Project EEA Grants / Norway Grants

A study and professional material preparation for *Watsonartcia casta* **and** *Chelis maculosa* **protection between years 2015 – 2016 (Months, Arctiidae, woolly bears).** (**Butterflies Conservation society**)

Mapping and exploration in potential areas of occurrence

A technical and data mapping preparation was held after finding new locations and field work. One of the methods used for search for locations with possible occurrence was a method of filtration from biotope and Natura natural mappings of the Czech Republic in which former known occurrences were marked. Cooperation was established with AOPK CR, for example, occurrence of nutrient plants was found on a website http://portal.nature.cz/publik_syst/ctihtmlpage.php?what=3&nabidka=hlavni.

One of the main planned activities was mapping, monitoring and field study of appropriate locations on **at least 52 mapping areas** in 6 basic and 12 integrated units.

Nevertheless, the final result was 87 mapping areas (overlaps included). *W. casta´*s mapping was done on 81 areas and *CH. maculosa´*s mapping on 41 areas, all together 122 x 2 locations were mapped.

CASTA	Area	Detail		81 areas
Study	21 areas	93	Positive	
Study	64 areas	190	Negative	

MACULOSA	Area	Detail		6 areas
Study	6 areas	9	Positive	
Study	61 areas	253	Negative	

The mapping consisted of visiting 52 mapping areas (with at least one historical location), each area being visited at least twice when one visit focused on detection through light held from May to June, depending on weather and location and the second one depending on caterpilar presence from June to May the following year. If the detection through light and caterpilar was not succesful in one visit (due to climatic conditions etc.), another detection was made. The research in potential areas of occurence was done similarly.

The monitoring and mapping was carried out in following areas (the number of areas listed here being minimal):
Doupovské Mountains, Sokolovsko (mainly military area and its surroundings) - 5 mapping areas
Most, Ústí nad Labem and its surroundings - 9 mapping areas

Jižní Morava (connected to NP Podyjí, M. Krumlov, Chřiby, Pálava) - 13 mapping areas
larger area of **Český Kras** and **Křivoklátsko** - 14 mapping areas
Boletice (mainly military area and its surroundings) - 4 mapping areas
Brdy and Střední Povltaví (military area and surroundings of dams Orlík, Slapy) - 3 mapping areas
Střední Čechy (former military area Milovice, Žehuň surroundings) - 3 mapping areas

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Analytical part and Results

Methods

The basis for the estimation of biotope preferences of both woolly bears species were the data of occurence collected in a field work. For the calculation matters, only the data of presence or absence on particular places were used. Exactly 83 map areas in the Czech Republic were chosen for the mapping and monitoring of both species based on a combination of historical occurence and estimated high level xerothermic or structurally similar biotopes. Some map areas were the same for both species. At least two locations were tested and controlled in each of the map areas. All together, 96 locations (245 chosen places) were field controlled for the *Chelis maculosa* specie and 176 locations (284 chosen places) for the *Watsonarctia casta* specie.

A buffer was established for the analysis itself and all biotopes, their representation and are, were identified there. The buffer was established to be a circle of 50m radius from the field-work place. It was a combination of three factors:

1. The most probable flight zone of the males.
2. Possibility of ground transportation for the females in 2 hour time during the main activity period.
3. Possibility of caterpillar motion and transport.

As potential variables explanation served on one hand a relative representation of various biotopes on particular spots (**61 biotopes for *Watsonarctia casta* and 58 biotopes for *Chelis maculosa***) and on the other hand a number of biotopes on every spot plus altitude. In a following analysis, other variables were added, namely presence or absence of nine species of larvae nutrient plants (*Galium album, Galium aparine, Galium boreale, Galium glaucum, Galium odoratum, Galium palustre*s.l., *Galium rotundifolium, Galium sylvaticum, Galium verum*) and nine species of diagnostic (dominant) plants on the location (*Cornus mas, Crataegus* sp.*, Cytisusnigricans, Juniperus communis, Primula* sp.*, Rosa gallica, Sedum reflexum, Sorbusaria* s. l.*, Tilia cordata*).

