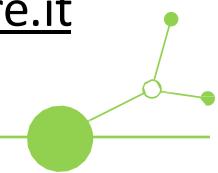
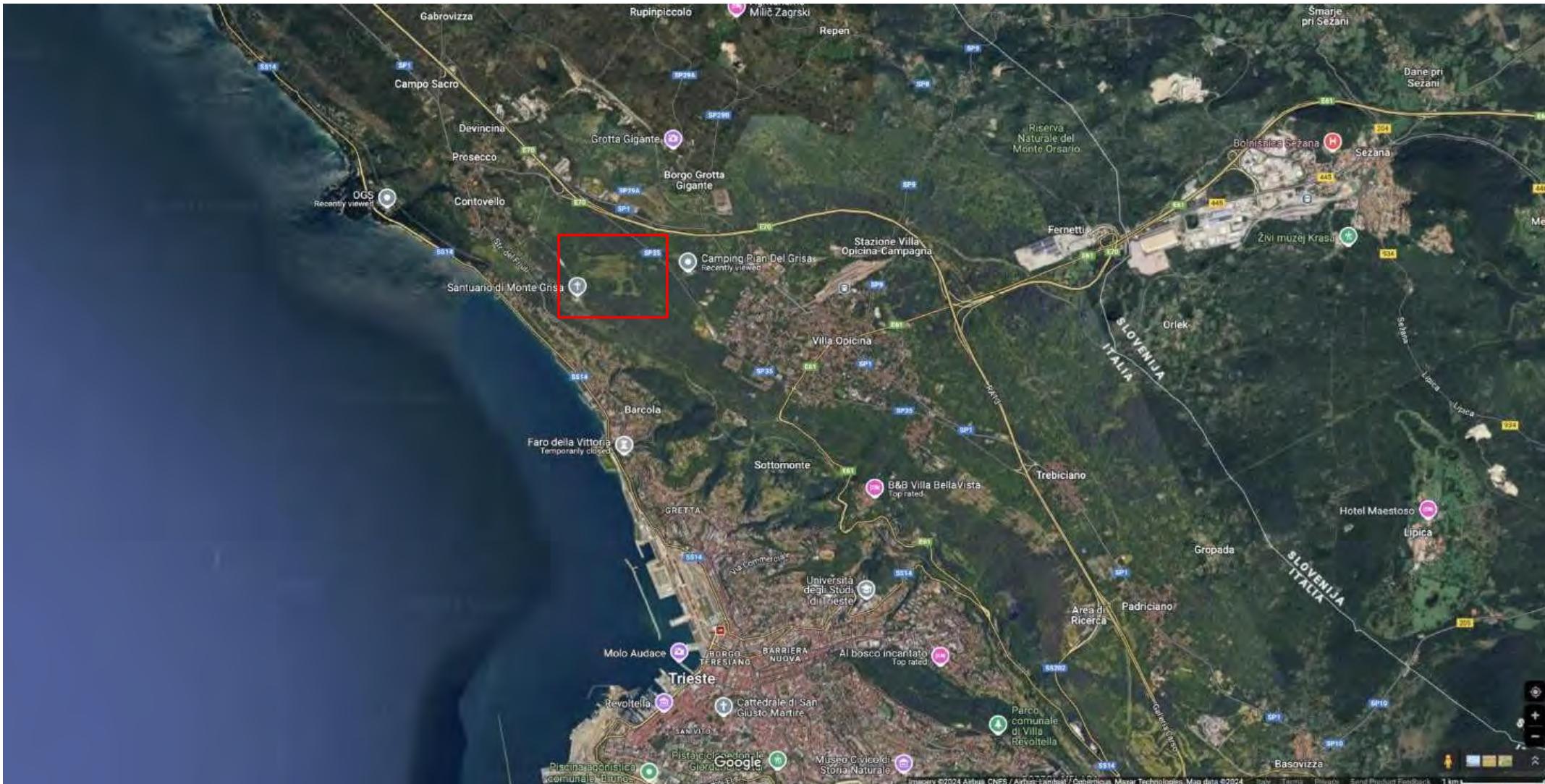




