

### **C.3 Non-modelled European butterfly species**

Due to our methodological restrictions, it was not possible to model the climate change risk for a large number of species with a very restricted European distribution (149 species, see Table C.3.1). Most of these species would expect to be categorized as being at extremely high risk (HHHR) from climate change because they have such a limited distribution and because any change in climate space is likely to have a strong impact.

Better models should be developed for these species in the future, but it is important not to ignore them in the current discussion on climate change impacts on butterflies. We have therefore listed them below to highlight European endemics and give an indication of the European distribution. We also have listed the closest relative of the taxon concerned in those cases where taxonomic discussion is ongoing. In some cases, the species mentioned in the first column may eventually be included as subspecies of this closest relative.

**Table C.3.1:** European butterfly species which have not been modelled within this atlas (excluding the territories of Belarus, Ukraine, Moldova, and Russia)

Closest relative: Closest relative of the taxon concerned in those cases where taxonomic discussion is ongoing.

E = European endemic (I = island endemic, M = mountain endemic)

European distribution: see table C.3.2 with the country codes of European countries (ISO 3166-1 alpha-2 code)

Species	Engl. Name	Closest relative	E	European distribution
<b>Hesperiidae</b>				
<i>Borbo borbonica</i> (BOISDUVAL, 1833)	Zeller's Skipper		–	ES: Algeciras; GI
<i>Carcharodus stauderi</i> (REVERDIN, 1913)	False Marbled Skipper	<i>Carcharodus boeticus</i>	–	GR: Ionian islands
<i>Pelopidas thrax</i> (HÜBNER, 1821)	Millet Skipper		–	GR: Ionian islands; CY
<i>Pyrgus cinarus</i> (RAMBUR, 1840)	Sandy Grizzled Skipper		–	BG; MK; AL; GR, ES
<i>Spialia therapne</i> (RAMBUR, 1832)		<i>Spialia sertorius</i>	E: I	FR: Corsica; IT: Sardinia
<i>Syrichthys cribrellum</i> (EVERSMANN, 1841)	Spinose Skipper		–	RO; MK, BG
<i>Thymelicus abristi</i> (REBEL, 1894)		<i>Thymelicus acteon</i>	E: I	ES: Canary Islands
<i>Thymelicus lynx</i> (LEDERER, 1861)	Levantine Skipper		–	GR
<b>Papilionidae</b>				
<i>Archon apollinus</i> (HERBST, 1789)	False Apollo		–	GR; TR
<i>Papilio hospiton</i> GENE, 1839	Corsican Swallowtail		E: I	FR: Corsica; IT: Sardinia
<i>Zerynthia cretica</i> (REBEL, 1904)	Cretean Festoon	<i>Zerynthia erisyi</i>	E: I	GR: Crete
<b>Pieridae</b>				
<i>Anthocharis damone</i> (BOISDUVAL, 1836)	Eastern Orange Tip		–	AL, IT: S Italy; GR; MK
<i>Catopsilia florella</i> (FABRICIUS, 1775)	African Migrant		–	ES: Canary Islands; MT, CY
<i>Colias aurorina</i> (HERRICH-SCHÄFFER, 1850)	Greek Clouded Yellow		–	GR
<i>Colias balcanica</i> REBEL, 1903	Balkan Clouded Yellow	<i>Colias caucasica</i>	E: M	BA; RS; AL; MK; BG; GR

