Monitoring of biotopes of national importance in Switzerland: overview of a long-term program

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Bogs

Fens

Fens

Dry meadows and pastures

Dry meadows and pastures

Alluvial areas

Alluvial areas

Alluvial areas

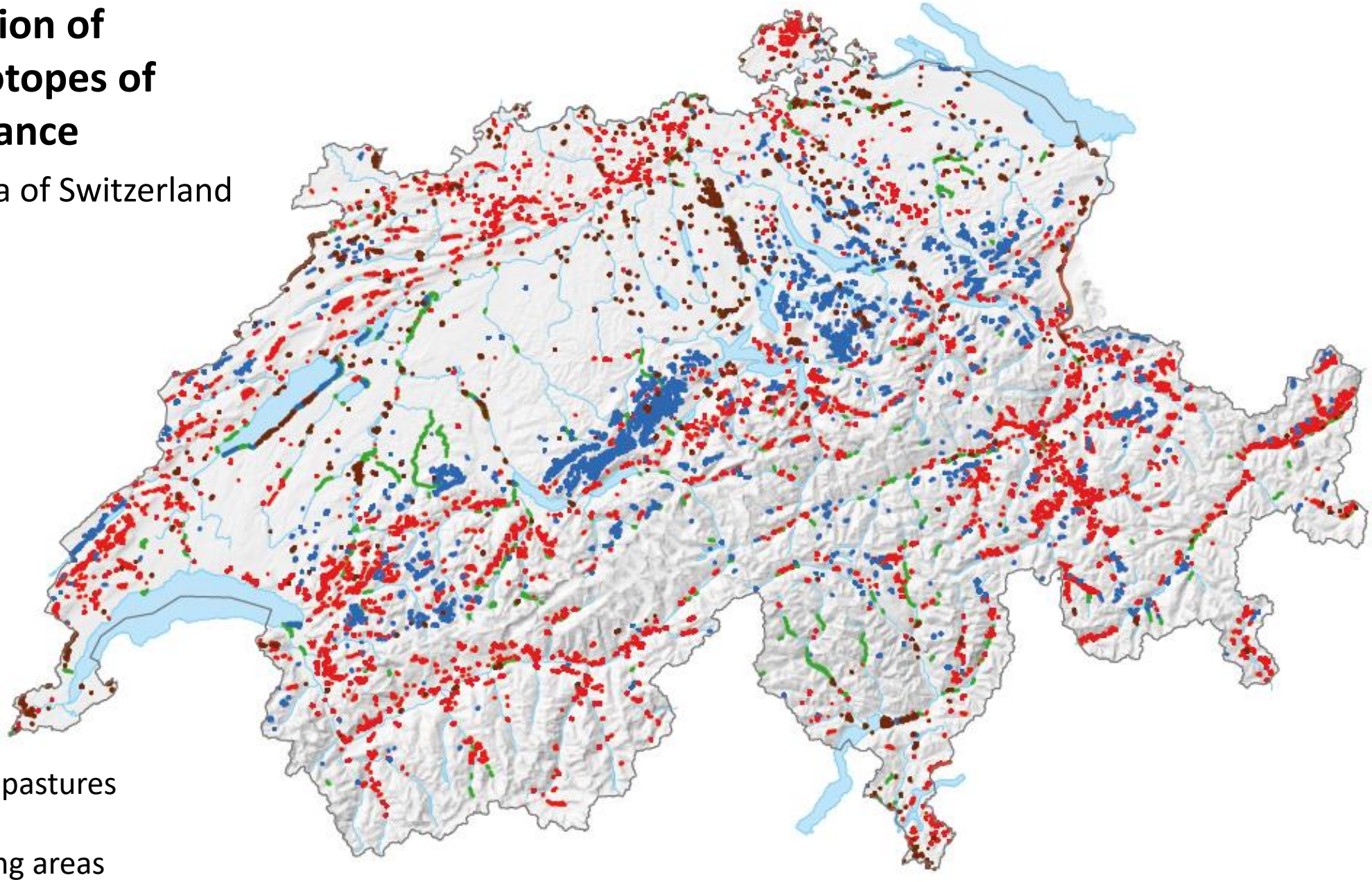
Glacier forefields

Amphibian breeding areas

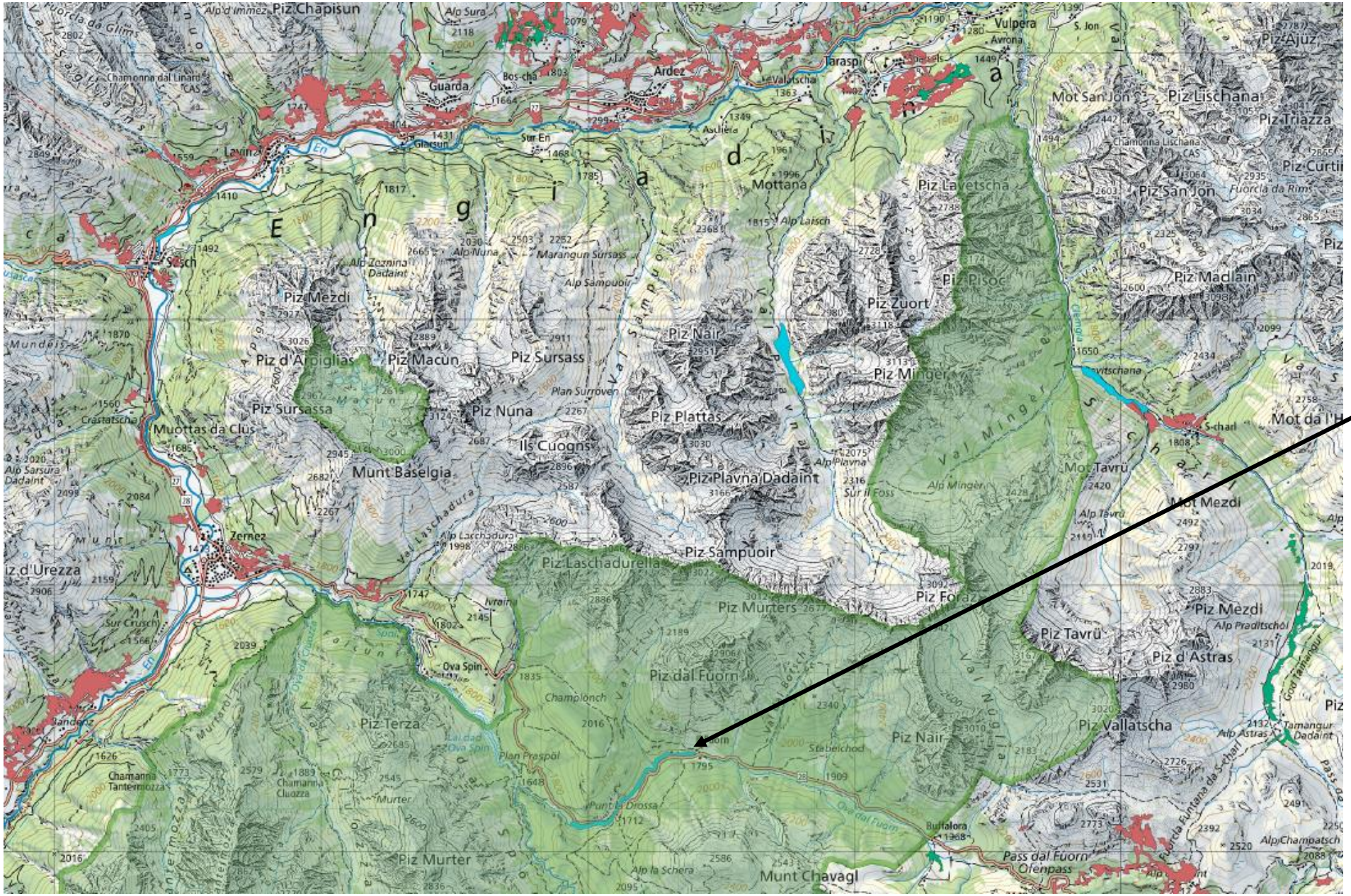
Amphibian breeding areas

Spatial distribution of 7000 sites of biotopes of national importance

⇒ 2.27% of the area of Switzerland



- Dry meadows and pastures
- Fens and bogs
- Amphibian breeding areas
- Alluvial areas (incl. glacier forfields)


Alluvial area
'Ova dal Fuorn'
Piz Chapisun
Alp Sura
Vulpera
Ardez
Guarda
Lavin
En
Engadin
Mottana
Piz Lischana
Piz Triazza
Piz Ajüz
Piz San Jon
Piz Lavetscha
Piz Madlain
Piz Pisoc
Piz Zuort
Piz Nair
Piz Minger
Piz Mezdi
Piz d'Aipiglias
Piz Macun
Piz Sursass
Piz Nuna
Piz Plattas
Piz Sursassa
Muottas da Clüs
Ils Cuogns
Munt Baselgia
Piz Plavna Dadaint
Mot Tavrü
Mot Mezdi
Zernez
Piz Sampuoir
Piz Laschadurella
Piz Murters
Piz Foraz
Piz Tavrü
Piz d'Astras
Piz Mezdi
Ova Spin
Piz dal Fuorn
Piz Terza
Piz Vallatscha
Piz Nair
Piz Murter
Munt Chavagl
Pass dal Fuorn
Ofenpass
Alp Champatsch
Val Sampuoir
Val Minger
Val Laschadura
Val Nair
Val Mezdi

Monitoring the Effectiveness of Habitat Conservation in Switzerland (WBS)

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Federal Office for the Environment
FOEN

⇒ **Initiated** in 2011 as a long-term monitoring project by the Federal Office for the Environment and conducted by WSL (Swiss Federal Research Institute for Forest, Snow and Landscape Research)

⇒ **Main goal:**
Estimation of trends in quality and quantity of the biotops of national importance:
Are the biotopes of national importance (dry grasslands, fens, bogs, floodplains, amphibian breeding areas) developing according to their conservation targets?