SAVE THE GRASSLAND: ENHANCING BIODIVERSITY OF A THREATENED KARSIC HABITAT

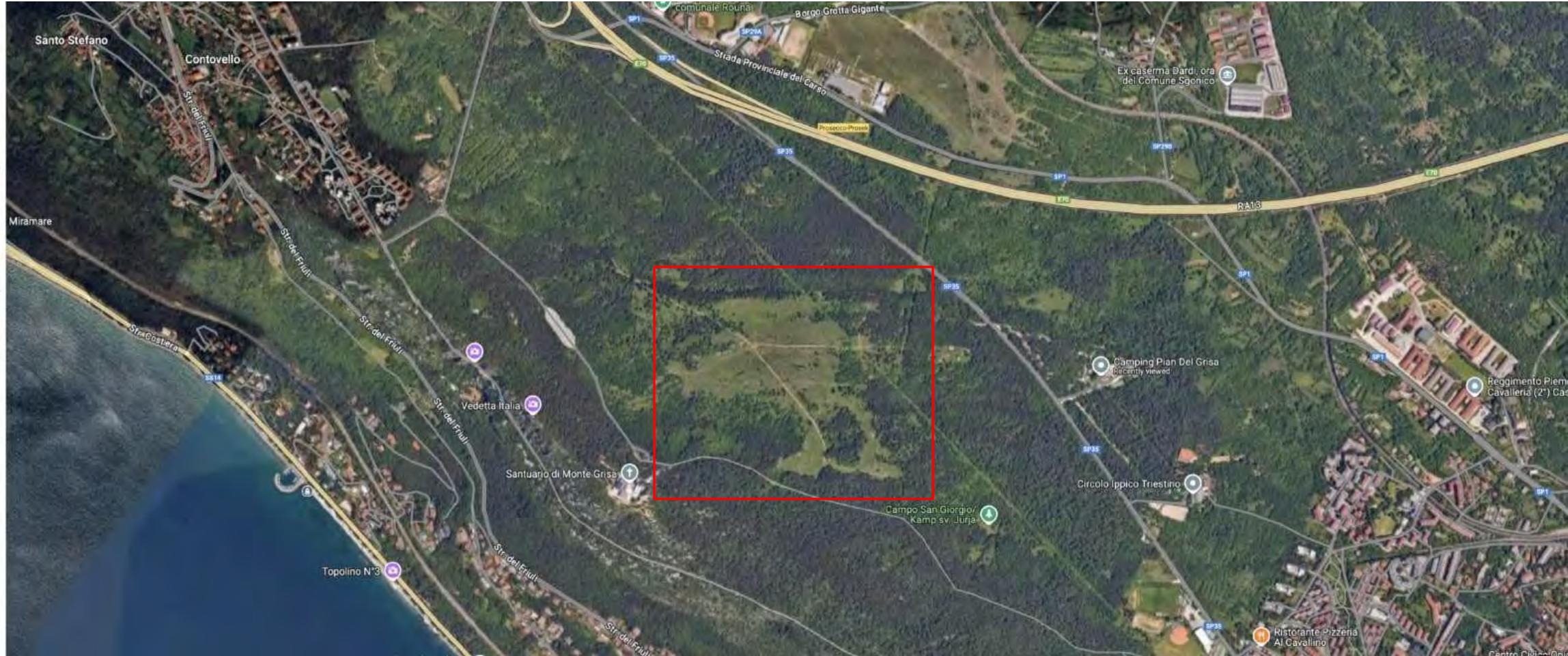
PP13
WWF Italy Foundation
Miramare Marine Protected Area
www.ampmiramare.it





Pilot study area: Pian del Grisa 45°41'48.3"N 13°45'29.0"E

ReCo



Karst grassland: its origins and ancient uses

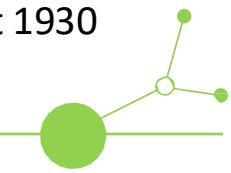
ReCo



Auremiano - Sheep grazing (SLO) - Archivio Caldart 1930



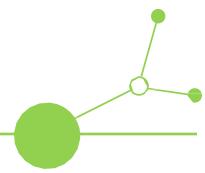
Divacia (SLO) - Haymaking - Archivio Caldart 1930





Sgonico (Trieste Province) - Grazing land improvement actions - Archivio Caldart 1930

ReCo

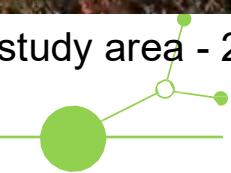




Black pine and smoke tree bush on Karst grassland - Archivio Caldart
1930



Black pine and smoke tree bush in the pilot study area - 2024

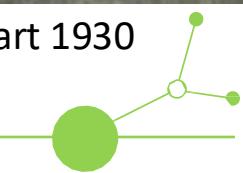




Trebiciano (Trieste Province) - Archivio Corpo Forestale Regionale FVG



Dolina – cattle grazing - Archivio Caldart 1930



THE KARSIC LANDA HISTORY

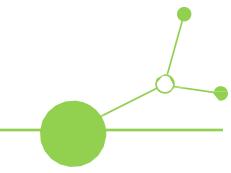
ReCo



DEFORESTATION



PASTURE

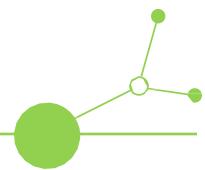


THE KARSIC LANDA HISTORY

The landa is zoogenic in origin, the result of the grazing pressure, mainly of sheep and goats, exercised for centuries on deforested areas. Its formation seems to have already begun by the Bronze Age (5,500 - 3,200 years ago) with a rise in pastoral activity to which the Karst was subject.

