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Research information note

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The marsh fritillary butterfly in the Avalon Marshes, Somerset: A study on habitat restoration and the re-establishment potential

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Introduction

The marsh fritillary butterfly became locally extinct in the Avalon Marshes, Somerset, in 1995. Re-establishment of this highly threathened UK Biodiversity Action Plan priority species is desirable. However, the former habitat has suffered severely from drainage caused by neighbouring peat excavations, resulting in purple moor-grass and scrub encroachment. The cover of the host plant Devil's-bit scabious has declined considerably, while in some areas it has disappeared alltogether. To realize a sustainable re-establishment of the butterfly, significant habitat restoration is necessary.

What was done

The aim of this study is to

1. investigate whether a sustainable re-establishment of the marsh fritillary is feasible in the Avalon Marshes;
2. to identify suitable measures that achieve both restoration of the vegetation and habitat restoration for the marsh fritillary butterfly, and to indentify any bottlenecks that might occur during the habitat restoration phase or when maintaining habitat conditions in the future.

This was done by carrying out a number of studies and experiments:

1. A habitat availability assessment for the marsh fritillary on Shapwick Heath NNR
2. A model study investigating the re-establishment possibilities for the butterfly in a viable meta-population structure in the Avalon Marshes.
3. An experiment investigating ways to realize a quick increase in host plant cover by means of different management regimes.
4. An experiment investigating management regimes that can significantly reduce the domination of purple moor-grass and scrub species.
5. A seed bank study investigating the possibilities of natural regeneration of the host plant from the soil seed bank.
6. A study that investigated Devil's-bit scabious' micro-scale habitat characteristics.
7. An experiment studying the effects of the restoration grazing regimes on the host plant and its ability to reproduce.
8. A study investigating the feasibility of re-establishment of the host plant by means of transplants, and the effects of cattle grazing on the success rate.

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Results and conclusions

For certain experiments, conclusions can only be drawn after they have been monitored for at least three years, but the study has already put forward some important points.

A sustainable re-establishment of the marsh fritillary in a viable meta-population structure is feasible in the Avalon Marshes. However, since large parts of the habitat have degraded severely, significant habitat restoration is necessary. The main factor in restoration is re-establishment and increase in cover of Devil's-bit scabious. However, re-colonization of suitable habitat patches is limited, probably because of the host plant's poor dispersal capacity and absence of a seed bank. The intensive grazing regimes prevent flowering and seed setting of the few remaining host plants and thus further hinder dispersal and increase in cover. Marsh fritillary habitat restoration entails more than vegetation restoration, and additional measures are necessary to realize the required re-establishment of the host plant. Optional measures are sowing and planting of Devil's-bit scabious, and management regimes under which planting and sowing are most successful are being investigated as part of this study.
The results of the experiment studying the effects of grazing on Devil's-bit scabious suggest that even at low stocking rates, sheep select for the fine grass patches containing the host plant and possibly for the host plant itself, resulting in small plants with a low biomass. The biomass of the host plant is an important factor in the ecology of the butterfly. Management consisting of sheep grazing hinders re-establishment of the butterfly.

English Nature's viewpoint

Vegetation communities exhibit a wide range of variation in composition and structure and rare and declining grassland species like the marsh fritillary are dependent on specific properties like the abundance of the host plant and structure of the sward. When setting targets to reach favourable condition for a site, one should ideally not only set criteria for the vegetation, but should also take the requirements of key vertebrates and invertebrates into account, so that bottlenecks are identified in an early stage and can be acted upon.

Selected references

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