BIOLOGIE, 72-SUPPL.: 183-185, 2002
BIOLOGIE, 72-SUPPL.: 183-185, 2002

The large blue butterfly *Maculinea alcon* in Belgium: science and conservation

W. VANREUSEL, H. VAN DYCK & D. MAES

Introduction

In Belgium, the obligate ant-parasitic butterfly *Maculinea alcon* is confined to NE-Flanders (Kempen) and has decreased considerably in distribution (fig. 1) and abundance.

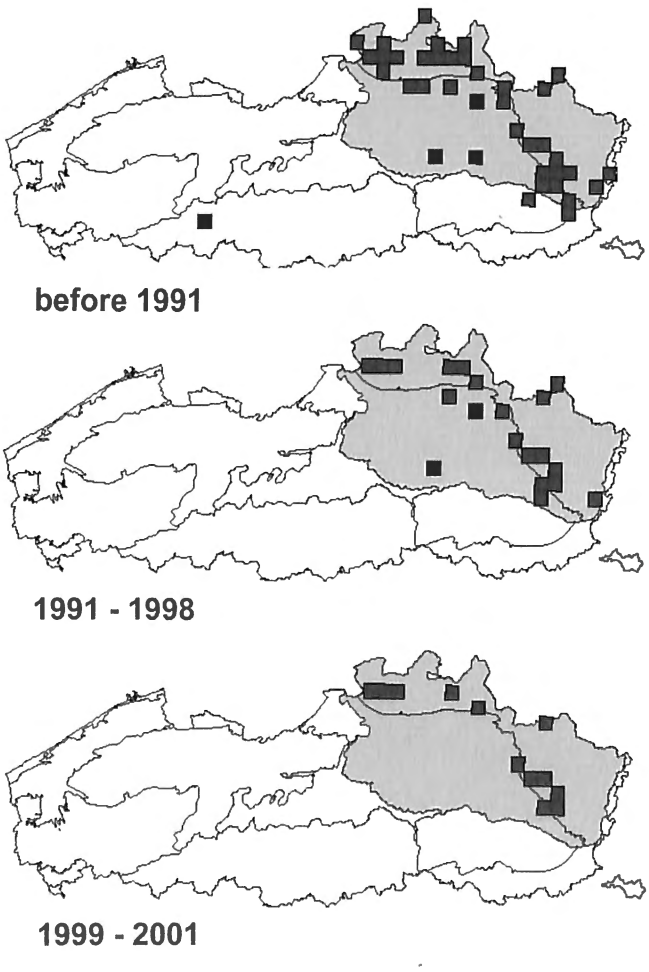

Fig. 1 — Distribution of *Maculinea alcon* in Flanders (N-Belgium) expressed as occupied 5 × 5 km square grid cells (UTM-projection).

According to the Flemish Red List, *M. alcon* is threatened. It is one of the few legally protected butterflies. Since 1996, both its complex life history and conservation biology have been studied rather intensively by our research team. Several populations went extinct, no less than 9 did so in the 1990s including extinctions in nature reserves. Our analyses indicate that populations of smaller, more isolated sites have a significantly higher extinction probability. At present, only 12 populations remain in 8 areas, including 5 nature reserves and 3 military areas (table 1). Based on detailed egg counts, most populations show negative trends. We have recently finalised a Species Action Plan for *Maculinea alcon* funded by the Flemish Ministry of Nature Conservation (VANREUSEL *et al.* 2000). It was the first action plan for an invertebrate, but Flanders has only little experience with the implementation of such plans and with the integration of species-specific knowledge into site-oriented conservation. Hence, the *M. alcon* plan will be an important test-case.

Threats

Due to intensive land-use, both the quantity and quality of nature in Belgium (particularly Flanders) is under high pressure leading to severe losses of butterfly diversity among other components of biodiversity (MAES & VAN DYCK 2001). Reserves are extremely small and negative environmental influences consequently high. The increased use of fertilisers in agriculture since the 1950s and the overproduction of manure strongly affected nutrient-poor communities like wet heathlands and grasslands with the only hostplant of the butterfly the Marsh gentian, *Gentiana pneumonanthe*. Inappropriate (or the lack of) management has also contributed to the decline.

