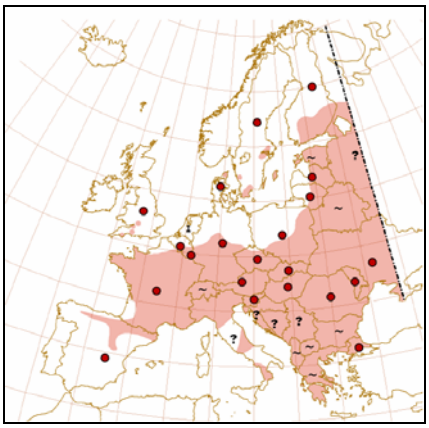
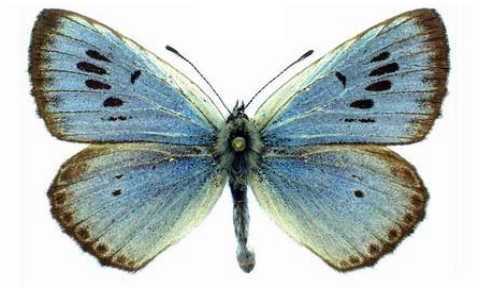
Large blue *Maculinea arion*

Habitats Directive – Annex IV





Maculinea arion occurs in the zones between c 40° and 62°N*[1]

	AT	BE*	BU	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IR
Present														
	IT	LV	LT	LU	MA	NL	PL	PT	RO	SL	SV	SE	UK*	
Present														

* re-introduced

SPECIES INFORMATION

ECOLOGY

- The large blue butterfly is a day butterfly with a large distribution area;
- Adults generally emerge in mid-June and may be seen until early August;
- The flying period at a single locality is 3 to 5 weeks, but the individual butterfly is short-lived, with an average lifespan of only 3 to 5 days;
- Females lay eggs exclusively in the flower buds of thyme *Thymus spp.* or oregano *Oreganum vulgar.* Eggs hatch in a few days and the three first larval instars feed on flowers of the host plant;
- After fourth molting the larva drops to the ground and awaits arrival of the ant (principally *Myrmica sabuleti)*, which mistakes it for one of its own grubs and brings it back to its underground colony. Inside the ants nest the butterfly larva feeds undetected on ant grubs;
- The predatory butterfly larvae need nests of a certain size to survive (minimum over 350 worker ants), and as a general rule there can only be one larva in each ant nest (and even then the average survival rate is still only around 20%);
- After a period of 10 months in the ants nest the butterfly pupates and flies away to start the cycle over;
- Adults generally stay within their own habitat patch which increases the risk of local extinction. But some adult butterflies have been observed flying up to 5 kilometers to recolonise sites nearby.

[1] **. Drawing courtesy of http://www.biolib.cz/*

HABITAT REQUIREMENTS

- The large blue is found in dry grassland, on sandy and calcareous soils;
- Especially in Eastern Europe, it may be associated with forest edges or open areas in woodlands; In the North it is associated with south-facing short-grazed vegetation typically less than 2-3cm high. In the southern part of its range the species occurs mainly in hilly or mountainous areas (avoiding south facing slopes) and is found in more dense herbaceous cover (> 20cm in height);
- The species is entirely dependent on the presence of its host plant thyme *Thymus praecox, T. serpyllum or T. pulegioides* (mainly in northern parts of the range) or oregano *Origanum vulgare* (mainly in southern part of range) and on the presence of its host ant mainly *Myrmica sabuleti*;
- Suitable habitat for the butterfly is therefore restricted to areas where both the host ant and the local host plant(s) are present in sufficient abundance;
- In ideal circumstances 1 ha should contain more than 5% cover of the host plant and a high density of ant nests (ca 2500);
- Preservation of a suitable microhabitat for the host ant is usually the critical factor. If conditions are not optimal, *Myrmica sabuleti* is quickly outcompeted by other ant species;
- The host plants are generally found on well drained grassy areas which are relatively poor in nutrient and lightly grazed. In Northern Europe they are associated with warm, dry habitats whereas in Southern Europe they occur in more humid areas;
- Generally, the large blue has less specific habitat requirement in the southern parts of its distribution range than in the northern parts where its niche is much narrower. But exact habitat requirements vary significantly according to local climate and soil conditions;
- Suitable conditions for large blue butterflies should extend over a sufficiently large area to support a whole metapopulation (i.e. a series of small local populations). This means managing on a landscape level to ensure there are many suitable patches of habitats close to one another irrespective of whether they are used or not by the butterfly – just protecting sites where the species is present will not ensure its survival as local extinctions are frequent.

