

Supplementary material

Table S1. Butterfly species recorded in the study, with their corresponding classification into the different categories of resource specialization and dispersal ability. Trophic specialization of the larvae: 1, monophagous; 2, oligophagous; 3, polyphagous. Habitat specialization (1 to 4, from most specialized to least specialized) measured by the ‘species specialization index’ (SSI) of Julliard et al. (2006), whenever a species occurred in at least three monitoring transects. Dispersal ability (1 to 4, from minimal to maximal) according to various references and unpublished information from the study area (see text for details).

	Trophic specialization	Habitat specialization	Dispersal ability
Hesperiidae			
<i>Erynnis tages</i>	2	2	1
<i>Carcharodus alceae</i>	2	3	3
<i>Carcharodus lavatherae</i>	2	3	2
<i>Carcharodus flocciferus</i>	1	1	1
<i>Carcharodus boeticus</i>	2	1	1
<i>Spialia sertorius</i>	1	4	1
<i>Muschampia proto</i>	1	1	1
<i>Pyrgus carthami</i>	1	–	1
<i>Pyrgus malvoides</i>	2	4	2
<i>Pyrgus serratulae</i>	1	1	1
<i>Pyrgus cirsii</i>	1	2	1
<i>Pyrgus armoricanus</i>	2	3	2
<i>Pyrgus alveus</i>	2	3	1
<i>Thymelicus lineola</i>	2	1	1
<i>Thymelicus sylvestris</i>	2	2	1
<i>Thymelicus acteon</i>	2	4	2
<i>Hesperia comma</i>	1	2	1
<i>Ochlodes venatus</i>	2	4	2
<i>Gegenes nostrodamus</i>	2	2	4
Papilionidae			
<i>Zerynthia rumina</i>	1	3	2
<i>Parnassius mnemosyne</i>	1	–	2
<i>Parnassius apollo</i>	1	1	2
<i>Iphiclides podalirius</i>	2	4	3
<i>Papilio machaon</i>	3	4	4
Pieridae			
<i>Leptidea sinapis</i>	2	4	2
<i>Anthocharis cardamines</i>	2	4	2
<i>Anthocharis euphenoides</i>	1	4	2
<i>Zegris eupheme</i>	2	1	2

<i>Euchloe crameri</i>	2	4	2
<i>Euchloe simplonia</i>	2	–	2
<i>Aporia crataegi</i>	2	3	2
<i>Pieris brassicae</i>	3	4	4
<i>Pieris mannii</i>	2	2	2
<i>Pieris rapae</i>	3	4	4
<i>Pieris ergane</i>	1	–	2
<i>Pieris napi</i>	2	3	3
<i>Pontia callidice</i>	2	1	2
<i>Pontia daplidice</i>	3	3	4
<i>Colotis evagore</i>	1	–	4
<i>Colias crocea</i>	2	4	4
<i>Colias alfacariensis</i>	1	2	2
<i>Gonepteryx rhamni</i>	1	4	3
<i>Gonepteryx cleopatra</i>	1	4	3
Riodinidae			
<i>Hamearis lucina</i>	1	2	1
Lycaenidae			
<i>Lycaena phlaeas</i>	1	4	3
<i>Lycaena virgaureae</i>	1	1	2
<i>Lycaena tityrus</i>	1	1	1
<i>Lycaena alciphron</i>	1	2	1
<i>Lycaena hippothoe</i>	1	1	1
<i>Thecla betulae</i>	1	2	2
<i>Neozephyrus quercus</i>	1	3	3
<i>Laeosopis roboris</i>	1	2	1
<i>Tomares ballus</i>	2	2	1
<i>Callophrys rubi</i>	3	3	1
<i>Callophrys avis</i>	2	3	1
<i>Satyrium w-album</i>	1	2	1
<i>Satyrium spini</i>	2	2	1
<i>Satyrium ilicis</i>	1	2	1
<i>Satyrium esculi</i>	1	4	2
<i>Satyrium acaciae</i>	1	3	1
<i>Lampides boeticus</i>	3	3	4
<i>Cacyreus marshalli</i>	1	3	2
<i>Leptotes pirithous</i>	3	2	4
<i>Cupido minimus</i>	1	3	1
<i>Cupido osiris</i>	1	2	1
<i>Cupido argiades</i>	2	2	2
<i>Cupido alcetas</i>	1	1	2
<i>Celastrina argiolus</i>	3	4	3
<i>Pseudophilotes baton</i>	1	1	1
<i>Pseudophilotes panoptes</i>	1	3	1
<i>Scolitantides orion</i>	1	2	1
<i>Glaucopteryx alexis</i>	2	3	1
<i>Glaucopteryx melanops</i>	2	2	1
<i>Iolana iolas</i>	1	–	2

