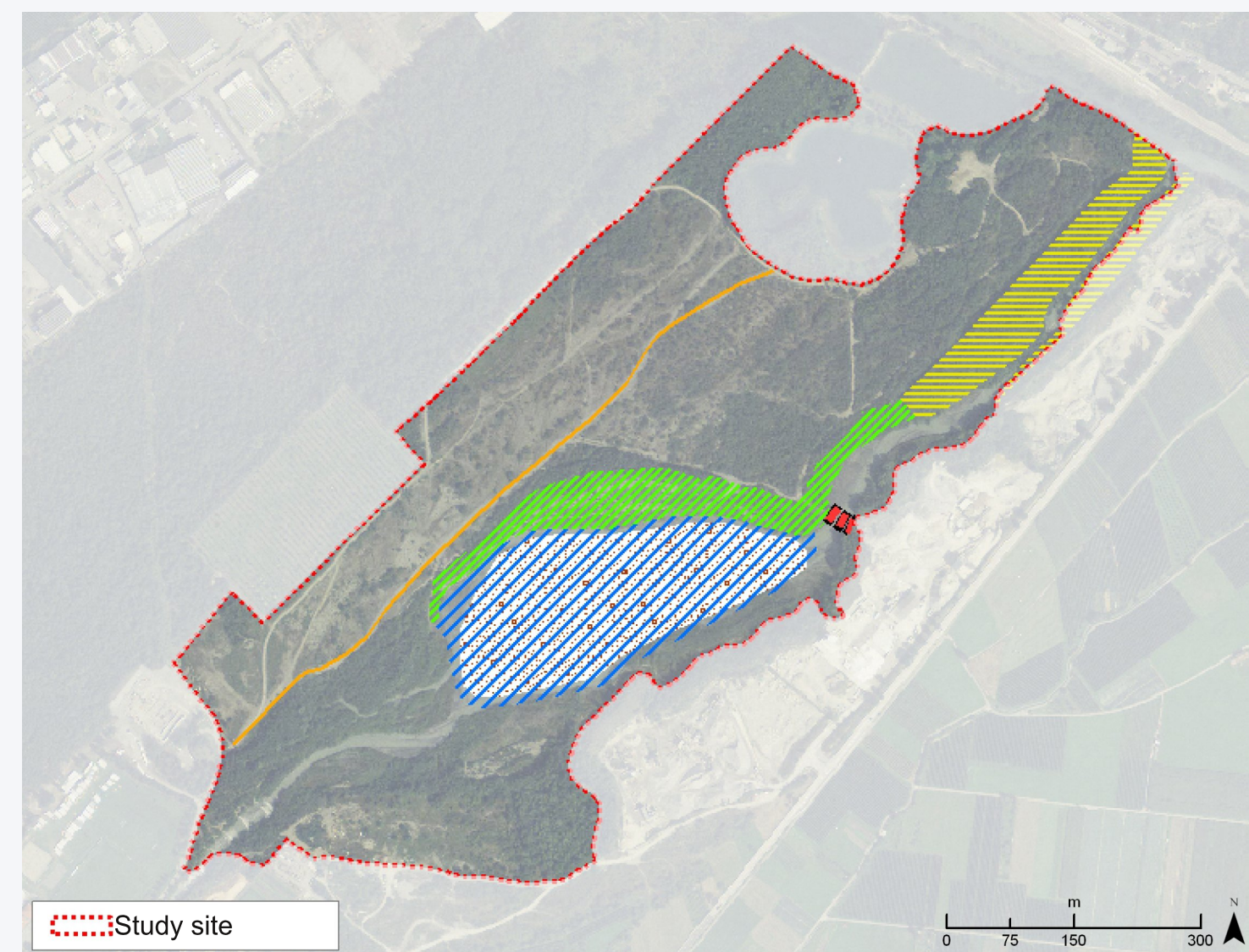


Prader Sand: River restoration due to channel widening

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Project background The river Suldenbach is an alpine river in Northern Italy. Since the middle of the 20th century the river was affected by regulation measures inhibiting natural river dynamics in the area of Prader Sand. Originally this section was a dynamic floodplain with vegetated islands, gravel bars and meandering channels. In 2000 a first set of restoration measures launched by the Department of Hydraulic Engineering of the Autonomous Province of Bozen/Bolzano - South Tyrol took place. The main objectives were to allow riverbank erosion to occur and return the river to its former natural structure and creating new, or reactivating old, fluvial habitats.