Species	Engl. Name	Closest relative	E	European distribution
<i>Colias fuchs</i> (DE BOBER, 1812)	Pale Arctic Clouded Yellow		–	Arctic Scandinavia: NO; SE; FI
<i>Colias evagore</i> (KLUG, 1829)	Desert Orange Tip		–	ES: South Spain
<i>Euclioe charltonia</i> (DONZEL, 1842)	Greenish Black Tip		–	ES: Canary Islands
<i>Euclioe constantini</i> BACK, 2008		<i>Euclioe belemia</i>	E: I	ES: Gran Canaria
<i>Euclioe eversti</i> STAMM, 1963		<i>Euclioe belemia</i>	E: I	ES: Tenerife
<i>Euclioe hesperidum</i> ROTHCHILD, 1913		<i>Euclioe belemia</i>	E: I	ES: Fuerteventura
<i>Euclioe insularis</i> STAUDINGER, 1861	Corsican Dappled White	<i>Euclioe ausonia</i>	E: I	FR: Corsica; IT: Sardinia
<i>Euclioe penia</i> (FREYER, 1852)	Eastern Greenish Black Tip	<i>Euclioe charltonia</i>	–	MK; BG; GR; TR
<i>Gonepteryx cleobule</i> (HÜBNER, 1825)	Canary Brimstone		E: I	ES: Canary Islands
<i>Gonepteryx madeirensis</i> FELDER, 1862	Madeira Brimstone		E: I	PT: Madeira
<i>Pieris balana</i> LORKOVIC, 1968		<i>Pieris napi</i>	E	BA; RS; AL; MK; BG; GR
<i>Pieris cheiranthi</i> (HÜBNER, 1808)	Canary Islands' Large White	<i>Pieris brassicae</i>	E: I	ES: Canary Islands
<i>Pontia chloridice</i> (HÜBNER, 1813)	Small Bath White		–	BG; GR; TR; MK
<b>Lycaenidae</b>				
<i>Apharitis acamas</i> (KLUG, 1834)	Levantine Leopard		–	CY
<i>Aricia morronensis</i> (RIBBE, 1910)	Spanish Argus	<i>Aricia artaxerxes</i>	E: M	ES; FR: Pyrenees
<i>Azanus nbalus</i> (CRAMER, 1782)	Bright Babul Blue		–	ES: Gran Canaria
<i>Chilades trochylus</i> (FREYER, 1844)	Grass Jewel		–	CY; GR
<i>Capido carswelli</i> STEMPPFER, 1927	Carswell's Littel Blue	<i>Capido minimus</i>	E: M	ES: Murcia
<i>Capido lorquini</i> (HERRICH-SCHÄFFER, 1847)	Lorquin's Blue		–	ES, PT: Southern Iberian Peninsula
<i>Cybeleus nebbianus</i> (BRULLÉ, 1840)	Canary Blue		E: I	ES: Canary Islands
<i>Glaucopsyche paphos</i> CHAPMAN, 1920	Paphos Blue		E: I	CY
<i>Lycaena bleusei</i> (OBERTHÜR, 1884)		<i>Lycaena ityrus</i>	E: M	ES

Species	Engl. Name	Closest relative	E	European distribution
<i>Lycena subalpina</i> (SPEYER, 1851)		<i>Lycena ityros</i>	E: M	Alps
<i>Lycena thebis</i> (KLUIG, 1834)	Fiery Copper		–	GR
<i>Plebejus bellieri</i> (OBERTHÜR, 1910)	Bellier's Blue	<i>Plebejus idas</i>	E: I	FR: Corsica; IT: Sardinia, Elba
<i>Plebejus danielianus</i> (FREYER, 1832)	Gavarnie (Balkan) Blue	<i>Plebejus pyrenaeus</i>	–	BA, GR: Macedonia
<i>Plebejus euryptilus</i> (FREYER, 1852)	Eastern Brown Argus		–	GR
<i>Plebejus hespericus</i> (RAMBUR, 1839)		<i>Plebejus pylaon</i>	E	ES
<i>Plebejus loeви</i> (ZELLER, 1847)	Loew's Blu		–	GR: Ionian islands
<i>Plebejus pylorinus</i> (FREYER, 1845)	Cretan Argus		E: I	GR: Crete
<i>Plebejus pylaon</i> (FISCHER, 1832)	Zephyr Blue		–	UA; RU
<i>Plebejus pyrenaeus</i> (BOISDUVAL, 1840)	Gavarnie Blue		E: M	FR: Pyrenees; ES: North Spain
<i>Plebejus trappi</i> (VERITY, 1927)		<i>Plebejus pylaon</i>	E: M	Alps: CH; IT
<i>Plebejus villai</i> JUTZELER ET AL., 2005		<i>Plebejus idas</i>	E: I	IT: Elba
<i>Plebejus zyelichi</i> (HEMMING, 1933)		<i>Plebejus glandon</i>	E: M	ES: Sierra Nevada
<i>Polyommatus ainsae</i> (FORSTER, 1961)	Forster's Furry Blue	<i>Polyommatus fulgens</i>	E	ES: North Spain
<i>Polyommatus andronicus</i> (COUTSIS & GHAVALAS, 1995)	Phalakron Blue	<i>Polyommatus icarus</i>	E: M	GR: Macedonia
<i>Polyommatus aroaniensis</i> (BROWN, 1976)	Grecian Anomalous Blue		E: M	BG; GR, MK
<i>Polyommatus coelestinus</i> (EVERSMANN, 1848)	Pontic Blue		–	GR: Peloponnese
<i>Polyommatus elinae</i> COUTSIS & DE PRINS, 2005		<i>Polyommatus aroaniensis</i>	E: M	GR
<i>Polyommatus exuberans</i> (VERITY, 1926)		<i>Polyommatus ripartii</i>	E: M	IT: Valle di Susa
<i>Polyommatus fabressei</i> (OBERTHÜR, 1910)	Oberthur's Anomalous Blue		E	ES
<i>Polyommatus fulgens</i> (DE SAGARRA, 1925)		<i>Polyommatus dolus</i>	E	ES: Catalonia
<i>Polyommatus galloii</i> (BALLETTO & TOSO, 1979)		<i>Polyommatus ripartii</i>	E	IT: South Italy
<i>Polyommatus gemmargentii</i> (LEIGHIER, 1987)		<i>Polyommatus coridon</i>	E: I	IT: Sardinia
<i>Polyommatus golgus</i> (HÜBNER, 1813)	Nevada Blue		E: M	ES: Sierra Nevada

