



Hutovo blato

Močvarni kompleks Hutovo blato predstavlja značajno stanište za 43 vrste vilinih konjica i jedno je od rijetkih, još uvijek značajnim djelom očuvanih prirodnih močvarnih područja u Bosni i Hercegovini.

Vilini konjici spadaju među najstarije poznate insekte čiji su preci živjeli na Zemlji prije više od 300 miliona godina.

U prošlosti su vilini konjici dostizali nevjerovatne dimenzije, sa rasponom krila od preko 70 cm to su bili najveći insekti koji su ikada postojali.

Nakon stotina miliona godina danas su zahvaljujući čovjeku brojne vrste ovih fascinantnih i jedinstvenih stvorenja suočene sa nestankom, te je potrebno hitno djelovati na njihovu zaštitu.

Kao predatori u vrhu lanca ishrane ovi insekti imaju važnu ekološku ulogu u staništima u kojima žive. Pored toga oni su i odlični indikatori stanja i promjena u staništima koji nam omogućavaju da praćenjem brojnosti populacija na vrijeme primijetimo i reagujemo na negativne promjene u životnoj sredini, te time zaštitimo ne samo ove insekte nego i mnoge druge organizme sa kojima dijele stanište.



Coenagrion ornatum Gyll.



Calopteryx maculata L.



Libellula depressa L.

• *Cordulegaster heros* je balkanska vrsta koju možemo naći jedino u primarnim staništima, čistim prirodnim potocima i manjim rijekama, najčešće u šumovitim predjelima. Ova vrsta je zaštićena Amnekom II i IV Direktivom o staništima EU. Glavni uzroci ugroženosti su uništenje šuma i hidrotehnički zahvati na izvontima, kao i klimatske promjene.

• *Calopteryx maculata* je mediteranska vrsta koja naseljava izvorišne dijelove potoka i rijeka u južnoj Hercegovini. Ugrožena je prije svega uništavanjem staništa. U Bosni i Hercegovini i Hrvatskoj nalazi se sjevero-zapadna granica rasprostranjenja ove vrste.

• *Coenagrion ornatum* naseljava biste tekudice sa bogatom razvijenom vodenom vegetacijom. Populacije ove vrste koja je zaštićena Amnekom II Direktivom o staništima EU bilježe u Evropi izražen pad brojnosti. Glavni razlozi ugroženosti su uništenje i загаđenje staništa.



Reka i potoci sa bogatom vodenom vegetacijom vilinih konjica i bogato stanište vrste *Coenagrion ornatum* u Delatinskom polju



Isušavanje staništa u Crvenom polju



Uklanjanje prirodnih staništa u Travniku



Nazjarna paljenja travne u Žrnovnici

Zbog čega su vilini konjici ugroženi? Najznačajnije prijetnje opstanaku vilinih konjica su: gubitak staništa usljed uništavanja ili promjene u načinu upravljanja zemljištem; isušivanje staništa i izazivanje neprirodnih fluktuacija nivoa vode; nedostatak pravilnog upravljanja vodenim površinama što dovodi do uništenja obilnog područja, prirodne strukture dna i vegetacije; загаđenje; unošenje alohtonih organizama, kao i klimatske promjene.

S obzirom da prvu fazu životnog ciklusa provode u vodenj sredini vilini konjici su osjetljivi na загаđenje vode, isušivanje i degradaciju vodenih staništa. S druge strane, odraslim insektima potrebna su različita kopnena staništa i vegetacija u fazi sazrijevanja, lova i parenja, te su ovisni o riječnim koridorima, livadama i šumama.

U mnogim kraškim poljima u BiH nalaze se značajna staništa koja omogućavaju razvoj raznovrsne faune vilinih konjica. Nova istraživanja su pokazala da ova specifična staništa imaju veliki značaj za brojne vrste, uključujući i više ugroženih i rijetkih vrsta. Nažalost, i pored izuzetno bogatog biodiverziteta i visokog ekološkog značaja ova unikatna staništa još uvijek su nedovoljno istražena i zaštićena.



Libellula depressa L.



