New data on hoverflies from the Velebit mountains (Croatia)

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Introduction
The Velebit is the largest mountain range in Croatia stretching 145 km along the Adriatic Coast from Senj to the source of the Zrmanja river northwest of Knin. The Velebit consists out of a calcite mountain range (karst type) with several peaks above 1500 m up to Vaganski vrh (1758 m). In the Velebit there are two national parks: Sjeverni Velevit in the North and Paklenica in the South.
Main habitat types from sea level upwards are Mediterranean pine forest, oak-hornbeam and common hornbeam forest, (mountain) beach and spruce forest, sub-alpine beech, spruce and black pine forest (*Pinus nigra*), alternated with (sub)alpine grasslands, and on the highest hilltops also mountain pine krummholz (*Pinus mugo*).


NP Paklenica

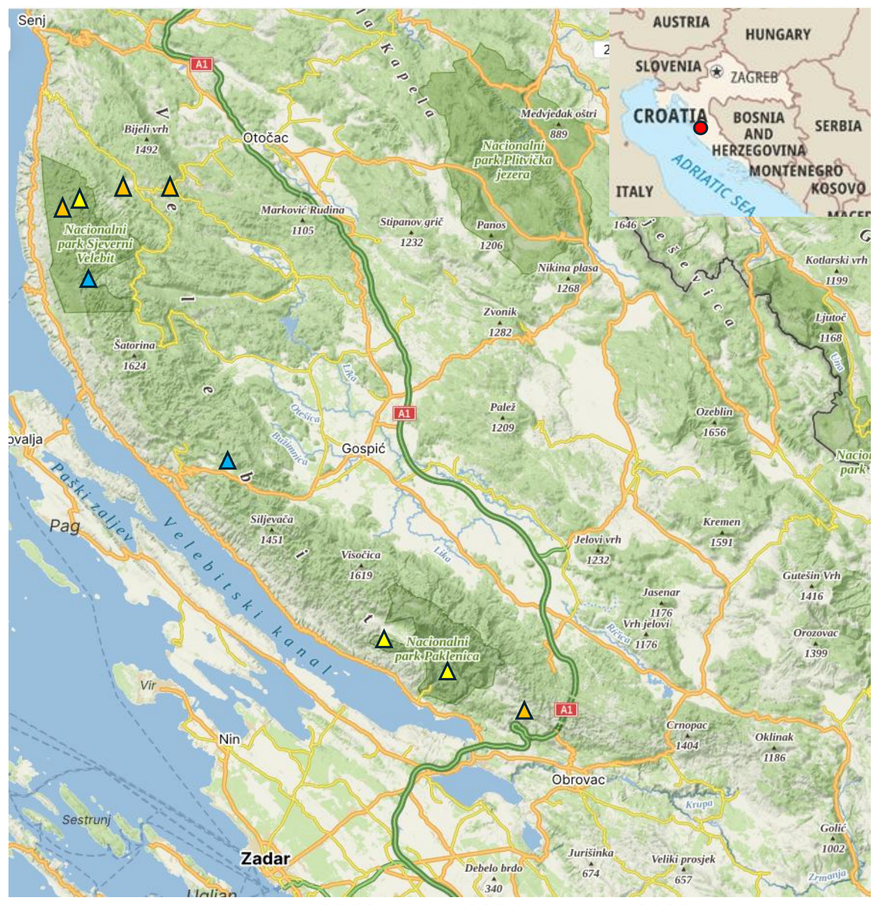

Meadow in oak-hornbeam forest


Mountain beech forest


NP Sjeverni Velevit


Subalpine meadows


Pinus mugo near mountain top



Main collecting sites: 2022 (blue), 2024 (yellow), 2025 (orange)

Despite its natural beauty and accessibility throughout both National Parks, the hoverfly fauna of the Velebit is poorly investigated. The first author visited the Velebit in the second half of June in 2024 and 2025 and the second author in early August 2022. In total, we found 98 species of which 18 species are previously unrecorded taxa for Croatia according to the European species country list from 2023 (Reverté *et al.* 2023 https://doi.org/10.1111/icad.12680 - supporting information list 2).

Below the species list form the Velebit with **bold** indicated species previously unrecorded taxa for Croatia.
For each species its status on the European Red List of hoverflies is indicated:
(LC = Least concern, NT = Near Threatened, VU = vulnerable, EN = endangered)
Additionally is indicated in which habitat types each species was encountered:
1 (Mediterranean pine), 2 (oak-hawthorn forest), 3 (beach and spruce forest), 4 (sub-alpine beech, spruce and pine forest and meadows), 5 (*Pinus mugro* dwarf pines at mountain tops)

