

**Saving the  
Macedonian Grayling**



**Butterfly**  
**CONSERVATION EUROPE**

# Saving the Macedonian Grayling



Photo: Chris van Swaay



**Macedonian**  
Entomological  
Society



# Saving the Macedonian Grayling

## Authors

Rudi Verovnik, Branko Micevski

## Production

Butterfly Conservation Europe, [www.bc-europe.eu](http://www.bc-europe.eu)

This project was partly funded by the  
Mohamed bin Zayed Species Conservation Fund

## Preferred citation

Verovnik, R. & Micevski, B. (2012) Saving the Macedonian Grayling. Butterfly Conservation Europe, Wageningen.

## Keywords:

Butterfly, Europe, Biodiversity, conservation , monitoring, Critically Endangered

November 2012



*Rare and endemic butterflies, like this  
Macedonian Grayling (*Pseudochazara cingovskii*),  
deserve our attention and conservation efforts.*





Contents

Summary ..... 3

1. Introduction..... 4

2. Activities ..... 5

3. Results ..... 7

    Distribution ..... 7

    Population research at Pletvar..... 11

4. Review of the threat status ..... 12

5. Public relations ..... 13

6. Future actions..... 14

7. Conclusions..... 15

Literature..... 16



*The Macedonian Grayling is perfectly camouflaged on the marble stones and screes.*

## Summary

The Macedonian Grayling is one of the most threatened butterflies in Europe, known previously from only a single site. During our surveys it was found at six additional sites. The population size at Pletvar, where its presence was known previously, was estimated at over 3000 adults. This does reduce its extinction risk and justifies its downgrading to the level of Endangered species (EN) rather than Critically Endangered (CE) as at present. Quarrying remains the main threat, as such activities are visible at five out of seven sites. Raising public awareness and cooperation with quarry owners will be essential for long term successful conservation.



*The first author Rudi Verovnik during field study at the Pletvar site (left above), where quarrying has started (above). To the left a marked Macedonian Grayling (B16).*

## 1. Introduction

The Macedonian Grayling (*Pseudochazara cingovskii*) is a narrow endemic butterfly so far known only from a single site in central Macedonia. It flies on the marble slopes of Pletvar where it is perfectly adapted to the white and pale grey stones and rocks on which it often sits.

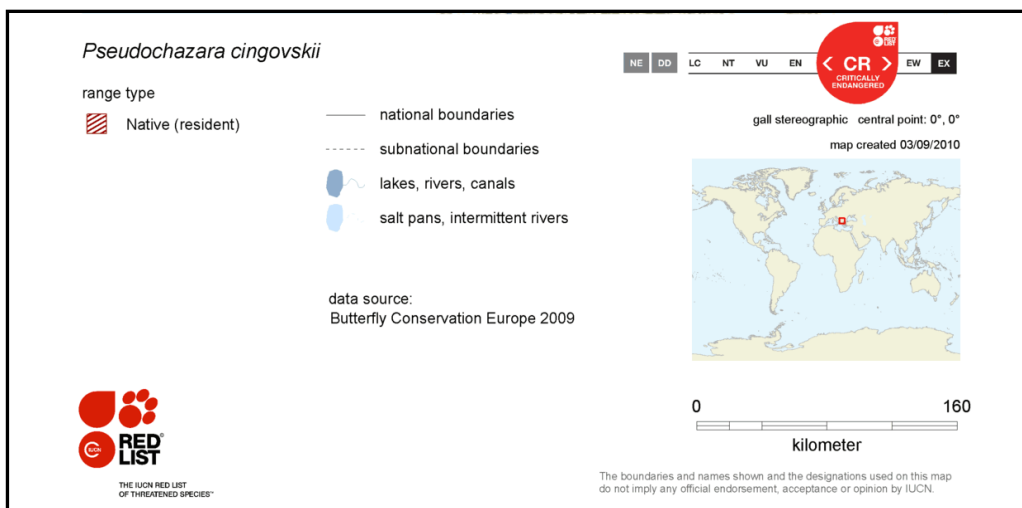
Before this study the extent of the known habitat of the Macedonian grayling was extremely limited, covering less than 1.5 km<sup>2</sup>. Such restricted range is also the major threat factor as even a large accidental fire could seriously damage the population. However, the main threat lies in the excavation of the valuable white marble that has already disturbed part of its habitat. Any large scale quarrying at the site could thus eradicate this unique butterfly. In the last Red List of butterflies in Europe (Van Swaay et al., 2010) the Macedonian Grayling was therefore classified as Critically Endangered (Figure 1).

