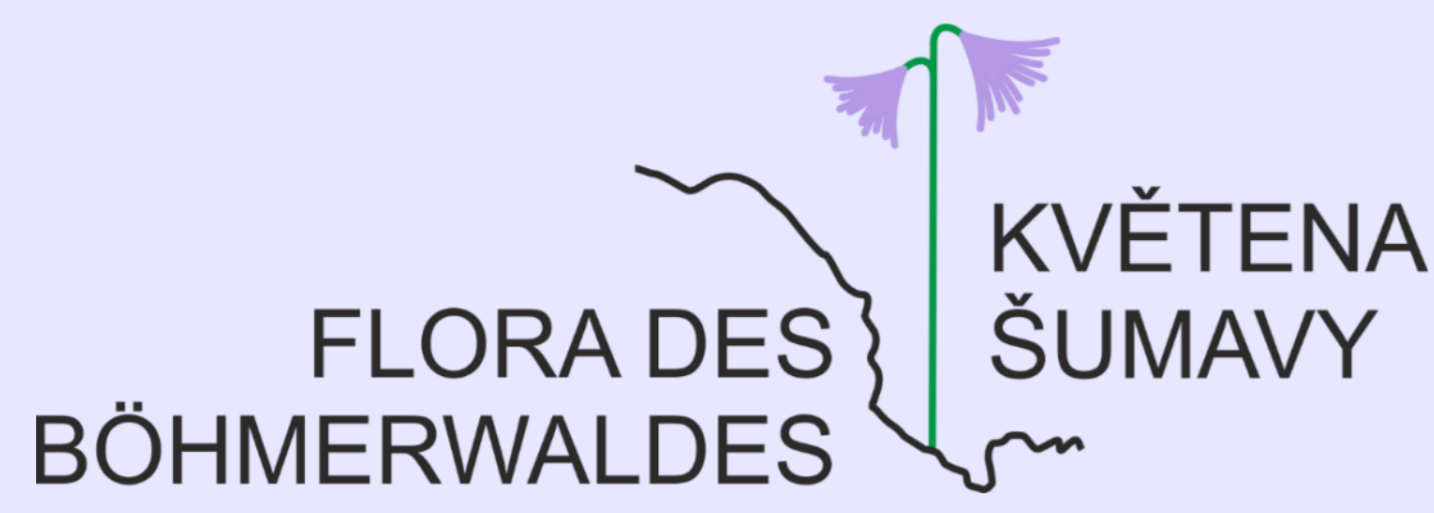


Eight years of grazing on the Ruckowitzschachten – qualitative and quantitative changes in the vegetation



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Fig. 1: The Ruckowitzschachten is a 17ha large grassland area in the high elevation of the Bavarian Forest National Park. Long-term grazing over centuries resulted in a high diversity of plants and animals such as *Gentiana pannonica*, *Senecio subalpinus*, *Dactylis verrucivorus* or *Ichthyosaura alpestris*.

Motivation

Grasslands in the higher altitudes of the Bavarian Forest National Park are biodiversity hotspots with large areas protected by the Fauna-Flora-Habitat directive. Since 2014, a grazing regime with cattle was reinstated at the largest grassland (Fig. 1), the Ruckowitzschachten, to imitate the traditional land use and conserve the grassland communities. A monitoring of the vegetation was installed. Since the monitoring of endangered plants is part of the project “Flora of the Bohemian Forest” it was continued and evaluated within the project.

Qualitative changes

61 vegetation records provided insight in qualitative changes over eight years of grazing (Fig. 2). Grazing did increase the number of species moderately in semi-dry