Species	Engl. Name	Closest relative	E	European distribution
<i>Polyommatus humedasa</i> (TOSO & BALLETTI, 1976)	Piedmont Anomalous Blue		E: M	IT: Aosta valley
<i>Polyommatus iphigenius</i> (HERRICH-SCHÄFFER, 1847)	Chelmos Blue		–	GR: Mt. Chelmos
<i>Polyommatus menalcas</i> (FREYER, 1837)			–	TR
<i>Polyommatus nepholiptamenes</i> (BROWN & COUTSIS, 1978)	Higgins' Anomalous Blue	<i>Polyommatus ripartii</i>	E: M	BG; GR: Macedonia
<i>Polyommatus niphellensis</i> (SCHURIAN, 1977)		<i>Polyommatus coridon</i>	E: I	FR: Corsica
<i>Polyommatus orphicus</i> KOLEV, 2005		<i>Polyommatus dantchenkoi</i>	E: M	BG
<i>Polyommatus violetae</i> (GOMEZ-BUSTILLO ET AL., 1979)	Andalusian Anomalous Blue	<i>Polyommatus fabresvei</i>	E: M	ES: South Spain
<i>Polyommatus nigritus</i> (OBERTHÜR, 1910)		<i>Polyommatus dolus</i>	E	IT
<i>Satyrus ledereri</i> (BOISDUVAL, 1848)	Orange-Banded Hairstreak		–	GR: Samos
<i>Scolitantides barbatae</i> (PRINS & POORTEN, 1982)	Sardinian Blue		E: I	IT: Sardinia
<i>Tarucus balcanicus</i> (FREYER, 1845)	Little Tiger Blue		–	HR; AL; MK; BG; GR; TR
<i>Tarucus theophrastus</i> (FABRICIUS, 1793)	Common Tiger Blue		–	ES: Southeast Spain
<i>Tomares nogeli</i> (HERRICH-SCHÄFFER, 1852)	Nogel's Hairstreak		–	RO; UA
<i>Turanana endymion</i> (FREYER, 1850)	Odd Spot Blue		–	GR but non-Europe if <i>T. taygetica</i> is accepted as separate species.
<i>Turanana taygetica</i> (REBEL, 1902)		<i>Turanana endymion</i>	–	GR: Chelmos & Taygetos
<b>Nymphalidae</b>				
<i>Argynnis elisa</i> (GODART, 1823)	Corsican Fritillary		E: I	FR: Corsica; IT: Sardinia
<i>Boloria improba</i> (BUTLER, 1877)	Dusky-winged Fritillary		–	Arctic Scandinavia: NO; SE; FI
<i>Boloria napaea</i> (HOFFMANSEGG, 1804)	Mountain Fritillary		–	NO; SE; FI; Alps & Pyrenees: ES, FR, CH, IT, AT
<i>Boloria polaris</i> (BOISDUVAL, 1829)	Polar Fritillary		–	Arctic Scandinavia: NO; SE; FI
<i>Chazara prieuri</i> (PIERRET, 1837)	Southern Hermit		–	ES