Following methods were used for the calculations: Canonic correspondence analysis (CCA) in a Canoco5 program and Canonic redundant analysis (RDA). The data wee analysed for each specie individually. Monte Carlo test with 999 permutations was used for the testing.

Results:

Chelis maculosa specie was found only on five areas (four locations) out of 245 assumed areas. *Watsonarctia casta* was found in more areas, to be precise on 93 areas out of 284 assumed ones.

The occurrence of *Chelis maculosa* was positively correlated with a T3.3A biotope mosaic **(Sub-Pannoniosteppic grasslands, 6240*), K3 (Tallmesic and xeric scrub) and T6.1A (Acidophilous vegetion of vernaltherophytes and suculents, 8230)**, negatively with X4 (permanent agricultural cultures), none of the host or dominant plant species had a significant influence. See Tab. 1, Pic. 1 and Pic.1a.

Watsonarctia casta was found on a larger scale of biotopes, namely from grass **T8.1A (Dry lowland and colline heaths, 5130**), to all **T3 (Dry grasslands)** and to **T3.5B (Acidophilous dry grasslands, 6210).** The specie occurrence was negatively influenced by by following biotopes: S1.2 (Chasmophytic vegetation of siliceous cliffs and boulder screans) and „-1" (urban areas or similar anthropogenic locations). See Tab. 2, Pic. 2 and Pic.2a.

Other variables had no influence. Only after integration of 18 plant species (9 species of host and 9 species of diagnostic ones) the result became more precise. Apparently, this specie **prefers areas with a higher number of various biotopes mosaic and areas with stone crop (*Sedum* spp.) and avoids bushy areas (woody plants *Sorbus* spp., *Rosa* spp., *Juniperus* sp.)** Other variables had no influence. (See Tab. 3, Pc. 3.)

The occurence of both species is conditioned by quite strict biotope requirements. *Chelis maculosa* needs a mosaic of various biotopes which are not easily sustainable, as a low number of positive findings of this butterfly shows. As the results suggest, there are only a few tolerated areas that enable the specie to survive. The specie needs dry grass to survive, namely T3.3A = Sub-Pannoniosteppic grasslands, 6240*. However, the number of such areas is very limited in the Czech Republic (290 ha), furthermore, these areas are highly fragmentised.

For the *Watsonarctia casta* specie is especially significant negative succession influence. The lack of fires influences its occurrence (many occurrence locations used to be near railway trails and in military areas). Current economy and landscape management suggest that further

prosperity of this specie is not possible. The prosperity is supposed to be not on the level of metapopulations, but on the level of surviving. With further fragmentation of adequate biotopes (especially with the *Chelis maculosa* specie), there is no long-term perspective for this butterfly fauna in our landscape.

Strict management restrictions are needed to protect the landscape, the **most significant ones being a support to already existing thermophilic grasslands and a guarantee of enormous growth of T3 (Dry grasslands) in hundreds of percent.** E.g. a grant program from OPŽP, biodiversity area of support can be used.

The study has reached almost the half of historically monitored areas of occurrence, as far as the number of map areas is concerned. The record of positive occurrences is, nevertheless, on 10% of former area which predicts large changes in the landscape and vanishing of appropriate biotopes.

The project has fulfilled all the established parameters.

Many thanks to the donors and mediators.

Abbreviations used in the graphs (system of biotope marking by Natura 2000):