The main scientific aim of our project was to assess the threat status of the species by:

- surveying additional, potentially suitable sites in the wider surrounding of the known population

- map the suitable habitat
- estimate the effects of quarrying on the habitat of the species
- make provisional population size estimates based on mark, release, recapture (MRR) method.

Effective conservation of the Macedonian Grayling is possible only if the public and local people appreciate its importance; therefore one of the main targets of our project was to raise public awareness of the butterfly. To achieve this, an information board was erected at the main site and leaflets were distributed to quarry managers giving information on the species and its the reasons for its conservation priority.



**Figure 1: The Macedonian Grayling is considered Critically Endangered (CR) on <http://www.iucnredlist.org> Date: November 2012**



## 2. Activities

**Effective conservation needs good knowledge, which can only be achieved by research. To save the Macedonian Grayling we conducted an extensive survey of nearby habitat patches as well as study the population size in the main locality.**

The activities on the Macedonian Grayling project in 2012 included:

April

- preparation activities for leaflet and information board
- first visit to the site to check for accommodation during the field season

May

- issuing of the license to work with Macedonian wildlife (issued by Ministry of Environment and physical planning)

June

- finalization of the leaflet and information board layout and texts
- preparation for field surveys (identification of potential suitable sites based on Google Earth images)

July

- field work from 2.7. to 14.7.
- meeting with quarry staff and locals

August

- data collation and analysis

October

- printing of the leaflet and the information board
- installation of the information board at Pletvar (figure 2)
- distribution of leaflets to local community, quarry owners and staff

November

- informing the governmental institutions (meeting with the director of the State Office for Environment)
- writing the report



**Figure 2: The information board was set at the entrance to the Pletvar village just below the habitat of the Macedonian Grayling.**

All work was completed according to plans, except for a meeting with the quarry owners. This proved to be impossible as most owners are foreigners and only rarely visit the Republic of Macedonia. Instead, each of them was contacted separately and advised on how they can contribute to the protection of this very important butterfly. They also received 20 leaflets to distribute to their staff.

Most of the work was done in the field during the first half of July which proved to be the peak of abundance of adults in 2012. As both surveys and MRR method are labor intensive we could not have accomplished all the tasks without valuable help of the following volunteers: Arthur van Dijk (NED), Milan Đurić (SRB), Dirk Maes (BEL), Nikola Micevski (MKD), Miloš Popović (SRB), Bosse van Swaay (NED), Chris van Swaay (NED), and Irma Wynhoff (GER).



**Figure 3: The field team on the Pletvar site (from left to right): Branko Micevski, Milan Đurić, Miloš Popović, Nikola Micevski, Dirk Maes, Arthur van Dijk, Bosse van Swaay, Irma Wynhoff. Not on the photo: Rudi Verovnik and Chris van Swaay.**