Module
Remote sensing

Christian Ginzler WSL

Module
Vegetation

Ariel Bergamini WSL

Module
Amphibian breeding sites

Benedikt Schmidt info fauna karch

Vegetation surveys

	Objects	Plots
Alluvial areas	124	2150
Fens and bogs	242	2180
Dry meadows and pastures	444	2780
Total	**810**	**7110**

- Complex sampling design: Two-stage sampling design with unequal probability sampling and sample spreading in ecological and geographic space (Tillé, Y. & Ecker, K. 2014. Environmental and Ecological Statistics)
- Each plot 10 m^2, circular (radius = 1.78 m); in alluvial areas an additional circular plot of 200 m^2 is recorded to get a more complete sample of woody plants
- Complete list of vascular plants together with cover estimates; in bogs and fens also bryophytes are recorded
- Every 6 years the same plot is recorded again

Main indicators derived from vegetation surveys

- **Changes in mean indicator values:** nutrients, moisture, light, temperature
- **Changes in species numbers:** Red List species, neophytes, habitats specialists, national priority species
- **Changes in the area of typical habitats**

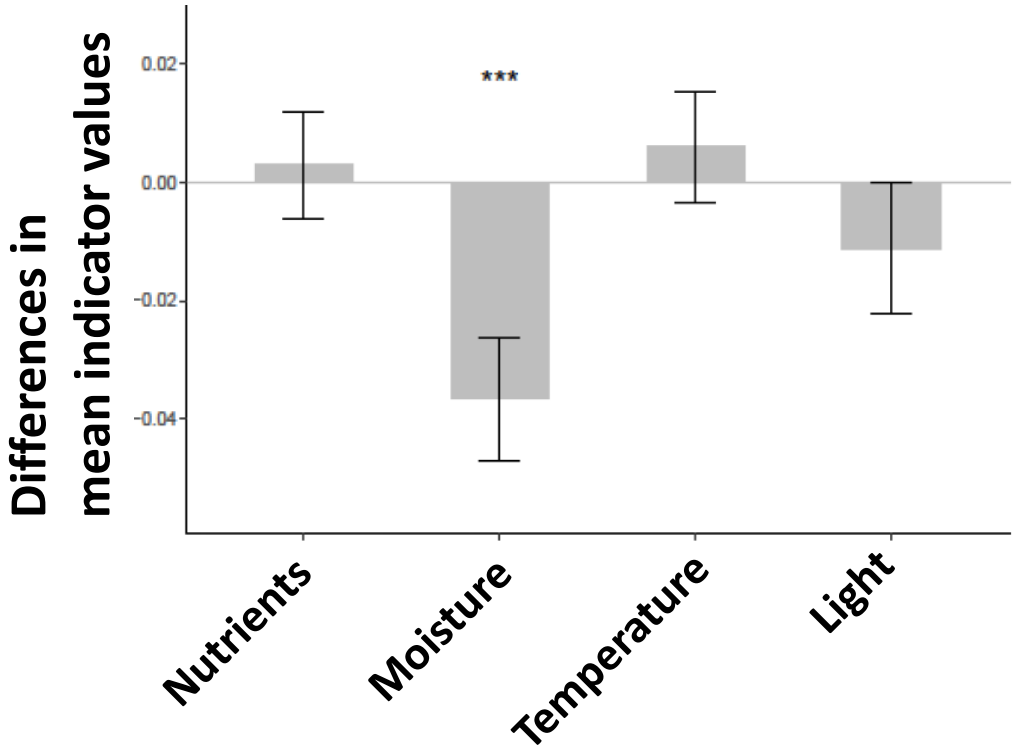
Changes in

⇒ ecological conditions

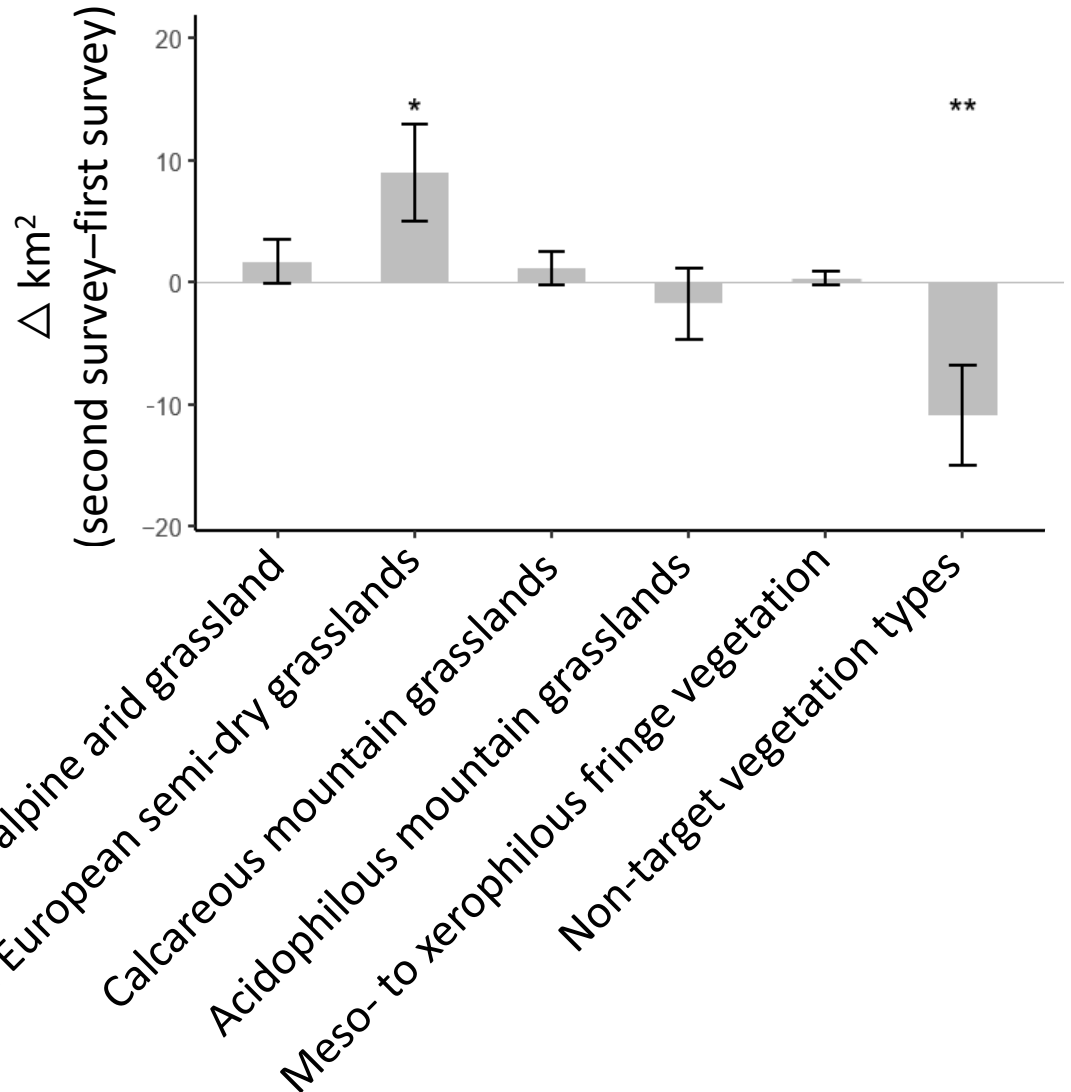
⇒ nature conservation values

Examples of preliminary results

Fens



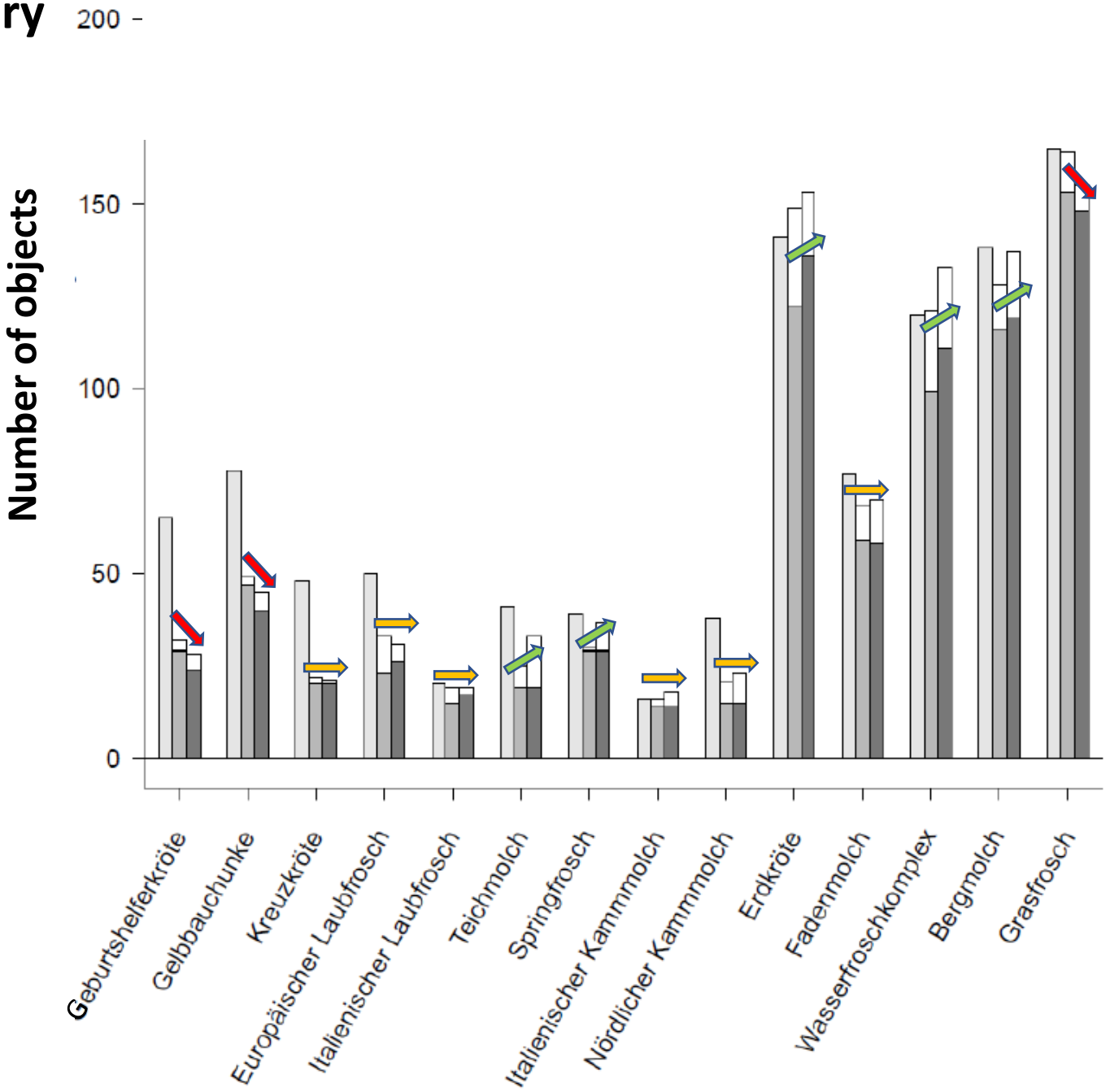
Changes of the area (km²) of vegetation types in dry meadows and pastures



