



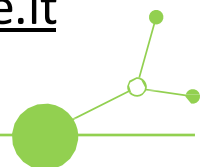
SAVE THE GRASSLAND: ENHANCING BIODIVERSITY OF A THREATENED KARSIC HABITAT

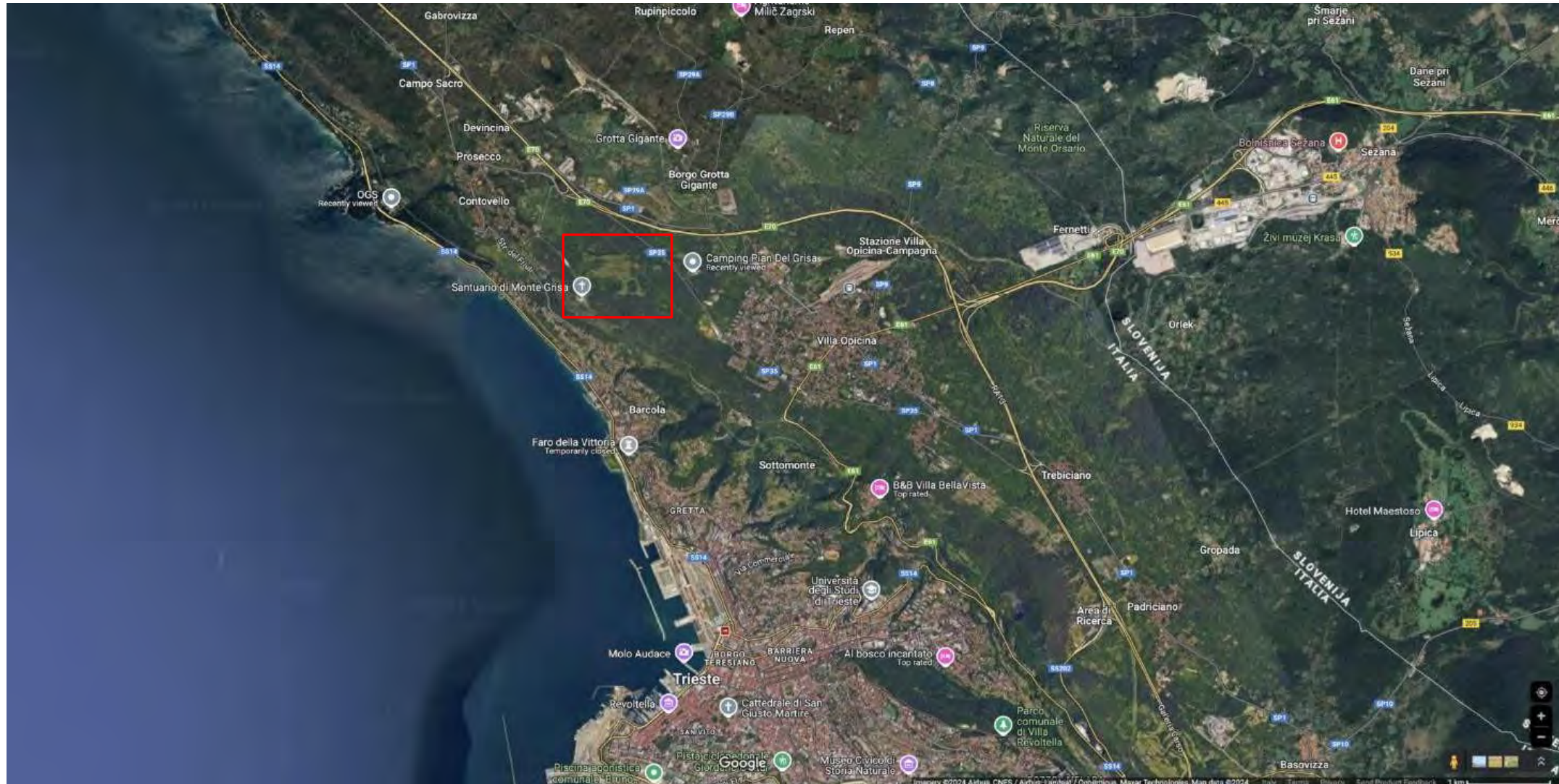
PP13

WWF Italy Foundation

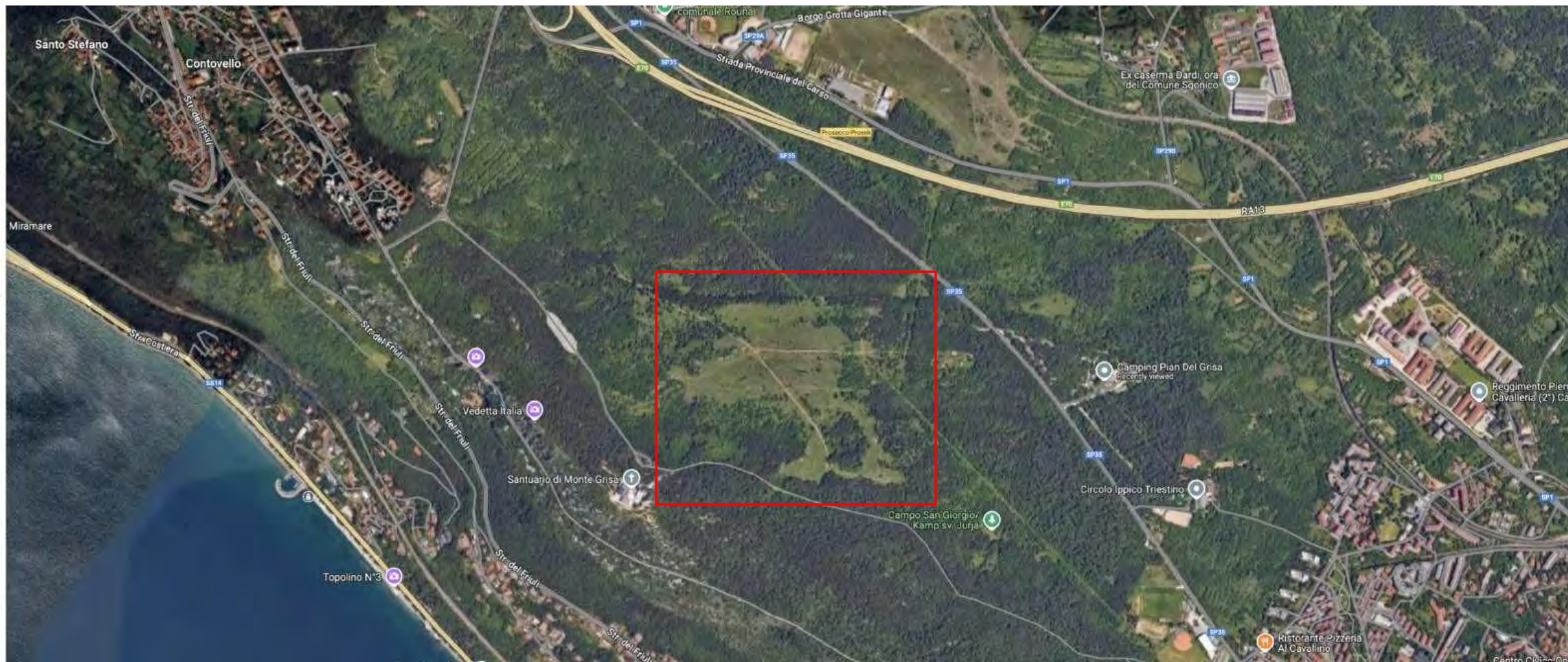
Miramare Marine Protected Area

www.ampmiramare.it





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



Karst grassland: its origins and ancient uses

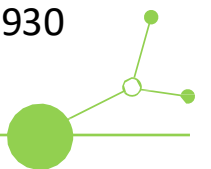
ReCo



Auremiano - Sheep grazing (SLO) - Archivio Caldart 1930

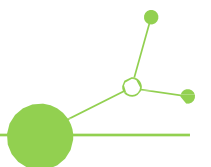


Divacia (SLO) - Haymaking - Archivio Caldart 1930





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





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



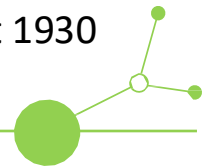
Black pine and smoke tree bush in the pilot study area - 2024