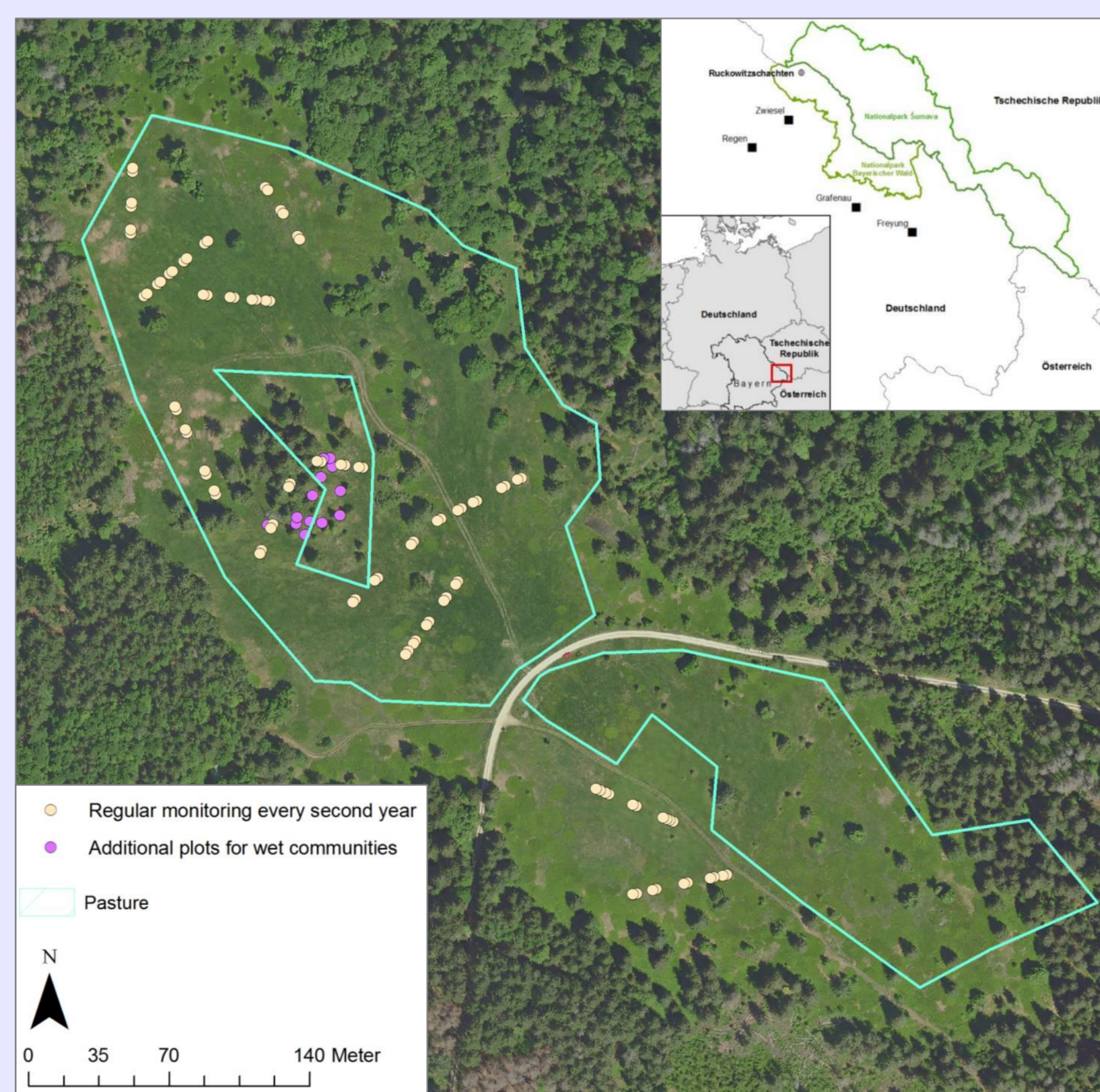


Fig. 2: Grazing was installed in 2014 by a LIFE-project. Around 10 cows of a traditional cattle breed (Rotes Höhenvieh) feed there for around one third of the summer. To evaluate the management regime, plots outside and inside the pasture were installed.

grasslands (*Nardetum*) and mountain meadows (*Polygono-Trisetion*) with around one plant (Fig. 3). This was our main priority since these grassland types are threatened and account for most of the pasture. Plots with wet meadows (*Calthion*) lost around five species in and outside the pasture, possibly due to extinction dept. The diversity of vascular plants did not change in *Carex brizoides* dominated stands, which was not eaten by the cattle. Furthermore, a moderate differentiation within the *Nardetum* and mountain meadows between grazed, mown and abandoned areas was revealed by an NMDS-ordination, supporting that the changes were induced by grazing.

Quantitative changes

For a quantitative evaluation of changes in the vegetation, mapping from 2014 and 2021 was compared (Fig.4). The results revealed that areas with *Vaccinium myrtillus*-shrubs or trees increased around 3 and 5% outside the pasture, whereas the increase in the pasture was low. Hence, our grazing regime sufficiently keeps the landscape open. The area of mountain meadow increased in the pasture, as desired, but the area of *Nardetum* exhibited a decline. The loss can be attributed to the smaller pasture, were the land use intensity has to be increased in the future to avoid further succession and to generally increasing patches of *Carex brizoides*.