Kód biotopu / Biotope code	Habitat code / prioritní*	Český název / Czech name	Anglický název / English name
K3		vysoké mezofilní a xerofilní křoviny	Tallmesic and xeric scrub
K4.A	40A0*	nízké xerofilní křoviny, primární porosty na skalách	Low Fric scrub, primary vegetation on rock
L4.B	9180*	suťové lesy	Ravine forest
S1.2	8220	štěrbinová vegetace silikátových skal a drolin	Chasmophytic vegetation of siliceous cliffs and boulder screans
T6.1B	8230	acidofilní vegetace efemér a sukulentů	Acidophilous vegetation of vernaltherophytes and succulents
T3		suché trávníky	Dry grasslands
T3.3A	6240*	subpanonské stepní trávníky	Sub-Pannonian steppe grasslands
T3.3B	6250*	Panonské sprašové stepní trávníky	Pannonian loess steppe grasslands
T3.5B	6210	acidofilní suché trávníky	Acidophilous dry grasslands
T5.5		acidofilní trávníky mělkých půd	Acidophilous grasslands on shallow soils
T8.1A	5130	suchá vřesoviště nížin a pahorkatin (jalovcová)	Dry lowland and colline heaths (with *Juniperus* sp.)
T8.1B	4030	suchá vřesoviště nížin a pahorkatin (bez jalovce)	Dry lowland and colline heaths (only *Juniperus* sp.)
X2		intenzivní obhospodařovaná pole	Intensively managed fields
X4		trvalé zemědělské kultury	Permanent agricultural crops