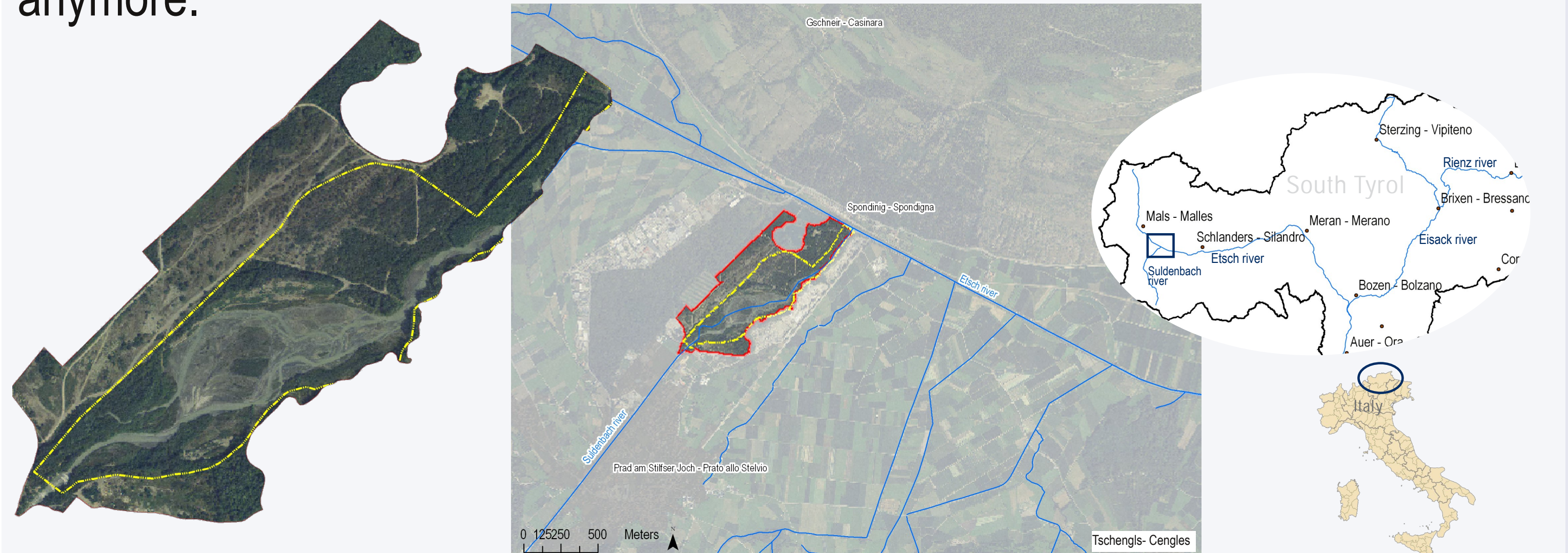


Measurements	Period
Termination of gravel extraction	since 2000
Deconstruction of the bridge inhibiting sediment transportation	2002
Prohibition of car transit	2003
Removal of riparian trees and lowering the shore line	2000 - 2006
Clearing of alder woods near the confluence of Suldenbach and Etsch rivers	2007 and 2010
Continuous channel widening due natural riverbank erosion	2000 - until now

Map of the measurements improving natural dynamics at the Suldenbach River (Prader Sand)



Study area The study area Prader Sand is located at the conjunction of the Suldenbach and the Etsch rivers. The study area (48,89 ha) is divided in an active floodplain and dry sites, those are not influenced by river dynamics anymore.