Species	Engl. Name	Closest relative	E	European distribution
<i>Coenonympha corinna</i> (HÜBNER, 1806)	Corsican Heath		E: I	FR: Corsica; IT: Sardinia
<i>Coenonympha elbana</i> STAUDINGER, 1901	Elban Heath	<i>Coenonympha corinna</i>	E: I	IT: Tuscany, Elba
<i>Coenonympha orientalis</i> REBEL, 1910	Balkan Heath		E: M	AL; BA; GR, RS
<i>Coenonympha thyrus</i> (FREYER, 1846)	Cretan Small Heath	<i>Coenonympha pamphilus</i>	E: I	GR: Crete
<i>Danais plexippus</i> (LINNAEUS, 1758)	Monarch, Milkweed		–	ES: Canary Islands, South coast; PT
<i>Erebia aethiopella</i> (HOFFMANNSEGG, 1806)	False Mneustra Ringlet		E: M	Alps: FR; IT
<i>Erebia calcaria</i> LORKOVIC, 1953	Lorkovic's Brassy Ringlet		E: M	Alps: IT; AT; SI
<i>Erebia christi</i> RÄTZER, 1890	Rätzer's Ringlet		E: M	Alps: CH, IT
<i>Erebia claudina</i> (BORKHAUSEN, 1789)	White Speck Ringlet		E: M	Alps: AT
<i>Erebia flavofasciata</i> HEYNE, 1895	Yellow Banded Ringlet		E: M	Alps: CH; IT; AT
<i>Erebia gorgone</i> BOISDUVAL, 1833	Gavarnie Ringlet		E: M	Pyrenees: FR; ES
<i>Erebia hispania</i> BUTLER, 1868	Spanish Brassy Ringlet		E: M	FR: Pyrenees; ES: Pyrenees & Sierra Nevada
<i>Erebia lefebvrei</i> BOISDUVAL, 1828	Lefebvre's Ringlet		E: M	Pyrenees: FR; ES
<i>Erebia nivalis</i> LORKOVIC & LESSE, 1954	De Lesse's Brassy Ringlet		E: M	Alps: CH; IT; AT
<i>Erebia orientalis</i> ELWES, 1900	Bulgarian Ringlet	<i>Erebia ephedron</i>	E: M	BG, RS
<i>Erebia palарica</i> CHAPMAN, 1905	Chapman's Ringlet		E: M	ES: Cantabria
<i>Erebia polaris</i> STAUDINGER, 1861	Arctic Woodland Ringlet	<i>Erebia medusa</i>	–	Arctic Scandinavia: NO; SE; FI
<i>Erebia rhodopensis</i> NICHOLL, 1900	Nicholl's Ringlet		E: M	BG; MK; GR, RS
<i>Erebia saipio</i> BOISDUVAL, 1832	Larche Ringlet		E: M	Alps: FR; IT
<i>Erebia siberryo</i> GRASLIN, 1850	False Dewy Ringlet		E: M	Pyrenees: FR; ES
<i>Erebia stiriа</i> (GODART, 1824)	Styrian Ringlet		E: M	Alps: AT; IT; SI; HR
<i>Erebia sudetica</i> STAUDINGER, 1861	Sudetan Ringlet		E: M	CH, FR: Alps; RO; CZ
<i>Erebia zapateri</i> OBERTHÜR, 1875	Zapater's Ringlet		E: M	ES: Central Spain

