

# SURVEY OF PROTECTED AND/OR NATURA 2000 LAND INVERTEBRATE SPECIES ALONG THE TUR AT THE ROMANIAN PROJECT SITE

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**Summary.** The inventory of beetle, lepidoptera and dragonfly species of the Tur River site of community importance (ROSCI0214) within the ROHU-79 project took place between 06.10.2018 and 30.06.2019. Two species of beetles were assessed during the project: *Cerambyx cerdo* and *Lucanus cervus*; six species of lepidopterans: *Eriogaster catax*, *Lycaena helle*, *L. dispar*, *Euphydryas aurinia*, *Leptidea morsei*, *Phengaris teleius*; and two dragonfly species: *Coenagrion ornatum* and *Ophiogomphus cecilia*. Most of the species listed above (*C. cerdo*, *L. cervus*, *E. catax*, *L. helle*, *L. dispar*, *E. aurinia*, *L. morsei* and *P. teleius*) were inventoried already between 2011-2012 in a SOP Environment Priority Axis 4 ERDF project. In the case of these species the evaluated habitats where those identified and visited in the previous period (2011-2012). In the case of dragonfly species (*C. ornatum* and *O. cecilia*) adults have been inventoried in the potentially most suitable habitats. During the field inventories the following species were found: *C. cerdo*, *L. cervus*, *E. catax*, *L. dispar*, *P. teleius*. No specimens were found in the case of the species *L. helle*, *E. aurinia*, *L. morsei*, *C. ornatum* and *O. cecilia*. *Euphydryas maturna*, another species of community importance was recently reported complementing the already known species list.

**Rezumat.** În cadrul proiectului ROHU-79, în situu de importanță comunitară Râul Tur (ROSCI0214), în perioada 06.10.2018 și 30.06.2019 a avut loc inventarierea speciilor de coleoptere, lepidoptere și de libelule. În cadrul proiectului au fost evaluate două specii de coleoptere: *Cerambyx cerdo* și *Lucanus cervus*; șase specii de lepidoptere: *Eriogaster catax*, *Lycaena helle*, *L. dispar*, *Euphydryas aurinia*, *Leptidea morsei*, *Phengaris teleius*; și două specii de libelule: *Coenagrion ornatum*, *Ophiogomphus cecilia*. Majoritatea speciilor enumerate mai sus (*C. cerdo*, *L. cervus*, *E. catax*, *L. helle*, *L. dispar*, *E. aurinia*, *L. morsei* și *P. teleius*) au fost inventariate și în perioada 2011-2012 în cadrul unui proiect POS Mediu Axa priorităță 4 FEDR. În cazul speciilor deja inventariate în perioada anterioară au fost vizitate habitatele unde speciile respective au fost deja identificate. În cazul speciilor de libelule (*C. ornatum*, *O. cecilia*) au fost inventariate habitatele potențiale cele mai potrivite pentru ei. În urma inventarierilor pe teren au fost găsite următoarele specii: *C. cerdo*, *L. cervus*, *E. catax*, *L. dispar*, *P. teleius*. Nu au fost găsite speciile *L. helle*, *E. aurinia*, *L. morsei*, *C. ornatum*, *O. cecilia*. Specia de importanță comunitară *Euphydryas maturna* a fost raportată recent, completând lista de specii deja cunoscute.

**Kivonat.** A Túr-menti Védett Területen (ROSCI0214) 2018.10.06 és 2019.06.30 között zajlott a bogár-, lepké- és szitakötő fajok monitoringja. A ROHU-79 projekt keretében felmértük 2 bogárfajt: a *Cerambyx cerdo*-t és a *Lucanus cervus*-t; hat lepkefajt: *Eriogaster catax*, *Lycaena helle*, *L. dispar*, *Euphydryas aurinia*, *Leptidea morsei*, *Phengaris teleius*; valamint két szitakötőfajt: a *Coenagrion ornatum*-ot és az *Ophiogomphus cecilia*-t. A felsorolt fajok jelentős részének esetében 2011-2012-ben már történt felmérés és állománybecslés, azért ezeket a fajokat a korábbi lelőhelyeiken kerestük. 2011-2012-ben egy POS Mediu Axa 4 FEDR projekt keretében a következő fajokat mértük fel: *E. catax*, *L. helle*, *L. dispar*, *E. aurinia*, *L. morsei*, *P. teleius*, *C. cerdo*, *L. cervus*. A két szitakötőfaj (*C. ornatum*, *O. cecilia*) esetében az imágókat a potenciális élőhelyeiken kerestük. A 2018 ősze és 2019 júliusa közötti időszakban történt felmérés, illetve monitoring során a következő fajokat találtuk meg: *C. cerdo*, *L. cervus*, *E. catax*, *L. dispar*, *P. teleius*. A felmérés során nem találtuk meg a következő fajokat: *L. helle*, *E. aurinia*, *L. morsei*, *C. ornatum*, *O. cecilia*. Egy, a védett terület romániai oldaláról eddig nem jelzett faj, a közösségi jelentőségű *Euphydryas maturna* egészítette ki a már ismert fajlistát.