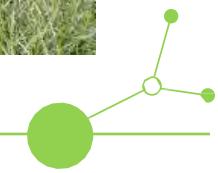


This grazing activity led to the development of a vegetation capable of withstanding trampling and browsing, forming a low discontinuous cover, interspersed with the rocky outcrops and growing on a primitive, shallow soil.



THE KARSIC LANDA HISTORY

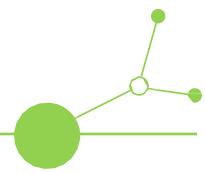
After the reforestation plan of the Austrian Empire, they used the *Pinus nigra* (Austrian pine or black pine), a pioneer species, to reforest the karsic surface.



THE KARSIC LANDA HYSTORY

In ancient times the landa extended across large areas, but at the present time, in which pastoralism is now very rarely practiced, we are witnessing a contraction in the area of this habitat as a result of the natural process of scrubbing over.

In these arid grasslands there are numerous endemic species and subspecies such as the Tommasini's Cinquefoil (*Potentilla tommasiniana*) or the tergestina subspecies of the Spring Gentian (*Gentiana verna*).



THE KARSIC LANDA

Class ***Festuco-Brometea***: xeric (dry) and mesoxeric (semi-dry) grasslands

Order ***Scorzoneretalia villosae (62A0)***: Eastern sub-mediterranean dry grasslands

(Alleanza) ***Satureion subspicatae***: Xerophilous and rupicolous grasslands from the North Adriatic to SE Alps

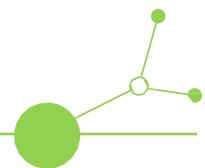
Association ***Genisto sericeae-Seslerietum juncifoliae (62A0a)***: primary grasslands on calcareous soils, sloping and wind exposed areas

→ Association ***Chrysopogono-Centaureetum cristatae (62A0b)***: Xerophilous grasslands of East Adriatic with marked thermophilicity and significant component of mediterranean species

→ Association ***Carici humulis-Centaureetum rupestris (62A0b)***: Xerophilous grasslands of East Adriatic and the inner Karst, more distant from the sea and with maximum concentration of illyrian species

(Alleanza): ***Scorzonerion villosae***: Meso-xerophilous Illyrian grasslands on sub-acidic soils

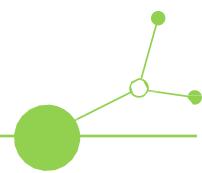
Association ***Danthonio-Scorzoneretum villosae (62A0c)***: meadows and pastures on red soil



THE KARSIC LANDA

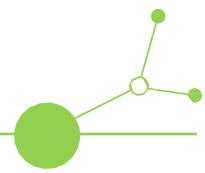
Hypothesis: based on preliminary observations the «*landa*» of the Monte Grisa should belong to «*Carici-Centaureetum*», the typical association of the Trieste Karst, but could display more thermophilous component.

It will be significant the study of the flowering seasons, because in the *Carici-Centaureetum* is approximately constant from the spring to the autumn; instead mediterranean plant associations have two maxima of flowering in autumn (most of all) and in spring, with a decrease in the summer.



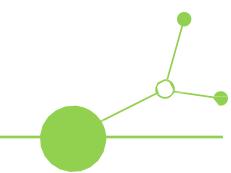
THE KARSIC LANDA

Climate change effects: monitoring the autumn flowering species, the effects of global warming seems to influence the period of blooming of same species, that are postponed; it will be check this point also in the late winter and early spring period.