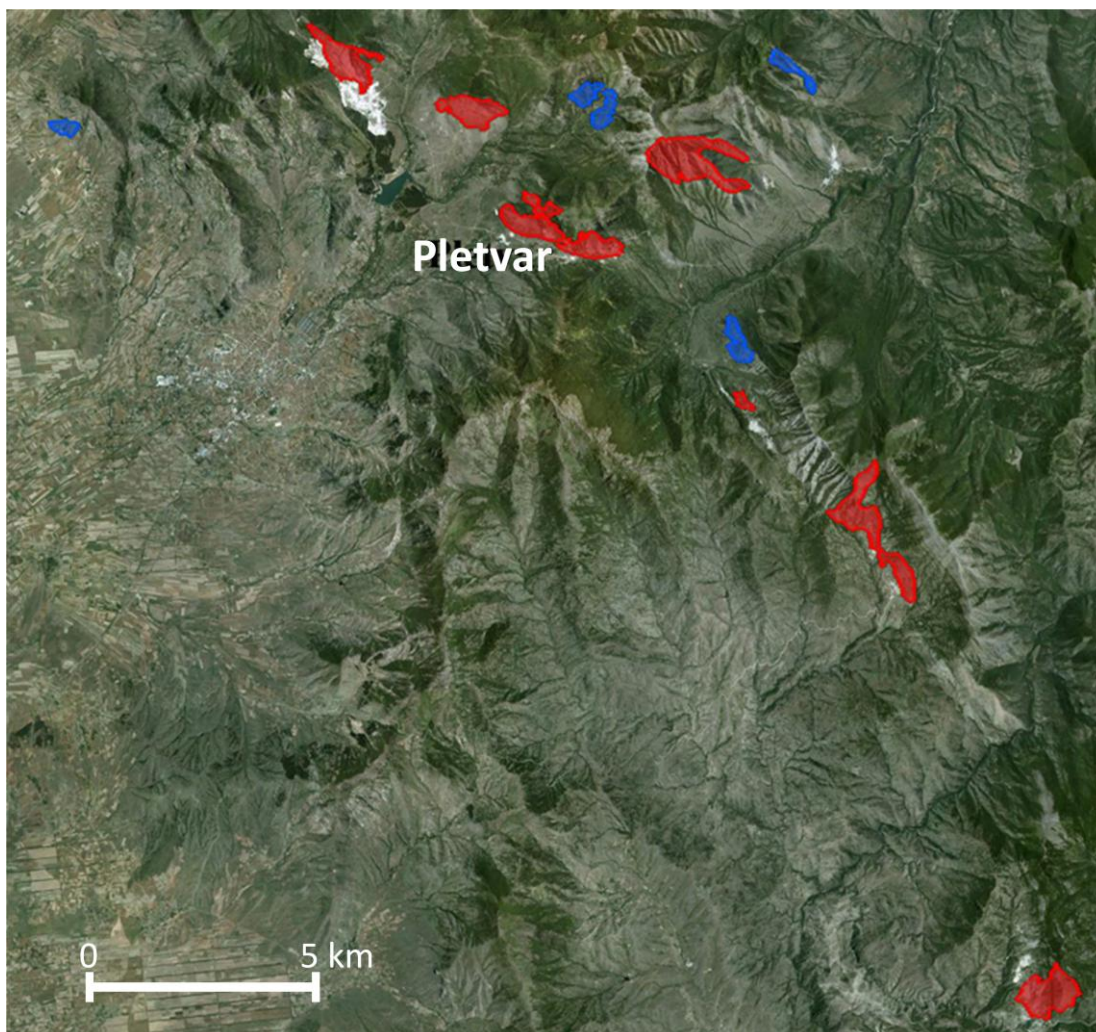
### 3. Results

All potential habitat patches in the surrounding of the known site were identified and visited in the peak of the flight season. Mark-Release-Recapture research gave information on the population size of the main locality.

#### Distribution

Potential habitat patches were identified using Google Earth images. This survey proved to be extremely successful also due to the fact that the habitat of the Macedonian Grayling is easily detectable based on the pale coloration of exposed rocks. Most of the selected sites

also had visible signs of quarrying. In total we visited 11 potential sites in the wider surrounding of the known population on Pletvar. We discovered the Macedonian Grayling at six new sites, thus greatly expanding its known range (Figure 4).