Outlook

After eight years of grazing we see positive changes in the quality and quantity of

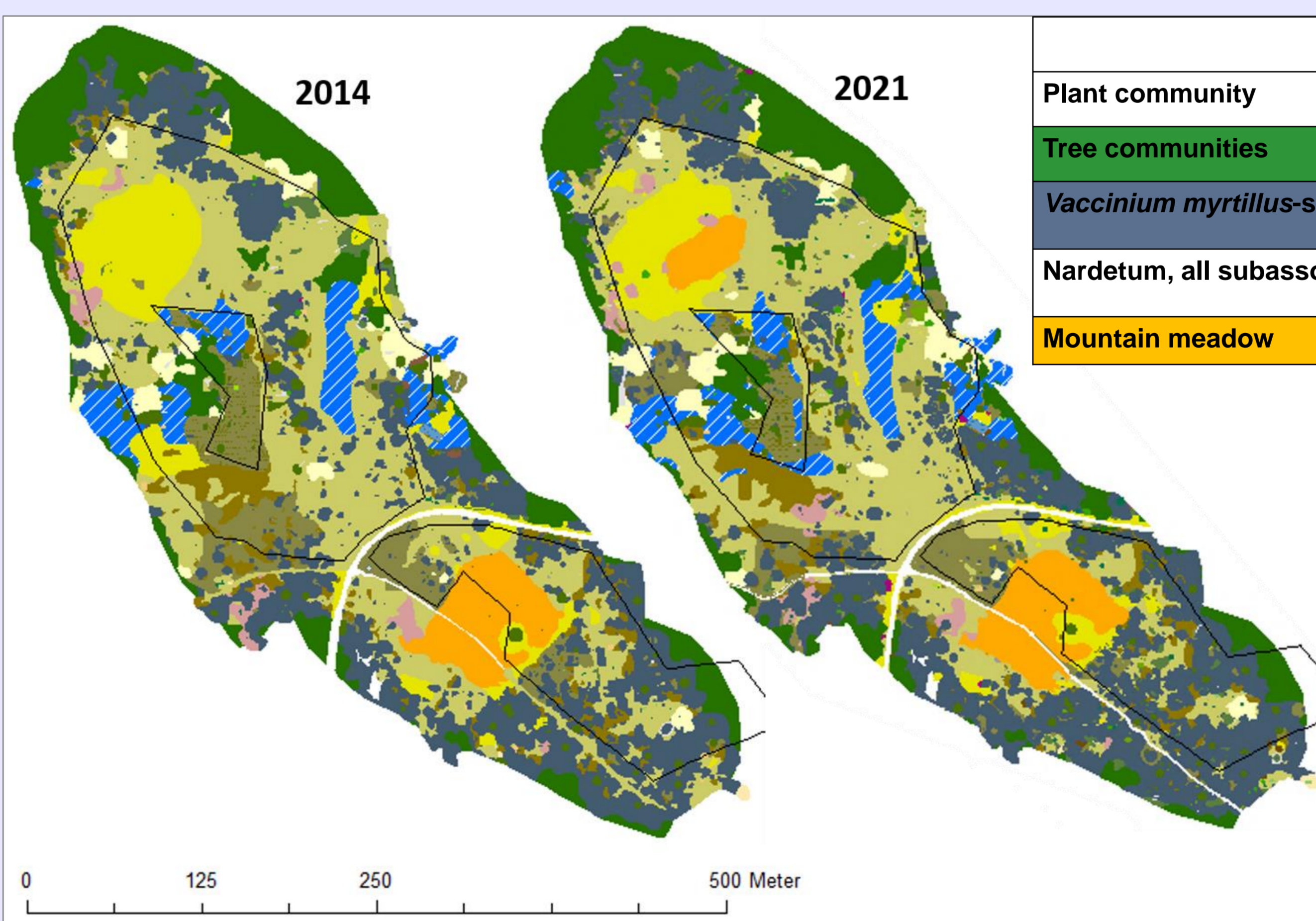


Fig. 4: Vegetation mapping from 2014 (Windmaiber, 2015) and 2021 (Schuller, in prep.) visualizes the quantitative changes in plant communities. A table summarizes the changes of the main vegetation communities.