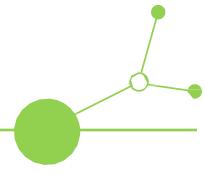


ReCo



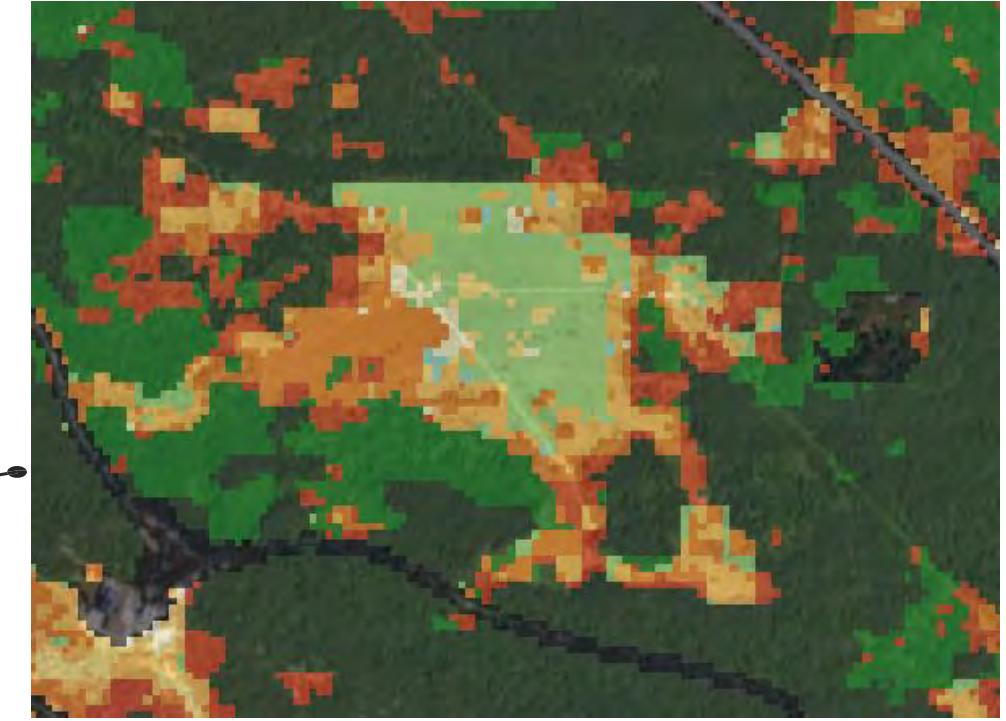


ReCo



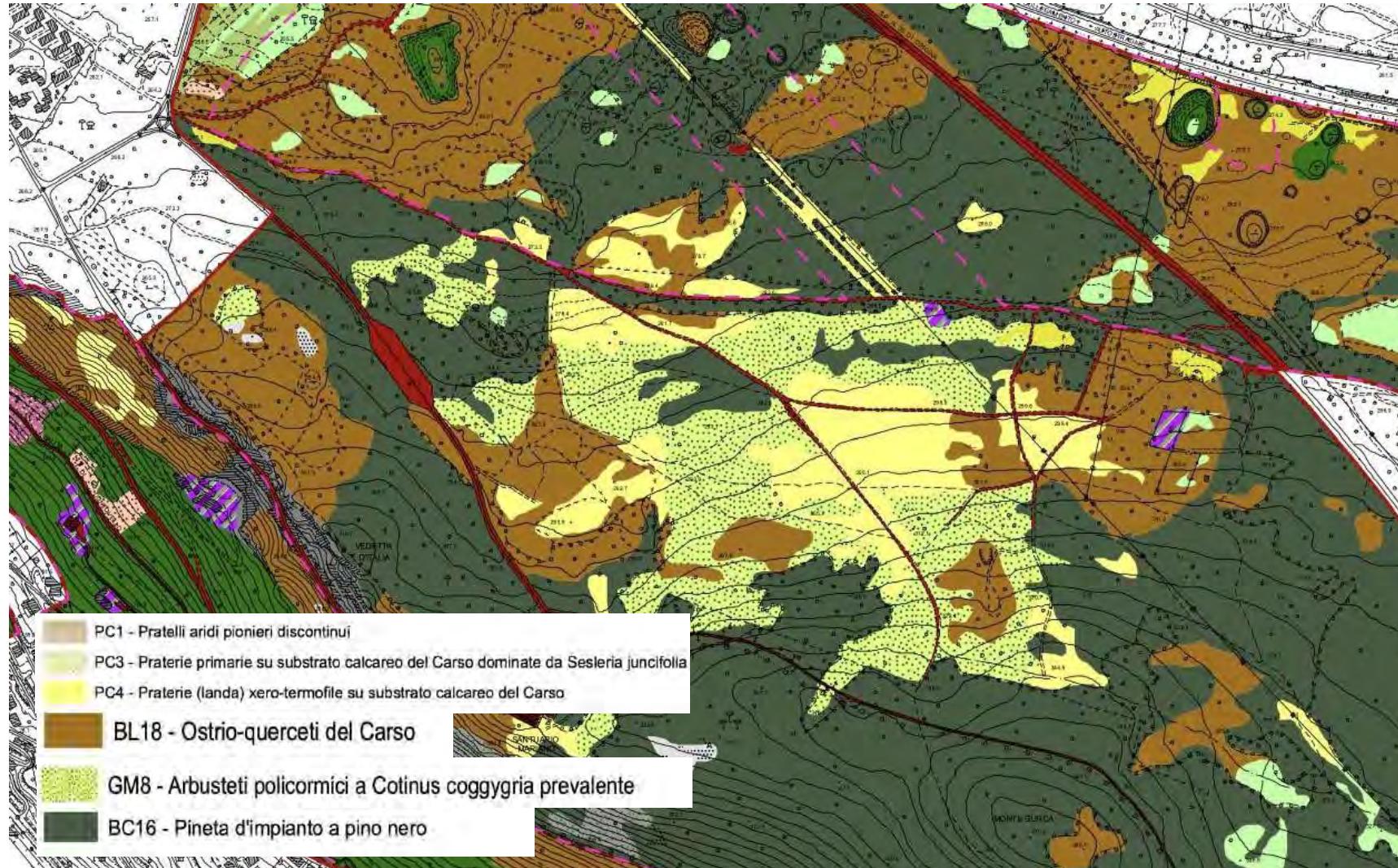


Ecomosaico del Carso – Kraški ekomozaik



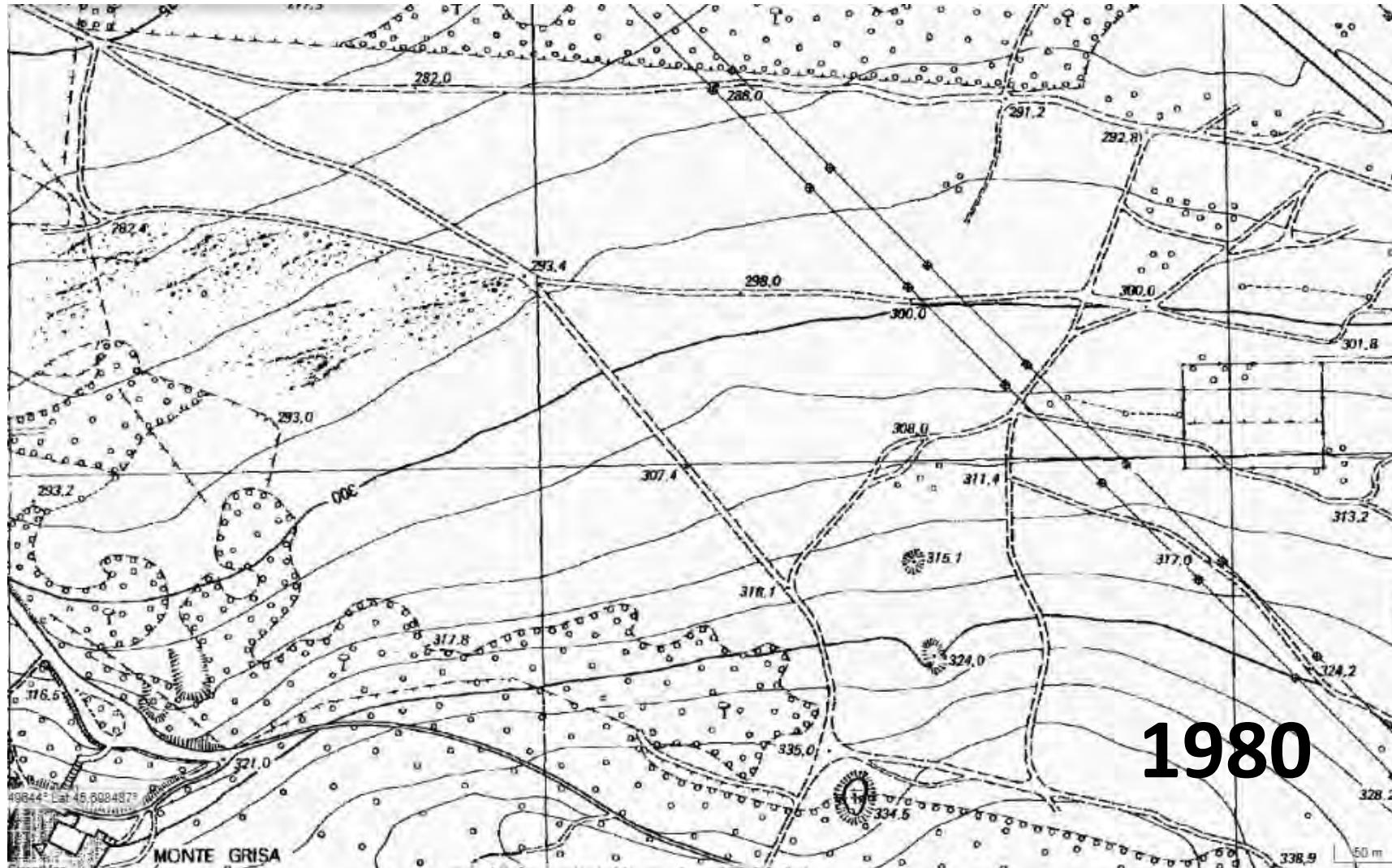
- Arbusteto
- Bosco e boscaglia a latifoglie decidue
- Landa incespugliamento 1
- Landa incespugliamento 2
- Landa non incespugliata
- Mosaico landa-boscaglia
- Pineta a pino nero
- Prato da sfalcio
- Prato pascolo