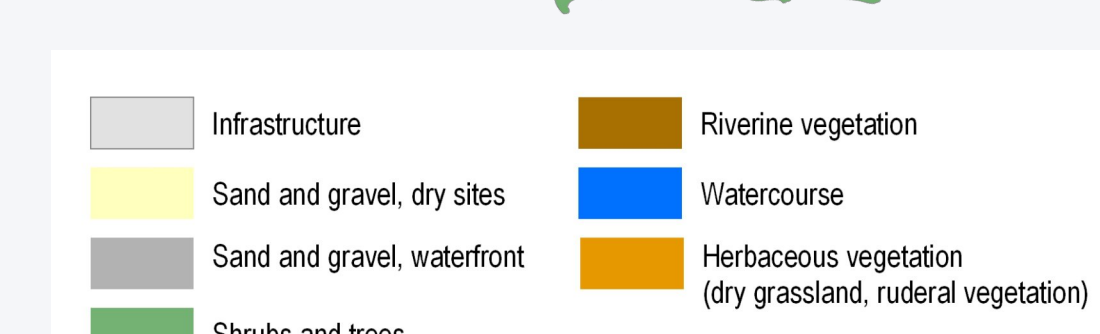
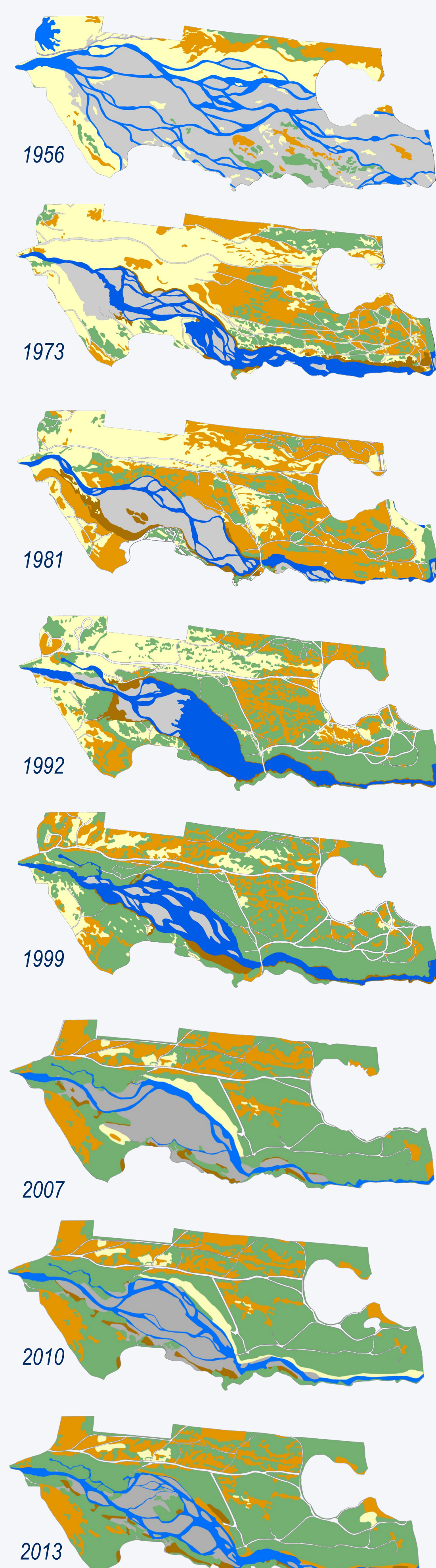
The location of the Suldenbach river and the study area of Prader Sand; Legend: red line... study area, yellow line... protected area "Prader Sand"

Objectives

- Evaluation of effectiveness of restoration activities
- Providing the basis for the habitat management plan of the protected area "Prader Sand"

