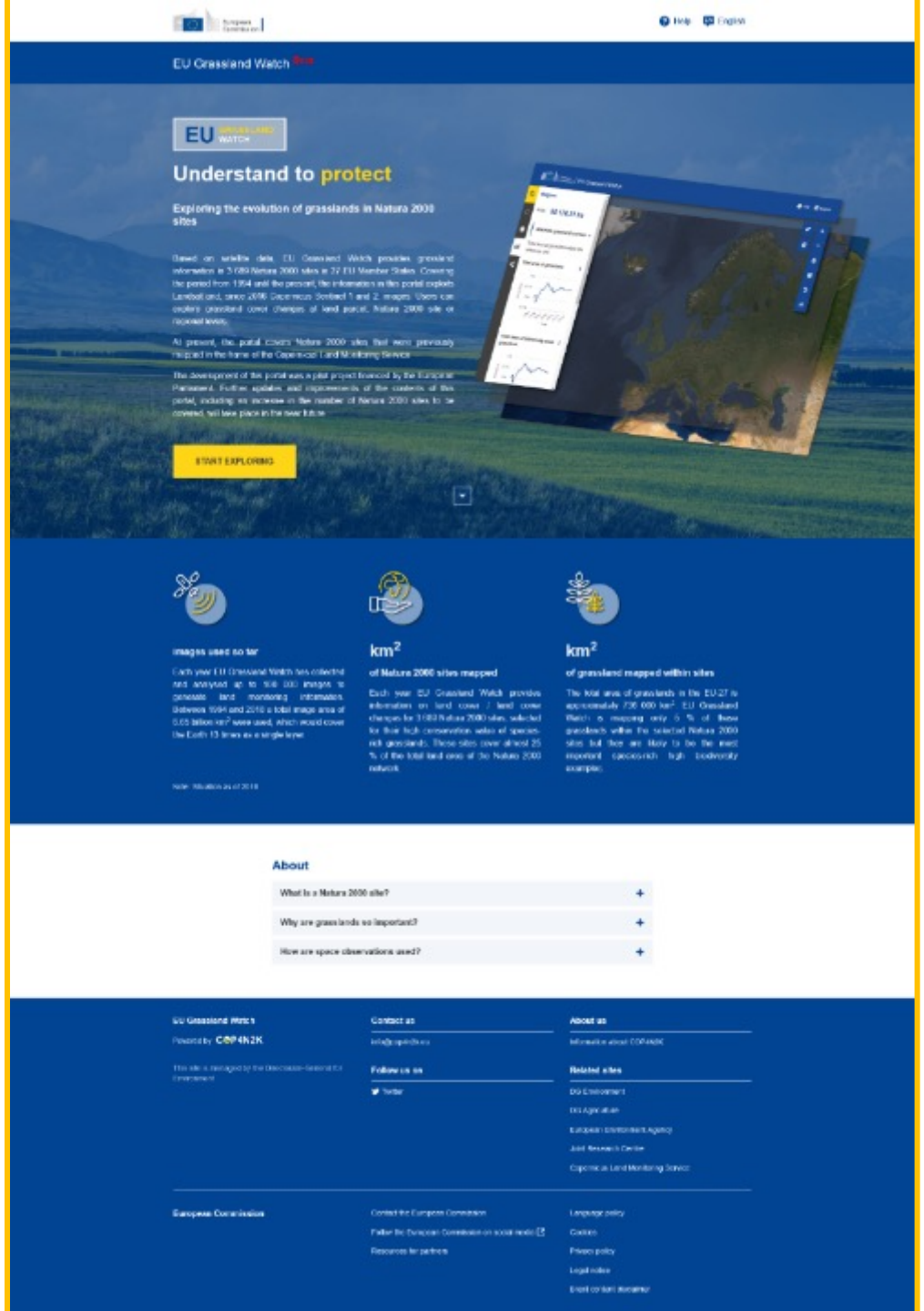


https://ec.europa.eu/eu-grassland-watch

prototype

European Commission

EU Grassland Watch Beta

European Commission

Help | English

Grassland surface extent

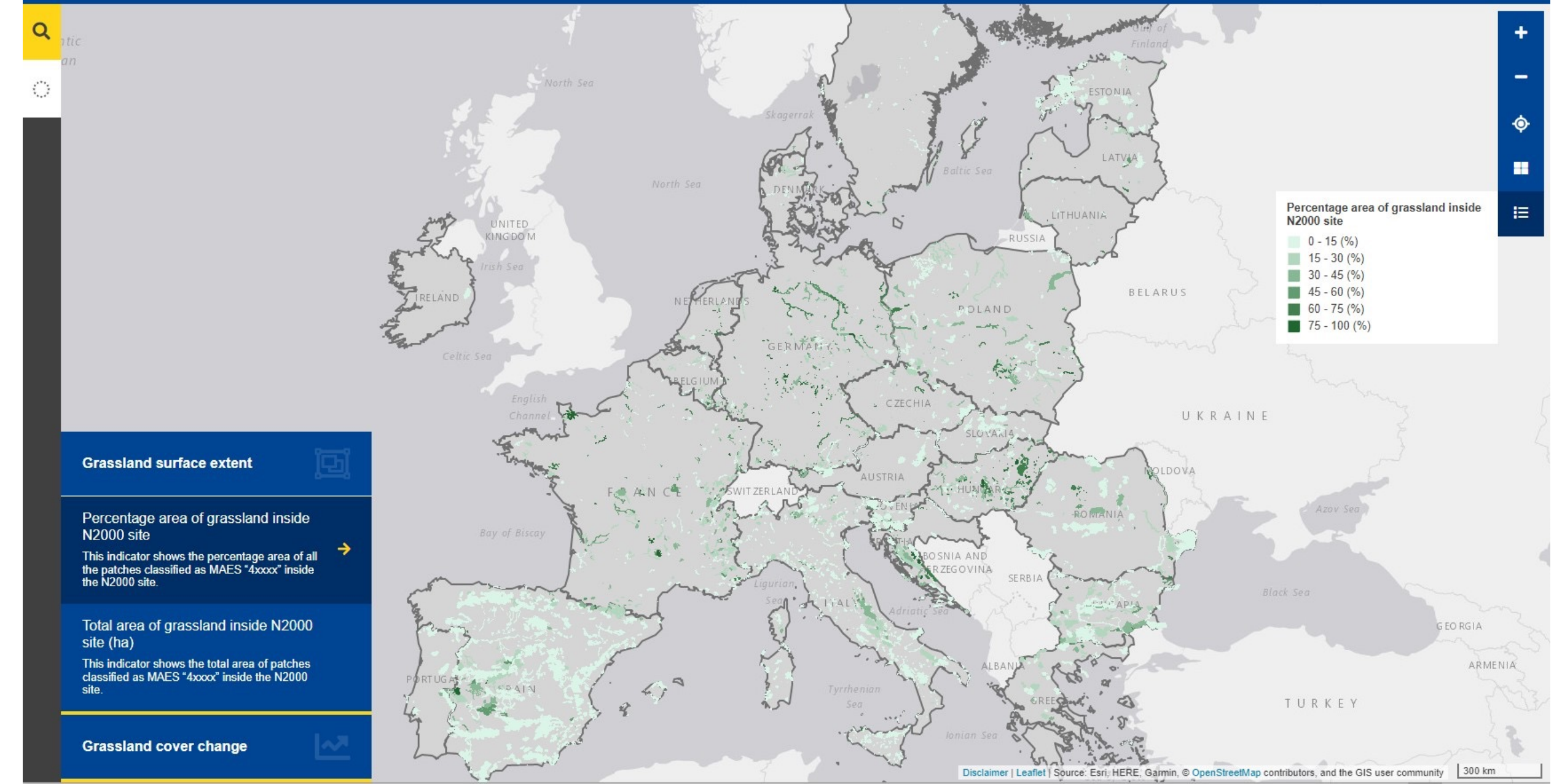
Percentage area of grassland inside N2000 site