Vegetation technical map

ReCo

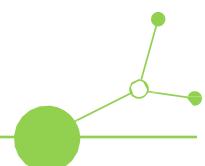


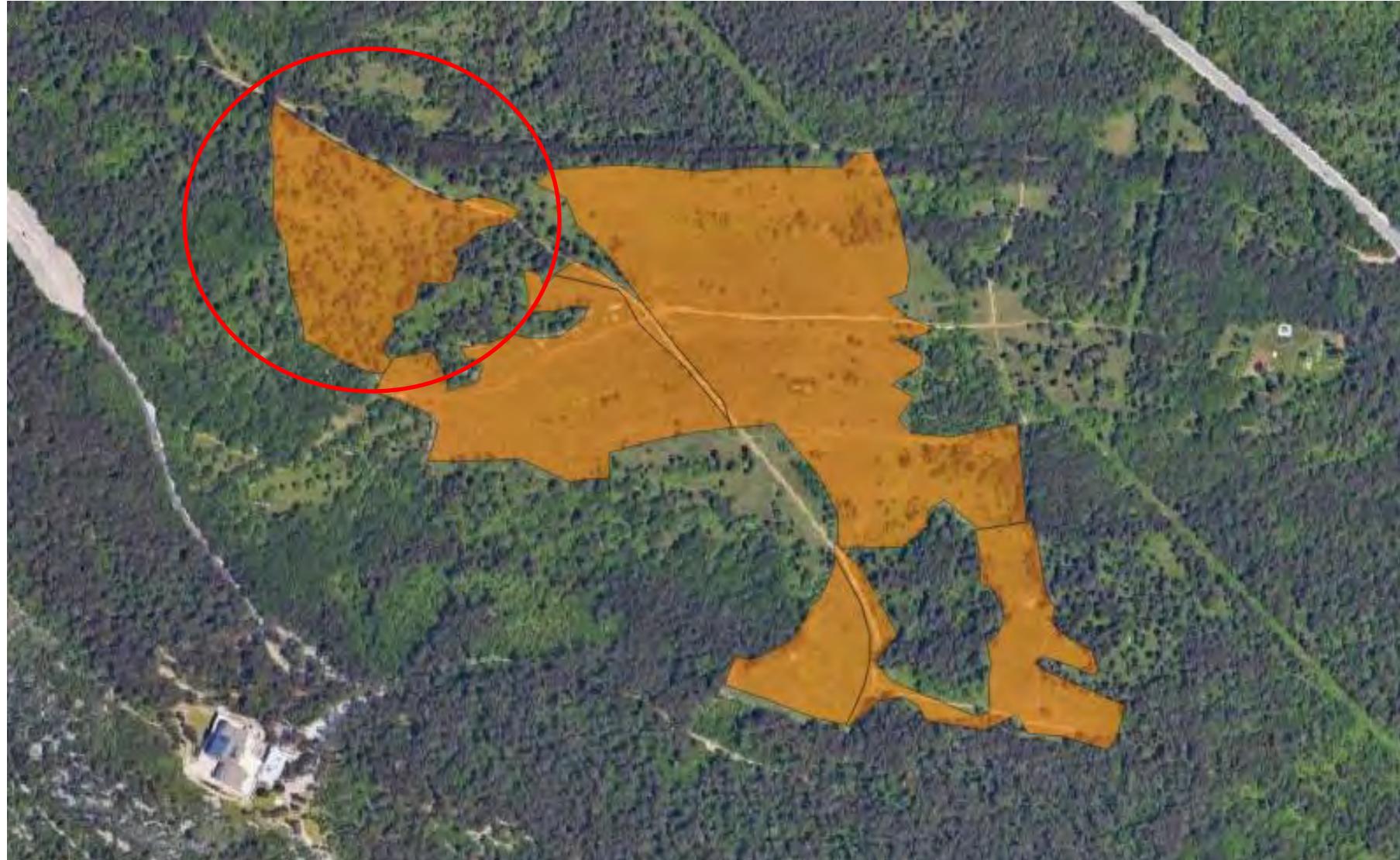
CTR - Regional technical map - Eagle FVG

