

Use of UTM maps to detect endangered lycaenid species in the Iberian Peninsula

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Summary

UTM distribution maps of 20 species of Iberian Lycaenidae included in Red Data Books or Lists have been prepared. Maps are presented for 10 species with a severely restricted distribution, that are present or have been recorded from less than thirty 10 km UTM squares (0.5% of the squares in the Iberian Peninsula). These species are considered to be endangered. Species recorded from 30 to 50 UTM squares are considered to be vulnerable, and those present in more than 50 squares and widely distributed in the Peninsula are treated here as not endangered. The validity of this classification of status is discussed and the importance of conserving some areas in which two or more endangered species are present is emphasized, especially in the case of the Sierra Nevada in southern Spain.

Introduction

Although Spain was the first country for which a concern for insect conservation was documented (PYLE *et al.*, 1981), real efforts towards the conservation of insects did not take place until recent times.

The first step towards the conservation of Lepidoptera in Spain was the publication of the "Libro Rojo de los Lepidópteros Ibéricos" (Iberian Lepidoptera Red Data Book, VIEDMA & GOMEZ BUSTILLO, 1976) in which the criteria to select rare or endangered species is a subjective one, but based on the authors' good general knowledge of the status of the Iberian species. The book was revised in 1985, new species were added, others were excluded, and some distribution of species and selection criteria updated. Nevertheless the criteria to select species remained a subjective one.

HEATH (1981), dealing with European endangered species, used the same selection criteria, at least as far as Iberian species is concerned. Another milestone in insect conservation, including Iberian data, is the book of COLLINS & WELLS (1987) dealing with particularly endangered species. Some Iberian endemics are considered in this book, and it has been used as a basis for the insects listed in the appendices of the Bern Convention.

Real conservation measures in Spain include declaration of National Parks and Nature Reserves by the Spanish Government. These protected areas were created mainly to conserve vertebrates or places of "outstanding beauty". Some management usually takes place in such areas, but the goal is always to save endangered mammals or birds. Priority has never been given to invertebrate conservation ; insect populations have been assumed to be unaffected by the changing environment.

A proposal to protect an area of central Spain possessing a rich butterfly fauna has recently been made (VIEDMA & al., 1985). Several studies were carried out in the area, but despite all the efforts of lepidopterists and conservation authorities, a motorway actually runs through the very centre of the area.

Nevertheless, some work with a conservation background is being undertaken in Spain. We would like to mention as examples some important mapping research in northern Spain (GOMEZ DE AIZPURUA, 1988) and several papers from VIEJO and co-authors (e.g. : VIEJO & al., 1989) dealing with the value of different kinds of forests from the conservation point of view.

In this paper we use the number of 10 km UTM squares in which each species has been cited to select endangered lycaenid species in the Iberian Peninsula. The resulting list of species and their status is very similar to those obtained with more subjective methods, but we think our method is more acceptable from the scientific point of view, because it allows some quantification of the vulnerability of rare species.

Materials and methods

We have selected for our study 20 Iberian lycaenid species, taken mainly from the list of VIEDMA & GOMEZ BUSTILLO (1976), but with the addition of some rare species from other lists and from our own experience.

Data for the distribution maps were gathered using bibliographic citations (open circles in the maps) and also data compiled by us (closed circles) from the following public or private collections : Museo Nacional Ciencias Naturales, Museo Zoología Barcelona, Sociedad Ciencias Naturales Aranzadi, Museo Ciencias Naturales Vitoria, Departamento Biología Animal Universidad Complutense Madrid, Departamento Biología Universidad Autónoma Madrid, Fidel Fernández-Rubio, Arcadi Cervelló, Luis Núñez. For some very rare species we have included data from personal communications of experienced collectors. The complete list of localities and UTM coordinates with the bibliographic or collection references are given elsewhere (MUNGUIRA, 1989).

Distribution data were processed using a HP 85 computer and an automatic cartography program for the Iberian Peninsula & Balearic Islands (REY, 1984). The maps were printed by a plotter attached to the computer.

Results

We consider a species “endangered” when it is present in the Iberian Peninsula in less than thirty 10 km UTM squares, “vulnerable” when present in 30 to 50 squares and “out of danger” when it has been found in more than 50 squares.