<i>Maculinea arion</i>	2	1	1
<i>Maculinea rebeli</i>	1	1	1
<i>Plebejus argus</i>	3	2	1
<i>Eumedonia eumedon</i>	1	–	1
<i>Aricia cramera</i>	1	4	2
<i>Aricia agestis</i>	1	3	2
<i>Aricia nicias</i>	1	–	1
<i>Polyommatus semiargus</i>	3	2	1
<i>Polyommatus escheri</i>	1	4	1
<i>Polyommatus dorylas</i>	1	1	1
<i>Polyommatus nivescens</i>	1	1	1
<i>Polyommatus amanda</i>	2	3	1
<i>Polyommatus thersites</i>	1	3	1
<i>Polyommatus icarus</i>	2	4	3
<i>Polyommatus eros</i>	1	–	2
<i>Polyommatus daphnis</i>	1	1	1
<i>Polyommatus bellargus</i>	2	3	1
<i>Polyommatus coridon</i>	1	2	1
<i>Polyommatus hispana</i>	2	2	1
<i>Polyommatus ripartii</i>	1	1	1
<i>Polyommatus fulgens</i>	1	2	1
<i>Polyommatus damon</i>	1	1	1
Nymphalidae, Libytheinae			
<i>Libythea celtis</i>	1	3	3
Nymphalidae, Heliconiinae			
<i>Argynnis paphia</i>	1	3	2
<i>Argynnis pandora</i>	1	2	3
<i>Argynnis aglaja</i>	1	2	2
<i>Argynnis adippe</i>	1	3	2
<i>Argynnis niobe</i>	1	1	2
<i>Issoria lathonia</i>	1	3	3
<i>Brenthis daphne</i>	1	2	1
<i>Brenthis hecate</i>	1	1	1
<i>Proclissiana eunomia</i>	1	1	2
<i>Boloria euphrosyne</i>	1	1	1
<i>Boloria selene</i>	1	–	1
<i>Boloria dia</i>	1	4	2
<i>Boloria pales</i>	1	–	1
Nymphalidae, Nymphalinae			
<i>Vanessa atalanta</i>	2	4	4
<i>Cynthia cardui</i>	3	4	4
<i>Inachis io</i>	1	4	3
<i>Aglais urticae</i>	1	1	3
<i>Polygonia c-album</i>	3	3	3
<i>Araschnia levana</i>	1	1	2
<i>Nymphalis antiopa</i>	2	3	3
<i>Nymphalis polychloros</i>	3	3	3

<i>Euphydryas desfontainii</i>	1	1	2
<i>Euphydryas aurinia</i>	3	4	2
<i>Melitaea cinxia</i>	2	3	1
<i>Melitaea phoebe</i>	2	4	2
<i>Melitaea trivia</i>	1	1	1
<i>Melitaea didyma</i>	2	3	2
<i>Melitaea diamina</i>	1	1	1
<i>Melitaea deione</i>	2	3	2
<i>Melitaea parthenoides</i>	1	2	1
<i>Melitaea athalia</i>	2	2	1
Nymphalidae, Limenitidinae			
<i>Limenitis camilla</i>	1	2	2
<i>Limenitis reducta</i>	1	4	2
Nymphalidae, Charaxinae			
<i>Charaxes jasius</i>	1	4	3
Nymphalidae, Apaturinae			
<i>Apatura ilia</i>	2	3	2
<i>Apatura iris</i>	2	–	2
Nymphalidae, Satyrinae			
<i>Pararge aegeria</i>	2	3	3
<i>Lasiommata megera</i>	2	4	3
<i>Lasiommata maera</i>	2	4	1
<i>Coenonympha arcania</i>	2	3	1
<i>Coenonympha glycerion</i>	2	1	1
<i>Coenonympha dorus</i>	2	3	1
<i>Coenonympha pamphilus</i>	2	4	2
<i>Pyronia tithonus</i>	2	3	2
<i>Pyronia cecilia</i>	1	4	2
<i>Pyronia bathseba</i>	2	4	2
<i>Aphantopus hyperantus</i>	2	2	1
<i>Maniola jurtina</i>	2	4	2
<i>Hyponphele lycaon</i>	2	1	1
<i>Erebia euryale</i>	2	–	1
<i>Erebia epiphron</i>	2	–	1
<i>Erebia triaria</i>	2	1	1
<i>Erebia gorgone</i>	2	–	1
<i>Erebia hispania/cassioides</i>	1	1	1
<i>Erebia lefebvrei</i>	1	–	1
<i>Erebia neoridas</i>	2	1	1
<i>Erebia oeme</i>	2	–	1
<i>Erebia meolans</i>	2	2	1
<i>Melanargia russiae</i>	2	1	2
<i>Melanargia lachesis</i>	2	4	2
<i>Melanargia occitanica</i>	2	2	2
<i>Melanargia ines</i>	1	1	2
<i>Satyrus actaea</i>	2	1	2