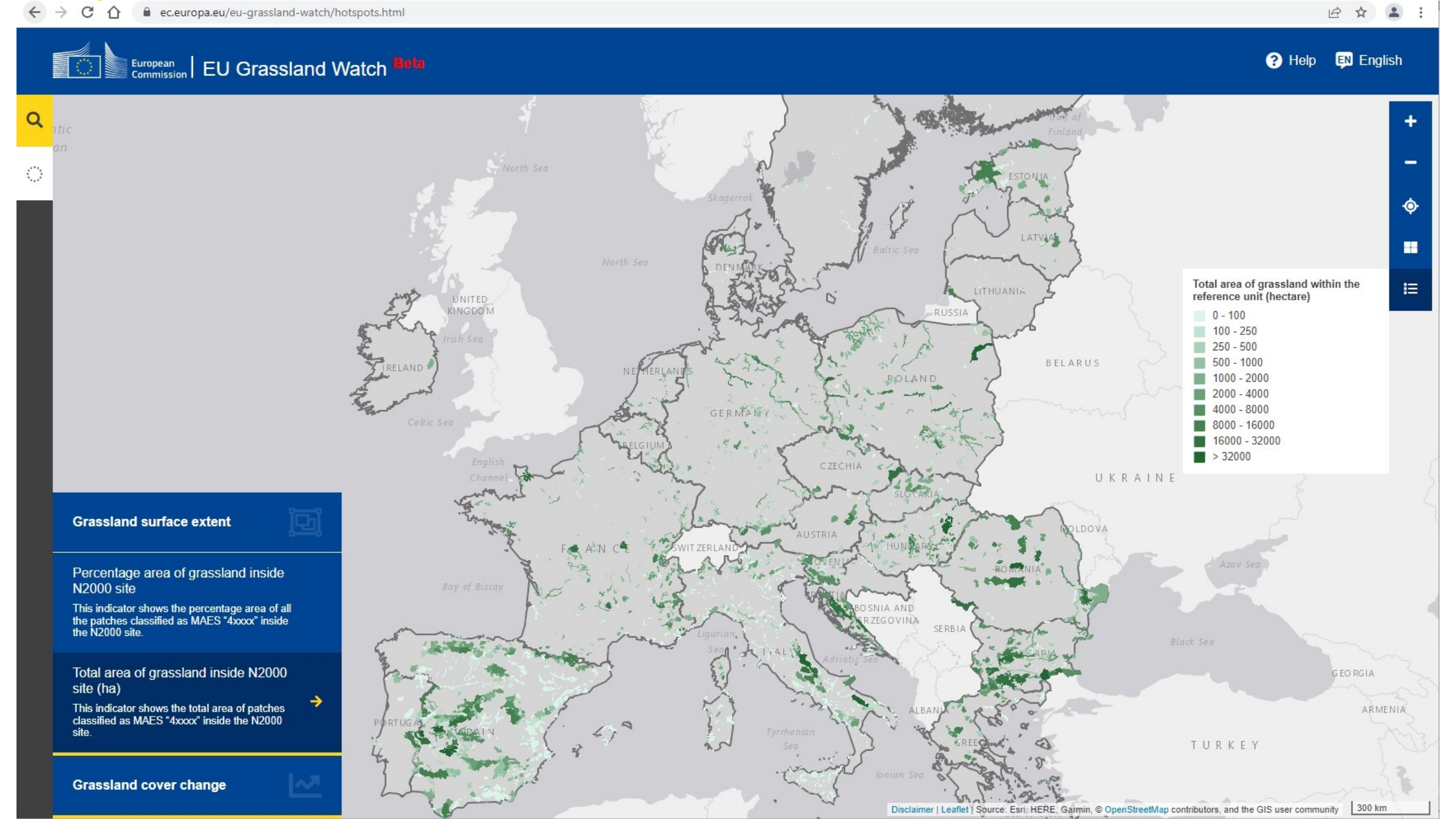
This indicator shows the percentage area of all the patches classified as MAES "4xxxx" inside the N2000 site.

Total area of grassland inside N2000 site (ha)

This indicator shows the total area of patches classified as MAES "4xxxx" inside the N2000 site.

Grassland cover change




ec.europa.eu/eu-grassland-watch/hotspots.html
European Commission | EU Grassland Watch Beta
Help
English
Total area of grassland within the reference unit (hectare)
0 - 100
100 - 250
250 - 500
500 - 1000
1000 - 2000
2000 - 4000
4000 - 8000
8000 - 16000
16000 - 32000
> 32000
Grassland surface extent
Percentage area of grassland inside N2000 site
This indicator shows the percentage area of all the patches classified as MAES "4xxxx" inside the N2000 site.
Total area of grassland inside N2000 site (ha)
This indicator shows the total area of patches classified as MAES "4xxxx" inside the N2000 site.
Grassland cover change
North Sea
Baltic Sea
Irish Sea
Celtic Sea
English Channel
Bay of Biscay
Skagerrak
Gulf of Finland
Ligurian Sea
Adriatic Sea
Tyrrhenian Sea
Ionian Sea
Black Sea
Azov Sea
ESTONIA
LATVIA
LITHUANIA
RUSSIA
BELARUS
UKRAINE
DENMARK
UNITED KINGDOM
IRELAND
NETHERLANDS
BELGIUM
GERMANY
POLAND
CZECHIA
SLOVAKIA
AUSTRIA
SWITZERLAND
HUNGARY
ROMANIA
MOLDOVA
BOSNIA AND HERZEGOVINA
SERBIA
ALBANIA
GREECE
TURKEY
GEORGIA
ARMENIA
PORTUGAL
SPAIN
ITALY
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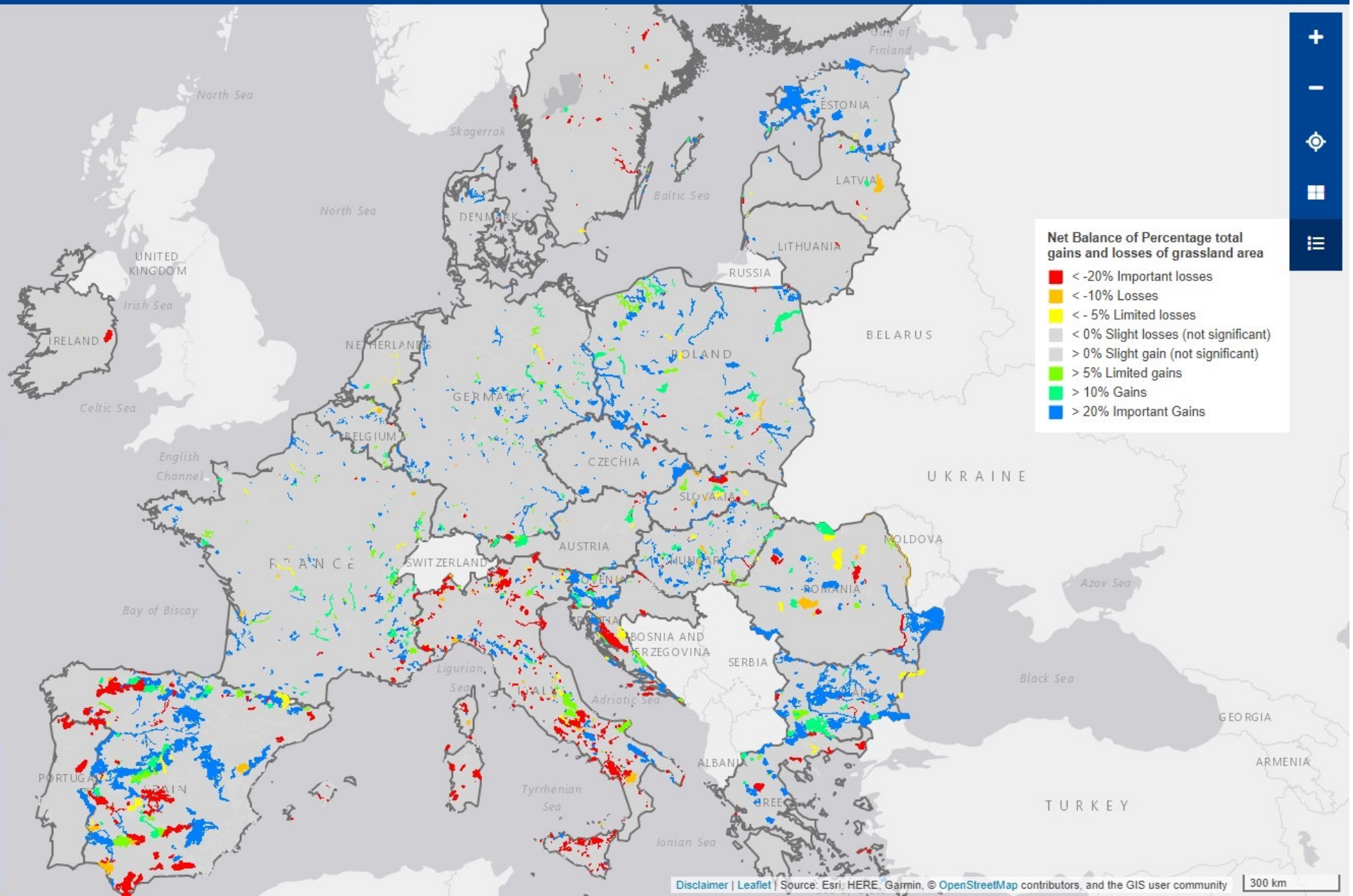
300 km



Grassland surface extent

Grassland cover change

Net balance of percentage total gains and losses of grassland area

The difference between the percentage gains and losses of grasslands (patches assigned as class 4xxxx), calculated between each consecutive pair of reference years (i.e., LULC map production years), inside the N2000 site.

Net balance of absolute total gains and losses of grassland area (ha)

The difference between the absolute total gains and losses of grasslands (patches assigned as class 4xxxx), calculated between each consecutive pair of reference years (i.e., LULC map production years), inside the N2000 site.

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Help | English

Grassland surface extent

Grassland cover change

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The difference between the percentage gains and losses of grasslands (patches assigned as class 4xxxx), calculated between each consecutive pair of reference years (i.e., LULC map production years), inside the N2000 site.

Net balance of absolute total gains and losses of grassland area (ha)

The difference between the absolute total gains and losses of grasslands (patches assigned as class 4xxxx), calculated between each consecutive pair of reference years (i.e., LULC map production years), inside the N2000 site.