Trebiciano (Trieste Province) - Archivio Corpo Forestale Regionale FVG



Dolina – cattle grazing - Archivio Caldart 1930



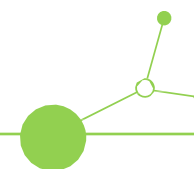
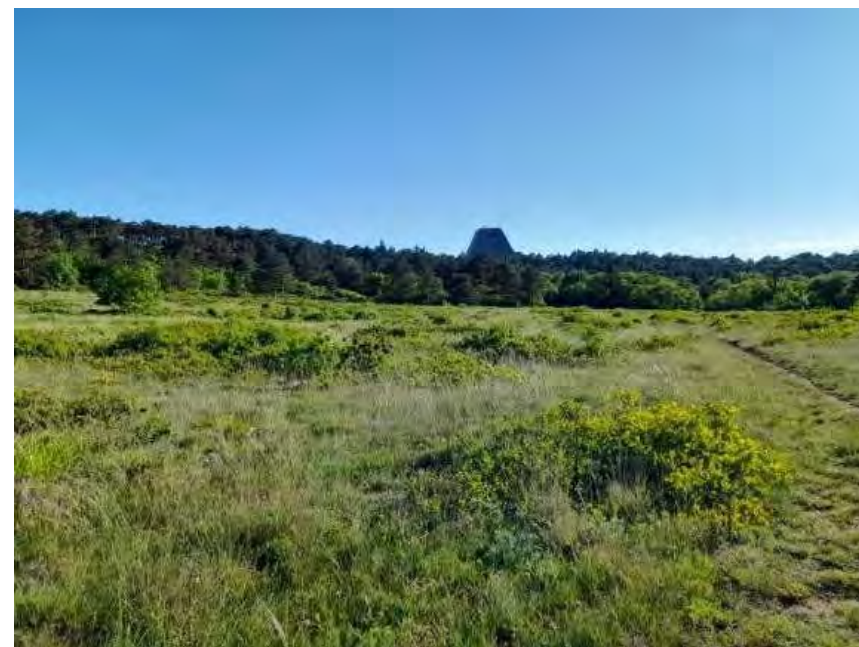
THE KARSIC LANDA HISTORY



DEFORESTATION



PASTURE

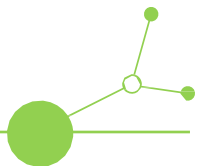


THE KARSIC LANDA HISTORY

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

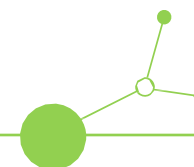
After the reforestation plan of the Austrian Empire, they used the *Pinus nigra* (Austrian pine or black pine), a pioneer species, to reforest the karsic surface.



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



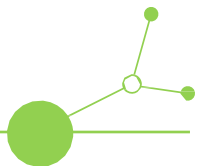
Association ***Chrysopogono-Centaureetum cristatae* (62A0b)**: Xerophilous grasslands of East Adriatic with marked thermophilicity and significant component of mediterranean species



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

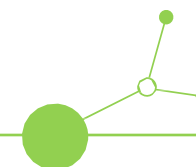
Association ***Danthonio-Scorzoneretum villosae* (62A0c)**: meadows and pastures on red soil



THE KARSIC LANDA

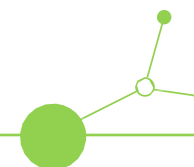
Hypothesis: based on preliminary observations the «landa» of the Monte Grisa should belong to «***Carici-Centaureetum***», the typical association of the Trieste Karst, but could display more termophilous component.

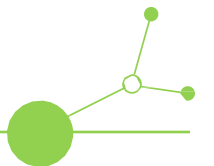
It will be significant the study of the flowering seasons, because in the *Carici- Centaureetum* is approximately constant from the spring to the autumn; instead mediterranean plant associations have two maxima of flowering in autumn (most of all) and in spring, with a decrease in the summer.



THE KARSIC LANDA

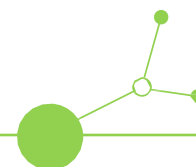
Climate change effects: monitoring the autumn flowering species, the effects of global warming seems to influence the period of blooming of same species, that are postponed; it will be check this point also in the late winter and early spring period.