## Introduction

The beetle (Insecta: Coleoptera) fauna of Satu-Mare county was studied especially at the end of the 19<sup>th</sup> and the beginning of 20<sup>th</sup> century (e.g., Bíró 1884). In recent decades, only a few works have appeared regarding the beetles of Satu Mare county (e.g., Balog et al. 1997). The great capricorn beetle (Coleoptera, Cerambycidae: *Cerambyx cerdo* Linnaeus, 1758) and the European stag beetle (Coleoptera, Lucanidae: *Lucanus cervus* Linnaeus, 1758) has been reported previously from different forests of the lower course of the Tur River (Nagy & László 2014).

The lepidopteran (Insecta: Lepidoptera) fauna of Satu-Mare county, respectively the Tur river basin was studied in more detail by Szabó A. and Szabó I. (Szabó 1996, Szabó 1996a, Szabó 1996b). A list of lepidopteran species containing 722 species was published in 2008, of which 88 species are diurnal butterflies (Rhopalocera: Papilioidea and Hesperioidea) (Szabó 2008). Thus, it

can be considered that the lepidopteran fauna of this area is quite well known.

Fenton's wood white (Lepidoptera, Pieridae, *Leptidea morsei* (Fenton, 1882)) despite it is reported from several European countries (Rákosi et al., 2003) and appears in a fairly wide area in Romania (Cuvelier & Dincă 2007) has been rarely reported from here. It appears usually on the edge of hardwood or near forest roads and it is associated with the habitat of *Neptis sappho* (Cuvelier & Dincă 2007). From the territory of the lower course of the Tur River the species *L. morsei* was reported by Szabó I. (1996b), but only two specimens were found in the Noroieni forest. In a paper published in 2008, in which the author lists all known species on the lower course of the Tur River, *L. sinapis* is mentioned, but *L. morsei* not (Szabó 2008). In a previous study (2011-2012), this species was not found in the surveyed area while the habitats and the host plants were present (Nagy & László 2014).

The large copper (Lepidoptera, Lycaenidae: *Lycaena*

*dispar* (Haworth, 1803), a vulnerable species due to the fragility of its habitats (Rákosy 2003) is quite common in Romania, but large populations are rare to find (Dinca & Villa 2008). Due to drainage of wetlands, some of the known populations are facing strong decline. From the territory of the lower course of the Tur River, *L. dispar* was reported by Szabó I. (1996b, 2008), and later by Nagy & László (2014).

The violet copper (Lepidoptera, Lycaenidae: *Lycaena helle* (Denis & Schiffermüller, 1775) based on the data published by Szabó A. (1996) was known from two places in Romania, but in a later paper more populations were reported from the country (Craioveanu et al. 2014). It has a larger population in Brașov County near the village of Vădeni (Poiana Narciselor) and a population in Maramureș county near Lapușel. The population encountered near Livada, Satu-Mare by Szabó A. (1996) has been drastically reduced in recent decades but present even in 2012 (Nagy & László 2014). From the territory of the lower course of the Tur River *L. helle* was reported by Szabó A. (1996), Szabó I. (1996a, 1996b, 2008) from the Mujdeni forest (Livada, Satu-Mare). This population was found later in 2011-2012 but with a reduced population size (Nagy & László 2014). The species is endangered due to forest economy (Szabó 2008) both in the country and throughout Europe (Van Swaay & Warren 1999).

The scarce large blue (Lepidoptera, Lycaenidae: *Phengaris (Maculinea) teleius* (Bergsträsser, 1779)) is present in many locations in Romania, but larger populations are in the counties of Brașov, Cluj and Satu Mare (Rákosy & Vodă 2008). It is distributed in wetlands where its host plant, *Sanguisorba officinalis* grows and females lay eggs on flowers, and larvae are fed by *Myrmica* ants such as *Myrmica sabuleti*, *M. rubra*, *M. scabrinodis*, or *M. vandeli* (Tolman & Lewington 2007). The drainage of the species habitats, the inappropriate use of mowing and pasture threatens the existence of the species. From the territory of the lower course of the Tur River the species was reported by Szabó I. (1996b), which is considered local, but frequently encountered from Turulung and to the Mujdeni forest (Szabó I. 2008). During a two-year period, several populations were encountered in the territories around the Tur River (Nagy & László 2014).

The marsh fritillary (Lepidoptera, Nymphalidae: *Euphydryas aurinia* (Rottemburg, 1775)) appears locally in isolated populations in marshy grasslands and wetlands in Banat and Transylvania (Schmitt & Rákosy 2007). Its host plant is *Succisa pratensis*, while other rarely reported host plants may be *Scabiosa* spp. and *Plantago* spp. From the territory of the lower course of the Tur River the species was reported by Szabó I. (1996b), who found the species only locally in the Mujdeni forest. No specimens have been found in recent years (Szabó I. 2008, Nagy & László 2014). The scarce fritillary (Lepidoptera, Nymphalidae: *Euphydryas maturna* (Linnaeus, 1758)) can be found in small bushy clearings containing young *Fraxinus* or *Populus* trees. It has not been reported previously from the lower course of the Tur River.