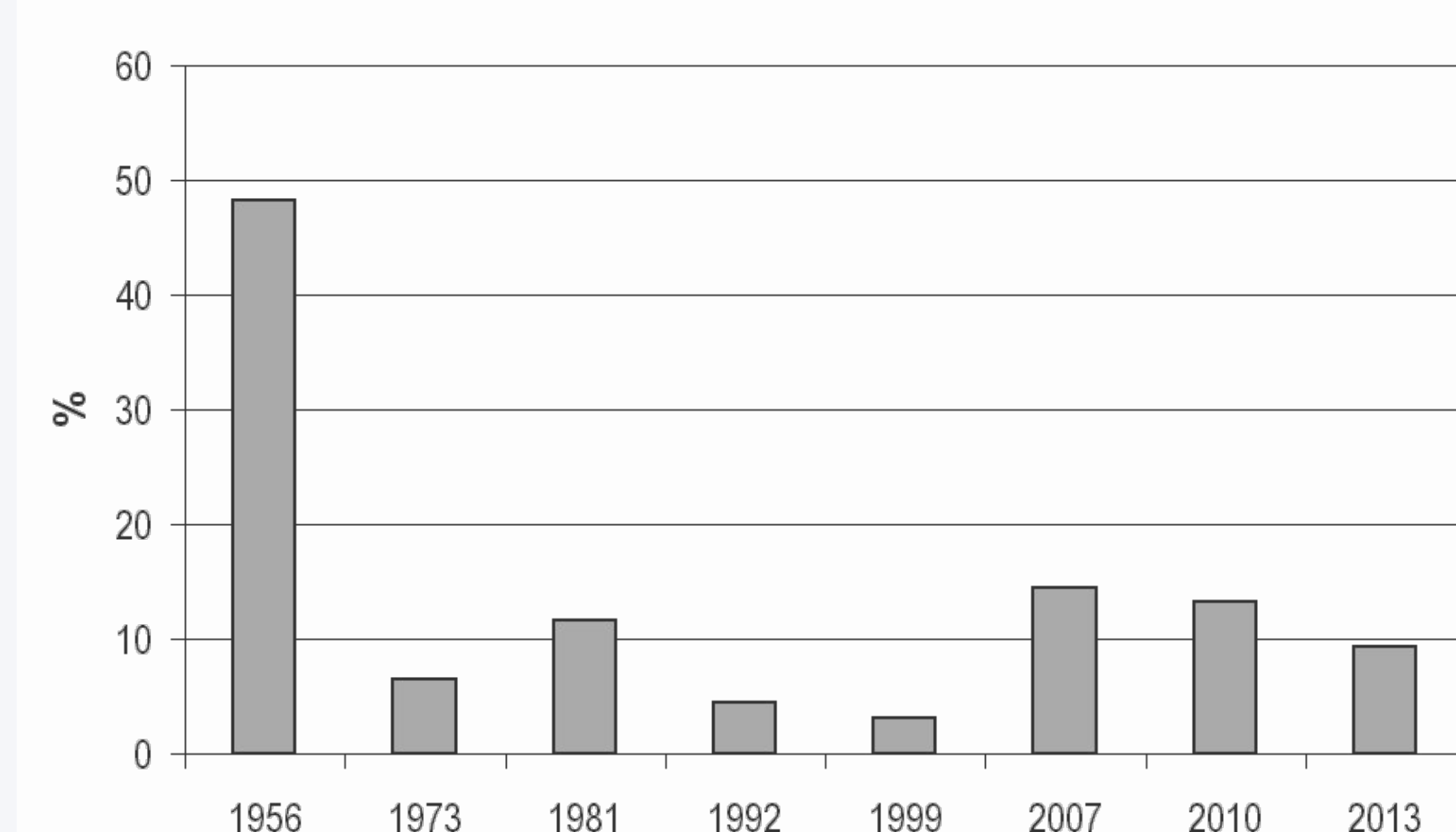
Methods

- Habitat and vegetation survey 2007, 2010 and 2013 (scale 1:1000)
- GIS-based analysis of river structures from 1956 according to available orthofotos



Development of the main landscape types since 1956

Results Results showed that habitat heterogeneity changed between 1956 and 2013. 1956 the size of the dynamic floodplain of Suldenbach river was 158 ha (48,3% of the study area) while 1999 the active floodplain area covered only 3,1% of the total investigation area. Since the revitalization measurements (since 2000) the availability of typical fluvial habitats increased as consequence of the revitalized hydrological and morphological dynamics. Now dynamic gravel and sediment banks cover 4,5 ha (9,3%) of the Prader Sand.

