Wild red deer benefit the conservation of European semi-natural open habitats

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Challenge

With increasing agricultural intensification in Europe, pastoral farming has been declining.

- Tremendous loss of extensively used open landscapes and associated biodiversity
- Secondary succession threatens many open habitat types
- Biomass removal through conservation management required

Conventional management (e.g. mowing, livestock grazing), however, is often impossible in large or inaccessible target areas. Is grazing by wild red deer (Cervus elaphus) a suitable alternative for maintaining open habitats?

Hypothesis: Red deer grazing benefits the vegetation structure and diversity of grasslands and heathlands.

Materials and methods

- Grafenwoehr military training area, Germany, ~230 km²
- Abundant red deer forage in open habitats due to targeted wildlife management
- Three-year field experiment (c.f. Riesch et al. 2019, 2020)
- Two open habitat types protected under the EU Habitats Directive

- Temporal exclusion of red deer using movable exclusion cages
  - Repeated assessments of the above-ground net primary productivity (ANPP) and forage removal 2015–2018
- Continuous exclusion of red deer: open vs. fenced plots
  - Vegetation surveys in 2014 and 2018 (before-and-after)

What did we learn?

- Foraging red deer removed on average 35–48% of the ANPP in grasslands
- In mown grassland, average forage removal reached 79% of the ANPP less mowing yield
- After 3 years of red deer exclusion, lower plant species richness in fenced compared to open plots (Fig. 3)

- Red deer removed on average 59% of the ANPP in heathlands
- In fenced plots, the area covered by bare soil decreased, falling below the minimum 5% required for a favourable habitat conservation status (Fig. 5)

Key messages

- Quantitative & qualitative benefits of grazing by wild red deer in open habitats
  - Biomass removal similar to livestock grazing with 0.5 animal units ha⁻¹ a⁻¹
  - Multiple favourable effects on habitat quality
- Red deer grazing is suitable for supporting open habitat conservation in large and inaccessible target areas

Fig. 1: Impressions of the habitat types, studied with five sampling sites each (Fig. 2&4)

Fig. 2: Grassland sampling sites: one pair of plots (open/fenced) per treatment (burnt/mown/un-treated)

Fig. 3: Plant species richness (mean±SE per 25 m²) in grasslands (n=5) before and after the exclusion of red deer from fenced plots (c.f. Riesch et al. 2020)

Fig. 4: Heathland sampling sites: only untreated areas (three of the five sites with two pairs of plots)

Fig. 5: Development of percent bare soil cover (mean±SE) in open and fenced heathland plots (n=8 each) over the study period (c.f. Riesch et al. 2020)