Amphibian surveys

- 258 objects (215 ‘ortsfeste’ objects, 43 ‘Wanderobjekte’); Randomly-stratified selection (stratified by biogeographic region and weigthed by mean species richness per object within regions)
- Each object is sampled every six years
- (3)-4 surveys within an object per year; high detectability of species

Preliminary results

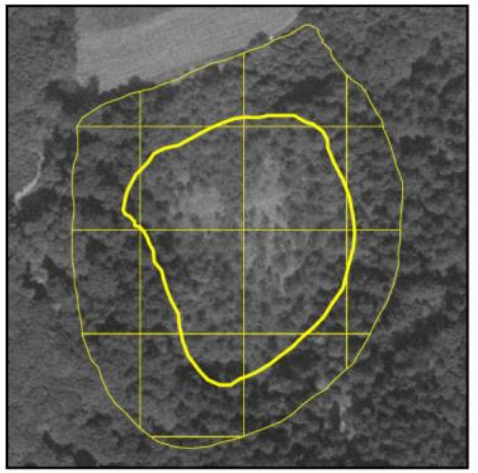


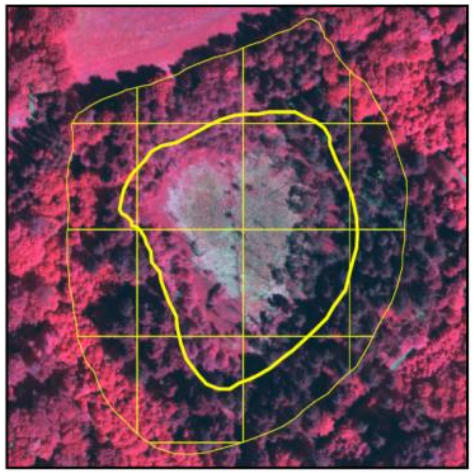
Species occurrences according to:

- Ordinance of Amphibian spawning areas (1980ies-1990ies)
- WBS first survey 2011-15
- WBS second survey 2017-2021

Remote sensing

- Visual interpretation of aerial images
- Interpretation of all 7000 objects of national importance, i.e. no sample
- Two methods:
  - Dry meadows, fens, bogs, amphibian breeding areas, alpine floodplains and glacier forefields: raster interpretation (50 x 50 m grid cells)