Reka i potoci sa bogatom vodenom vegetacijom vilinih konjica i bogato stanište vrste *Coenagrion ornatum* u Delatinskom polju

Ovaj poster je stanjaren iz okviru projekta „Research and Protection of Threatened Dragonfly Species and Habitats in the Mediterranean Region of Bosnia and Herzegovina“ koji je finansiran od strane Rufford Foundation. <http://www.rufford.org/projects/bosnia-herzegovina> (uključujući i email: donor@rufford.org)

Libellula tetraphylla jedina je vrsta ovog roda u svijetu i jedna od najvećih vrsta vilinih konjica kod nas. U dolini rijeke Neretve javlja se posebna tamna forma ove vrste koja nije prisutna nigdje drugo u Evropi. Hutovo blato predstavlja jedino poznato stanište ove vrste u Bosni i Hercegovini.

Hidrološki projekti koji narušavaju prirodni vodni režim predstavljaju najveću opasnost opstanaku ove vrste u BiH. Kao posljedica destrukcije staništa vrsta je izbrisana na Crvenom listu vilinih konjica Evrope među ugrožene (ranjive) vrste.





INTRODUCTION

Karst poljes, large depressions sharply bordered by steep slopes, are specific geological formations and one of the most outstanding examples of karst landscapes in the world. Although karst areas are generally known as dry places, many poljes in the Dinaric karst are periodical or permanent wetlands of international importance with a great diversity of freshwater habitats. More than 130 poljes exist in the Dinaric Alps, most of them located in Bosnia and Herzegovina and covering an area of approx. 1,350 km².



Figure 2. New plans that include complete regulation of water courses in Dubransko polje threat to completely destroy the habitat of *Coenonympha pamphilus*.

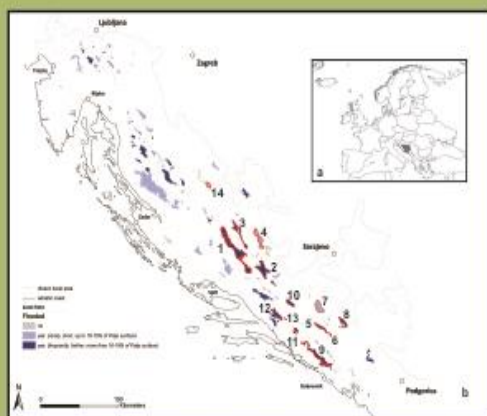


Figure 1. a) Geographical position of Bosnia and Herzegovina in Europe and b) karst poles of the Dinaric region (source: EuroNatur Foundation). Surveyed poles (Tab. 1) are highlighted with red colour.

MATERIALS AND METHODS

Special focus of this research were the species of European concern *Coenagrion ornatum*, *Lindenia tetraphylla* and *Cordulegaster heros*.

Table 2. The checklist of dragonfly species recorded in karst potholes of Bosnia and Herzegovina

[illegible]

Ljvansko polje is the largest polje (458 km²) in the Dinaric Alps and the largest periodically flooded karst polje in the world. Unique Karst peatland, largest in the Balkans, is located here. The International Dragonfly Fund supported the study of dragonfly species and habitats in Ljvansko polje in 2011. To date 42 species are recorded in the polje. Due to its large size, high variety of habitats and problems with mine fields from recent war parts of the polje still remained insufficiently researched, especially the alluvial forests and the peatland area in the northern part.

Numerous activities that can significantly affect or completely destroy freshwater habitats in the pojes are conducted or planned for the future. Water management already seriously affected freshwater habitats in some of the pojes. The natural flooding in several pojes still occurs and the floodplain are largely preserved, but plans for water extraction for energy production in these pojes are in progress.

Although in the neighbouring countries, Croatia and Slovenia, the poljes are included in the Natura 2000 network, in Bosnia and Herzegovina, the lack of information is the most significant gap that limits conservation planning and protection of dragonfly species and freshwater habitats and the creation of an efficient protected area network.