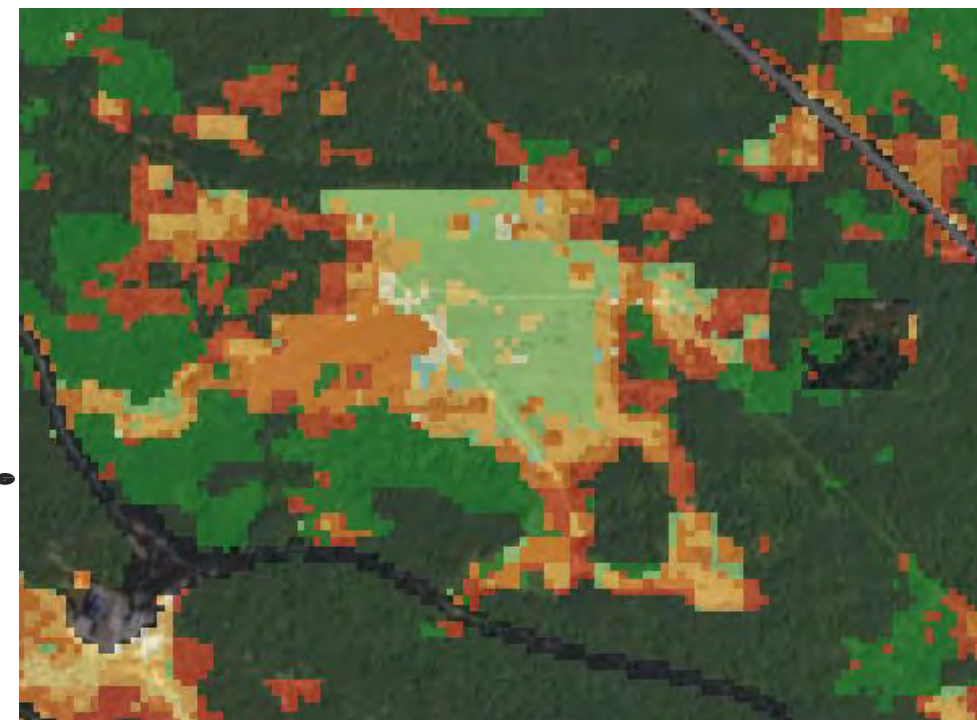






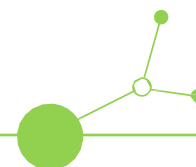
ReCo

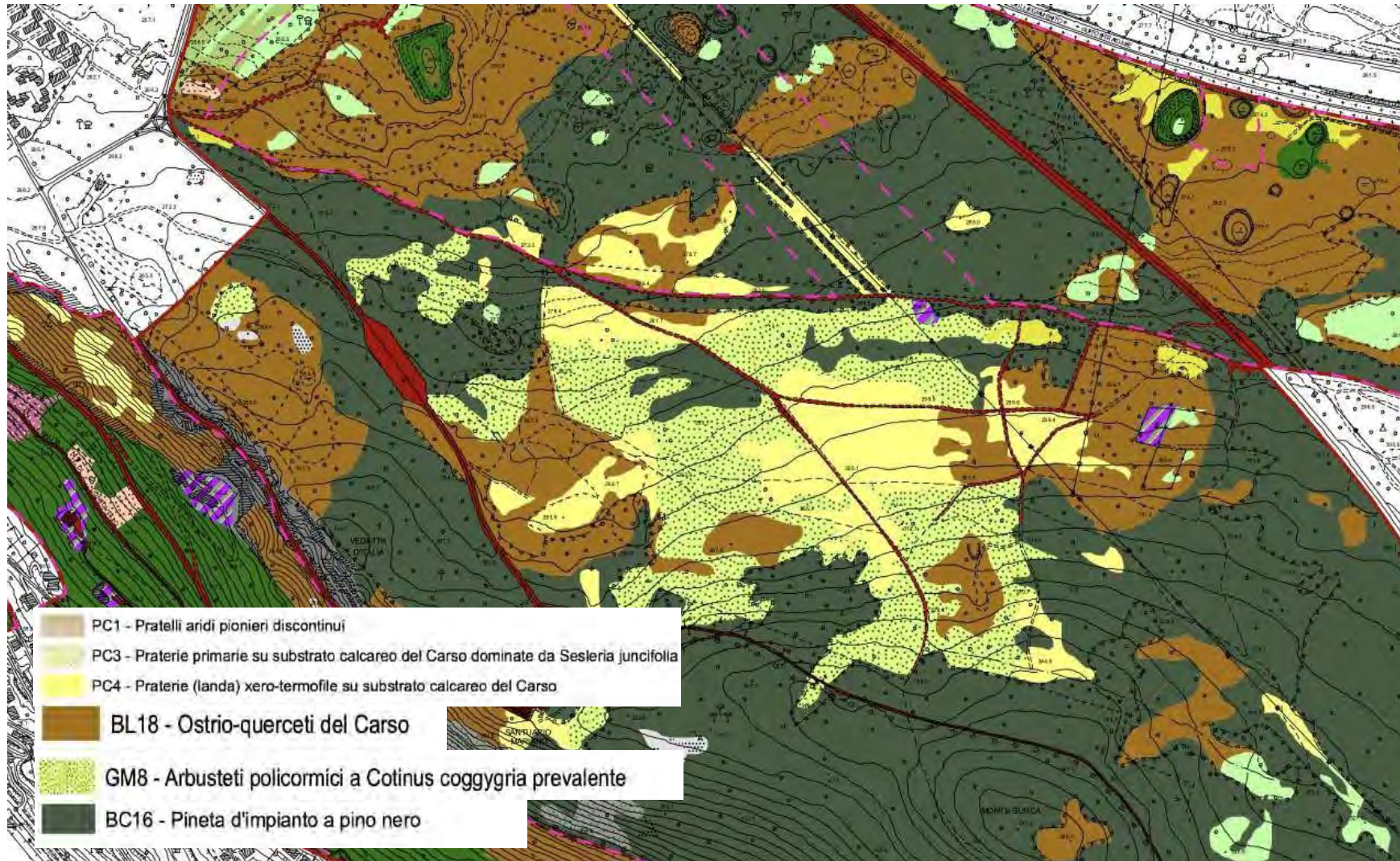




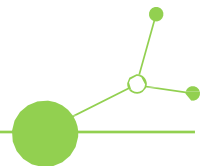
- Arbusteto
- Bosco e boscaglia a latifoglie decidue
- Landa incespugliamento 1
- Landa incespugliamento 2
- Landa non incespugliata
- Mosaico landa-boscaglia
- Pineta a pino nero
- Prato da sfalcio
- Prato pascolo