In this study we present maps of the 10 endangered Iberian lycaenids (Figs 1-9 ; *Maculinea alcon* and *M. rebeli* are included on the same map to show the geographical segregation of these two close species). We also include an example of a vulnerable species (Fig. 10) and of a previously listed species which we consider out of danger (Fig. 11). Table 1 is a comparison of all the Red Lists referring to the Iberian Peninsula with our own data (status and number of UTM squares in which each species has been cited).

The analysis of the maps shows the importance of several areas for the conservation of endangered lycaenids. The areas in which at least two endangered species are present are as follows :

— Sierra Nevada (Granada Province): two endangered and a vulnerable species. The endangered species (*Agriades zullichi* and *Lysandra golgus*) are restricted to this Sierra and therefore the conservation of the area should be held as a priority.

— Abejar and Sotillo del Rincón (Soria Province) where two endangered species of *Maculinea* are present.

— Sierra de Aralar (Navarra Province), from where *Strymonidia pruni* and *Maculinea alcon* have been recorded.

— Fuente De (Santander Province) : a locality with *Agriades pyrenaicus* and *Maculinea alcon*.

— Viella in the Valle de Arán (Lérida Province), La Molina (Gerona Province) and Encamp Cortals (Andorra) where *Aricia nicias* and *Maculinea rebeli* occur.

Discussion

Several authors have used the number of UTM squares in which a species is present to pinpoint endangered species. Thus GOMEZ DE AIZPURUA (1988) in Northern Spain follows LECLERCQ *et al.* (1980) and considers a species as “rare” when present in less than 20 (10 km) squares out of a total of 500 (4%). The same criteria was used by the latter authors for Belgium & Luxembourg (rare when present in less than 4% of a total of 400 squares). When dealing with larger areas the 4% criteria produces too many squares and therefore USHER (1986) suggests a smaller percentage for the British Isles, considering a species as rare when cited in less than 15 squares (0.5% of the roughly 3200 squares of the Isles). We have adopted this last criteria with the 30 squares (0.5% of the roughly 6000 squares of the Peninsula).



Fig. 1. Distribution of *Strymonidia pruni* in the Iberian Peninsula. Closed circles are citations confirmed by the authors and open circles are bibliographic citations.



Fig. 2. Distribution of *Lycaena helle* in the Iberian Peninsula. Closed circles are citations confirmed by the authors and open circles are bibliographic citations.



Fig. 3. Distribution of *Tarucus theophrastus* in the Iberian Peninsula. Closed circles are citations confirmed by the authors and open circles are bibliographic citations.

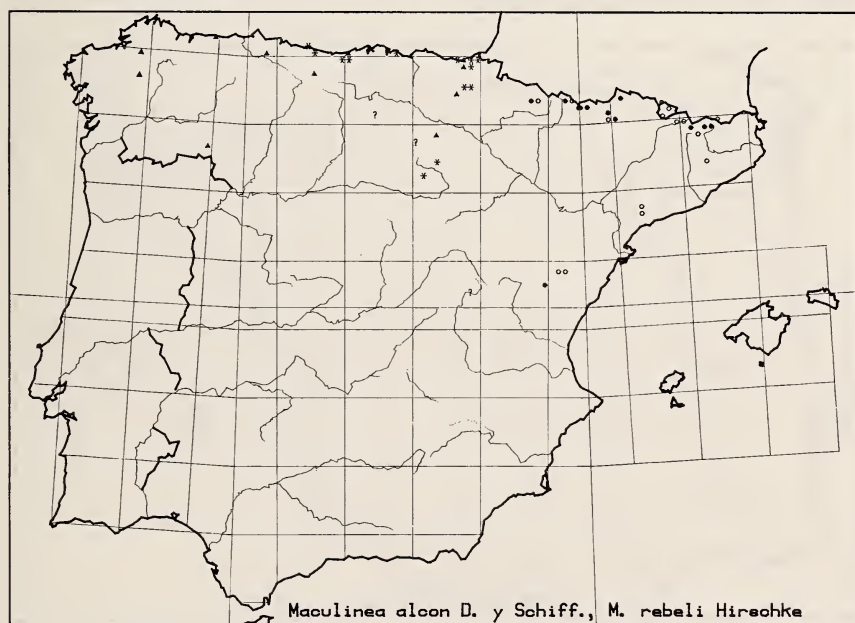


Fig. 4. Distribution of *Maculinea alcon* and *Maculinea rebeli*. Asterisks (*) and triangles (▲) are respectively confirmed and bibliographic citations of *M. alcon*. Closed circles and open circles are respectively confirmed and bibliographic citations of *M. rebeli*. Question marks (?) are erroneous citations.