**Figure 4: Distribution of surveyed sites of *Pseudochazara cingovskii* in vicinity of Pletvar in central Macedonia. The sites where the species was present are marked with red, without the species in blue.**

The new sites are presented in detail:

### **1. Southern slopes of Mt. Crvenica, above the large quarry (41°25,162' N; 21°35,946' E)**

This is the most intensively quarried site where remaining habitat is above and to the north of the quarry (Figure 5). Regardless of the quarrying activities around 20 adults of the Macedonian Grayling were seen indicating

a high density of adults at that site. The total size of the remaining habitat is 116 ha. This site is closest to Mt. Čave site which is around 2 km to the east. At this site additional 33 butterfly species were sighted.



***The extent of the potential remaining habitat for the Macedonian Grayling on southern slopes of Mt. Crvenica. Access road to the main quarry cuts through the habitat.***

### **2. Southern slopes of Mt. Čave, above the shooting range (41°24.332' N; 21°37.349' E)**

Mt. Čave is one of the most promising sites for the long term conservation of the Macedonian Grayling, as the police shooting range just below the habitat prohibits any quarrying activities (Figure 6). The site hosts one of the largest densities of adults with approximately

50 specimens recorded during a short visit to the site. The total size of the potential habitat is 96 ha. This site lies between the Mt. Crvenica site and Pletvar site both approximately 2 km away. Here, an additional 26 butterfly species were sighted.



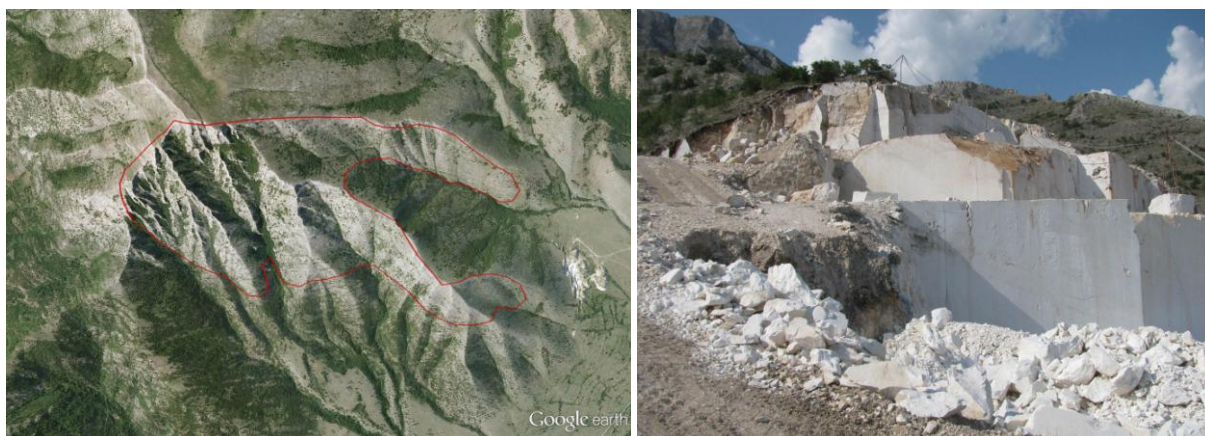
***Figure 6: The extent of the potential habitat for the Macedonian Grayling on southern slopes of Mt. Čave. The southern slopes of the mountain are prime habitat for the species.***



### 3. South-eastern slopes of Mt. Kozjak, above the quarry (41°23.039' N; 21°41.498' E)

The south-eastern slopes of Mt. Kozjak are the most inaccessible of the sites where Macedonian Grayling was discovered and extremely steep (Figure 7). Access is only possible through the newly opened quarry at the lower reaches of the slopes (not yet visible on the Google Earth image). Regardless of the current quarrying activities this site is highly important due to its greater size with around

200 ha of the potential habitat still available. A total of 8 adults were seen, most of them above the quarry, however butterflies were seen also in the quarry sitting on excavated marble rocks. This site is closest to Pletvar approximately 2 km to the southwest. At this site additional 26 butterfly species were sighted.