Pic. 1. The influence of the biotope variables on the presence (pres) or the absence (abs) of *Chelis maculosa* in the Czech Republic - based on the canonical redundant analysis (RDA).
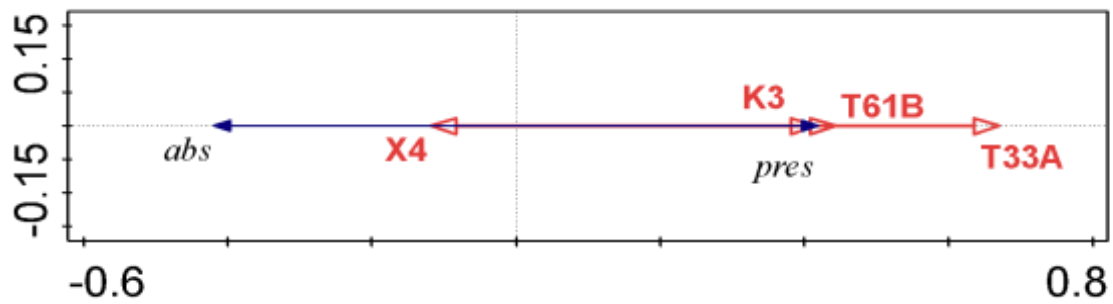
Pic. 1a. The influence of the biotope variables on the presence (pres) or the absence (abs) of *Chelis maculosa* in the Czech Republic - based on the conical correspond analysis (CCA).
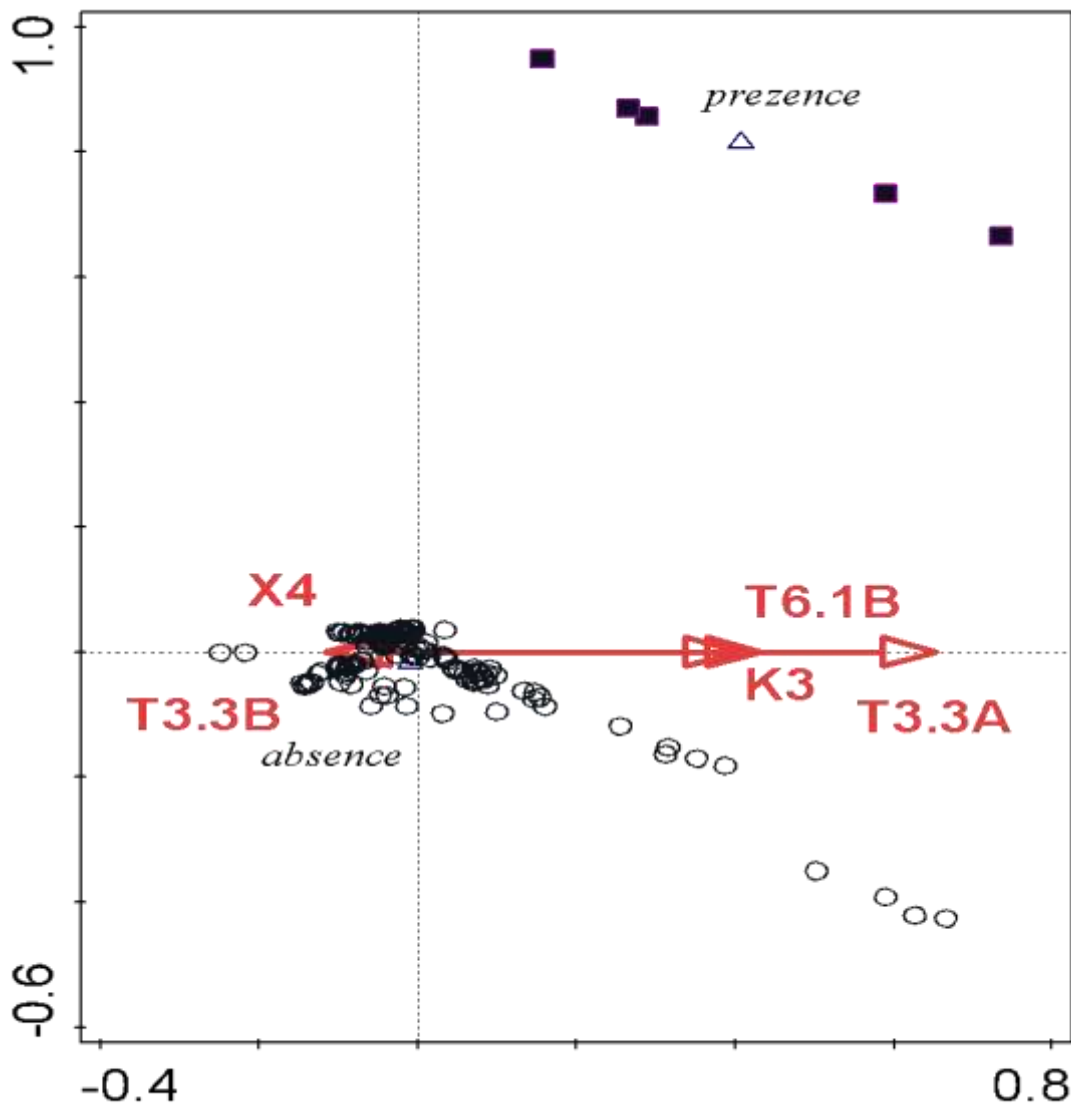
Pic. 2. The influence of the biotope variables on the presence (pres) or the absence (abs) of *Watsonarctia casta* in the Czech Republic - based on the canonical redundant analysis (RDA).