Karst watercourses are considered to be critically threatened habitats. The main threats are represented by water flow regulations, especially for agriculture practices and energy production, dam and reservoir building, climate change and pollution. The "Upper horizons" project that is in progress is a serious threat for dragonfly habitats in several poles. The Project includes complete regulation of water courses in these poles.



Figure 4. During winter large parts of Ljvarsko polje are flooded

Table 1. Karst policies selected for the study

	Karst polje	Number of recorded species	Species of European concern *	Rare and / or potentially threatened species in the country **
1	Livansko polje	42	<i>C. ornatum</i>	
2	Duvanjsko polje	28	<i>C. ornatum</i>	
3	Glamočko polje	29	<i>C. ornatum</i>	
4	Kupreško polje	25	<i>C. ornatum</i>	
5	Dabarsko polje	30	<i>C. ornatum</i>	<i>C. microstigma</i>
6	Fašnačko polje	20	<i>C. ornatum</i>	
7	Nevesinjsko polje	22	<i>C. ornatum</i>	
8	Galacko polje	25		
9	Popovo polje	27	<i>L. tetraphylla</i> , <i>C. heros</i>	<i>C. tenellum</i> , <i>C. microstigma</i>
10	Mostarsko blato	27	<i>C. ornatum</i> , <i>C. heros</i>	<i>E. najas</i> , <i>C. microstigma</i>
11	Hutovo blato	43	<i>C. ornatum</i> , <i>L. tetraphylla</i>	<i>C. tenellum</i> , <i>G. schneideri</i> , <i>S. nigra</i>
12	Ljubuško polje	31	<i>C. ornatum</i> , <i>C. heros</i>	<i>C. tenellum</i> , <i>C. microstigma</i> , <i>S. nigra</i>
13	Studenacko polje	22	<i>C. ornatum</i> , <i>C. heros</i>	<i>C. microstigma</i> , <i>S. nigra</i>
14	Petrovačko polje	15	<i>C. ornatum</i>	

** Red List does not exist in the country, the present data are based on the preliminary list of potentially threatened species.

RESULTS & DISCUSSION

In Bosnia and Herzegovina and Croatia *C. microstigma* is at the border of its distribution. Springs and streams in the poljes were found to be important habitats for this species as 60% of all localities in the country are located in the poljes. In Bosnia and Herzegovina *Lindenia tetraphylla* was only recorded in the poljes.

CONCLUSION

Karst poljes are unique ecosystems of priority relevance in nature conservation within the context of the Mediterranean region. The poljes require implementation of adequate conservation strategies, management plans and monitoring for the protection of its dragonfly fauna and its overall biodiversity.

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Distribution and threats to the populations of *Caliaeschna microstigma* (Schneider, 1845) at the north-western edge of its range

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Introduction

•*Caliaeschna microstigma* occurs only in the **Mediterranean region** of the Europe where it inhabits springs, fast flowing streams and small rivers that are often shaded.



Distribution of *C. microstigma* in Europe

- The males can be seen patrolling above the water surface usually in the afternoon.
- The females lay their eggs in the moss, thus the larvae spend their life among the moss, leaf litter, submerged tree roots and in lack of these more preferable substrates, sometimes can be found under the rocks in the water.



C. microstigma, male



C. microstigma, larvae



C. microstigma habitat

- Mediterranean Basin – one of the 34 biodiversity hotspots in the world – its karst streams and rivers are rare and important ‘habitat islands’ in a largely dry waterless karst landscape but yet very threatened area – by climate change, water management activities, water pollutions, reservoir and dam buildings, introduction of invasive alien species
- Threatened dragonfly species and many important freshwater habitats are not protected and management plans don’t exist – very likely that the conservation status of many dragonfly species could significantly deteriorate in the near future

The literature data considering the *C. microstigma* distribution and ecology is still quite scarce and the conservation measures do not exist, thus

The goals of this research are:

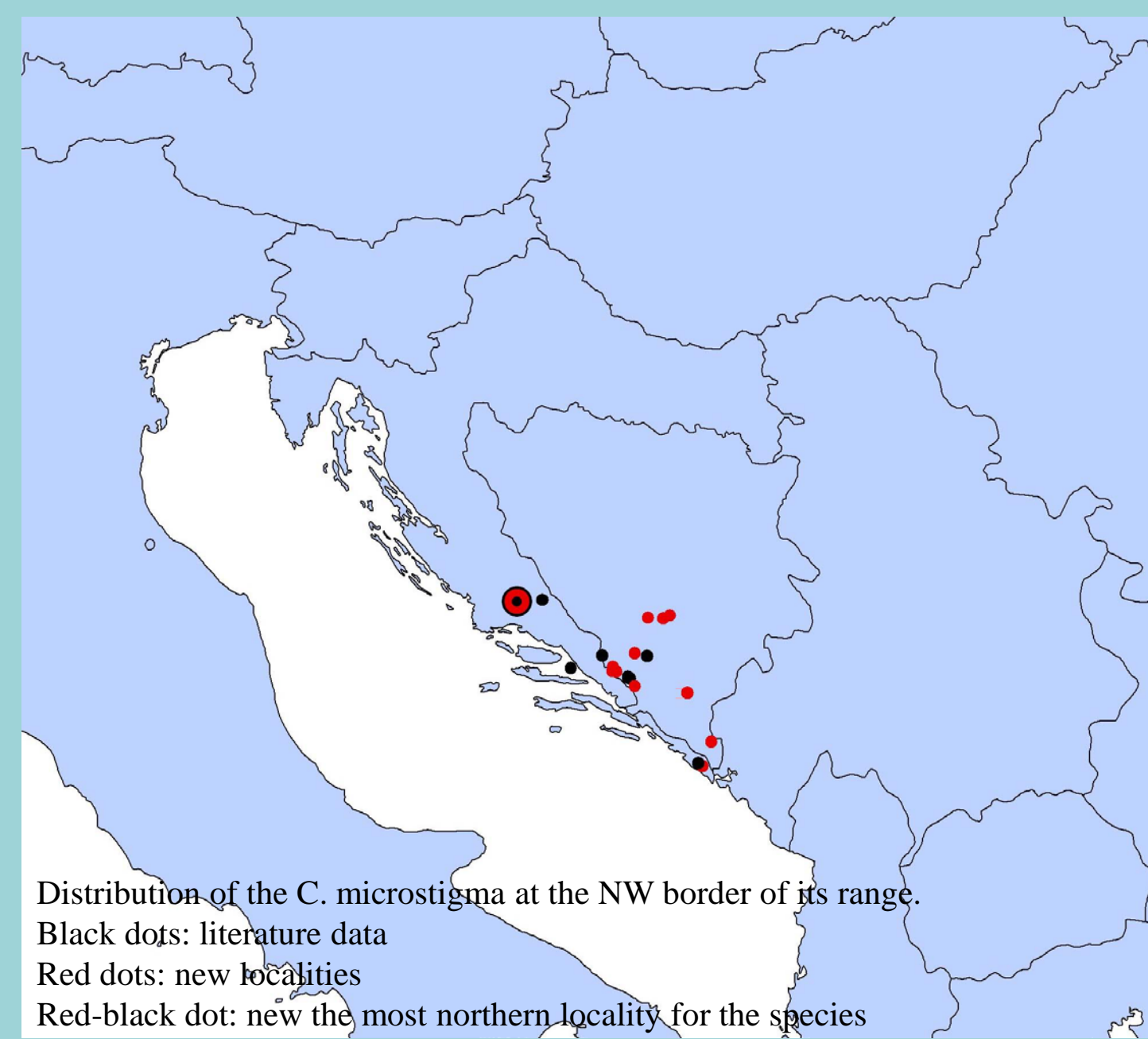
- ❖To give an overview of the distribution and status *C. microstigma* at the edge of its range in the North-West range of its distribution in Croatia and Bosnia and Herzegovina
- ❖To identify the gaps in the protection and geographic areas and habitats which need to be conserved.
- ❖To highlight the major threats to these habitats and propose conservation measures to mitigate their impact.
- The existing and new distribution data will be used for the selection of key conservation areas.