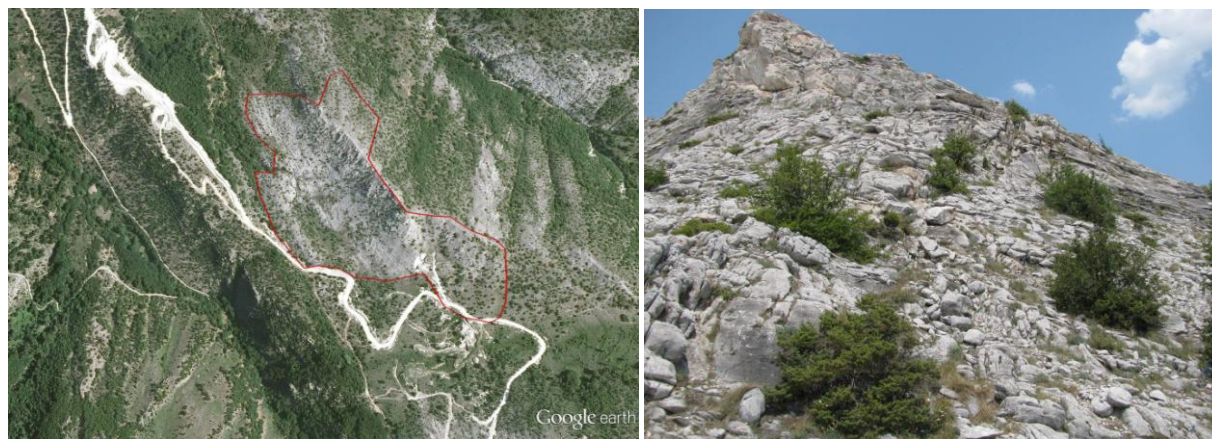


**Figure 7: The extent of the potential habitat for the Macedonian Grayling on south-eastern slopes of Mt. Kozjak. The new quarry destroyed the lower part of the habitat.**

### 4. Belovodica, western slopes of Veprčka Skrka hill south of the village (41°19.667' N; 21°42.486'E)

This is the smallest patch of suitable habitat surveyed (14 ha), however it could possibly be linked to the less accessible steep slopes of the mountain ridge just above the hill to the east, which were not surveyed (Figure 8). Three specimens of the Macedonian Grayling

were seen at the site. This site is closest to Veprčani quarry approximately 3,5 km to the southeast. At this site additional 21 butterfly species were sighted.



**Figure 8: The extent of the potential remaining habitat for the Macedonian Grayling on the western slopes of the Veprčka Skrka hill. The habitat is rockier than in other sites.**



##### **5. Veprčani, area surrounding the quarry north of the village (41°17.652' N; 21°44.853'E)**

This site is actually connected by a potentially suitable habitat on the steep slopes to the Belovodice site 3,5 km away and could constitute the potentially largest contiguous area of the Macedonian Grayling (Figure 9). The quarrying activities are still small scale at the moment, so large tracts of suitable habitat

remain (187 ha). Only two specimens of the Macedonian Grayling were seen during our survey. This was also due to midday heat when adults retreat to shade and are hard to detect. At this site additional 12 butterfly species were sighted.



**Figure 9: The extent of the potential habitat for the Macedonian Grayling at the quarry north of the Veprčani village. Parts of the habitat look ideal and possibly support large densities of adults.**

##### **6. Vitolište, barren slopes of the mountain west of the village (41°10.313' N; 21°47.325' E)**

The site at Vitolište is the most isolated with areal distance to the nearest neighbor at Veprčani exceeding 10 km. There are no quarries within the potential habitat, but there is an active quarry just at the border of the site (Figure 10). The total size of the

potential habitat is 152 ha. Only four specimens of the Macedonian Grayling were seen during the survey. The conditions were extremely hot at the time of the visit, despite early morning. At this site 12 additional butterfly species were recorded.