Species	Engl. Name	Closest relative	E	European distribution
<i>Hipparchia aristaeus</i> (BONELLI, 1826)	Southern Grayling		–	FR: Corsica; IT: Sardinia, Tuscany
<i>Hipparchia azorina</i> (STRECKER, 1899)	Azores Greyling		E: I	PT: Azores
<i>Hipparchia bacchus</i> HIGGINS, 1967		<i>Hipparchia nysäi</i>	E: I	ES: El Hierro
<i>Hipparchia blachieri</i> (FRUHSTORFER, 1908)		<i>Hipparchia aristaeus</i>	E: I	IT: Sicily
<i>Hipparchia christenseni</i> KUDRNA, 1977			E: I	GR: Carpathos
<i>Hipparchia eretica</i> (REBEL, 1916)	Cretan Grayling		E: I	GR: Crete
<i>Hipparchia cyprensis</i> (HOLIK, 1949)	Cyprus Grayling	<i>Hipparchia pellucida</i>	E: I	CY
<i>Hipparchia genava</i> (FRUHSTORFER, 1908)		<i>Hipparchia hermione</i>	E	CH; FR; IT
<i>Hipparchia gomera</i> HIGGINS, 1967		<i>Hipparchia nysäi</i>	E: I	ES: La Gomera
<i>Hipparchia leighi</i> KUDRNA, 1976		<i>Hipparchia semele</i>	E: I	IT: Eolian islands
<i>Hipparchia maderensis</i> (BETHUNE-BAKER, 1891)		<i>Hipparchia aristaeus</i>	E: I	PT: Madeira
<i>Hipparchia mervina</i> (STAUDINGER, 1871)			–	GR: Ionian islands
<i>Hipparchia neapolitana</i> (STAUDER, 1921)		<i>Hipparchia aristaeus</i>	E	IT: Campania
<i>Hipparchia neomiri</i> (GODART, 1823)	Corsican Grayling		E: I	FR: Corsica; IT: Sardinia, Elba, Capraia
<i>Hipparchia pellucida</i> (STAUDER, 1923)			–	GR: Ionian islands
<i>Hipparchia sbordonii</i> KUDRNA, 1984		<i>Hipparchia aristaeus</i>	E: I	IT: Ponza islands
<i>Hipparchia tamadabae</i> OWEN & SMITH, 1992		<i>Hipparchia nysäi</i>	E: I	ES: Gran Canaria
<i>Hipparchia tilosi</i> (MANIL, 1984)		<i>Hipparchia nysäi</i>	E: I	ES: La Palma
<i>Hipparchia wyssi</i> (CHRIST, 1889)	Canary Greyling		E: I	ES: Tenerife
<i>Maniola chia</i> (THOMSON, 1987)	Chios Meadow Brown		E: I	GR: Chios
<i>Maniola cypricola</i> GRAVES, 1928	Cyprus Meadow Brown		E: I	CY
<i>Maniola halicarnassus</i> THOMSON, 1990	Thomson's Meadow Brown		–	GR: Nissiros island
<i>Maniola megalia</i> (OBERTHÜR, 1909)	Turkish Meadow Brown		–	GR: Lesbos