Materials and methods:

- Study area:** small partially shaded rivers and streams in southern Dalmatia (Croatia) and Herzegovina (Bosnia and Herzegovina)
- Sampling:** larvae, imagoes and exuviae
- Inspection of the literature data:** 3 localities in Croatia, 6 in B&H

Results and discussion:

- 12 new** localities for the species were recorded – **3 in Croatia** and **9 in B&H** – **Vrba River in Croatia: new the most northern locality** - only adults were registered – revisitation needed to confirm the stability of the population since the larvae were not found



Distribution of the *C. microstigma* at the NW border of its range.
Black dots: literature data
Red dots: new localities
Red-black dot: new the most northern locality for the species

- habitats:** typical – small partially shaded rivers and streams
- partially channelized but richly vegetated streams present in B&H seemed to be suitable habitats for the larval development - larvae were found in the fast flowing parts of the streams under the rocks or among the dead wood parts, leaf litter, moss, like in other fast flowing inspected habitats, while the exuviae were collected from the water vegetation along the channelized part of the stream with the much slower flowing water

- the species has great dispersal abilities- its absence from the more N localities probably is not caused by its colonisation inability but is due to the climate factors and disadvantages of the habitats for the larval development



Unotypical habitat of the *C. microstigma* recorded in B&H

- observations considering the flight period:** literature data – starts in May – until end of the August; despite the colder and more humid year than the average is, emerging adults were registered already in the second half of the April



C. microstigma, exuvia

Conservation status and threats:

- the European and Mediterranean Red Lists: **NT**-the species has decreasing trend in Europe; it could significantly decline in near future – climate change, water management activities and water pollutions
- Croatia: Red list: **CR** – due to the northern border of distribution; its habitats are very threatened (power stations, dam buildings, pollution, water flow regulations)
- B&H: still no Red list – List of the potentially threatened dragonfly species – suggested status: **VU** – same threats as in Croatia



Polluted potential habitat for the species *C. microstigma*

Future activities will include revisitation of the already existin localities to confirm the stability of the populations and research of the new suitable localities

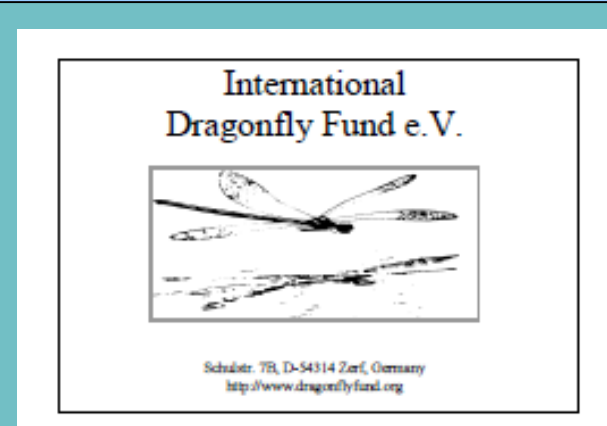
- expansion of the research on Western Balkans: Montenegro, Macedonia, Albania
- species and habitat **monitoring** in Croatia and B&H at the localities where stable breeding populations were determined: Ljuta River in Croatia, Trebižat River in B&H
- monitoring of the species: Capture – Mark-Recapture Method + collecting the exuviae along the chosen transect (because of the great dispersal ability of the species) + introduction of the species on potentially suitable habitat where the larvae were not registered
- habitat monitoring: pollution, physico-chemical parameters of the water, vegetation density and structure

Conclusion: even more additional locality inhabited by the *C. microstigma* were recorded, all these habitats are highly endangered thus for now we do not recommend changing the species conservation status on any of the Red lists

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Lindenia tetraphylla, istraživanje i zaštita staništa u Hutovom blatu