**Figure 10: The extent of the potential habitat for the Macedonian Grayling at Vitolište village. The site is extremely rugged and parts of the habitat are inaccessible.**

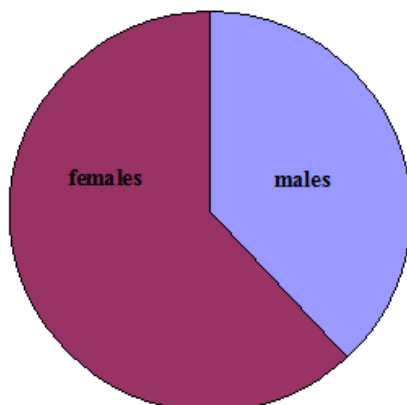


### Population research at Pletvar

We conducted the MRR method in three consecutive days in the western part of the Pletvar site. All specimens were marked with unique codes starting with a letter indicating the person who marked it and a serial number (Figure 11). Sex and the state of the wings of each specimen were noted. All specimens were released alive with no mortalities observed.

A total of 372 specimens were captured during the three days with a sex ratio of 1/1.6 in favor of females (Figure 12). Among these 70 specimens were recaptured on consecutive days.

Based on calculations using the Lincoln Petersen method (Southwood & Henderson 2000) the daily population size was estimated to be 650 adults. When applying the Jolly Seber method (Jolly 1965), the results were comparable with  $676 \pm 199$  adults estimated in the population on the third day of capturing. When one takes into account that the flight period of the species at Pletvar is at least one month long, and that we only covered one third of the Pletvar site, the total population size is probably well over 3000 individuals. A MRR study covering the whole extent of the potential habitat and spanning the whole generation would be required to get a more precise estimate of the population size.



**Figure 12: Sex ratio of the captured specimens of the Macedonian Grayling at Mt. Pletvar.**



**Figure 11: Two marked females of the Macedonian Grayling posing on the same plant at Mt. Pletvar.**


The Pletvar site is also the best studied faunistically, and data from previous visits are available. A total of 61 species of butterflies have been recorded here, most of them during the 2012 survey as well. Among these, several have a status of threatened species at European level (*Phengaris arion* (EN), *Aricia anteros* (NT), *Polyommatus dorylas* (NT), *Pseudophilotes vicrama* (NT), *Chazara briseis* (NT), *Carcharodus flocciferus* (NT)), or are included in the Habitats directive (*Phengaris arion*, *Euphydryas aurinia*). Conserving the habitat of the Macedonian Grayling would thus benefit many other threatened species, and it can be considered as a flagship species for this specific habitat.

## 4. Review of the threat status

The new findings enable us to reassess the threat status of the Macedonian Grayling using the IUCN criteria. The current status of Critically Endangered species (CR) has been derived from the criteria B1ab (iii,v) + B2ab (iii,v), a combination of extremely small extent of occurrence, presence at a single site and continuing decline of the habitat quality and population size. The reasoning can remain the same in the re-evaluation, only the extent of occurrence has changed due to the newly discovered populations. As the extent of occurrence is now larger than 100 km<sup>2</sup> and area of occupancy is over 10 km<sup>2</sup> (actually it is 50 km<sup>2</sup>) the revised status of the Macedonian

Grayling under both criteria B1 and B2 is Endangered (EN).

Although the risk of extinction of the Macedonian Grayling is not as high as it was proposed in the European Red list, the species still remains one of the most threatened butterflies in Europe with an extremely limited distribution and continuing process of habitat degradation due to quarrying. A more elaborate study of the populations and mobility of adults would give us additional important information as would regular monitoring of all known populations.



*We propose that the threat status of the Macedonian Grayling is downgraded to Endangered.*



## 5. Public relations

One of the main objectives of the project was to inform the local community and quarrying companies about the Macedonian Grayling and its endangerment. Most of these activities were undertaken in parallel with the field survey when locals and staff at active quarries were approached. The majority of responses were positive, especially when talking about saving the species and their habitats.