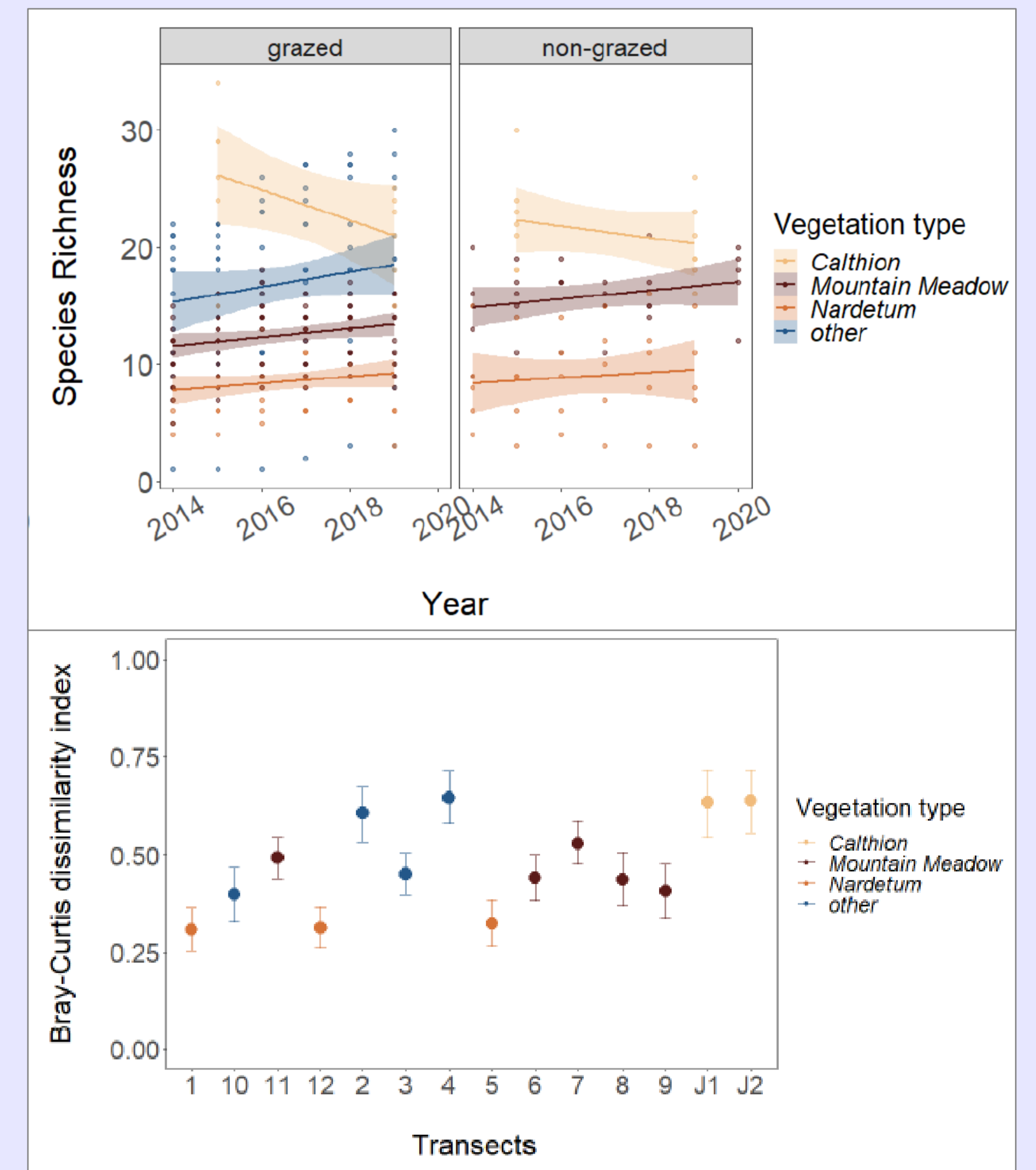


Fig. 3: Species richness of grazed and abandoned plots from four grassland types were evaluated shortly before grazing started and in 2020 (upper figure). With a glmer and grassland types as random effect, differences between species diversity before grazing took place in 2014 and in 2020 are shown. Strongest changes were found for wet meadows, particularly in the *Calthion*.

endangered grassland communities, particularly in the mountain meadows. However, unfavorable effects like large areas of *Carex brizoides* and *Vaccinium*-shrubs still linger and may need further manual encroachment or stronger grazing intensity to maintain the protected grassland habitats.

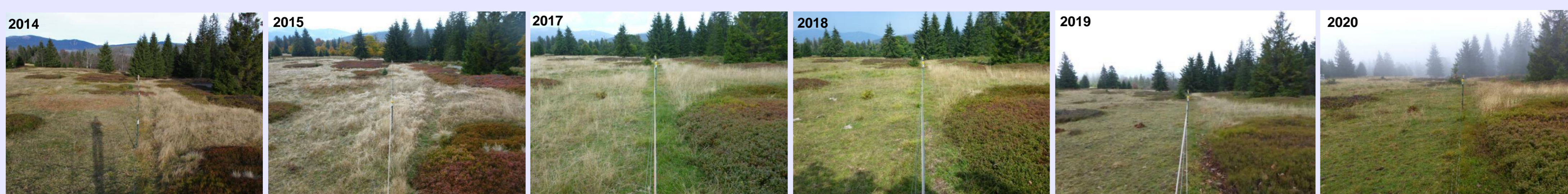


Fig. 3: Changes in the vegetation of the pasture (left half of the picture) and outside the pasture (right half) are visualized annually with a foto monitoring after grazing took place. The main aim of the grazing was to stop the growth *Vaccinium*-shrubs in the pasture that did not increase, whereas outside the pasture shrubs further extended.