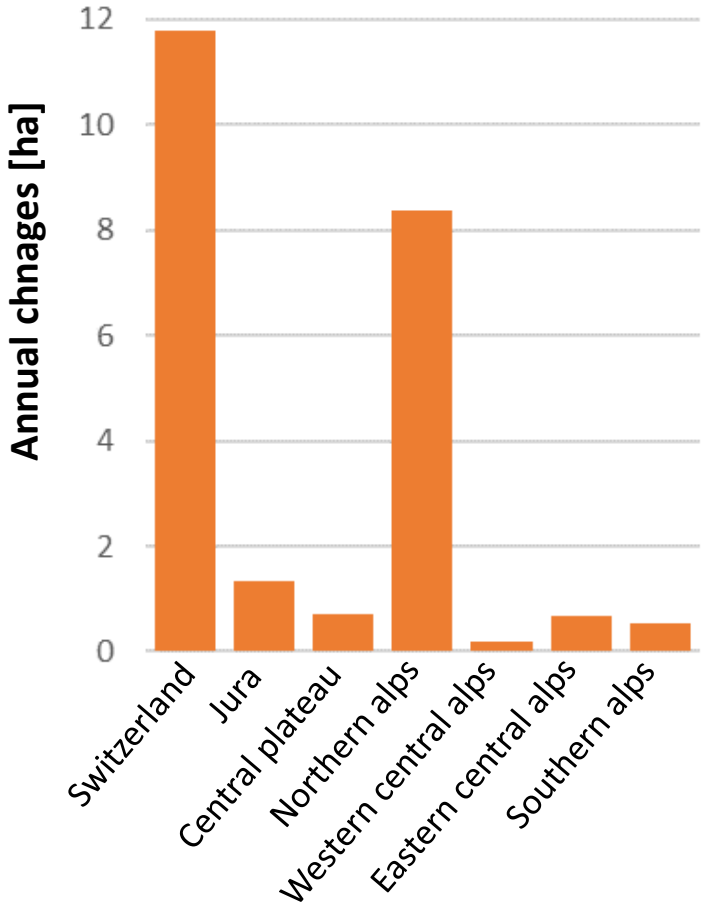




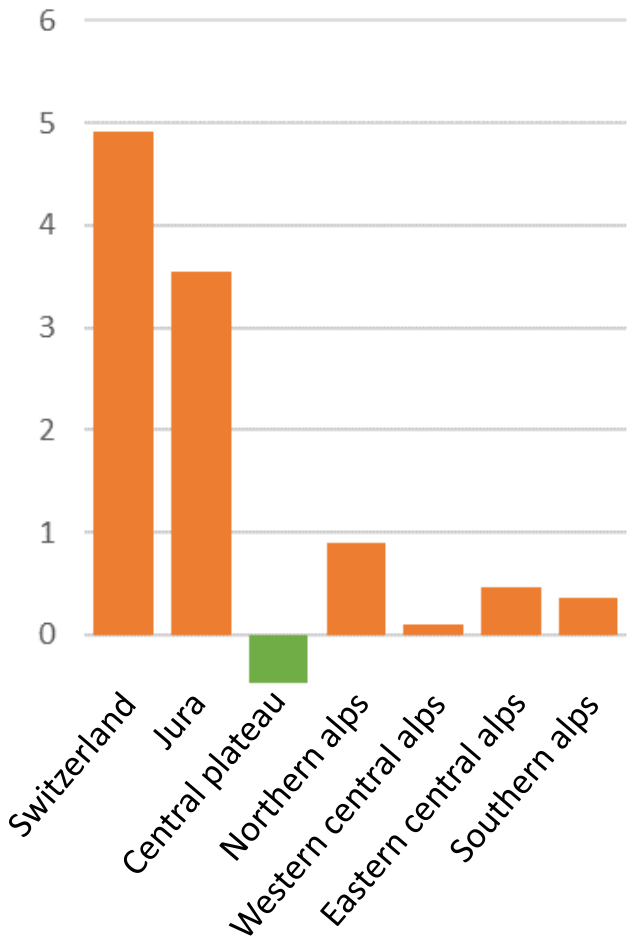
Exemplary results

Annual changes in the cover of trees and shrubs

Fens



Bogs



Bergamini et al. 2019, WSL Berichte 85

Remote sensing

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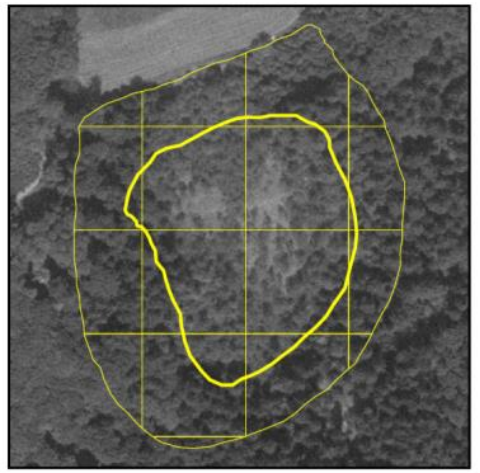
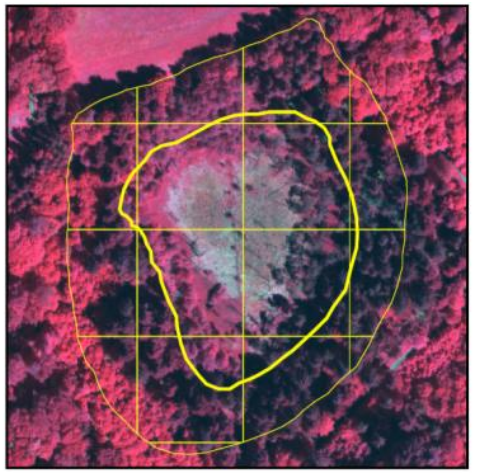
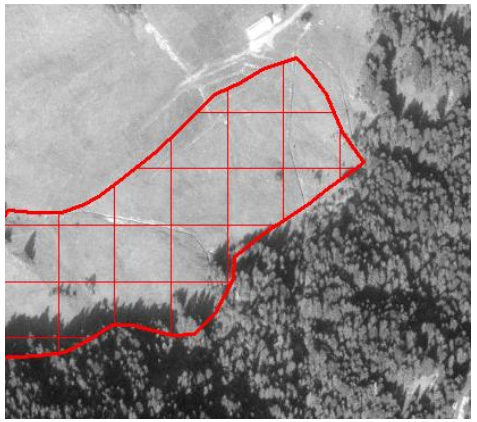
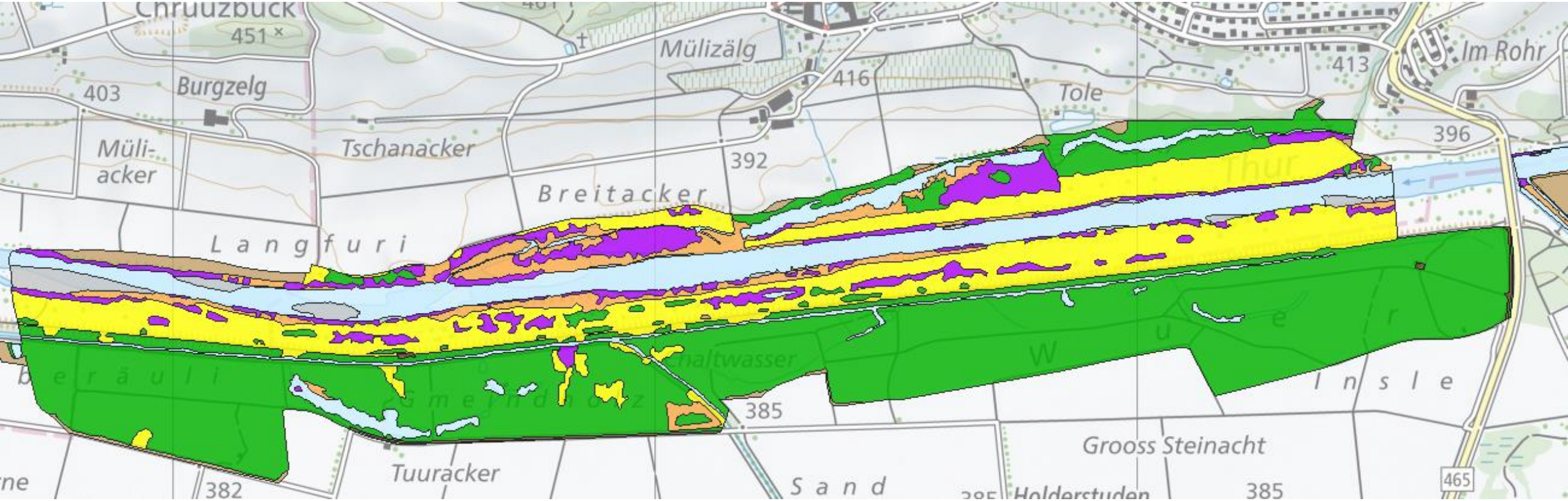
  - Floodplains, deltas, lakeside areas: mapping of so-called 'formations' (rough habitat classes)





