

STUDIES ON THE ECOLOGY
AND CONSERVATION
OF BUTTERFLIES IN EUROPE
VOL. 1: General Concepts
and Case Studies

Edited by *Elisabeth Kühn, Reinart Feldmann,
Jeremy Thomas & Josef Settele*

Conference Proceedings,
UFZ Leipzig-Halle,
December 2005



What areas to protect: biases in the historic record of Iberian butterflies faunistics

Helena Romo¹, Enrique García-Barros¹ & Jorge M. Lobo²

¹ Universidad Autónoma de Madrid, Department of Biology, E-28049 Madrid, Spain

² Museo Nacional de Ciencias Naturales, E-28006 Madrid

Contact: helena.romo@uam.es; garcia.barros@uam.es; mcnj117@mn.cn.csic.es

Using an exhaustive database with comprehensive information on butterfly faunistics in the Iberian Peninsula and the Balearic Islands, we estimated the completeness of faunistic inventories and the environmental, spatial, and land-use effects associated with the sampling intensities, on the basis of the 50 x 50 km UTM grid. The sources included in this database consist of a combination of labelled data from museum and private collection specimens, published or unpublished field data from biogeographic or faunistic works, as well as from standardized quantitative surveys carried out from 1784 to 2003. The environmental factors selected included four topographic variables (minimum, maximum and mean elevation, and elevational range); four geological variables (degree of clay cover), calcareous and siliceous substrates, plus geological diversity) and eight climatic variables (minimum and maximum monthly mean temperature, mean annual temperature, total annual rainfall, summer precipitation, number of sunny days per year, annual temperature variation, and annual precipitation variation). The land-use factors attempt to represent the degree of human disturbance, by measuring the coverage of the four most widespread human-induced landscapes in the study area: urban and industrial areas, non irrigated croplands, irrigated crops and anthropic pasturelands. Lastly, central latitude and central longitude of each UTM cell were used as spatial variables.

To achieve this, we adopted a former synthesis of seven main eco-physiographic Iberian sub regions, determining the proportion of adequately sampled squares that occur within each of these sub regions.

The degree of sampling effort was assessed by means of accumulation curves based on the Clench function, which relates the sampling effort and the number of species found. Using the General Linear Models regression procedure, the effect of 22 variables on the estimated sampling efforts was assessed. This combination of methods is proposed in order to evaluate the degree of geographic coverage of existing faunistic data, as well as the amount and nature of bias in the faunistic surveys, as a preliminary step in biodiversity studies.

The percentage represented by the well surveyed cells in each area ranges from roughly 27% to 46 %. With the exception of the Balearic Islands, all the sub regions contained an acceptable and roughly comparable proportion of well surveyed squares. The backward stepwise regression explained a 40% of the variance in the distribution of the number of database records. Entering

the sets of variables in order: first environmental, second land use and third spatial, produced significant progressive increments of the percentage of variation explained by the model.

The results confirmed that estimates of sampling effort derived from accumulation curves are less skewed than simple direct estimates such as counts of database records. A degree of spatial dependence was detected in the data; this was comparatively more important than the effects of environmental variables or of those related to land use. However, the last two eventually proved to be locally important. The results confirmed former statements that faunistic activities are often skewed according to relatively simple patterns related to the collectors' behaviour, such as accessibility, and attractiveness of the sampling sites. From the point of view of Iberian and Balearic butterflies, adequate inventories at the scale investigated may probably suffice for further studies on the diversity of this insect group. However, the results enabled us to point out general guide lines for the design of efficient further faunistic work.