Changes of grassland coverage within the reference unit, both in total and relative values (hectare)

- < -1000
- -1000 - -100
- -100 - 0
- 0 - 100
- 100 - 2000
- 2000 - 5000
- > 5000

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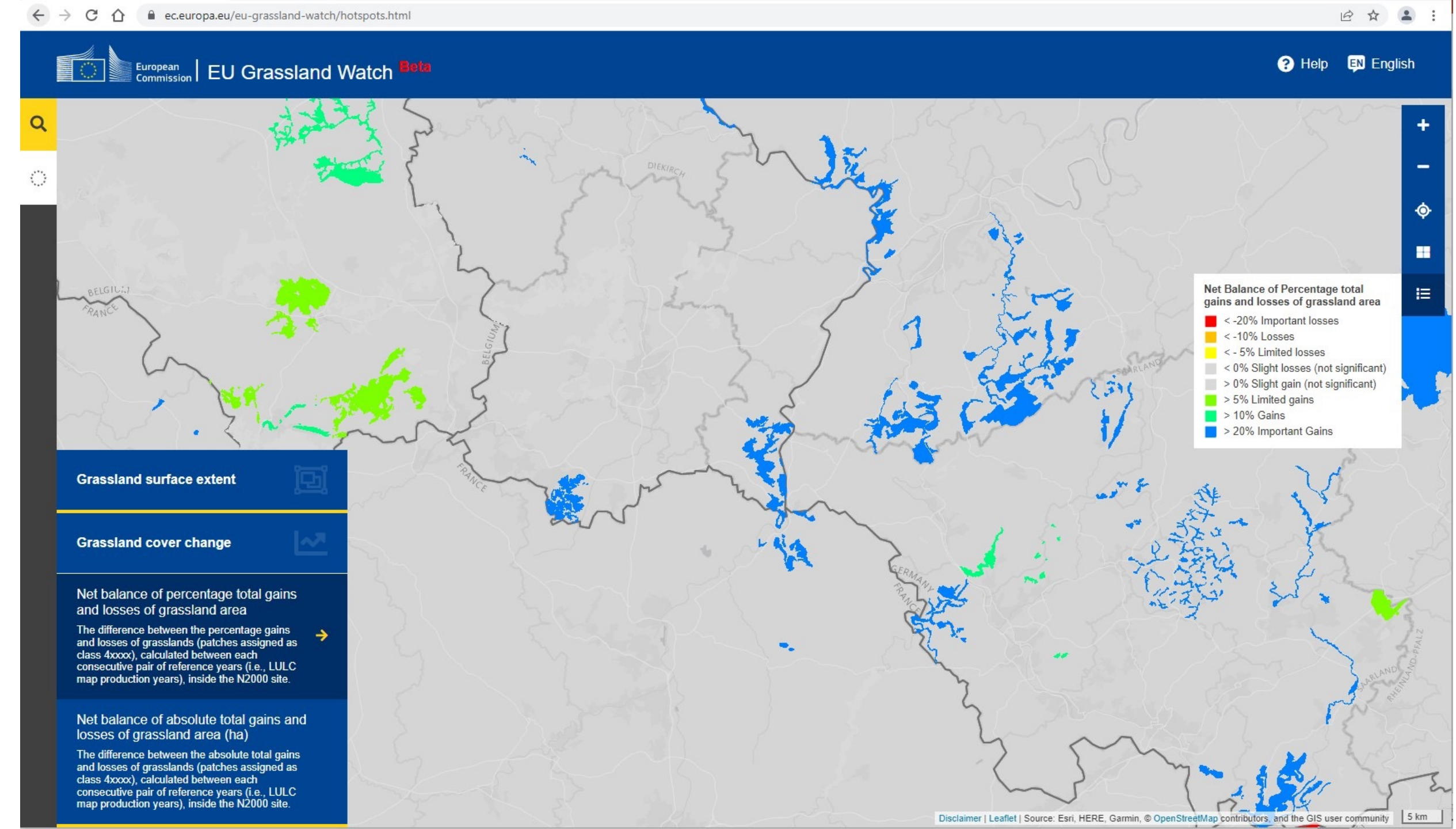
300 km


ec.europa.eu/eu-grassland-watch/hotspots.html
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English
Net Balance of Percentage total gains and losses of grassland area
< -20% Important losses
< -10% Losses
< - 5% Limited losses
< 0% Slight losses (not significant)
> 0% Slight gain (not significant)
> 5% Limited gains
> 10% Gains
> 20% Important Gains
Grassland surface extent
Grassland cover change
Net balance of percentage total gains and losses of grassland area
The difference between the percentage gains and losses of grasslands (patches assigned as class 4xxxx), calculated between each consecutive pair of reference years (i.e., LULC map production years), inside the N2000 site.
Net balance of absolute total gains and losses of grassland area (ha)
The difference between the absolute total gains and losses of grasslands (patches assigned as class 4xxxx), calculated between each consecutive pair of reference years (i.e., LULC map production years), inside the N2000 site.
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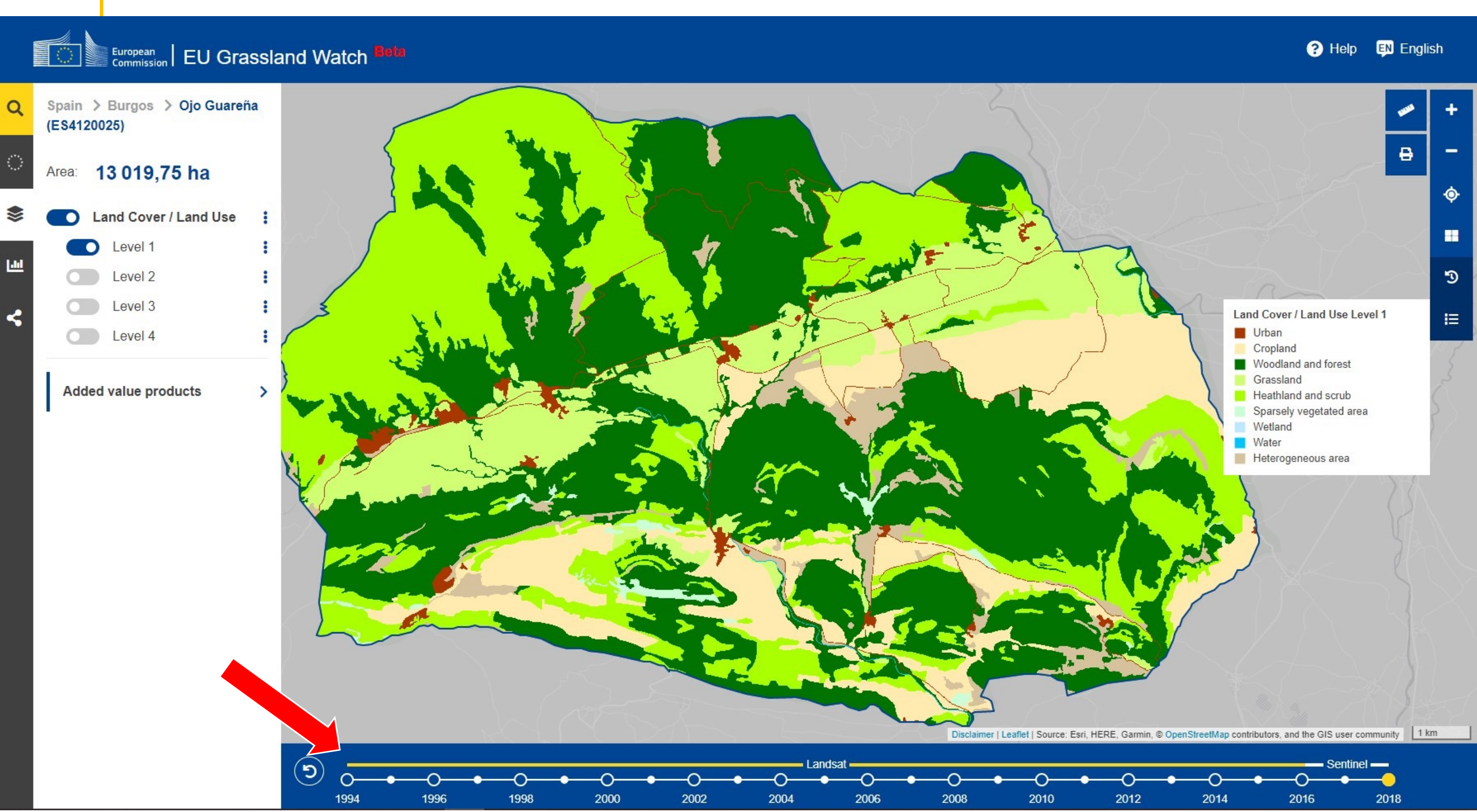
5 km