Brachypalpus laphriformis LC 4
Callicera aurata VU 3
Ceriana conopsoides LC 2
Cheilosia aerea LC 3
Cheilosia albitarsis LC 4
Cheilosia balkana EN 4
Cheilosia barbata LC 4
Cheilosia bracusi LC 4
Cheilosia canicularis LC 3,4
Cheilosia carbonaria LC 4
Cheilosia faucis EN 4
Cheilosia gagatea EN 4
Cheilosia gigantea LC 4
Cheilosia himantopa LC4
Cheilosia impressa LC 3,4
Cheilosia personata LC 4
Cheilosia proxima LC 4
Cheilosia rhynchops LC 4
Cheilosia ruffipes LC 2,3,4
Cheilosia scutellata LC 2
Cheilosia variabilis LC 3
Cheilosia vernalis LC 4
Cheilosia vulpina LC 4
Chrysotoxum elegans NT 3,4
Chrysotoxum fasciolatum LC 3
Chrysotoxum festivum LC 4
Chrysotoxum gracile EN 4
Chrysotoxum intermedium LC 2
Chrysotoxum lessonae LC 3,4
Chrysotoxum vernale LC 4
Dasysyrphus albostriatus LC 3
Dasysyrphus friuliensis LC 4
Dasysyrphus pinastri LC 4
Epistrophe grossulariae LC 3
Episyrphus balteatus LC 2,3
Eristalinus taeniops LC 1
Eristalis arbustorum LC4
Eristalis nemorum LC 4
Eristalis pertinax LC 3,4
Eristalis similis LC 3,4
Eristalis tenax LC 3,4
Eumerus basalis LC 2
Eumerus grandis LC 4
Eumerus tarsalis EN 2
Eumerus tricolor LC 4
Eumerus uncipes LC 2
Eupeodes corollae LC 2,3,4
Eupeodes flaviceps LC 5
Eupeodes luniger LC 4
Ferdinandea cuprea LC 3
Helophilus pendulus LC 3,4
Helophilus trivittatus LC 3
Lapposyrphus lapponicus LC 3,4
Leucozona lucorum LC 4,5
Melanostoma mellinum LC 2,4
Meliscaeva auricollis LC 3
Merodon aberrans LC 5
Merodon aureus LC 4
Merodon avidus LC 2
Merodon equestris LC 3,4
Merodon erivanicus LC 2
Merodon moenium LC 2,4
Merodon rufus LC 2,3,4
Merodon virgatus VU 3,4
Myathropa florea LC 3,4
Neocnemodon latitarsis LC 4
Paragus bicolor LC 1,2,3
Paragus haemorrhous LC 2,3,5
Paragus majoranae EN 2
Paragus pecchiolii LC 2,5
Paragus tibialis LC 1,3
Parasyrphus relictus LC 4
Phillipes stackelbergi LC 2,4
Pipiza fasciata LC 3
Pipiza noctiluca LC 2,4
Pipiza quadrimaculata LC 4
Pipizella annulata NT 5
Pipizella divicoi LC 5
Pipizella viduata LC 4,5
Platycheirus albimanus LC 2
Platycheirus fasciculatus LC 5
Scaeva selenitica LC 3,4
Sphaerophoria scripta LC 2,3,4
Spilomyia graciosa EN 2*
Spilomyia manicata LC 3,4
Spilomyia saltuum LC 3
Syritta pipiens LC 1,2,3
Syrphus ribesii LC 3,4
Syrphus torvus LC 4
Syrphus vitripennis LC 3,4
Trichopsomyia joratensis LC 4
Volucella inflata LC 3
Volucella inanis LC 3
Volucella pellucens LC 3,4
Volucella zonaria LC 2,3,4
Xanthandrus comtus LC 3
Xylota segnis LC 3,4
Xylota sylvarum LC 3

*recorded in Croatia in 2021 by iNaturalist

on observado.org and iNaturalist also:
Caliprobola speciosa LC 4
Didea faciata LC 4
Eupeodes latifasciatus LC 3
Fagisyrphus cincta LC 3
Ferdinandea aurea LC 1
Milesia semiluctifera LC 3
Scaeva pyrastri LC 4
Volucella bombylans LC 3

In taxonomic revisions (not complete) also:
Merodon chalybeatus
Merodon clavipes
Merodon serrulatus


Callicera aurata male


Chrysotoxum gracile female


Spilomyia saltuum female


Spilomyia graciosa female


Leucozona lucorum male

Most sampling effort was done at high altitudes (>1500 m) in the Sjeverni Velevit park in the second half of June when this area is full of flowering plants and hoverlfy species richness will be at its peak. In total 59 hoverfly species were encountered in this area, however typical spring early species and summer-autumn species will not have been around at the time. At the other altitudes and vegetation types, the sampling effort was lower and/or may not have been at the seasonal peak of the hoverfly species richness. Besides incidental collection, we performed about 10 sampling efforts of a few hours up to half a day.
It is obvious that we have observed only a part of the total hoverfly species in the Velebit. The Croatian hoverfly fauna currently counts 310 species (Reverté *et al.* 2023 + our results) but is likely to be counted up to more than 400 species.
Still much work has to be done to complete the species list for the Velebit. If you are interested to participate in this or already have data on hoverflies from the Velebit, please contact to the first author.

Seven of the encountered hoverfly species are listed on the European Red List of hoverflies as endangered. This emphases the importance of the Velebit for protection threatened hoverfly species. Observed threats for hoverflies are locally intensive grazing of (sub)alpine meadows by horses and also increasing recreation activities which damages the vegetation. Moreover climatological changes by global warming, such as dry and hot summers, is expected to effect the hoverfly fauna negatively. As a result of this, isolated mountain species such as *Cheilosia faucis* or more northern distributed species such as *Leucozona lucorum* may disappear over time from The Velebit.