THREATS

The large blue butterfly has declined in large parts of the distribution area and is now extinct in several countries. In others it only occurs in a few areas. The major threats and main reasons for the decline of the distribution area and reduction of populations can be summarized as:

- Abandonment of traditional farming practices: The presence of a vegetation structure suitable for the host ants and host plants depends on traditional management such as livestock grazing or hay cutting. If these are abandoned, ecological succession quickly makes the area unsuitable;
- Change of grazing pressure: Depending on the local climate, topography and soil conditions, optimum sward heights vary from very low (less than 2 cm) to medium-high (up to 40 cm) but are always within a quite restricted range at a given site. Hence, the optimum grazing pressure at a site is within rather narrow limits, and both a reduction and intensification of grazing may be detrimental;
- Agricultural intensification: The conversion of grasslands to arable land has been a major cause of destruction of large blue habitat. Fertilization of grasslands and eutrophication through airborne nitrogen leads to profound changes in the structure and composition of the vegetation, causing the host plants and/or host ants to disappear. Re-sowing of grasslands and frequent cutting for silage are also detrimental. Use of pesticides (herbicides, insecticides) may also have a negative impact;
- Habitat fragmentation: Loss of habitat makes the remaining, suitable habitat more fragmented. This isolation limits (meta)population size, the possibilities of dispersal and the re-colonization of sites where the species has disappeared. The resulting, isolated, often small populations are highly vulnerable to catastrophic mortality and other chance events. Fragmentation also prevents genetic interchange, making the populations vulnerable to stochastic processes such as genetic drift;
- Afforestation: destroys the habitat of the large blue.

FARMING PRACTICES FAVOURABLE TO THE LARGE BLUE BUTTERFLY

In many parts of Northern Europe the large blue now exists only in a few localities. Its survival, and possible increase and dispersal, depends on presence of both the host plants and the host ants. Consequently, management prescriptions need to be finetuned for each site, depending on local soil and climatic conditions.

Conservation also needs to be done at the level of the metapopulation. This ensures that there is a sufficient amount of suitable habitat present within a wider area so that butterflies can spontaneously colonise habitat patches where it is not currently present. Spontaneous local extinctions and recolonisation are commonplace and must be taken into account as it is important not to just protect areas where the species is present but also potential habitats.

The following measures should be supported in order to benefit the species:

- Maintenance of traditional management of grassland: Traditional management, especially extensive livestock grazing, should be maintained to control vegetation succession and keep the area sufficiently open;
- Prevent agricultural intensification in core areas for the species, especially in countries with very limited localities for the species;
- Setting appropriate grazing levels: The most appropriate level of grazing will depend from one locality to another. The optimum vegetation height, and thus the appropriate grazing regime, varies with the local conditions (altitude, aspect, slope, temperature etc.). Depending on the optimum vegetation height at a site, grazing by cattle, horses or sheep may be used;
- Scrub removal: In areas where succession has progressed, it may be necessary to supplement grazing with the removal of scrub and young trees, or this may have to be done before grazing is (re-)introduced at the site. In general, this should not be carried out over very large areas and mowing during flight period should be avoided;
- Avoid pesticides and fertilization: Application of insecticides and herbicides targeted at broad-leaved weeds should be avoided at large blue localities. Furthermore, Thymus plants are readily ousted by more competitive species when nutrient levels are raised. Thus, use of herbicides, insecticides, fertilizer and manure should be explicitly avoided at all butterfly sites;
- Restoration of habitat at adjacent sites: Expansion of existing habitats is in general an important conservation tool. Especially at small sites holding a single population, the area of suitable habitat should be enlarged. Restoration of habitat by means of the above-mentioned management measures should be encouraged at suitable sites (e.g. previously occupied sites) within dispersal distance from localities where the species is currently present;
- Ensure that the species is not collected: The species is strictly protected under EU law and must not be collected. Although over collection is not regarded a major threat any illegal collections of even small numbers could have significant effects on local populations;
- Planting of Thymus: In some parts of the species' range, it may take decades before host plants re-colonize sites where they have disappeared or are too sparsely distributed. At such sites, planting of Thymus in areas with a good population of *Myrmica sabuleti* has proved an effective way of re-creating good conditions for the large blue;

OTHER SPECIES BENEFITING FROM THESE CONSERVATION MEASURES

Like every species, the large blue has particular habitat requirements that are unique to its lifecycle. However, several of the measures mentioned above would also benefit other species protected under the Habitats and Birds Directives that are typical of these habitats such as:

- Orchid spp.;
- Sand Lizard, *Lacerta agilis;*

- *Bush Cricket, Saga pedo;*
- Other *Maculinea* species;

A wide range of bird species also depend on habitats occupied by large blues for instance:

- Stone curlew, *Burhinus oedicnemus.*
- European Roller, *Coracias garrulous;*
- Lesser Grey shrike, *Lanius minor.*
- Water pipit, *Anthus spinoletta;*
- Whinchat, *Saxicola ruberta;*
- Woodlark, *Lullula arborea;*
- Ortolan Bunting*, Emberiza hortulana*
- Bee-eater, *Merops apiester;*
- Redbacked Shrike, *Lanius collurio;*
- Hoopoe, *Upupa epops.*

OBLIGATIONS ARISING FROM THE HABITATS DIRECTIVE

The large blue is protected under the EU Habitats Directive 92/43/EEC, it is listed in Annex IV as strictly protected species. As a result, Member States must take the following measures to ensure its conservation:

General requirements

Member States must undertake measures that are designed to maintain or restore the large blue at a '*favourable conservation status'* in the EU (cf Article 2).