ReCo

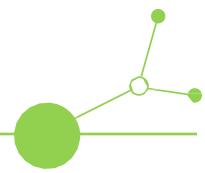
ORTHOPHOTOS
FROM 1998
TO 2020

Eagle FVG





ReCo



Upupa epops



Anthus campestris



Circaetus gallicus



Mantis religiosa

Amethyst eryngio



Cotinus coggygria



Pilot action for the enhancement of the karst dry grassland



I Seeds collection
Sum/wint 24



Trees cuttings
Summer 25



Bushes cutting
Summer 25



Sow in nursery
March 25



II Seeds collection
At end spring 25



Preparation
experimental
plot



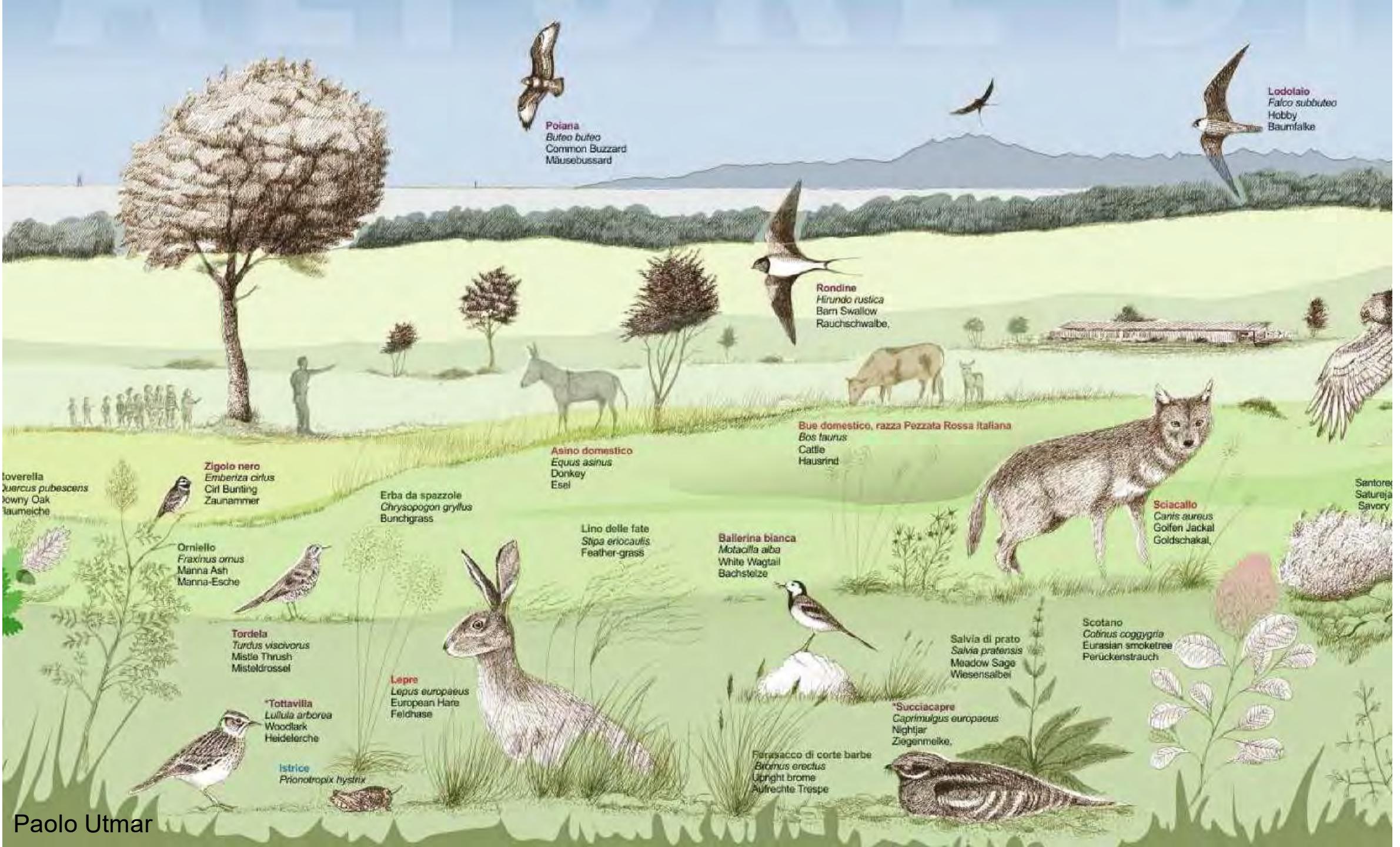
Transplanting
nursery-grown
species



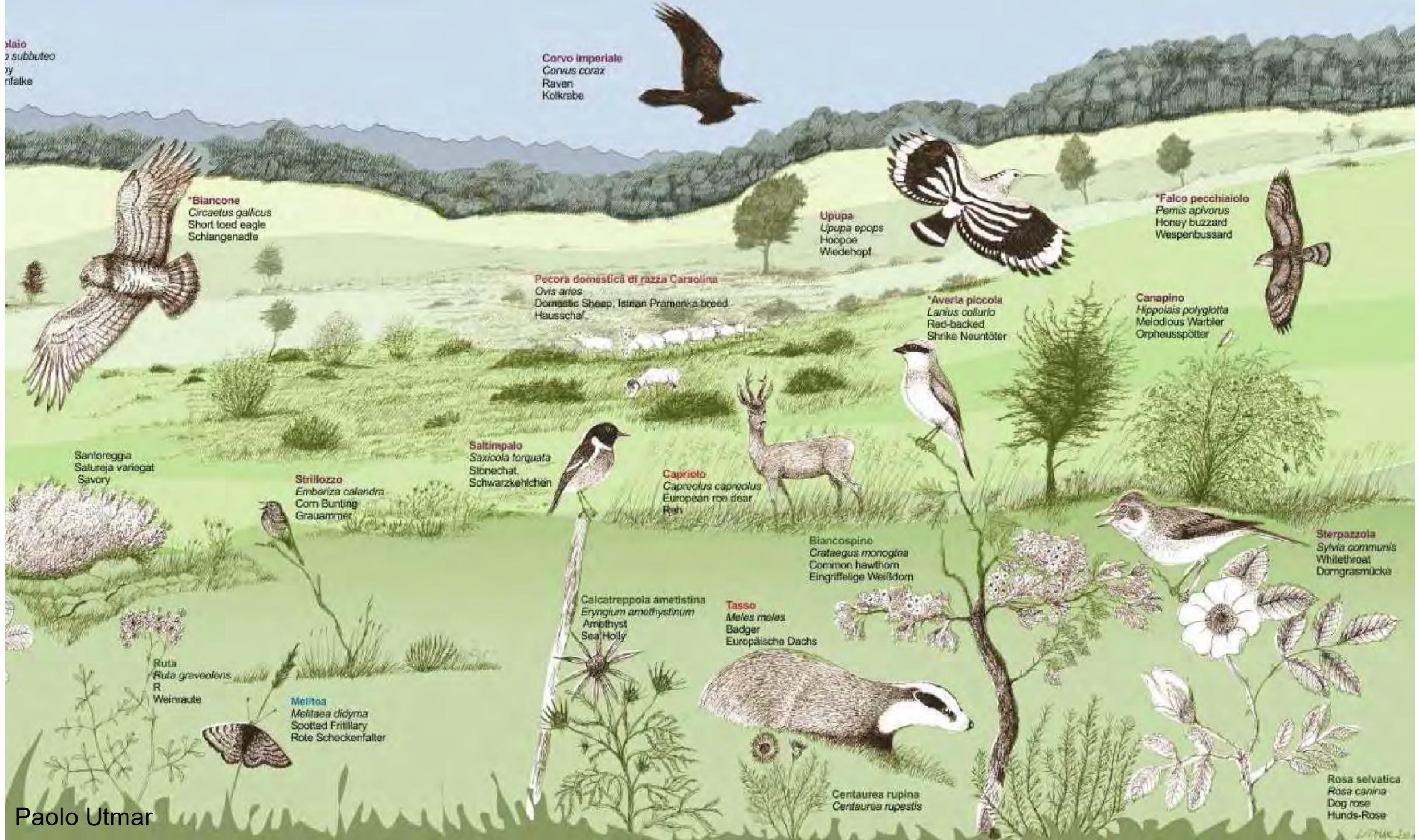
Assessment of
replant vitality
March 26



Periodic monitoring
activities and
citizen science events



plaio
a subbuteo
zy
nfalke



Monitoring of the Karst dry grassland at the Monte Grisa site

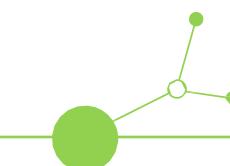
Vegetation monitoring on treated and natural areas

Methodology of vegetation monitoring and control

1
Mapping
with drone to
characterize
all the
study area

2
Monthly observations to
describe the flowering of
Karst dry grassland species
over time and measure
their abundance and
species richness

3
Creation of a digital atlas of
the most common species,
to be used in
citizen science activities



Monitoring of the Karst dry grassland at the Monte Grisa site