Species	Engl. Name	Closest relative	E	European distribution
<i>Maniola nureg</i> (GHILLANI, 1852)	Sardinian Meadow Brown		E: I	IT: Sardinia
<i>Maniola telmessia</i> (ZELLER, 1847)	Aegean Meadow Brown		–	GR: Ionian islands
<i>Melanargia pherusa</i> (BOISDUVAL, 1833)	Sicilian Marbled White	<i>Melanargia ocitanica</i>	E: I	IT: Sicily
<i>Melitaea arduinna</i> (ESPER, 1784)	Freyer's Fritillary		–	RO; BG; RS; MK; GR; TR
<i>Melitaea asteria</i> (FREYER, 1828)	Little Fritillary		E: M	Alps: CH; IT; AT
<i>Melitaea nevadensis</i> (OBERTHÜR, 1904)		<i>Melitaea albalba</i>	E: M	ES: Sierra Nevada
<i>Aglais ichnusa</i> (BONELLI, 1826)		<i>Aglais urticae</i>	E: I	FR: Corsica; IT: Sardinia
<i>Oeneis bore</i> (SCHNEIDER, 1792)	Arctic Grayling		–	Arctic Scandinavia: NO; SE; FI
<i>Kirinia climene</i> (ESPER, 1784)	Lesser Lattice Brown		–	RO; BG; RS; MK; AL; GR; TR
<i>Lasionommata paramagera</i> (HÜBNER, 1824)	Corsican Wall Brown	<i>Lasionommata megera</i>	E: I	FR: Corsica; IT: Sardinia
<i>Pararge xiphia</i> (FABRICIUS, 1775)	Madeiran Speckled Wood		E: I	PT: Madeira
<i>Pararge xiphioides</i> (STAUDINGER, 1871)	Canary Speckled Wood		E: I	ES: Canary Islands
<i>Proterebia afra</i> (FABRICIUS, 1787)	Dalmatian Ringlet		–	HR; GR
<i>Pseudochazara cingoniskii</i> (GROSS, 1973)	Macedonian Grayling		E: M	MK;
<i>Pseudochazara geyeri</i> (HERRICH-SCHÄFFER, 1845)	Grey Asian Grayling		–	MK; AL; BG; GR
<i>Pseudochazara graeca</i> (STAUDINGER, 1870)	Grecian Grayling		E: M	MK; AL; BG; GR
<i>Pseudochazara orestes</i> (PRINS & POORTEN, 1981)	Dils' Grayling		E: M	BG; GR
<i>Pseudochazara tisiphone</i> (BROWN, 1980)	Dark Grayling	<i>Pseudochazara mniszehüi</i>	E: M	AL; GR
<i>Pseudochazara williamsi</i> (ROMEL, 1927)		<i>Pseudochazara hippolyte</i>	E: M	ES: Sierra Nevada
<i>Vanessa virginiensis</i> (DRURY, 1773)	American Painted Lady		–	PT; ES
<i>Vanessa vulcania</i> (GODART, 1819)	Canary Red Admiral	<i>Vanessa indica</i>	E: I	ES: Canary Islands; PT: Madeira
<i>Ypthima asterope</i> (KILIG, 1832)	African Ringlet		–	GR: Ionian islands; CY



**Table C.3.2:** Country codes of European countries (ISO 3166-1 alpha-2 code)

Code	Country	Code	Country
AD	Andorra	IS	Iceland
AL	Albania	IT	Italy
AT	Austria	LI	Liechtenstein
BA	Bosnia and Herzegovina	LT	Lithuania
BE	Belgium	LU	Luxembourg
BG	Bulgaria	LV	Latvia
BY	Belarus	MC	Monaco
CH	Switzerland	MD	Moldova
CY	Cyprus	ME	Montenegro
CZ	Czech Republic	MK	Macedonia (Former Yugoslav Republic)
DE	Germany	MT	Malta
DK	Denmark	NL	The Netherlands
EE	Estonia	NO	Norway
ES	Spain	PL	Poland
FI	Finland	PT	Portugal
FO	Faroe Islands	RO	Romania
FR	France	RS	Serbia
GB	United Kingdom	RU	Russian Federation
GI	Gibraltar	SE	Sweden
GR	Greece	SI	Slovenia
HR	Croatia	SK	Slovakia
HU	Hungary	SM	San Marino
IE	Ireland	TR	Turkey
IM	Isle Of Man	UA	Ukraine

## C.4 Summary results

The results of our analyses are summarized in Figures C.4.1 and C.4.2 (and in tables App. 3.1 and App. 3.2). The study shows clearly that climate change poses a considerable additional risk to European butterflies. However, the risk varies considerably under the three storylines considered in this atlas.

Under the extreme, no dispersal GRAS scenario for 2080, 24% of the modelled species lose more than 95% of their present climatic niche and 78% lose more than 50%. A further 20% are under potential risk and only 6% of species can be rated as being at lower risk.