European Commission | EU Grassland Watch Beta
Help
EN English
Spain > Burgos > Ojo Guareña (ES4120025)
Area: 13 019,75 ha
Land Cover / Land Use
Level 1
Level 2
Level 3
Level 4
Added value products
Land Cover / Land Use Level 1
Urban
Cropland
Woodland and forest
Grassland
Heathland and scrub
Sparsely vegetated area
Wetland
Water
Heterogeneous area
Disclaimer | Leaflet | Source: Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community
1 km
Landsat
Sentinel
1994
1996
1998
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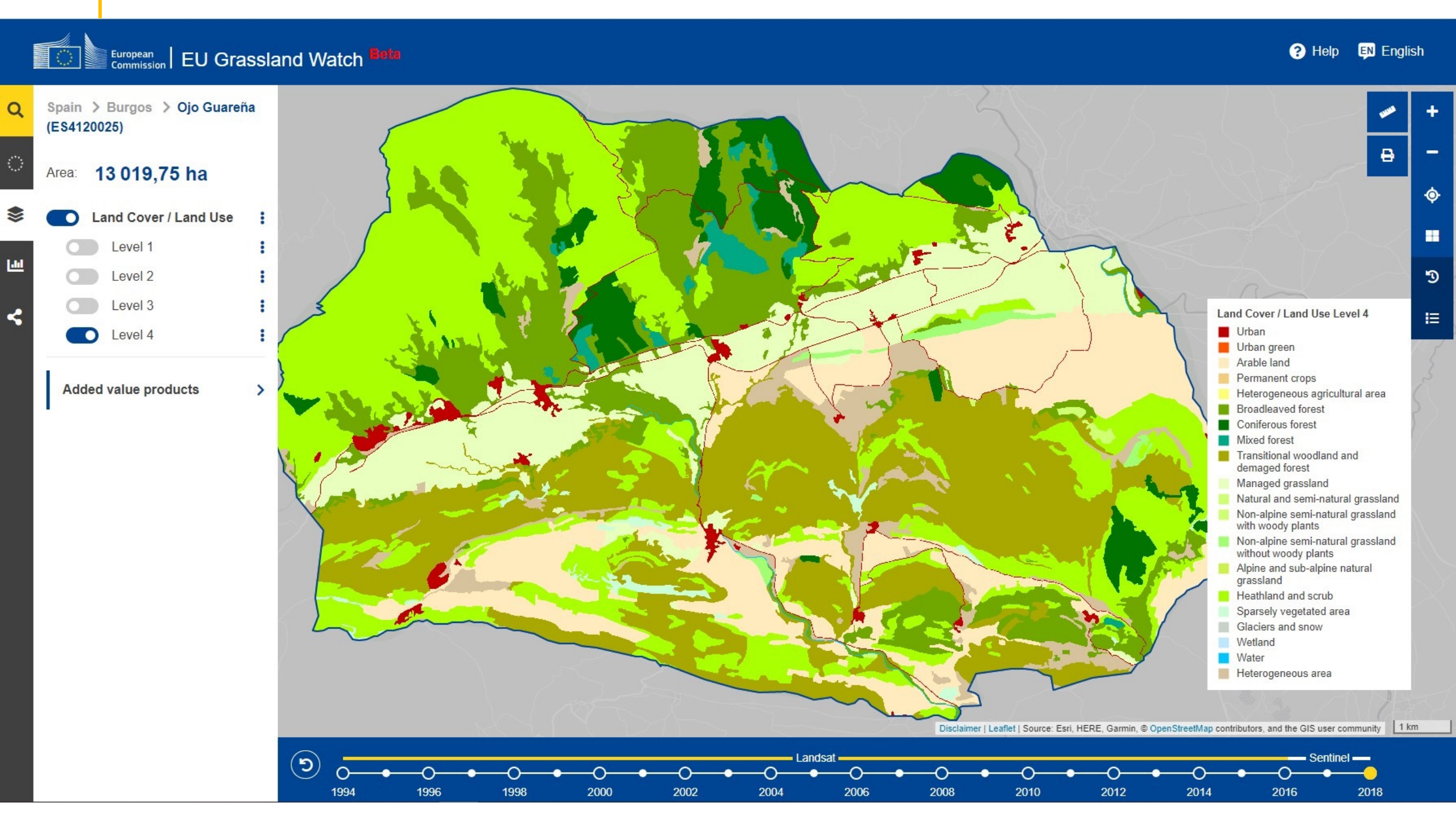
2016
2018

LC/LU level 1	LC/LU level 2	LC/LU level 3	LC/LU level 4
1 Urban	10 Urban	100 Urban	1000 Urban
	14 Urban green	140 Urban green	1400 Urban green
2 Cropland	21 Arable land	210 Arable land	2100 Arable land
	22 Permanent crops	220 Permanent crops	2200 Permanent crops
	23 Heterogeneous agricultural areas	230 Heterogeneous agricultural areas	2300 Heterogeneous agricultural areas
3 Woodland and forest	31 Broadleaved forest	310 Broadleaved forest	3100 Broadleaved forest
	32 Coniferous forest	320 Coniferous forest	3200 Coniferous forest
	33 Mixed forest	330 Mixed forest	3300 Mixed forest
	34 Transitional woodland and damaged forest	340 Transitional woodland and damaged forest	3400 Transitional woodland and damaged forest
4 Grassland	41 Intensively managed grassland	410 Intensively managed grassland	4100 Intensively managed grassland
	42 Extensively managed grassland	420 Extensively managed grasslands (Alpine, sub-alpine and non-alpine)	4200 Extensively managed grasslands (Alpine, sub-alpine and non-alpine, with and without woody plants)
		421 Non-alpine grassland	4211 Grassland with scattered woody vegetation
			4212 Grassland without scattered woody vegetation
		422 Alpine and sub-alpine grassland	4220 Alpine and sub-alpine grassland
5 Heathland and scrub	50 Heathland and scrub	500 Heathland and scrub	5000 Heathland and scrub
6 Sparsely vegetated area	61 Sparsely vegetated area	610 Sparsely vegetated area	6100 Sparsely vegetated area
	63 Glaciers and snow	630 Glaciers and snow	6300 Glaciers and snow
7 Wetland	70 Wetland	700 Wetland	7000 Wetland
9 Water	90 Water	900 Water	9000 Water
9999 Heterogeneous area	9999 Heterogeneous area	9999 Heterogeneous area	9999 Heterogeneous area

European Commission


European Commission | EU Grassland Watch Beta
Help
English
Spain > Burgos > Ojo Guareña (ES4120025)
Area: 13 019,75 ha
Land Cover / Land Use
Level 1
Level 2
Level 3
Level 4
Added value products
Land Cover / Land Use Level 4
Urban
Urban green
Arable land
Permanent crops
Heterogeneous agricultural area
Broadleaved forest
Coniferous forest
Mixed forest
Transitional woodland and demaged forest
Managed grassland
Natural and semi-natural grassland
Non-alpine semi-natural grassland with woody plants
Non-alpine semi-natural grassland without woody plants
Alpine and sub-alpine natural grassland
Heathland and scrub
Sparsely vegetated area
Glaciers and snow
Wetland
Water
Heterogeneous area
Disclaimer | Leaflet | Source: Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community
1 km
Landsat
Sentinel
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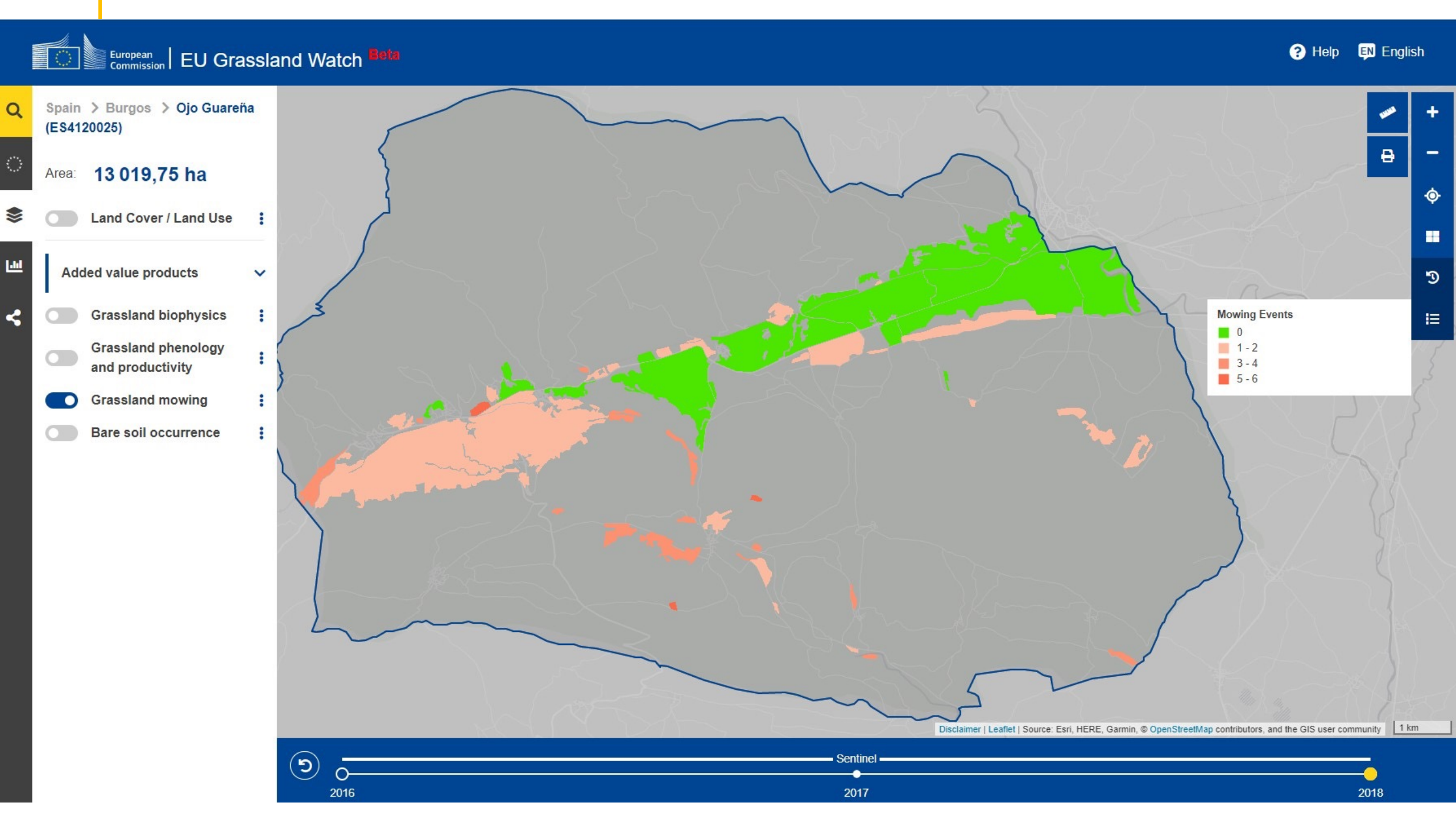
European Commission | EU Grassland Watch Beta
Help
English
Spain > Burgos > Ojo Guareña (ES4120025)
Area: 13 019,75 ha
Land Cover / Land Use
Added value products
Grassland biophysics
Grassland phenology and productivity
Grassland mowing
Bare soil occurrence
Mowing Events
0
1 - 2
3 - 4
5 - 6
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1 km
Sentinel
2016
2017
2018