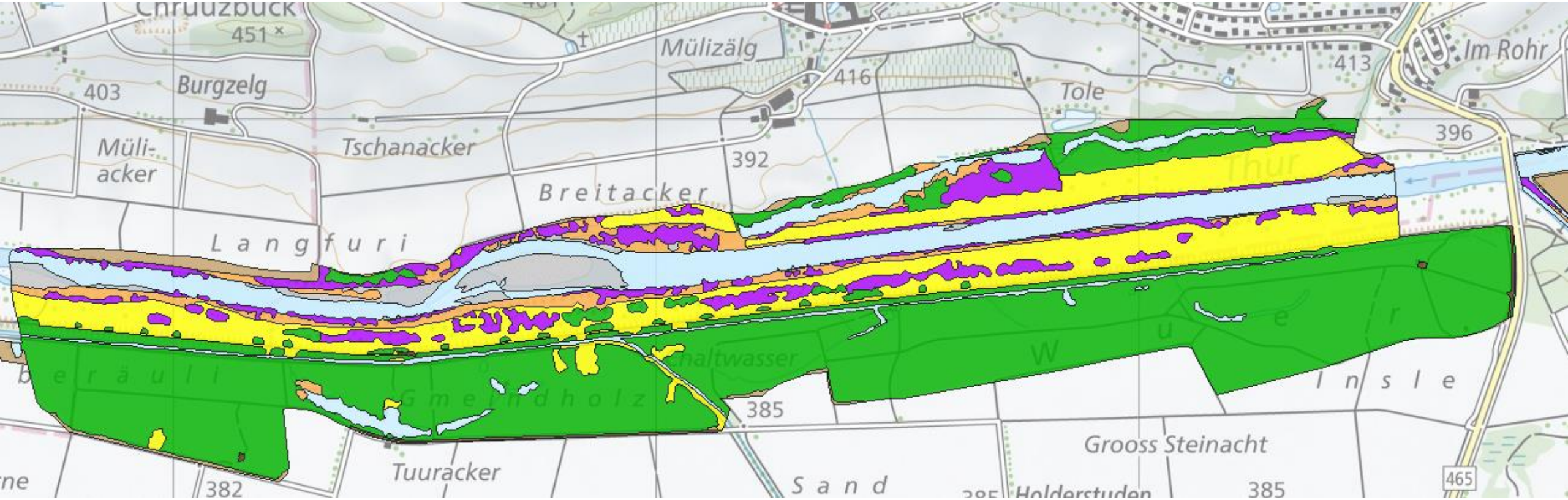


First survey: 2011



- Water
- Sites without vegetation (e.g. gravel banks)
- Sites without woody vegetation
- Softwood alluvial forest
- Hardwood alluvial forest
- Agricultural areas
- Other forest types
- Other herb-dominated vegetation
- Rocks
- Infrastructure (e.g. buildings)