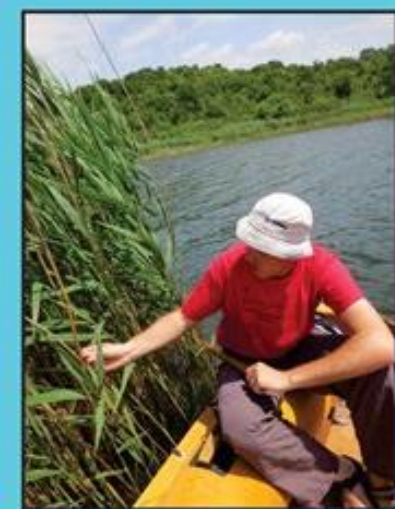


Iako vilini konjici predstavljaju malu grupu insekta, oni imaju izuzetno važnu ekološku ulogu u slatkovodnim staništima. Ovi insekti takođe predstavljaju dobre indikatore koji nam ukazuju na negativne promjene u životnoj sredini zbog čega je poznavanje njihove distribucije i ekologije od velikog značaja za zaštitu slatkovodnih ekosistema, globalno najugroženijih tipova staništa. Zbog svoje ljepote i fascinantnog životnog ciklusa vilini konjici predstavljaju ambasadore slatkovodnih staništa.

U Hutovom blatu, najznačajnijem močvarnom području u Bosni i Hercegovini, živi *Lindenia tetraphylla*, jedna od najfascinantnijih evropskih vrsta vilinih konjica.



Lindenia tetraphylla jedina je vrsta ovog roda u svijetu i jedan od najvećih vilinih konjica u BiH. Rasprostranjena je od centralne Azije, preko Bliskog Istoka do mediterana. Na prostoru mediterana postoji mali broj stalnih populacija, prije svega na obalama sjevernog Jadrana, u Grčkoj i Turskoj. Staništa i ekologija vrste su još uvijek slabo poznati, uglavnom naseljava veća jezera i sporo tekuće rijeke koje karakteriše dobro razvijena vegetacija trčćaka. U dolini rijeke Neretve javlja se posebna tamna forma ove vrste koja nije prisutna nigdje drugo u Evropi.



U Hutovom blatu provedeno je istraživanje distribucije i ekologije vrste kako bi se na što bolji način moglo pristupiti planiranju zaštite. U saradnji sa parkom prirode planira se provođenje programa monitoringa koji bi omogućio dugoročno očuvanje ove ugrožene vrste u Hercegovini, za koju Hutovo blato predstavlja jedino poznato stanište u zemlji.

U sklopu terenskog istraživanja početkom jula mjeseca na Deranskom jezeru pronašli smo svlakove ove ugrožene vrste. Ovim je definitivno i po prvi put dokazano razmnožavanje ove vrste u Parku prirode Hutovo blato.

Zbog čega je *L. tetraphylla* ugrožena?

Osnovni razlog ugroženosti vrste je uništenje staništa kao posljedica narušavanja vodnog režima. Usljed ugrožavanja malog broja preostalih populacija vrsta je uvrštena na Crvenu Listu vilinih konjica Evrope među ugrožene (ranjive) vrste. Pored toga uključena je i u ANNEX II Direktive o staništima Evropske unije i zaštićena Konvencijom o zaštiti divljih vrsta i staništa u Evropi (Bernska konvencija). Planirana izgradnja hidroenergetskih objekata u slivu rijeke Neretve i preusmjeravanje vode u druge dijelove sliva može dovesti do značajne degradacije vrijednih močvarnih staništa u Hutovom blatu. Ovi zahvati dovode u opasnost i staništa ove ugrožene vrste, a mogu dovesti i do njenog potpunog nestanka iz BiH, kao i značajnog ugrožavanja kompletne populacije u delti rijeke Neretve.



Istraživanje provode Udruženje za biološka istraživanja i zaštitu prirode BIO.LOG i Slovensko odonatološko društvo u saradnji sa Parkom prirode Hutovo blato u okviru projekta: „Kraška slatkovodna staništa: identifikacija i participativno planiranje očuvanja ugroženih vrsta beskičmenjaka i riba“ koji finansira Partnerski fond za kritično ugrožene ekosisteme (Critical Ecosystem Partnership Fund - CEPF). Početne faze istraživanja u Hutovom blatu podržala je Rufford fondacija.