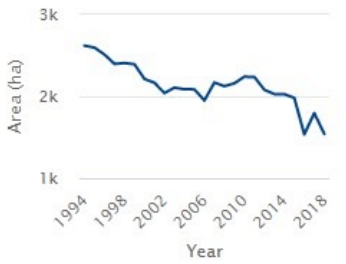
Spain > Burgos > Ojo Guareña (ES4120025)

Area: **13 019,75 ha**

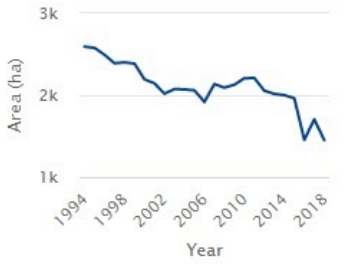
Absolute grassland surface

Total area of grassland within the reference unit.

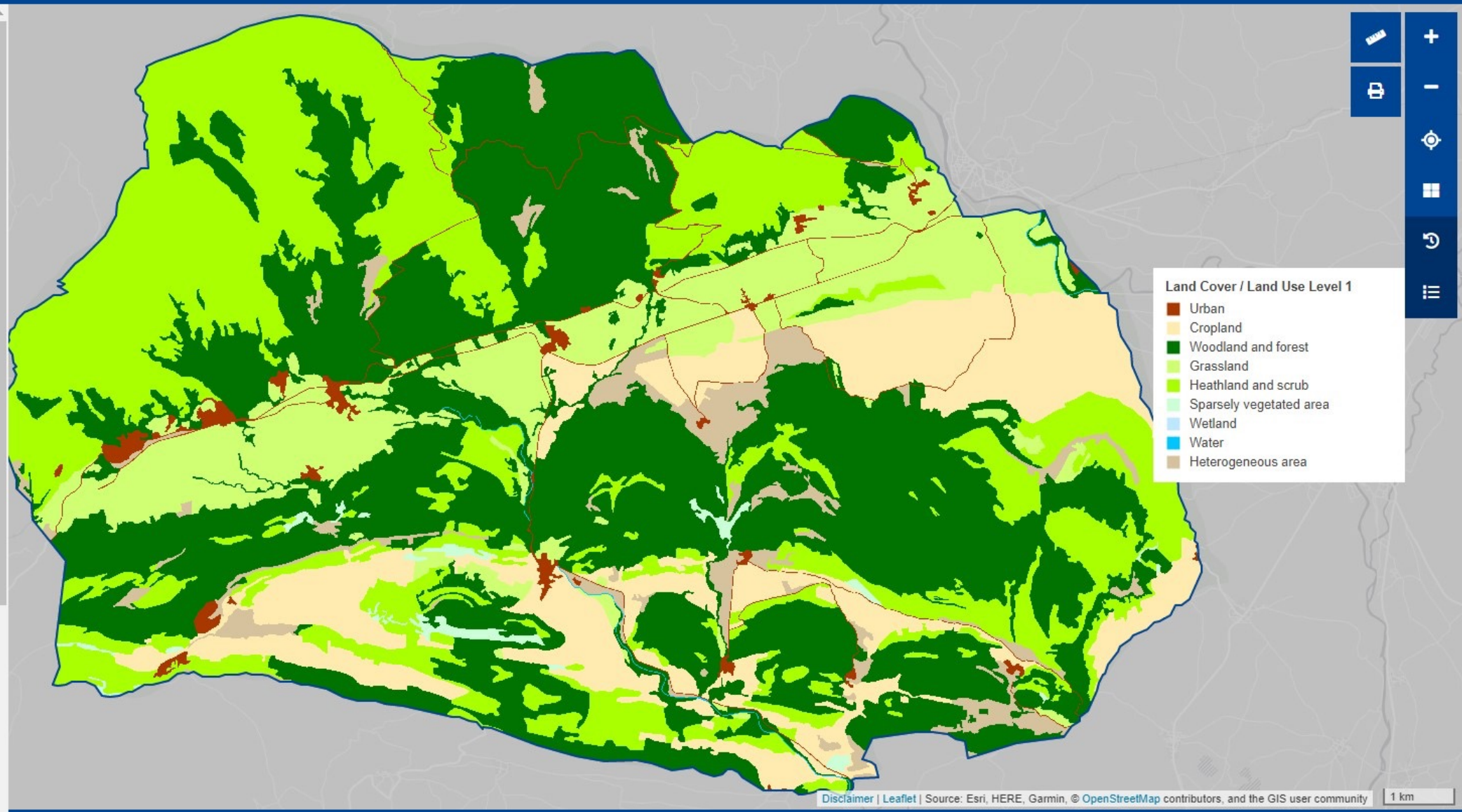
Total area of grassland



Total area of intensively used grassland



Total area of extensively used grassland



Close

Proportion of land cover categories

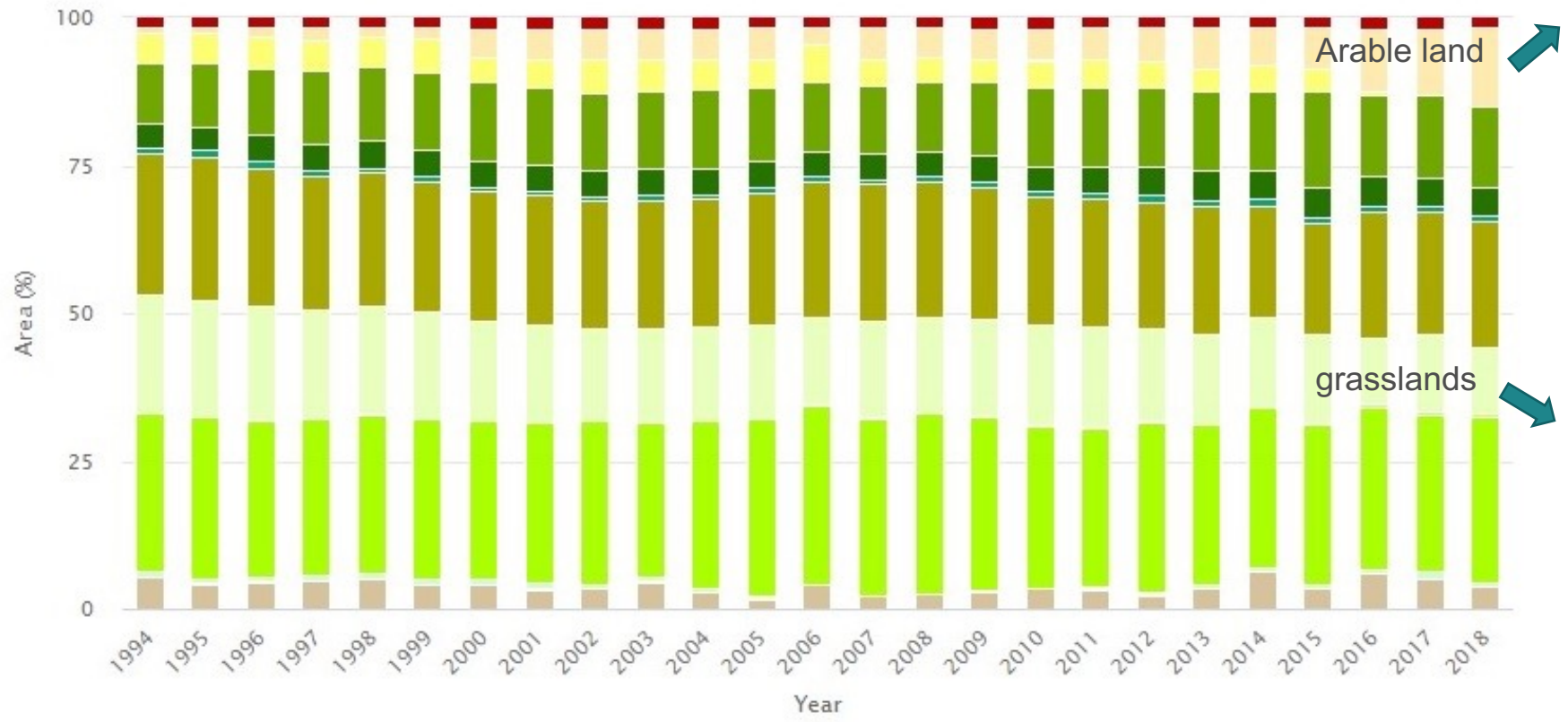
The indicator 'Proportion of land cover categories' gives the percentage of each existing Land Cover/Land Use class within the N2K site for each reference (i.e., Land Cover/Land Use map production) year. The indicator is calculated as the sum of all the areas of the objects with the same MAES code divided by the total area of the N2K site and gives an overview of the land cover/land use class distribution within the site.