However, none of the persons contacted wished to be actively involved in the process, and the staff members directed us to discuss that with the owners. Unfortunately the printing of the leaflets was not possible before the field season, therefore we could not disseminate the leaflets during the survey.

In October, when the leaflets were available, we approached all quarry owners by phone and sent them the leaflets with an explanatory letter. In order to avoid direct conflict, we tried to get them involved in active conservation of the Macedonian Grayling through controlling the habitats at quarries and reporting any poaching activities that could prove to be illegal. Due to easy access there has been a lot of illegal collecting done

at the Pletvar site and illegal trade with the species is still present at insect fairs across Europe. The owners are willing to inform their staff to report any collecting activities to the Nature protection inspectorate in Prilep and the Macedonian entomological Society (ENTOMAK).

We also held a meeting with the governmental institution involved in nature protection the State Office for Environment. They were informed about our activities and results. The main discussion was focused on actual protection of the Macedonian Grayling, as despite protected status the species is still under threat due to habitat loss and collecting. They agreed that the Macedonian Grayling distribution will be taken into account when issuing further concessions for quarrying in the Prilep region.

We hope that further contact with the quarries will allow us to participate in the restoration of the abandoned quarrying sites, where re-establishing suitable habitat for the Macedonian Grayling could be essential for its long term survival.



*Quarrying is the largest threat to almost all remaining sites of the Macedonian Grayling.*

## 6. Future actions

BCE and the Macedonian Entomological Society (ENTOMAK) will continue to monitor the known Macedonian Grayling populations and widen its search for potential new populations in the central part of Macedonia.

Based on recent surveys a designation of a protected area for the Macedonian Grayling is plausible and both organizations will seek opportunities to encourage the governmental nature protection organizations to take that step.

Raise further funding to study the population structure and mobility of the Macedonian Grayling throughout its known range.

Intensify the communication with the local government, population and quarry owners to achieve best possible in situ protection of the Macedonian Grayling.

Propose the Macedonian Grayling for addition to the Habitats Directive annexes II and IV when Macedonia becomes a candidate Country for joining the European Union.



***Quarrying for marble can destroy the habitat of the Macedonian Grayling. As the habitat requires almost no management to maintain in optimum condition, designating these areas as nature reserve might be enough to protect this butterfly for future generations to enjoy.***



## 7. Conclusions

The Macedonian Grayling is a habitat specialist limited to the marble scree slopes and rocks where it is perfectly camouflaged by its underside color. This effectively limits its distribution and only rarely adults venture outside its habitat for nectaring.

The distribution of the species is very limited and is comprised of seven possibly disjunct habitat patches covering a total of less than 50 km<sup>2</sup>.

The population at the Pletvar site is estimated at over 3000 adults, however a more detailed study would be required to confirm that.

The Macedonian Grayling status can be downgraded from Critically Endangered (CR) to Endangered (EN) due to its larger extent of the distribution. Nevertheless it still remains one of the main conservation priorities among European butterflies.

Main threat to the species is continuing quarrying in five out of the seven populated sites. On the long run restoration of habitats in abandoned quarries could be crucial for the survivor of the species.

Although the local community shows interest and shares concerns about potential extinction of the Macedonian Grayling, they are at present not willing to actively participate in its conservation. Further public awareness actions will be essential to gain their support.



*The Macedonian Grayling is a habitat specialist limited to marble scree slopes and rocks.*

## Literature

Jolly, G. M. (1965). Explicit estimates from capture-recapture data with both death and immigration – Stochastic model. *Biometrika* 52: 225 – 247.

Southwood, T.R.E. & Henderson, P. (2000) *Ecological Methods*, 3rd edn. Blackwell Science, Oxford.

Van Swaay, C., Cuttelod, A., Collins, S., Maes, D., Lopez Munguira, M., Šašić, M., Settele, J., Verovnik, R., Verstrael, T., Warren, M., Wiemers, M. & Wynhoff, I. (2010) *European red List of Butterflies*. Publications Office of the European Union, Luxembourg.