Vegetation monitoring on treated and natural areas

Vegetation monitoring and control

Methodology of animal monitoring and control

2
Periodically
mown areas

3
Cleared areas with
controlled cutting of
the karst shrubland
in 2022 and 2025

4
Experimental plots
with transplanting
nursery-grown
species

1
Natural areas no
longer used for
grazing of sheep,
goats, and cattle, for
50 years (since 1979)

5
Smoke tree
areas with
periodic
clearing in
2025

6
Forest edges
with karst
shrubland
and black
pine forest

Monitoring of the Karst dry grassland at the Monte Grisa site

ReCo

Butterflies, carabids and birds monitoring

Methodology of animal monitoring and control

1
Monthly field butterfly observations along prefixed transects that pass through all experimental areas and habitats, also using the EBM scheme. Verifying of the butterfly-flower host plant pairing

2
Direct observation resident, migratory, and nesting birds along predetermined transects that pass through all experimental areas and habitat

3
Atlas of Karst dry grassland butterflies and birds

Monitoring of the Karst dry grassland at the Monte Grisa site

ReCo

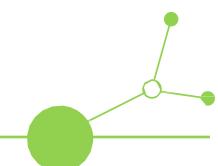
DISSEMINATION ACTIVITIES



General target

Students

Stakeholders





ReCo

THANK YOU!

