Heathlands

A Lost World?

GÖTEBORGS
UNIVERSITET

Mattias Lindholm
Institutionen för biologi och miljövetenskap
Naturvetenskapliga fakulteten

Akademisk avhandling för filosofie doktorsexamen i naturvetenskap med inriktning biologi, som med tillstånd från Naturvetenskapliga fakulteten kommer att offentligt försvaras fredag den 24 maj 2019, kl. 10.00 i Hörsalen, Botanhuset, Institutionen för biologi och miljövetenskap, Carl Skottsbergs gata 22B, Göteborg. Fakultetsopponent är Docent Erik Öckinger, Institutionen för ekologi, Sveriges lantbruksuniversitet, Uppsala.

ISBN 978-91-7833-446-9 (Tryckt)
ISBN 978-91-7833-447-6 (PDF)
Tillgänglig via http://hdl.handle.net/2077/59796

Lindholm M. (2019) Heathlands – A Lost World?

Mattias Lindholm, Department of Biological and Environmental Sciences, University of Gothenburg, Box 461, SE405 30 Göteborg, Sweden
E-mail: mattias.lindholm@bioenv.gu.se

Keywords Heathland, *Calluna*, Conservation, Coleoptera, Carabidae, Lycosidae, Management, Restoration, Conservation strategy

Abstract Heathland is a familiar landscape type in southwest Sweden. It is open with few trees, and the vegetation is dominated by dwarf-shrubs growing on nutrient-poor soils. Dry heaths with Heather *Calluna vulgaris* and wet heaths with Bell Heather *Erica tetralix* are common vegetation communities in the heathland, and they often form mosaics. The heathland landscape is highly threatened, with large substantial areal losses of 95% in Sweden since the 1800s. Heathland supports around 200 red-listed species, including plants, insects, birds and reptiles.

In this thesis, I have studied some of the last remaining heathlands in Sweden, and I have investigated how different successional stages and vegetation communities differ in species composition and diversity of beetles (Coleoptera), wolf spiders (Araneae: Lycosidae) and vascular plants (Tracheophyta). I have also studied different methods to restore grass-dominated heaths.

In Papers I-II, I showed that old and degenerated heaths have rather low diversity of plants, ground beetles and wolf spiders. The ground beetle and wolf spider fauna in the old heaths included species that are shade-tolerant generalists that are also found in forests. However, a few heathland specialists seem to be associated with old stands of heaths. Young successional heaths had a higher diversity, and restoration of old *Calluna vulgaris* stands to pioneer vegetation resulted in higher species richness of plants and ground beetles. The ground beetles that were most favoured by the treatments were mainly generalists that are found in open habitats, not only in heathlands. The lack of heathland specialists in the restored plots may be a result of fragmentation. The studied heathland sites were isolated with long distances to the nearest well-managed heathland.

In Paper III, I could show that the different vegetation communities in the heathland contained different assemblages of beetles. The rich variation of habitats contributed to a high species diversity with a total of 367 species of beetles identified in the study. Fifty-two of these were classified as species with high conservation value. Many environmental variables, e.g. wetness, salinity, nutrients and sandy soils, were responsible for the differences in species composition of beetles. Vegetation communities that had clearly different environmental conditions also had a more specialised fauna of beetles.

In Paper IV, I studied the effects of different restoration methods on heaths that have become dominated by grasses. The methods I tested were: high-intensity burning, low-intensity burning and top-soil removal. Both burning treatments resulted in low regeneration of *Calluna vulgaris* and high grass cover. However, the treatment with top-soil removal resulted in a high number of *Calluna vulgaris* seedlings, low grass cover and a rich pioneer heathland flora.