The conservation status of a species is taken as 'favourable' when:

- populations are maintaining themselves over the long term and no longer showing signs of continuing decline;
- their natural range is not being reduced;
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Protecting the species

The large blue is listed in Annex IV of the Habitats Directive. Member States should therefore take the requisite measures to establish a general system of protection for the large blue, and in particular to prohibit the following (cf Art 12):

- deliberate killing or capture by any method;
- deliberate disturbance, particularly during breeding, rearing, hibernation and migration;
- deliberate destruction or taking of eggs in the wild;
- deterioration or destruction of breeding sites or resting places;
- the keeping, sale and transport of specimens from the wild.

LARGE BLUE CONSERVATION THROUGH CAP/RDP

The obligations arising under the Habitats Directive for the large blue can be integrated into Common Agricultural Policy in the following manner:

Cross compliance

Cross compliance is a horizontal CAP tool and applies to all direct payments (Pillar I), Pillar II payments (Less Favoured Area payments, Agri-Environment, Natura 2000 compensatory payments, and certain wine payments). The cross compliance requirements consist of 19 Statutory Management Requirements (SMR), and the requirements set to keep land in good agricultural and environmental conditions (GAEC).

The are no Statutory Management Requirements (SMR) of the CAP that apply to the large blue butterfly as it is not a species for which site designation under Natura 2000 is required, and the requirements of Article 12 of the Habitats Directive are not part of Statutory Management Requirements.

Nevertheless, farmers must keep farms in good agricultural and environmental conditions (GAEC) which requires a minimum level of maintenance through compulsory standards, for instance, for:

- Retention of landscape features including where appropriate, hedges, ponds, ditches, trees (in line, in group or isolated) and field margins;
- Avoidance of encroachment of unwanted vegetation on agricultural land;
- Protection of permanent pasture.

Member States can also voluntarily set standards, for example, for[2]:

- Minimum livestock stocking rates or/and appropriate regimes;
- Establishment and/or retention of habitats;

Measures under Rural Development Programmes funded from EAFRD:

The following measures could be used to benefit large blues:

- **Less Favoured Area payments:** (Article 37) linked to existing farming practices where they support upkeep of traditional low-input farming systems;
- **Agri-environmental schemes:** (Article 39) linked to voluntary measures such as maintaining or re-introducing appropriate grazing levels favoured by the large blue, prohibiting the use of pesticides and herbicides, not mowing during flight periods;
- **Reimbursement of non-productive investments**: (Article 41) can cover a range of expenses from on-farm investments linked to AE schemes or to measures identified in species action plans such as restoring and reconnecting suitable habitats for the species;
- **Conservation of rural heritage** (Article 57)**:** drawing up of management plans for places of high natural value inhabited by the large blue, environmental awareness actions regarding the conservation needs of the large blue, and investments associated with the maintenance, restoration and upgrading of the natural heritage and with the development of high nature value sites;

In addition the following could also be used:

- **Training and information** (Article 21): e.g. could help make AE schemes more effective and train farmers and experts in the Farm Advisory Services on conservation and management requirements linked to wildlife such as large blue butterflies;
- **Farm Advisory Services (FAS)** (Article 24 of RDR): the cost of obtaining advisory services on how to meet the minimum cross compliance requirements, such as GAEC can be reimbursed to farmers, foresters and other land managers, which can be beneficial to, inter alia, large blue;
- **LEADER** (Article 61): integration of conservation of large blue into area-based local development strategies and enhancement of dialogue and collaboration between farmers, conservationists and other rural stakeholders in the area concerned.

EXAMPLES OF LARGE BLUE FRIENDLY MEASURES UNDER RDP

Few measures were found in the RDPs which are directly targeted at large blue conservation but several measures could in theory have a positive indirect effect on the butterfly. The following provide some examples of how different countries have introduced large blue friendly farming through the Rural Development Regulations for 2000-2006 and 2007-2013. Further details are provided in the species report of the Wildlife and Sustainable Farming Initiative: http://circa.europa.eu/Public/irc/env/swfi/library?l=/species_reports&vm=detailed&sb=Title

[2] *These standards are however compulsory for those Member States who had already set a minimum requirements for these standards before 1 January 2009 or where national rules addressing the standard are applied in the Member State.*

SLOVENIA

The **Slovenian** Agri-Environment Programme (SKOP) within the Programme for Rural Development was introduced in 2001 as a pilot programme, with the aim to promote and offer financial support for 22 different agricultural measures in 4 groups: (1) diminishing negative environmental impacts of agriculture; (2) maintenance of natural wealth, biodiversity, soil fertility and traditional cultural landscapes; (3) protection of protected areas; (4) education, training and promotion.