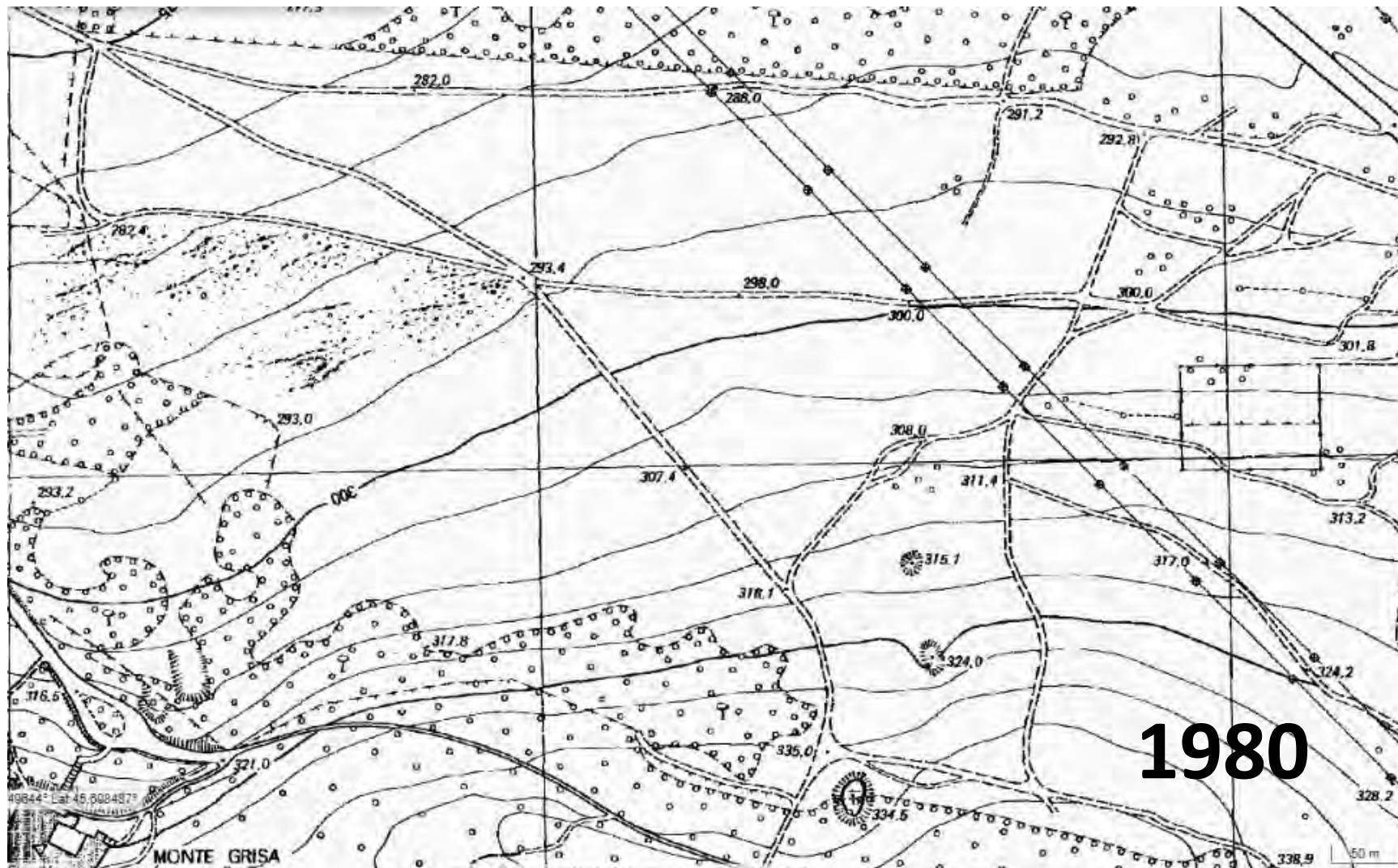
Ecomosaico del Carso – Kraški ekomozaik





Vegetation technical map

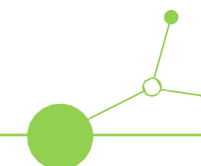


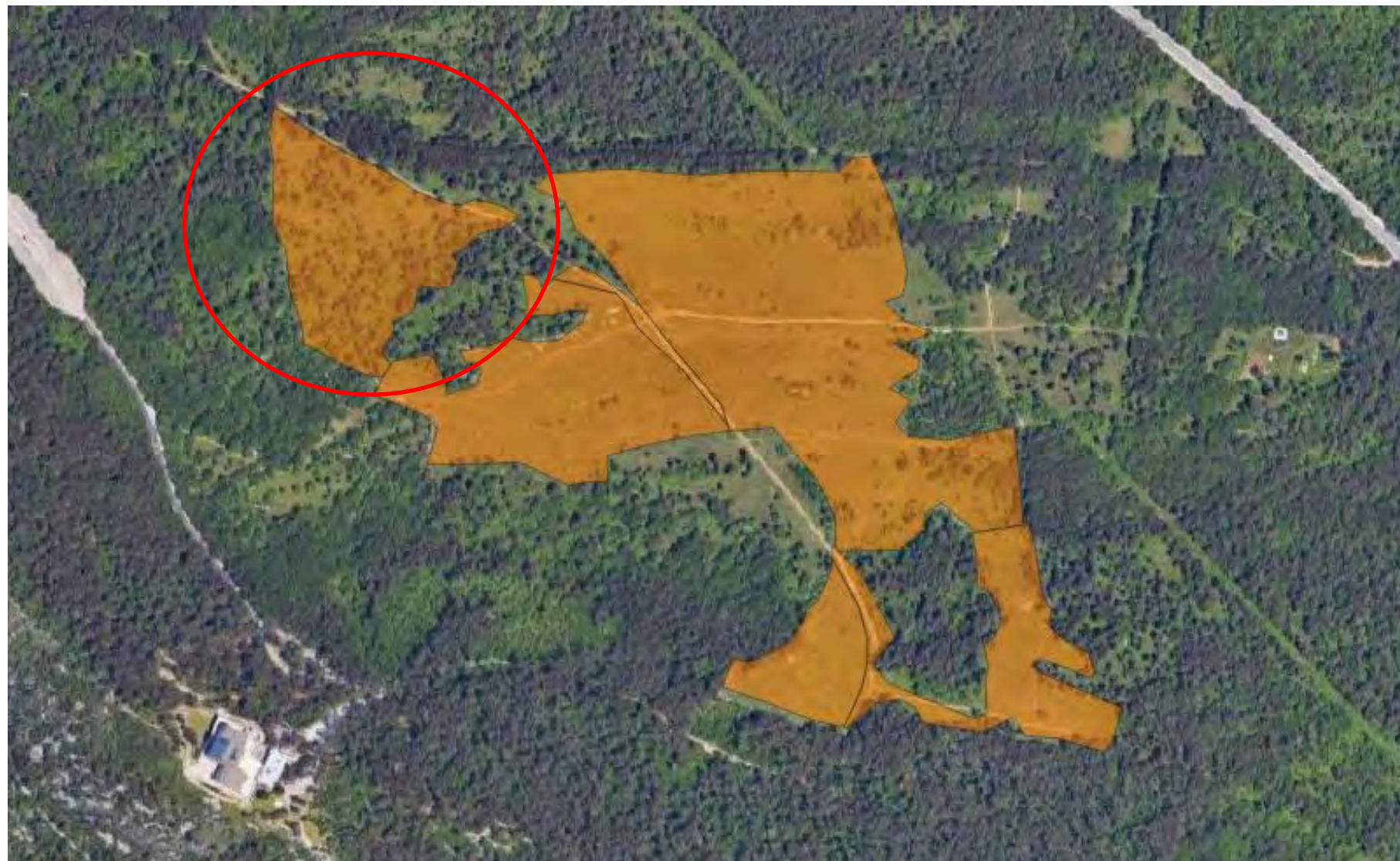


CTR - Regional technical map - Eagle FVG

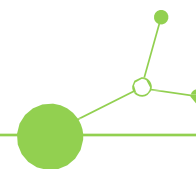
ORTHOPHOTOS
FROM 1998
TO 2020

Eagle FVG





ReCo



Upupa epops



Circaetus gallicus



Anthus campestris



Amethyst eryngo

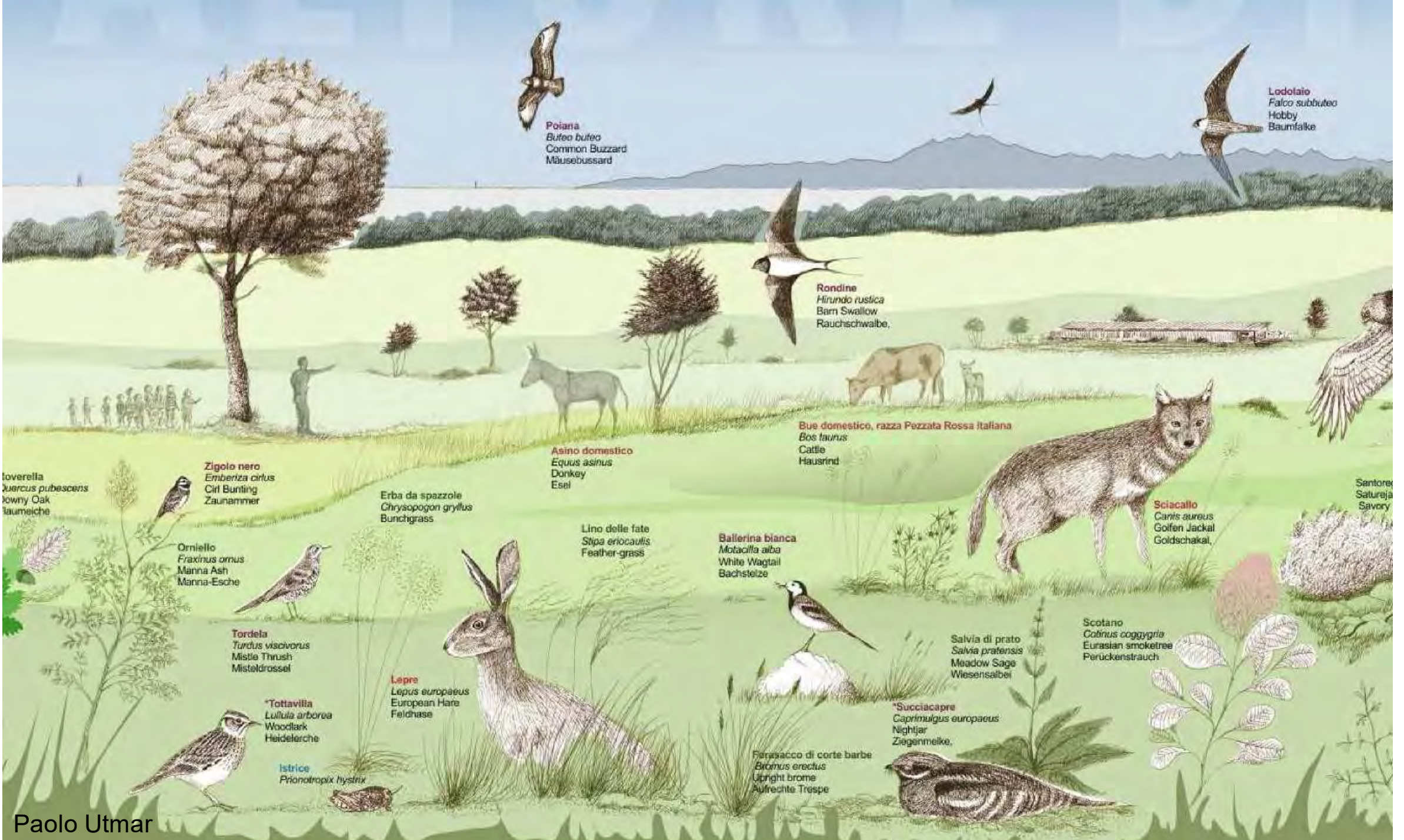


Mantis religiosa



Cotinus coggygria





Poiana
Buteo buteo
Common Buzzard
Mäusebussard

Lodolaia
Falco subbuteo
Hobby
Baumfalke

Rondine
Hirundo rustica
Barn Swallow
Rauchschwalbe

Bue domestico, razza Pezzata Rossa Italiana
Bos taurus
Cattle
Hausrind

Asino domestico
Equus asinus
Donkey
Esel

Sciacallo
Canis aureus
Golden Jackal
Goldschakal

Ballerina bianca
Motacilla alba
White Wagtail
Bachstelze