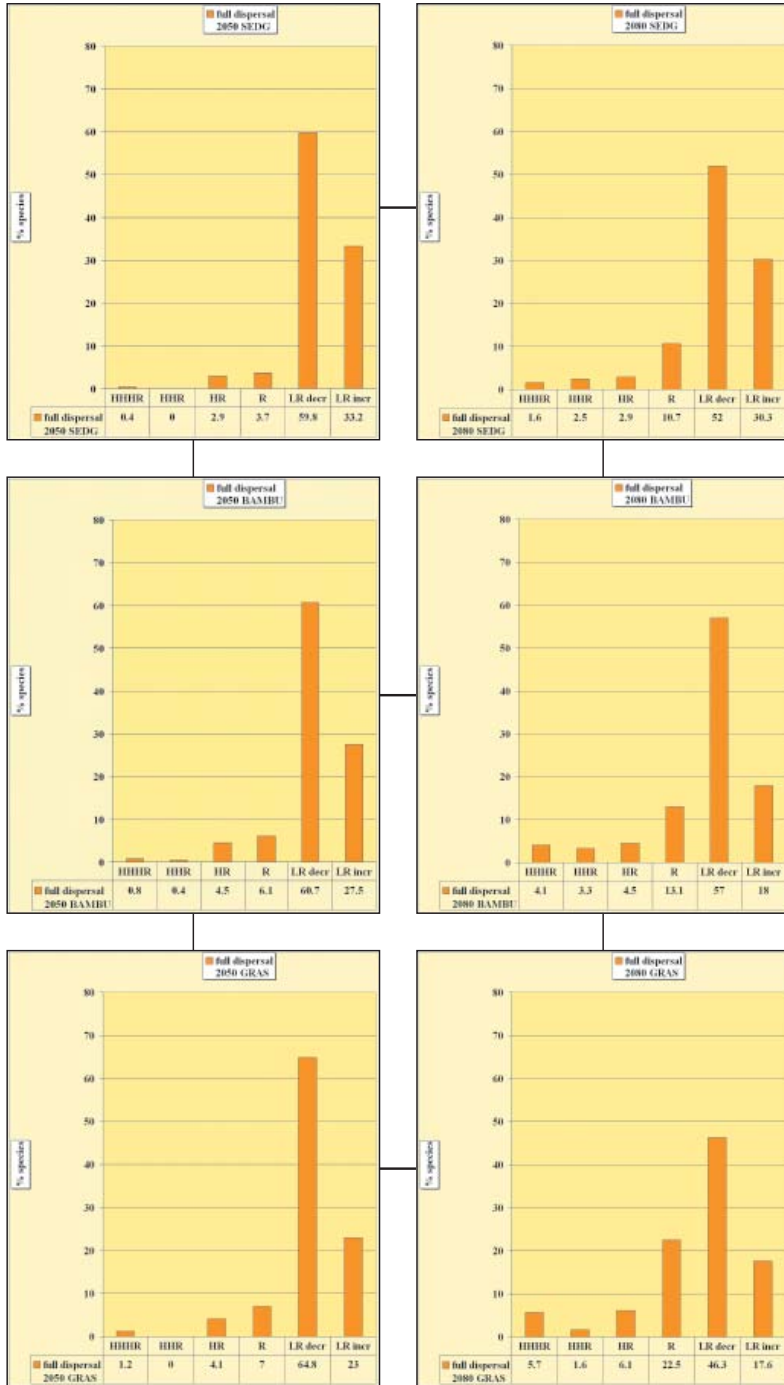
Under the intermediate, no dispersal BAMBU scenario for 2080, 9% lose more than 95% of their climatic niche and 66% lose more than 50%. While under the best case SEDG scenario, only 3% lose more than 95% of their climatic niche and 48% lose more than 50%.

The results also show that there is a considerable time lag in the effects of climate change on European butterflies. Until 2050, the effects across different scenarios are still moderate. Under the no dispersal GRAS scenario (excluding the PR category), around 60% of species are still rated as experiencing a lower risk until 2050, while in 2080 these are a mere 6%. The relative differences are similar across all the scenarios.