Fig. 5. Distribution of *Maculinea nausithous* in the Iberian Peninsula. Closed circles are citations confirmed by the authors, open circles are bibliographic citations and question marks (?) are erroneous citations.

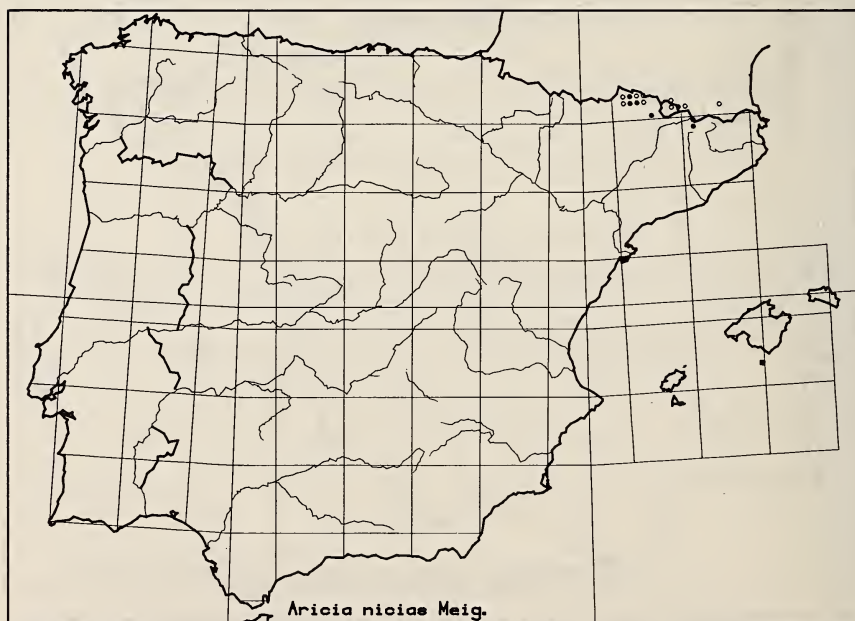


Fig. 6. Distribution of *Aricia nicias* in the Iberian Peninsula. Closed circles are citations confirmed by the authors and open circles are bibliographic citations.



Fig. 7. Distribution of *Lysandra golgus* in the Iberian Peninsula. Closed circles are citations confirmed by the authors and open circles are bibliographic citations.



Fig. 8. Distribution of *Agriades zullichi* in the Iberian Peninsula. Closed circles are citations confirmed by the authors and open circles are bibliographic citations.



Fig. 9. Distribution of *Agriades pyrenaicus* in the Iberian Peninsula. Closed circles are citations confirmed by the authors and open circles are bibliographic citations.



Fig. 10. Distribution of *Cupido lorquini* in the Iberian Peninsula. Closed circles are citations confirmed by the authors, open circles are bibliographic citations and question marks (?) are erroneous citations.