Lino delle fate
Stipa eriocalis
Feather-grass

Erba da spazzole
Chrysopogon gryllus
Bunchgrass

Zigolo nero
Emberiza citrinella
Cirl Bunting
Zaunammer

Quercia
Quercus pubescens
Downy Oak
Laubmeise

Orniello
Fraxinus ornus
Manna Ash
Manna-Esche

Turdella
Turdus viscivorus
Mistle Thrush
Misteldrossel

Tottavilla
Lullula arborea
Woodlark
Heidelerche

Istrice
Prionotrochis hystrix

Lepre
Lepus europaeus
European Hare
Feldhase

Salvia di prato
Salvia pratensis
Meadow Sage
Wiesensalbei

Scotano
Cotinus coggygria
Eurasian smoke tree
Perückenstrauch

Succiacapre
Caprimulgus europaeus
Nightjar
Ziegenmelke

Ferascio di corte barbe
Bromus erectus
Upright brome
Aufrechte Trespel

olaio
o subbuteo
y
nfalke

Corvo imperiale
Corvus corax
Raven
Kolkkrabe

***Biancone**
Circus gallicus
Short toed eagle
Schlangenadler

Upupa
Upupa epops
Hoopoe
Wiedehopf

***Falco pecchiaiolo**
Pernis apivorus