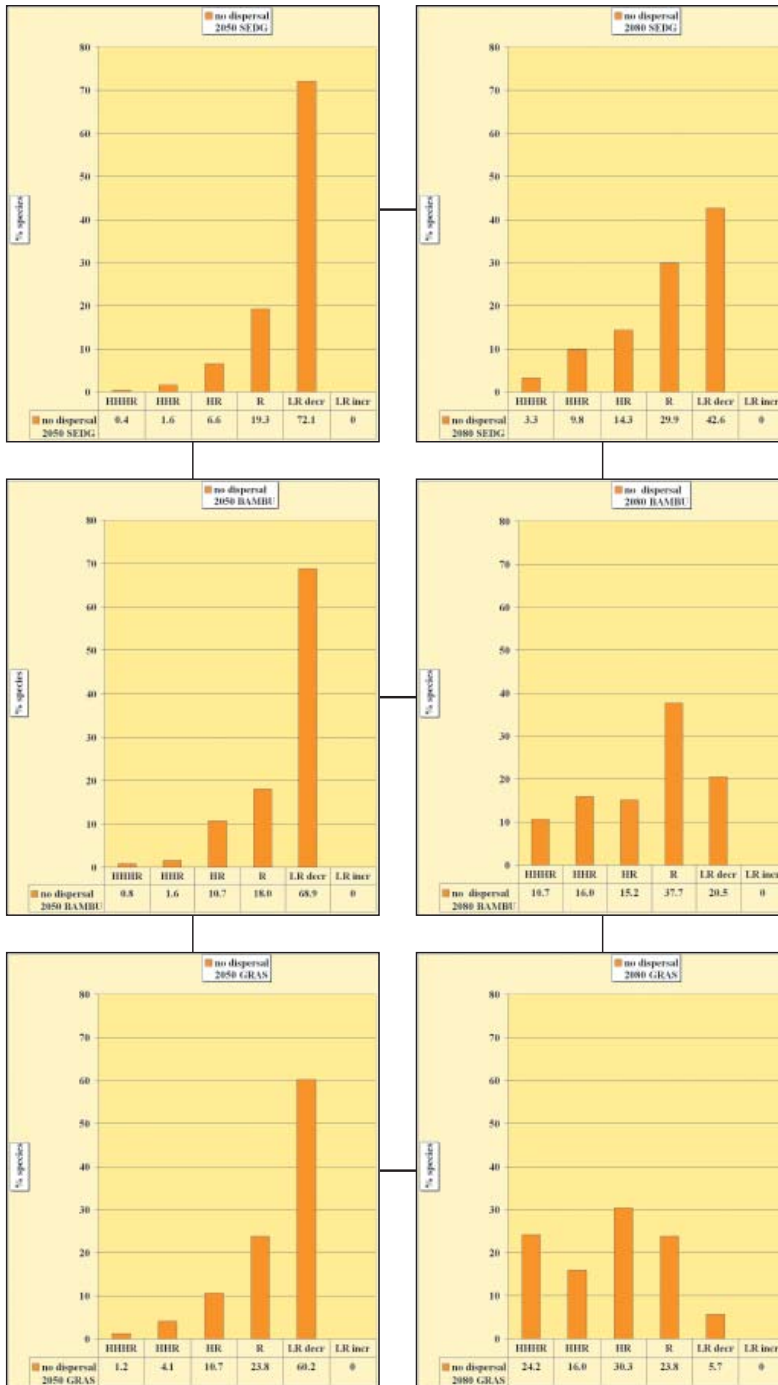
Dispersal ability is one of the major factors that will affect a species ability to survive under future climatic conditions. This ability is a proxy not only for mobility itself, but also for the availability of suitable habitats in the new areas of the respective climatic niches. Under the very moderate SEDG scenario, 33% of species could experience a net increase in climate niche space until 2050, and even 30% of the species have this option until 2080. Under the other two scenarios, around a quarter of species could experience an increase in climate space until 2050, while by 2080 this is only the case for 18%. Thus, until 2050, there may be better conditions for some warmth-loving species, provided they can respond, but these subsequently get worse.

The most striking differences in the results are the ones between the different scenarios. Considering the no dispersal scenarios again for 2080, the number of species of the lower risk category ranges between 43% for SEDG and 6% for GRAS (with 20% for BAMBU).

On page 630 we present the results of climate risk analysis for both time steps (left and right column) under the three scenarios SEDG (first row), BAMBU (second row), and GRAS (third row) for full dispersal, while on page 631 the same is shown under the assumption of no dispersal (for definition of risk categories see chapter B.4, pages 24ff.).



**Figure C.4.1:** Percentages of climate risk categories of European butterflies under the full dispersal assumption for 2050 (left column) and 2080 (right column) under the three scenarios SEDG (first row), BAMBU (second row), and GRAS (third row). (without “PR”; for category definitions see pp. 24ff.)



**Figure C.4.2:** Percentages of climate risk categories of European butterflies under the no dispersal assumption for 2050 (left column) and 2080 (right column) under the three scenarios SEDG (first row), BAMBU (second row), and GRAS (third row). (without “PR”; for category definitions see pp. 24ff.)