Choose export format

PNG

Export

Chart | Table



Spain > Burgos > Ojo Guareña (ES4120025)

Area: **13 019,75 ha**

Land Cover / Land Use

- Level 1
- Level 2
- Level 3
- Level 4

Added value products

- **Grassland biophysics**
- **Grassland phenology and productivity**
- **Grassland mowing**
- **Bare soil occurrence**

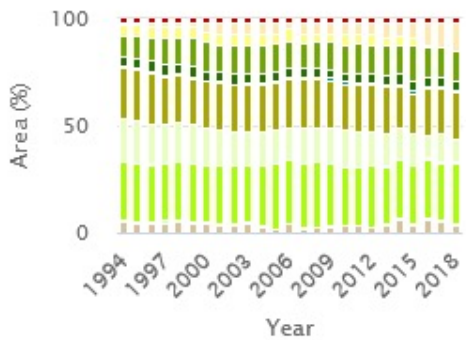
Spain > Burgos > Ojo Guareña (ES4120025)

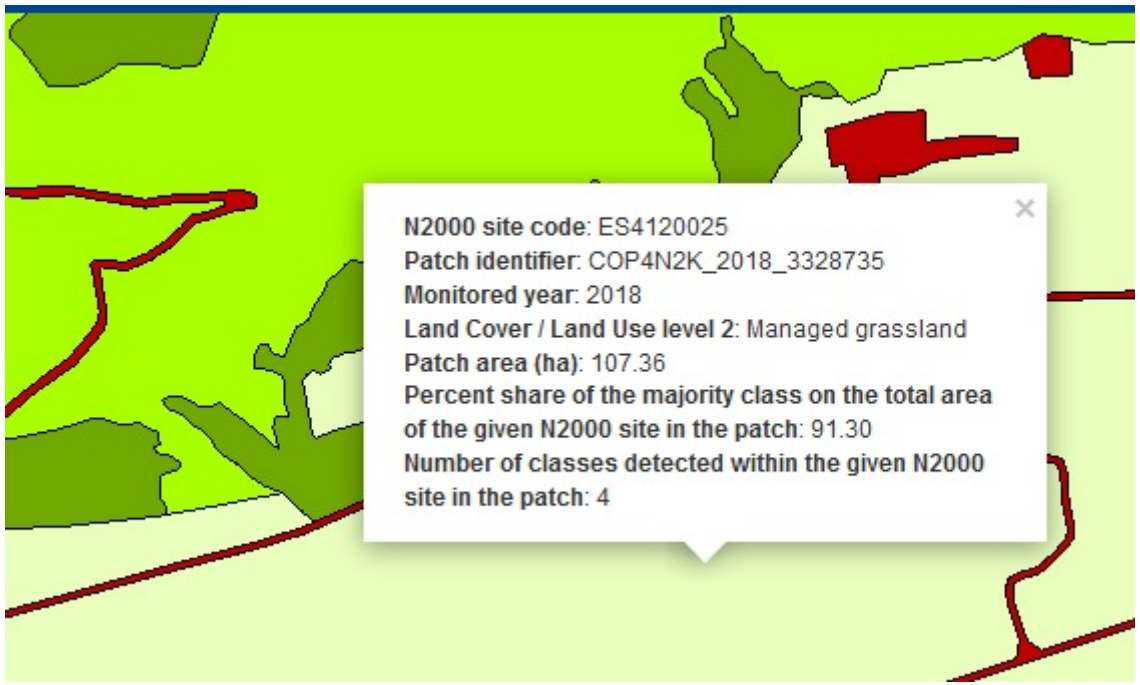
Area: **13 019,75 ha**

- **Absolute grassland surface**
- **Relative grassland surface**
- **Grassland cover changes**
- **Class diversity**