The government expected the agri-environment programme to be attractive for farmers and that gradually between 20 and 40% of all agricultural land will be included. Already at the beginning of the implementation of SKOP in 2001, more than 20% of applicants for subsidies decided to participate in agri-environment programmes.

Under the new RDP (2007-2013) three schemes are of particular interest for rare butterflies and their habitats. The large blue is not specifically targeted but other species within the Maculinea family are mentioned and so it is highly likely that the large blue will benefit equally from these measures.

Submeasure 214 –III/3: Preservation of grassland habitats of butterflies: The aim is to increase the area of grassland to ensure the successful reproduction of endangered plant and animal species and the targeted reproduction of endangered grassland butterfly species (such as *Lycaena dispar, Maculinea teleius, Maculinea nausithous, Euphydryas aurinia*) in ecologically important areas.

The main measures to be undertaken in areas identified as ecologically important on an official register include: not mowing or grazing during the butterfly's development on nutritional grassland plants between the period 1 July to 20 August; maintaining stocking densities as 0.2-1.9 LU/ha but not producing livestock manure surplus; not allowing the application of mineral fertilisers and plant protection products. In addition, existing border strips and hedgerows must be trimmed and thinned every second year.

Submeasure 214 –III/4; preservation of litter meadows: Similar in terms of objectives to the above, this measure aims at the preservation of litter meadows within ecologically important areas. Mowing on these extensive grasslands and border strips must be adjusted to enable successful butterfly development and simultaneously maintain existing grassland habitat types rich in orchids and endangered birds such as corncrake. Pasture and mowing is not allowed before 25 August but is obligatory thereafter, stocking densities must be maintained at 0.2-1.9 LU/ha but must not produce livestock manure surplus; application of mineral fertilisers and plant protection products are also not allowed and existing border strips and hedgerows must be trimmed and thinned every second year.

LITHUANIA

In Lithuania, two of the six agri-environment schemes included in the RDP for 2004-2006 could have been useful indirectly to improve the habitat of *Maculinea arion.* These are the Grassland Management scheme and the Protected Target Areas scheme.

The general aims of the AE schemes as a whole were:

- 20,000 farms with a total of 200,000 ha enter the AE schemes;
- Land abandonment is reduced by 5%;
- 20% of the semi-natural grasslands and meadows are under AE management agreements;
- 50% of farmland in Natura 2000 sites are under AE management agreements.

The objectives of the Grassland Management scheme were to conserve permanent natural and semi-natural grasslands, to maintain extensive farming systems on existing grasslands and to prevent possible future introduction of intensive farming systems on these areas.

The scheme requirements included:

- No ploughing or re-sowing with improved grass varieties;
- Limitations on nitrogen use (max. 60 kg of total N per ha);
- Removal of bushes (manually); cut bushes must be removed;
- Isolated trees should be retained;
- Conditions on grazing to prevent overgrazing, undergrazing and other ways of damage of sward; max. 1 LU per ha if grazed during whole season;
- If not used for grazing, areas must be mown at least once a year;
- Mowing should be from centre of field towards edges; mown grass must be removed;
- In floristically rich grasslands, mowing should not take place before August;
- In floristically rich grasslands, pesticides and fertilizers are not allowed.

Agreements were entered for a minimum of 5 years. Annual payment of 809 LTL per ha (234 € per ha) was calculated by adding up costs for each undertaking listed in the agreement plus a 10% incentive.

The objective of the Protected Target Areas scheme was to provide a comprehensive approach to the conservation and management of designated target areas. These target areas include Natura 2000 sites, nationally protected areas (strict reserves, nature reserves, national and regional parks), and core areas and stepping stones of the Lithuanian ecological network. Farmers holding their land in protected target areas are obliged to comply with specific requirements as a condition of participating in the scheme.

Proposed measures for each area were developed with participation of the staff of the protected area, and individual agri-environment plans shall be prepared by an approved planner in consultation with an environmentalist.

Among the proposed requirements were:

- No ploughing, reseeding or improvement of natural or semi-natural habitats;
- No application of pesticides, fertilizers and manure on natural or semi-natural habitats;
- Conditions for management of “rich species meadows”: postponed date of mowing, no fertilizers, restrictions on grazing.