Honey buzzard
Wespenbussard

Pecora domestica di razza Carzolina
Ovis aries
Domestic Sheep, Istrian Pramenka breed
Hausschaf

***Averla piccola**
Lanius collurio
Red-backed
Shrike Neuntöter

Canapino
Hippolais polyglotta
Melodious Warbler
Orpheusspötter

Santoreggia
Satureja variegata
Savory

Strillozzo
Emberiza calandra
Corn Bunting
Grauammer

Saltimpalo
Saxicola torquata
Stonechat
Schwarzkehlchen

Capriolo
Capreolus capreolus
European roe deer
Reh

Biancospino
Crataegus monogyna
Common hawthorn
Eingriffeliger Weißdorn

Sterpazzola
Sylvia communis
Whitethroat
Domgrasmücke

Ruta
Ruta graveolens
R
Weinraute

Melitea
Melitaea didyma
Spotted Fritillary
Rote Scheckenfalter

Calcatreppola ametistina
Eryngium amethystinum
Amethyst
Saa Holly

Tasso
Meles meles
Badger
Europäische Dachs

Centaurea rupina
Centaurea rupestris

Rosa selvatica
Rosa canina
Dog rose
Hunds-Rose

Monitoring of the Karst dry grassland at the Monte Grisa site

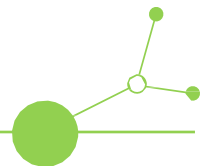
**Vegetation monitoring
on treated and natural areas**

**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

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

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

5
Smoke tree
areas with
periodic
clearing in
2025

4
Experimental plots
with transplanting
nursery-grown
species

6
Forest edges
with karst
shrubland
and black
pine forest

Monitoring of the Karst dry grassland at the Monte Grisa site

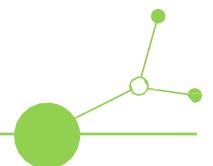
**Butterflies, carabids and birds
monitoring**

**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

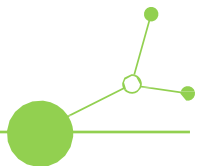
DISSEMINATION ACTIVITIES



General target

Students

Stakeholders





THANK YOU!