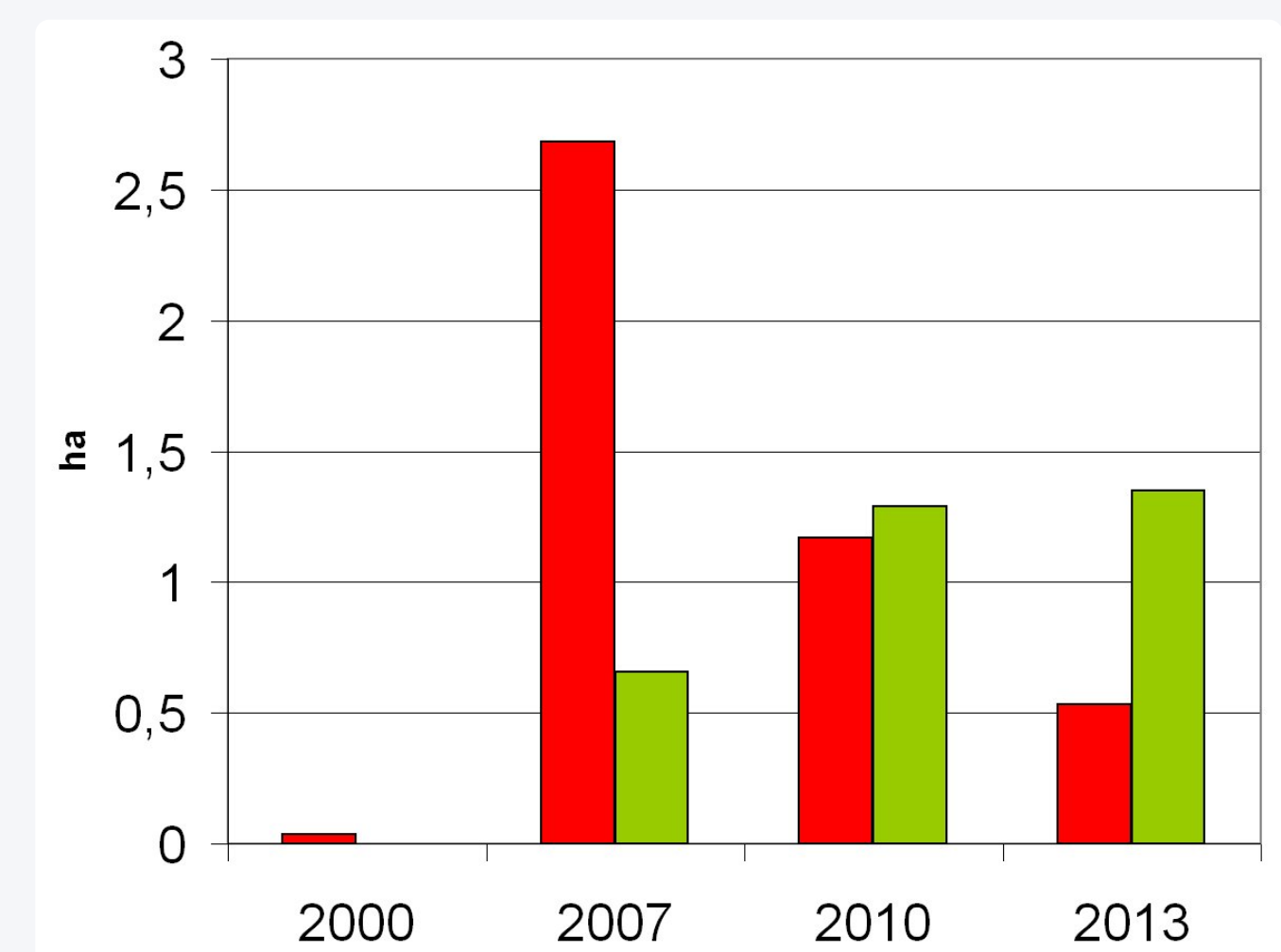


Percent coverage of dynamic sand and gravel bars of Suldenbach river at the Prader Sand from 1956 to 2013