Diversity of land use/land cover classes within the reference unit

Proportion of land cover categories





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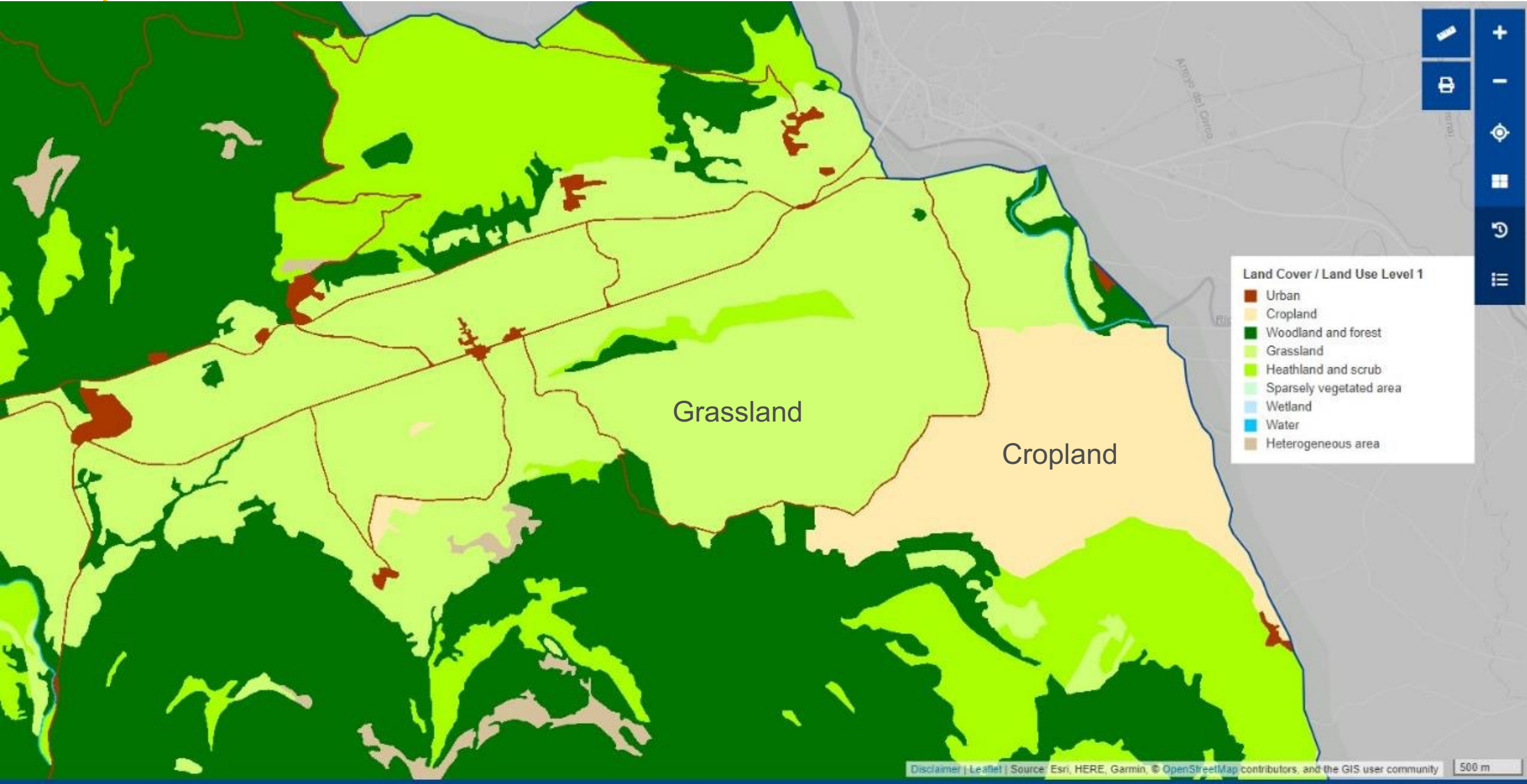
Land Cover / Land Use Level 1
Urban
Cropland
Woodland and forest
Grassland
Heathland and scrub
Sparsely vegetated area
Wetland
Water
Heterogeneous area
Grassland
Cropland
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500 m
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Sentinel
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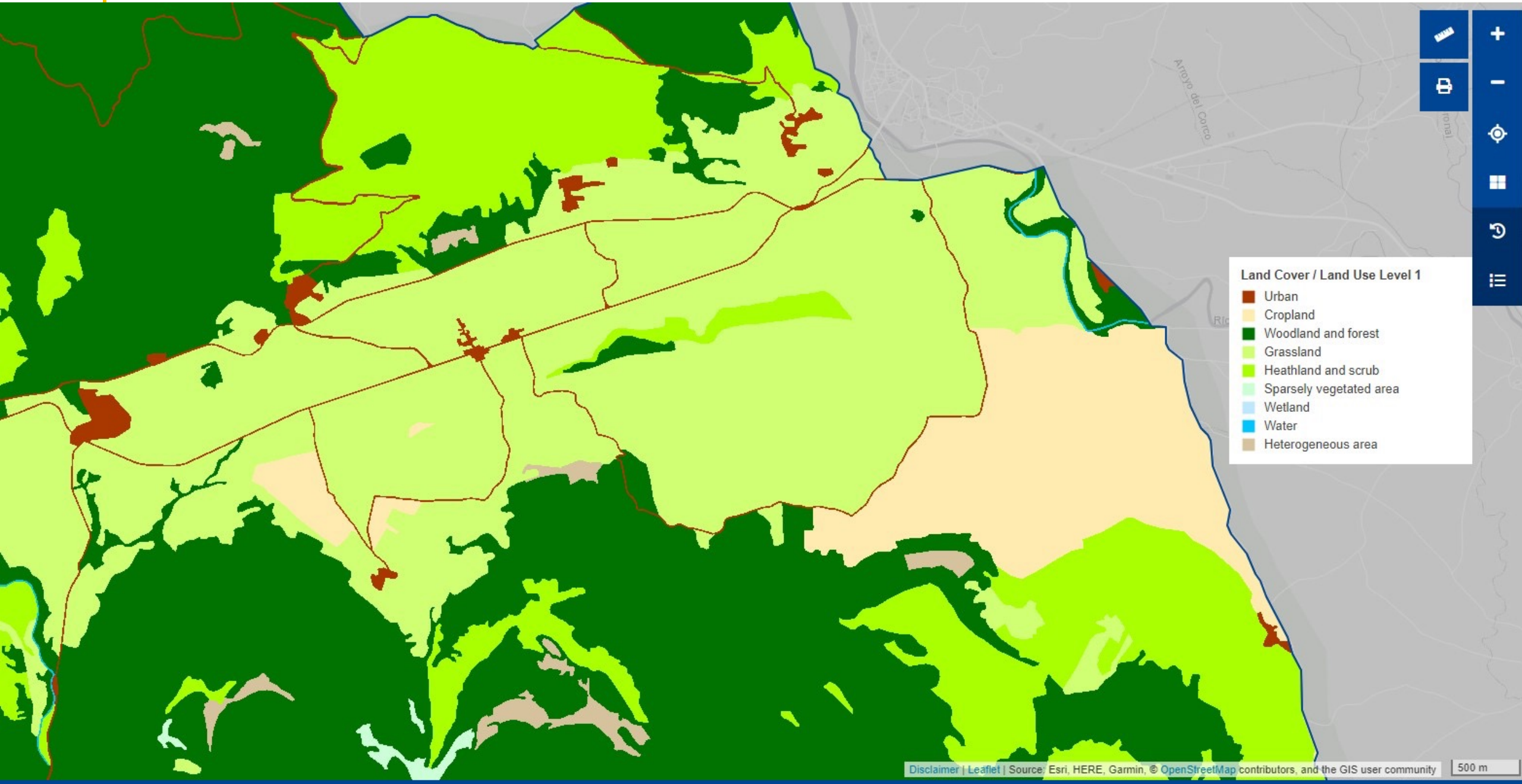
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Sparsely vegetated area
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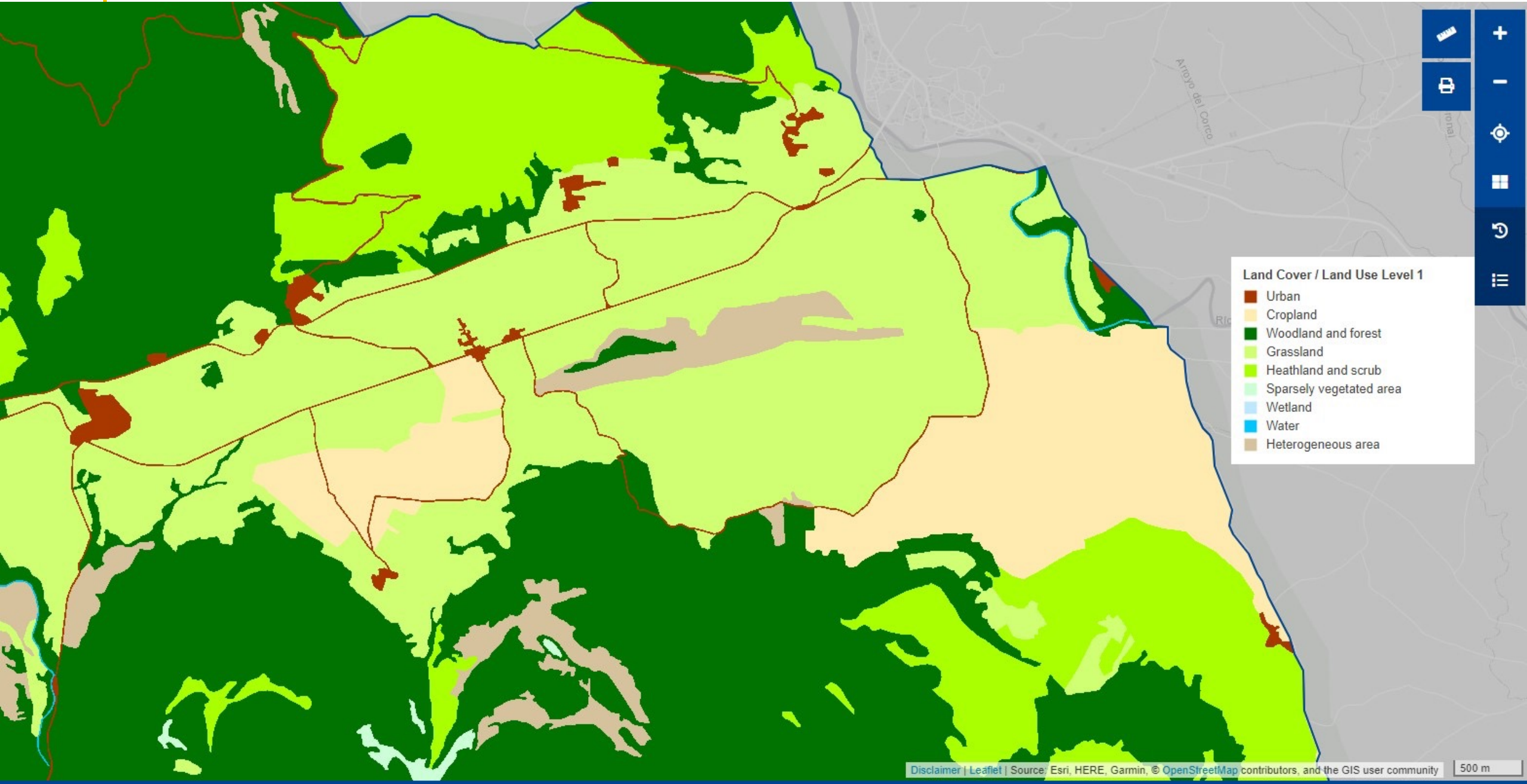
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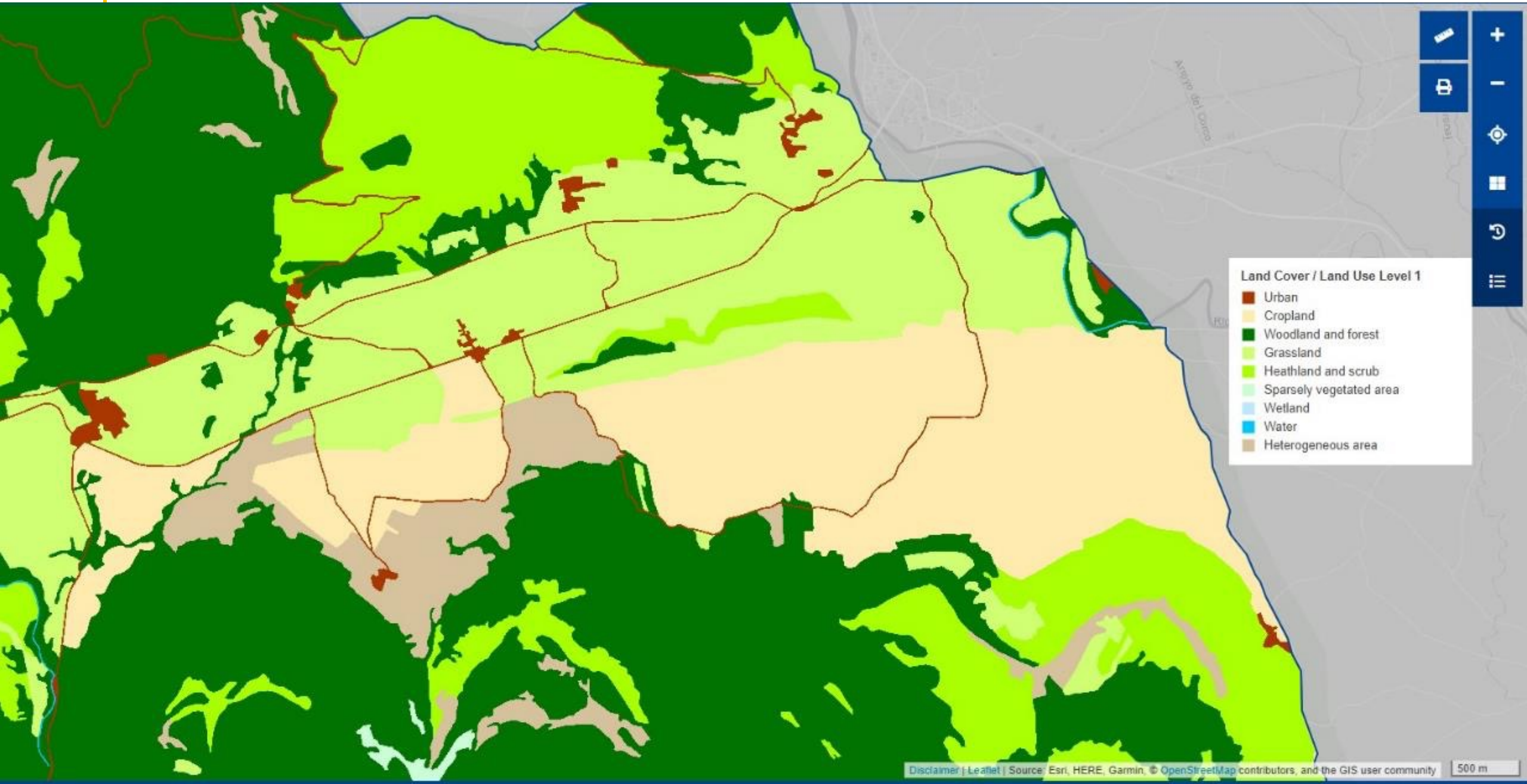
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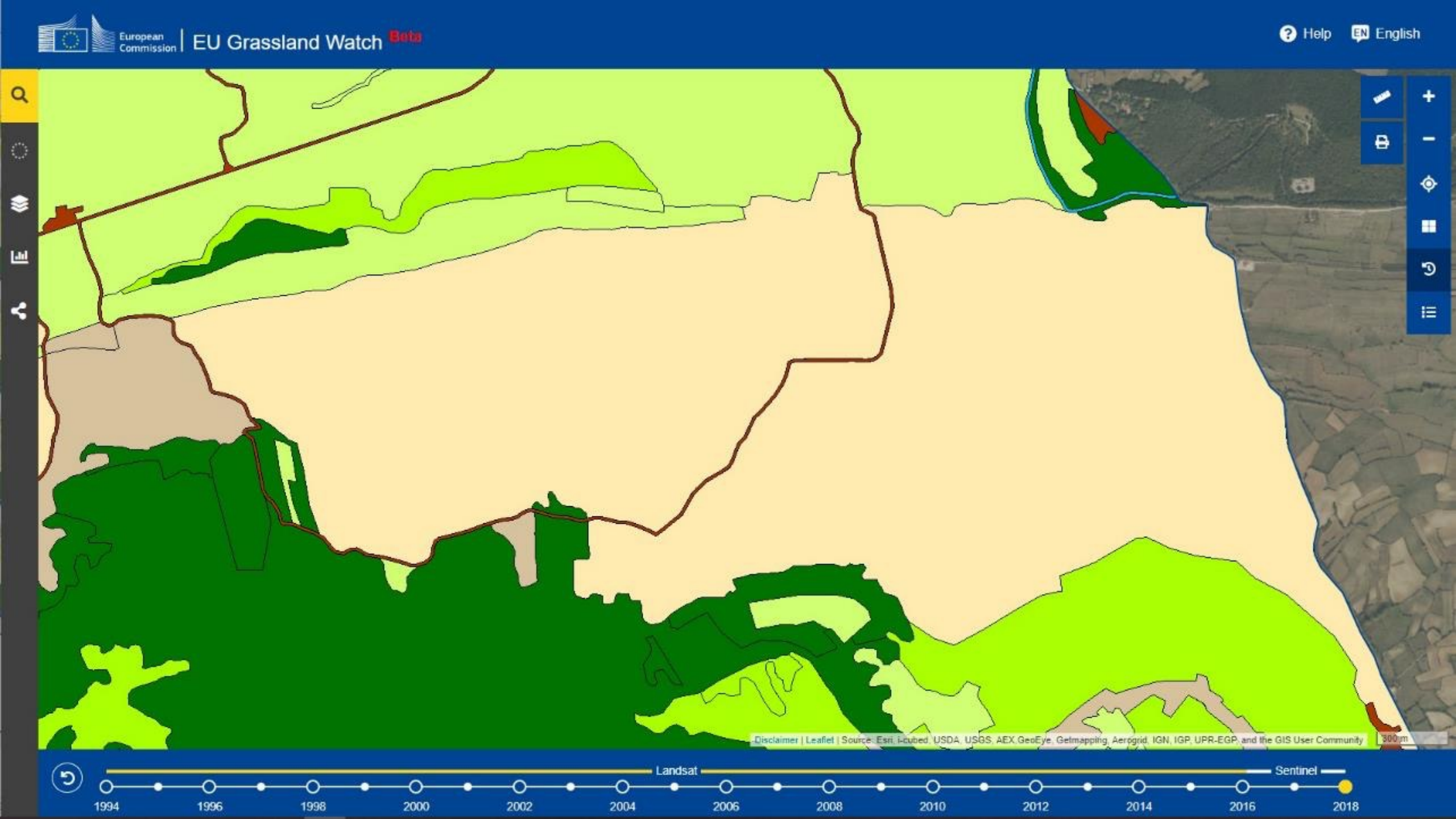
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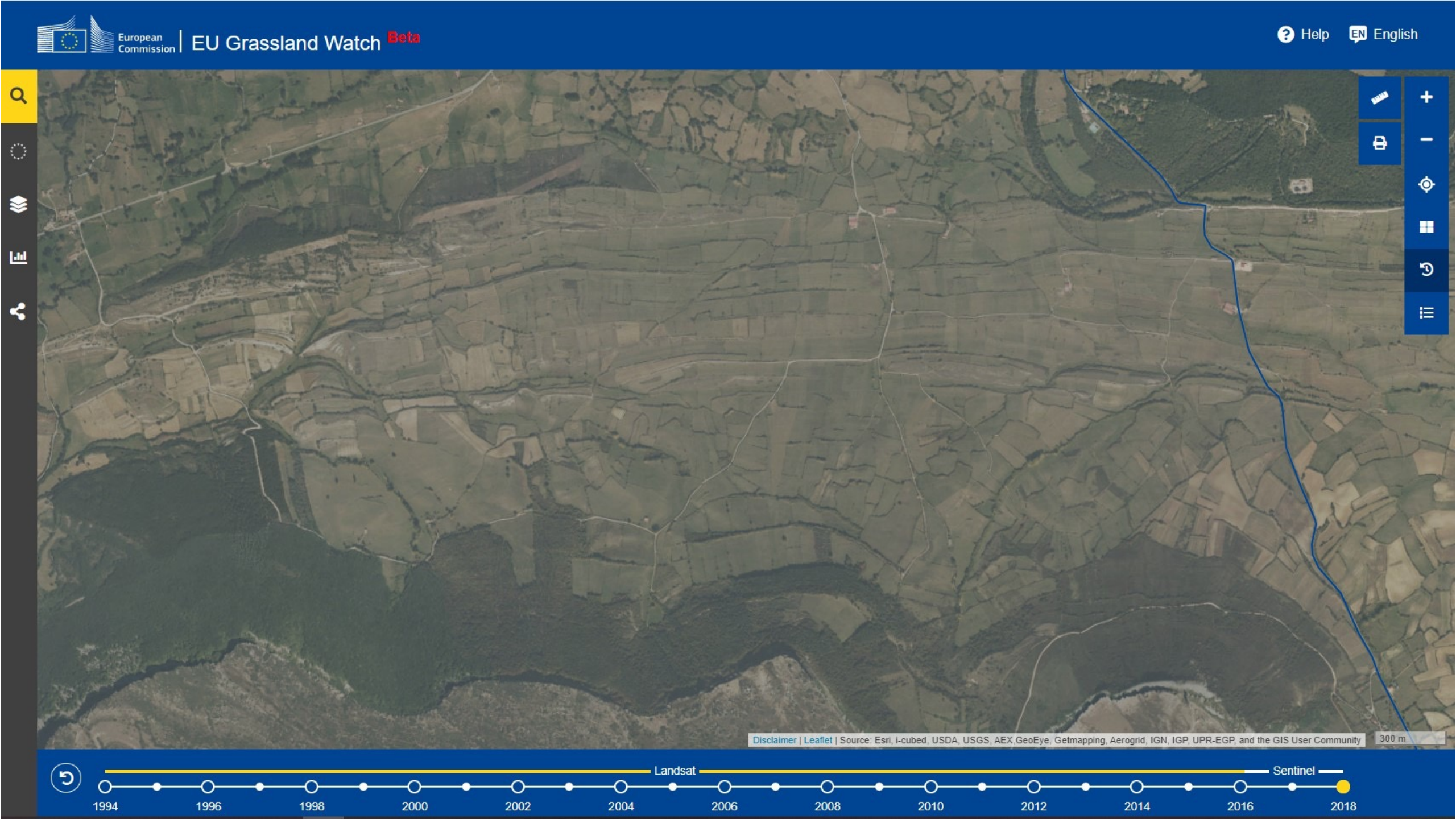
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300 m
Landsat
Sentinel
1994
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2018

Main difficulties encountered

- Many boundaries for land units are far too large, sometimes including hundreds of individual land parcels that may have a variety different land uses/ land management regimes !
- Still some important land cover interpretation errors (in particular - but not only - for the period prior to 2016 (Landsat only))

➔ **EU Grassland Watch** still to be considered as a **prototype tool !**

- Project delays created by the large amount of information to be processed – project took longer than expected.

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Next steps

- Small service contract for the processing of data 2018-2022 (ongoing)
- Launch open call for tender with EP financial support (2nd half 2022)
  - Extend the tool to all remaining Natura 2000 grassland sites
  - Improve the land cover interpretation & adapt delineation of land cover units
  - Create a Community of Users, collect users' feedback on their needs (e.g. only retain pertinent indicators) ➔ adapt the tool accordingly
  - explore possibilities for integrating additional data sources (e.g. high-resolution imagery), fill remaining data gaps, improving data collection & processing, etc.

➔ create a fully operational, sustainable and user-driven EU monitoring system with reliable information on land cover/land use changes in all Natura 2000 sites with grassland habitats

Thank you for your attention !

https://ec.europa.eu/eu-grassland-watch/

European Commission