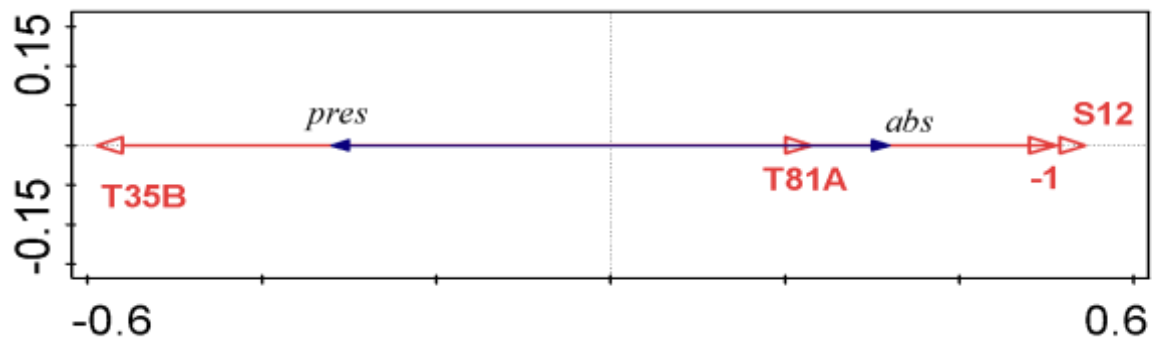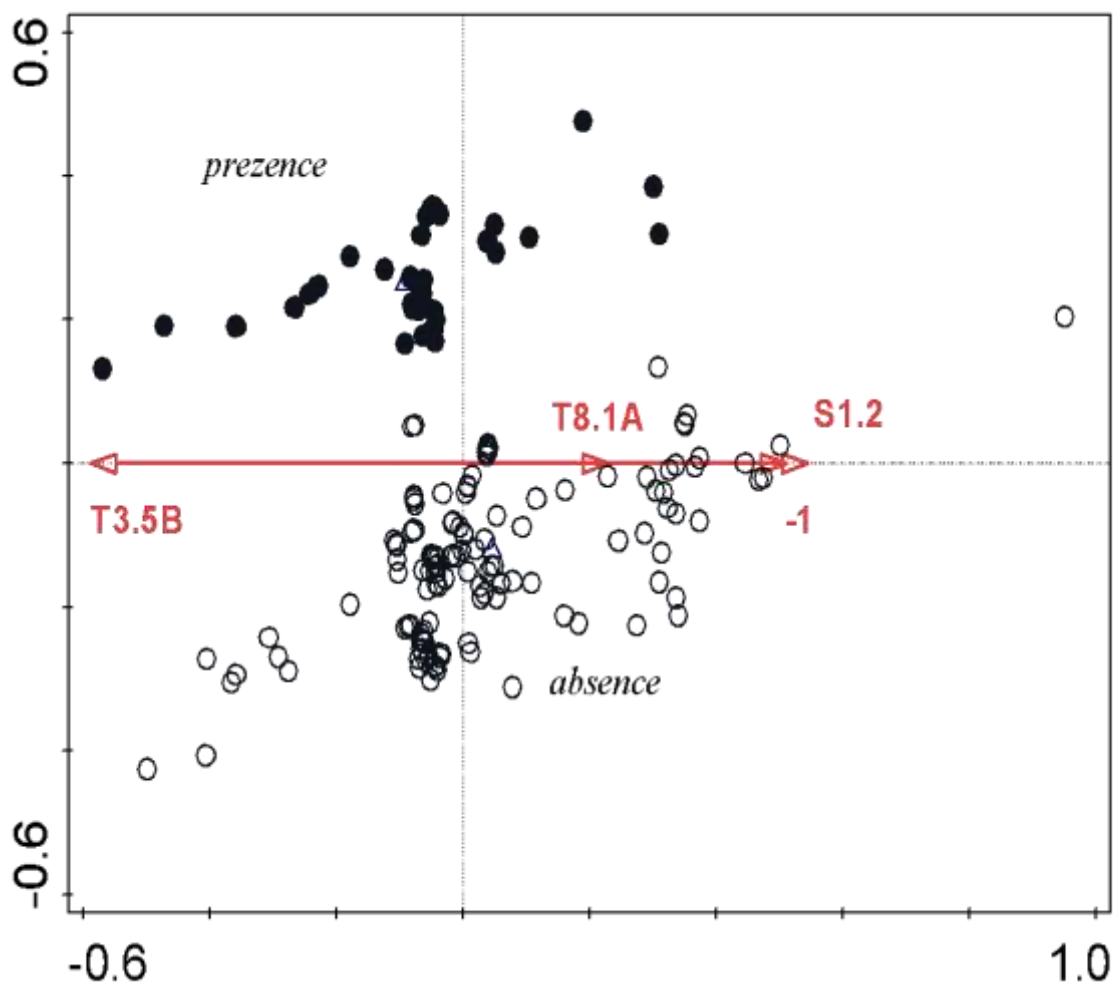

Pic. 2a. The influence of the biotope variables on the presence (pres) or the absence (abs) of *Watsonarctia casta* in the Czech Republic - based on the conical correspond analysis (CCA).

Pic. 3. The influence of the biotope variables and the dominant and host plants on the presence (pres) or the absence (abs) *Watsonarctia casta* in the Czech Republic - based on the conical correspond analysis (CCA).