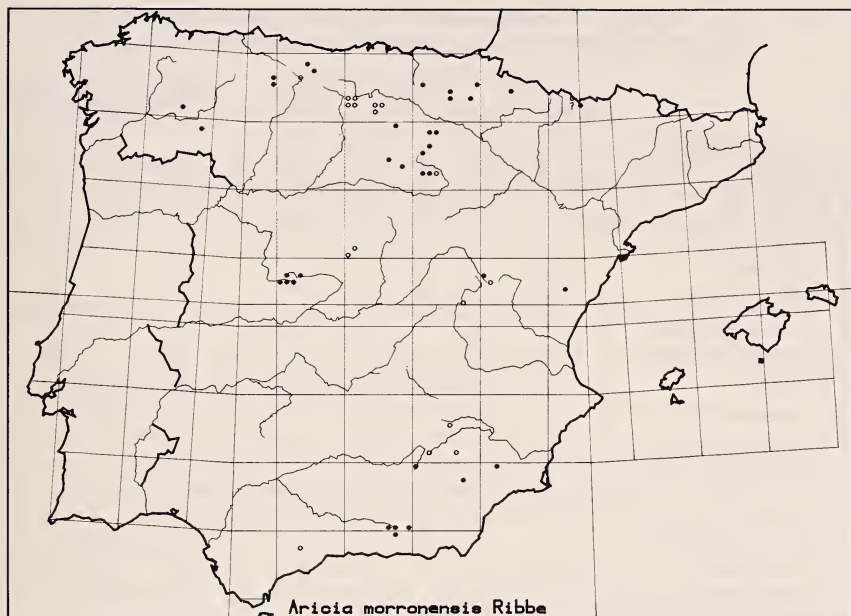


Fig. 11. Distribution of *Aricia morronensis* in the Iberian Peninsula. Closed circles are citations confirmed by the authors, open circles are bibliographic citations and question marks (?) are erroneous citations.

Our method is far from perfect, because a species present in more than 30 squares that are concentrated in the same area, may be endangered. Major developments such as urbanisation may represent a real threat to the species in this particular case. The reverse may also happen, and a species present in less than 30 squares that is widely distributed, may not in fact be seriously endangered.

A similar problem arises when considering habitat vulnerability, because an “out of danger” species like *Maculinea arion* may become endangered if changes such as those that occurred in England (THOMAS, 1980) would ever take place. In the Iberian Peninsula we can say that, based on our own experience high altitude localities are at present less endangered than lowland habitats, where human pressure is more severe. Again this must not be considered absolute, as the situation may change very quickly in certain mountain areas in the future.

Another problem is that of the age of records. Many records are very old, and have not been confirmed recently. Therefore certain butterfly species may have since vanished from some recorded localities. The knowledge in the Iberian Peninsula is still far from that of the British Isles where records can be monitored through time (HEATH, 1974).

Table 1. E : endangered, R : rare, O : out of danger,
V : vulnerable, L : endemic, ? : undetermined

	VIEDMA & al., 1976	VIEDMA & al., 1985	HEATH, 1981	Status	No. UTM squares
<i>Maculinea teleius</i> <i>M. arion</i>	R R	R R	E E	— O	2 (?) 124
<i>Iolana iolas</i> <i>Cupido lorquinii</i>	V V	E V	R V	V V	33 31
<i>Aricia nicias</i> <i>Plebejus pylaon</i>	R R	R R	— V	E V	14 37
<i>Agriades glandon</i> <i>Lysandra nivescens</i>	L L	L O	— —	V O	36 101
<i>L. golgus</i> <i>L. caelestissima</i>	L L	E O	V —	E —	3
<i>Agrodiaetus ainsae</i> <i>A. fabressei</i>	R L	R O	— —	— —	
<i>A. ripartii</i> <i>Aricia morronensis</i>	R L	O L	— —	— O	55
<i>Lycaena helle</i>	—	R	V	E	2
<i>Agrodiaetus violetae</i> <i>Agriades zullichi</i>	— —	V —	— —	— E	4
<i>Maculinea alcon</i> <i>M. rebeli</i>	— —	— —	E —	E E	23 27
<i>M. nausithous</i> <i>Agriades pyrenaicus</i>	— —	— —	E V	E E	6 5
<i>Aricia eumedon</i> <i>Tarucus theophrastus</i>	— —	— —	— —	V E	36 12
<i>Strymonidia pruni</i> <i>Polyommatus eros</i>	— —	— —	— —	E V	10 34
<i>Strymonidia acaciae</i> <i>Callophrys avis</i>	— —	— —	? V	— —	
<i>Scolitantides orion</i> <i>Agrodiaetus damon</i>	— —	— —	R ?	— —	

It may also be possible that some species are under represented on our maps. This may be the case with *Tarucus theophrastus*, *Maculinea alcon*, *Cupido lorquinii* and *Iolana iolas*, species for which suitable habitats are more abundant than the recorded distribution of the butterflies.

Limited as it is we think that our method is a useful tool to select rare species. At least it calls our attention towards some species overlooked in other lists due to their abundance in some collections. Our data suggest that species like *T. theophrastus* and *Strymonidia pruni*, together with others included

in previous lists, should be considered endangered, because their limited distribution will make them extremely vulnerable to habitat changes.

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