Second survey: 2017



- Water
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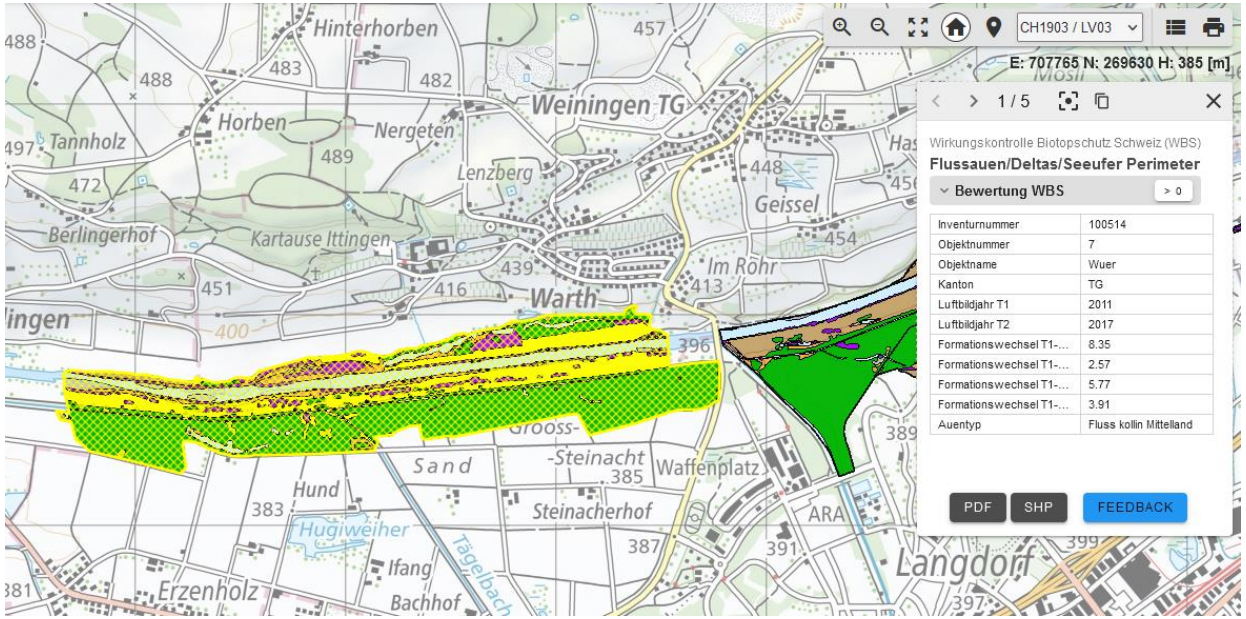
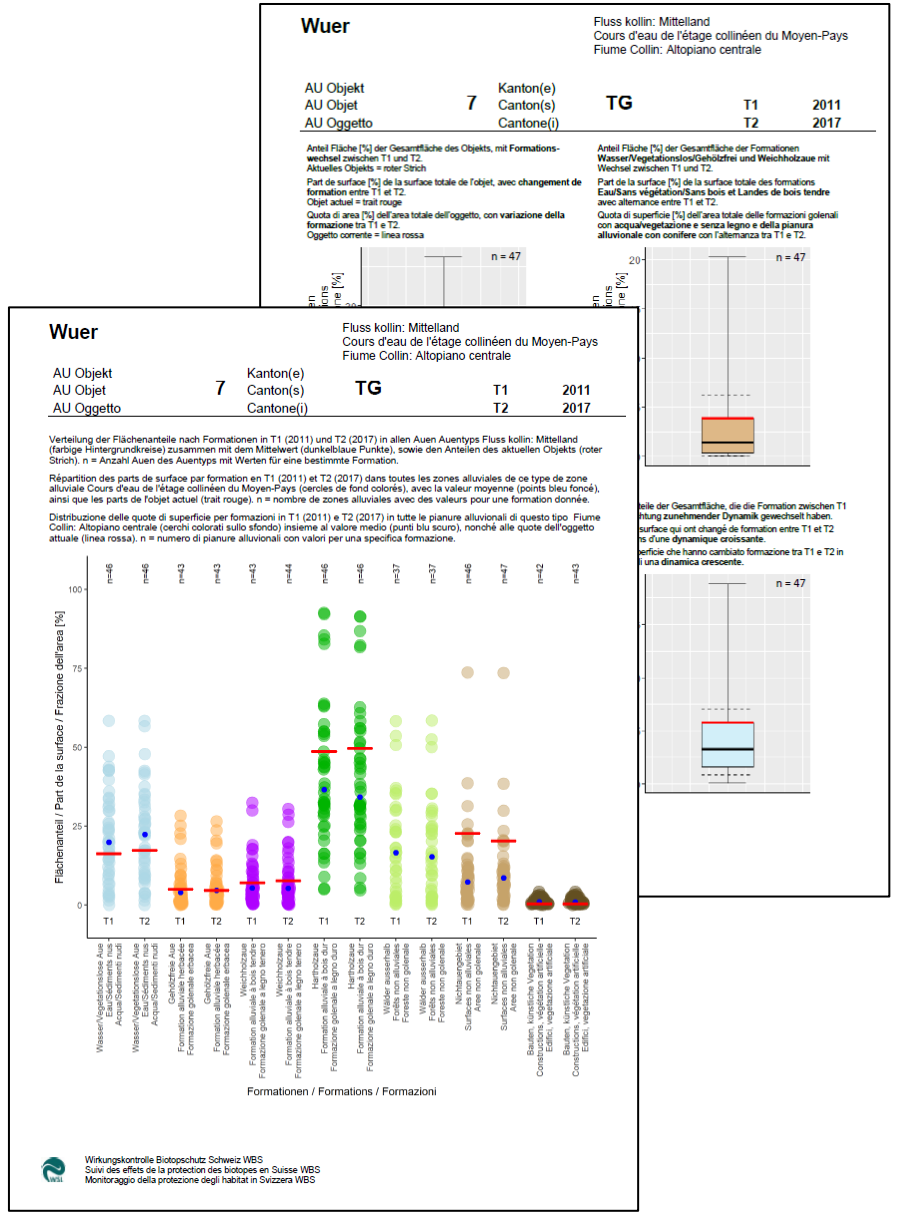
Availability of data

- All data (remote sensing, vegetation, amphibian data) are available for the cantons (via virtual data center)
- Vegetation data and amphibian data also stored in the national data centers (infoflora, infofauna, Swissbryophytes)
- If interested in scientific analyses, contact us, we’re happy to collaborate





Dossiers for each object for cantons in virtual data center

2024
Analyses of changes between first and second survey

2023

2011
Project start

2017
End of first survey period

2023
End of second survey period

2029
End of third survey period

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More information: www.wsl.ch/biotopschutz