<i>Hipparchia fagi</i>	2	2	2
<i>Hipparchia alcyone</i>	2	3	1
<i>Hipparchia semele</i>	2	2	2
<i>Hipparchia statilinus</i>	2	3	2
<i>Hipparchia fidia</i>	2	4	1
<i>Arethusana arethusa</i>	2	2	2
<i>Brintesia circe</i>	2	4	2
<i>Chazara briseis</i>	2	2	1
Nymphalidae, Danainae			
<i>Danaus chrysippus</i>	2	1	4

Table S2. Factor loadings of land-cover variables (measured in a buffer area of 5 km around each butterfly site) on the first axis of the principal component analysis summarising landscape structure.

Landscape PCA1 Analysis	
Eigenvalue	1.88
Percentage	31.36
Landcover variable	Factor loadings
Open forest	0.44
Dense forest	0.39
Farmland	-0.55
Urban cover	-0.39
Bare ground	0.29
Shrubland	0.33

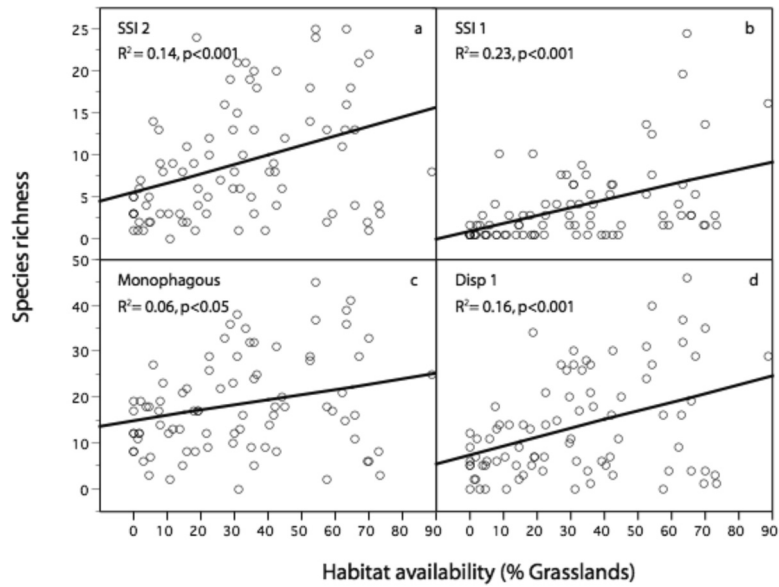


Figure S1. Observed trends between species richness and percentage of grassland habitat for specialist groups measured at the local scale (i.e. the proportion of grassland within the 5-m wide census area along the transects). (a) SSI 2 habitat specialists, (b) SSI 1 habitat specialists, (c) Monophagous species, and (d) Dispersal class 1.