Restoration output

Restoring wet heathlands with *M. alcon* requires a careful combination of species-specific and more general measures. In small populations a series of ''intensive care'' management options were advised (e.g. very small scale

Table 1 — Overview of the populations, their size (number of eggs), habitat size, number of habitat patches and the trend in population size since 1999.

Population	# Eggs in 1999	Area of habitat (ha)	# Habitat patches	Trend 1999-2001
Groot Schietveld	>2975	10,3	>7	?
Hageven	4431	3,0	8	+
Liereman	5506	4,4	6	–
Sonnisheide	4611	1,3	1	–
Teut	5472	4,8	1	–
Visbedden	?	1,3	?	–
Withoefse Heide	456	2,7	1	–
Zwart Water (*)	2287	3,3	2	–
Zwarte Beek				
a) Mathiashoeve	4873	1,8	1	–
b) Fonteintje	>12798	5,3	2	–
c) Panoramaduinen	3510	3	1	–
d) Katershoeve	1843	1,3	6	–
Total	>48762	42,4	35	

sod-cutting to stimulate germination of gentians, VANREUSEL *et al.* 2000). Such an approach requires intensive supervision in the field. When a population reaches a more safe level, intensive management can be relaxed. Beneficial actions at a less detailed scale can then be incorporated in the routine management. Permanent evaluation by monitoring is essential, but not self-evident in practice.

Some results

Host ants

We observed considerable variation in ant colony density (10-43 nests/100 m^2) and within species spectra between years and areas. We found direct evidence for the use of nests of *Myrmica ruginodis*, but also found large larvae in a *M. scabrinodis* nest and recently adopted larvae in a *M. rubra* nest. The 3 possible host-ant species were present in all populations (MAES, VAN DYCK, VANREUSEL & CORTENS, unpublished).

Host plants

On a course-grained distribution map, the only host plant *Gentiana pneumonanthe*, has a relatively wide distribution in Flanders. However, at the population level the situation is much more dramatic: almost all populations are small to very small with low densities and bad recruitment (lack of germination due to eutrophication and acidification). Densities of adult host plants differ widely between years (probably due to a large proportion of plants in the dormant stage in wet years) and between areas (as a result of management type and soil conditions). Management and soil type also influence growth form which in turn affects oviposition patterns.

Oviposition

Egg load per bud or per individual host plant were shown to differ strongly among populations. Whether egg distributions can be useful indicators to managers is under further investigation. In contrast to other *Maculinea* studies, oviposition patterns agreed with ant-mediated oviposition that was partly or fully counter-balanced by intraspecific competition when hostplants already carry several eggs (VAN DYCK *et al.* 2000). Host plant phenology also affected oviposition, but our results did not support the view of a mutually exclusive explanation for the presence of host ants. Time windows for oviposition of individual flower buds and plants were much longer than was recognised before (e.g. 26 % of buds

were used for >15 days). Host plant phenology and the presence of host ants should be considered as complementary effects for oviposition in *M. alcon* (VAN DYCK & REGNIERS, unpublished).

References

MAES, D. & VAN DYCK, H., 2001. Butterfly diversity loss in Flanders (north Belgium): Europe's worst case scenario? *Biological Conservation*, 99: 263-276.

VAN DYCK, H., OOSTERMEIJER, J.G.B., TALLOEN, W., FEENSTRA, V., VAN DER HIDDE, A. & WYNHOFF, I., 2000. Does the presence of ant nests matter for oviposition to a specialised myrmecophilous *Maculinea* butterfly? *Proceedings of the Royal Society of London (B)*, 267: 861-866.

VANREUSEL, W., MAES, D. & VAN DYCK, H., 2000. Soortbeschermingsplan gentiaanblauwtje. Rapport van de Universiteit Antwerpen (UIA-UA) in opdracht van de afdeling Natuur van het Ministerie van de Vlaamse Gemeenschap.

Wouter VANREUSEL
Hans VAN DYCK
Department of Biology
University of Antwerp
Universiteitsplein 1
B-2610 Antwerp

Dirk MAES
Institute for Nature Conservation
Kliniekstraat 25
B-1070 Brussels