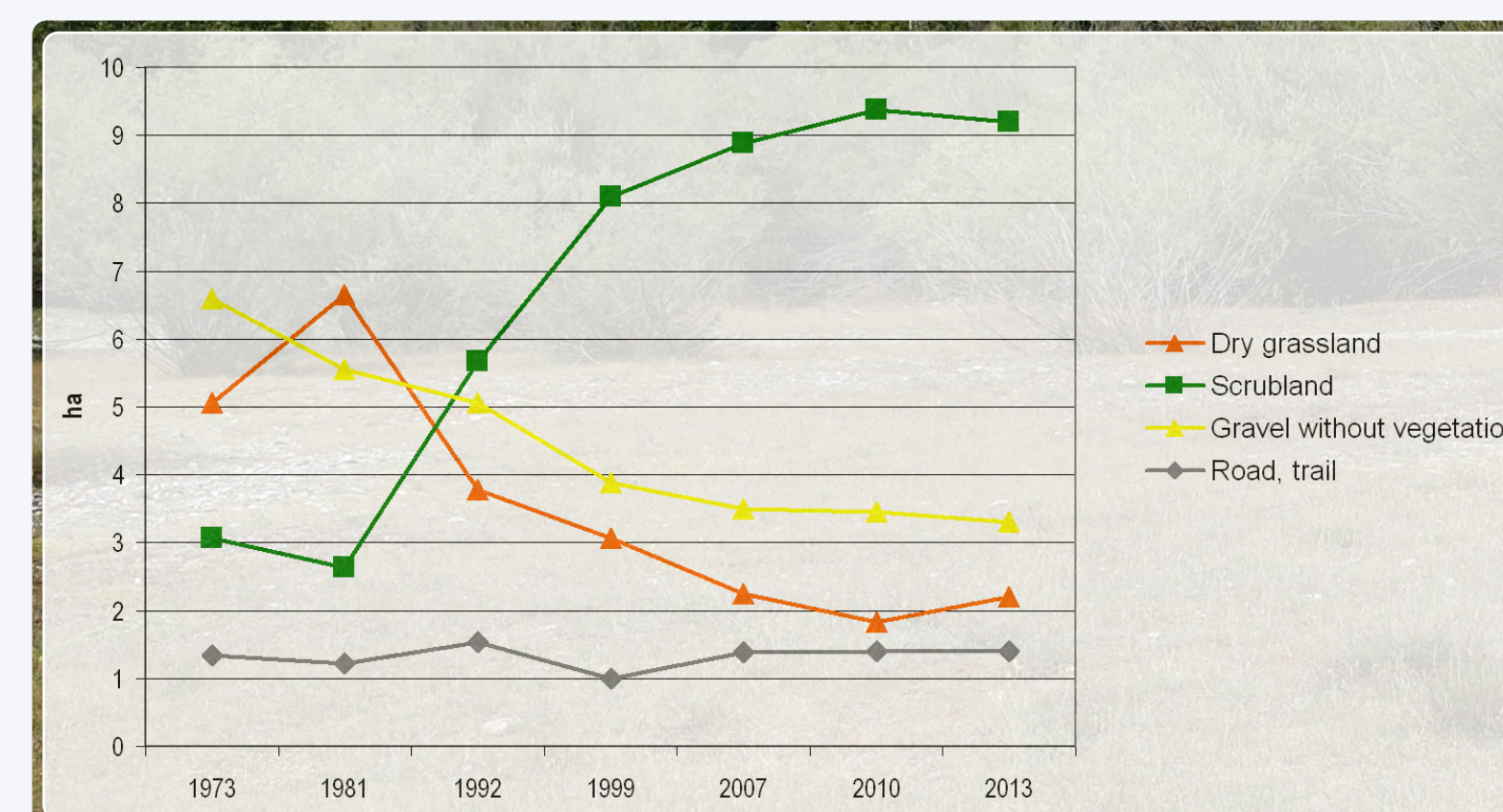
In 2013 19 different habitat types were recorded. Pioneer habitats as vegetation-less gravel and sandbanks, herbaceous pioneering plants and ligneous vegetation with *Myricaria germanica* or *Salix purpurea* are predominant. In particular *Myricaria germanica* is regarded as one of the most important indicator species for alpine rivers with natural dynamics. The nowadays endangered species of *Myricaria germanica* is widespread over the flood plain of the Suldenbach river (1,9 ha). Before the revitalization this species faced extinction in the Prader Sand.



Size of sites with *Myricaria germanica* since 2000. Legend: red... *Myricaria germanica*-shrubs; green... *Salix purpurea* with *Myricaria germanica*.



The adjacent dry sites isolated from river dynamics and covered with dry grassland and gravel sites were used as pasture and military area until 1980. Now the dry sites are characterized by a high shrub cover at the expense of valuable grassland. Currently pasturing is reintroduced to restore a habitat mosaic of open sites, grassland and shrubs.



Succession at the dry sites isolated from river dynamics



Conclusions

Post restoration vegetation survey in 2007, 2010 and 2013 showed successful measures: The Suldenbach river at the area Prader Sand has now a shifting mosaic of channels, bars and islands. Flow and flood pulses create a diversity of habitats with a typical riparian vegetation mosaic. The heavily endangered German Tamarisk (*Myricaria germanica*) is widespread again and serves as indicator of ecological functionality.