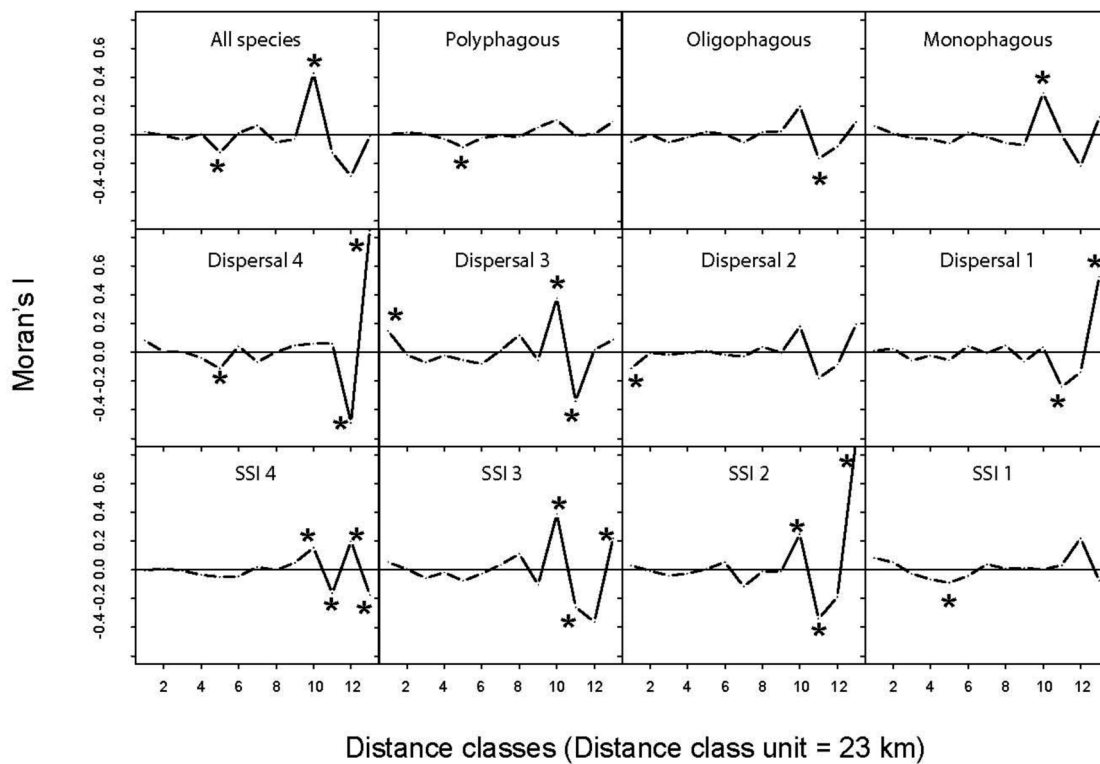


Figure S2. Moran's I correlograms of the residuals of the models with minimum AICc values in Table 1 (bold values). Significant autocorrelation at each distance class is indicated by an asterisk. The number of distance classes applied in the correlograms was calculated following Sturge's rule.

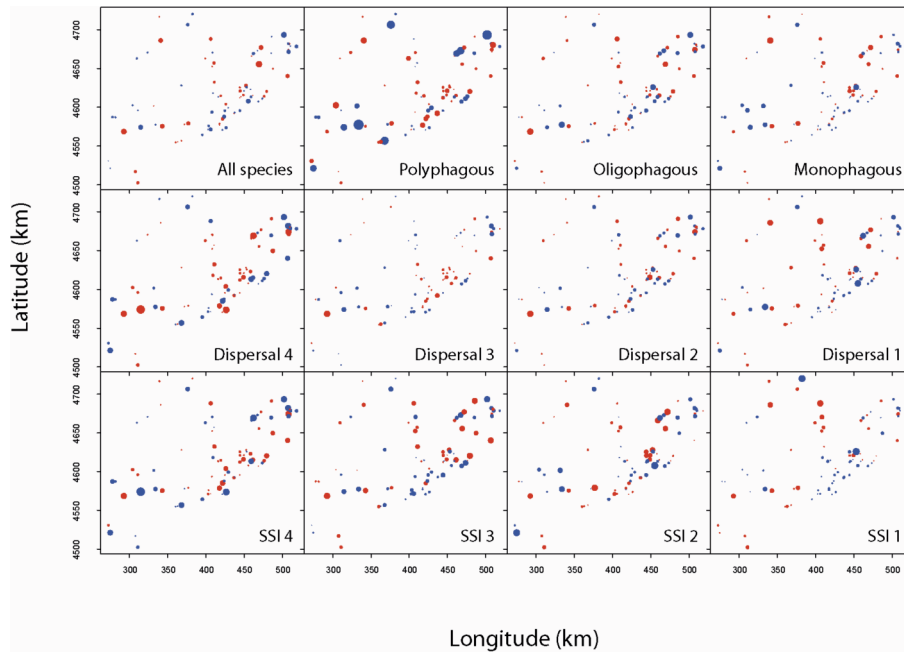


Figure S3. Spatial maps of the residuals of the models. Positive and negative residuals were extracted from models with minimum AICc values in Table 1 (bold values), and are represented by blue and red dots respectively. The size of the dot is proportional to the numeric value of the residual. The presence of spatial autocorrelation in the residuals of the model produces a more clustered distribution.