The eastern eggar (Lepidoptera, Lasiocampidae: *Eriogaster catax* (Linnaeus, 1758), appears throughout

Romania but it is rarely reported. It is found at the edges of deciduous forests, in thermophilic hedges (the hillsides of southern orientation) with *Prunus spinosa* and *Crataegus* sp. Because the adult is not extremely sensitive to light and larvae show a high parasite prevalence that results in few adults, traditional collection methods (light traps) are not effective. That is why observing silk nests is more effective for sensing the species. From the territory of the lower course of the Tur River the species was reported by Szabó I. (2008), which is considered local around the oak forests. In the period of 2011-2012 several larvae were found in bushy habitats around the Tur River (Nagy & László 2014).

Regarding dragonfly and damselfly species present in the Tur river area 18 species were already assessed (Szálassy 2008). The ornate bluet (Odonata, Coenagrionidae: *Coenagrion ornatum* Selys, 1850) is a threatened species of lowland headwater streams which can be easily confounded on field with the closely related species *C. pulchellum* (Dijkstra & Lewington 2006). The green snaketail dragonfly (Odonata, Gomphidae: *Ophiogomphus cecilia* (Fourcroy, 1785)) has not been reported previously from the lower course of the Tur River. Its adults rest on the ground or on vegetation, and this is usually a difficult species to approach (Dijkstra & Lewington 2006).

## Methods used during the survey

Between 06.10.2018 and 30.06.2019 there were surveyed the following species: *C. cerdo*, *L. cervus*, *C. ornatum*, *O. cecilia*, *E. cataracta*, *L. helle*, *L. dispar*, *E. aurinia*, *L. morsei* and *P. teleius*. The fieldwork was carried out by two persons, at adequate weather conditions. In the case of previously surveyed species (in 2011-2012 there were sampled the following: *C. cerdo*, *L. cervus*, *E. cataracta*, *L. helle*, *L. dispar*, *E. aurinia*, *L. morsei* and *P. teleius*) there were visited those sites where the above-mentioned species were found previously (Nagy & László 2014). The damselfly *C. ornatum* was surveyed in a three-year period during 2015-2017 along lowland creeks.

## Survey methods of Coleoptera species

**Cerambyx cerdo:** in the course of the sampling there were identified old trees (especially *Quercus* sp.) with signs of occupancy by the beetle's larvae such as holes with a red interior, or on which adults or their remains were found. We have examined oak trees in the following forest patches: Noroieni, Mocear, Jelejnic, Dimoșag, Botoșeag, Mujdeni, Turulung Vii, Weiss and Porumbești. Also, there were observed adults and road kills between May-September.

**Lucanus cervus:** we examined oak trees, and additionally, there were performed transects on road parts where previously we have observed road kills of this species and there were counted the killed specimens. At the same time, we have observed flying adults at the forest margins at the early evening hours and count the flying specimens. During the fieldwork there were visited the

following forests: Noroieni, Mocear, Mujdeni, Turulung Vii, Weiss, Porumbesti.

#### Survey methods of Lepidoptera species

***Leptidea morsei***: we surveyed forest edges or habitat patches near forest roads where previously host plants were found near the following localities: Noroieni, Mujdeni, Turulung Vii, Weiss, Porumbesti.

***Lycaena dispar***: during the fieldwork there were surveyed the riverbanks and stream banks where previously host plants and specimens were found along the Tur river, Talna, Egherul Mare and Racta.

***Lycaena helle***: we examined the previously surveyed habitats; we saved the coordinates of found host plants and count the specimens if encountered. During the fieldwork there was surveyed the forest near Livada and the habitat patches where previously host plants were found.

***Phengaris (Maculinea) teleius***: during the fieldwork there were examined the previously surveyed meadows, with recordings of coordinates of found host plants and counted specimens. Counting of adults was performed in 3-4 100-meter-long sections of a 1000 meter transect through a habitat.

***Euphydryas aurinia***: we examined the previously surveyed habitats containing both host plants and host ant colonies and saved the coordinates of found host plants. During the fieldwork we have surveyed habitats around Mujdeni forest.

***Eriogaster catax***: we recorded coordinates of caterpillar tents, and counted individual larvae in the previously surveyed bushy habitats near Turulung Vii (near Weiss forest) and Porumbesti where previously caterpillars and host plants were found.

#### Survey methods of Odonata species

One part of the protected area (only the slow flowing creeks) was surveyed in a three years period between: 2015-2017. The survey of the two Odonata species has focused on the sampling of both larvae, exuviae and adult specimens. Samplings of adult specimens were carried out on the whole flying period of the species when adequate weather conditions occurred in the following water bodies: Tur river, Talna river and Egherul Mare stream.

## Results

***Cerambyx cerdo***: while there were surveyed both adults and trees with exit holes, we found 5 adults: one alive in Livada forest, and four carcasses under old oaks in Micula. We also have found one old oak in Micula with 15 exit holes, and on a pasture near Livada with 28 exit holes on 6 oaks (Fig. 1). The estimated population size in 2011-2012 was 702 (95% CI: 30.20-1373.10) based on 47 emergence holes encountered on different transects. In 2019 on the same sites, we encountered a

total of 43 emergence holes, which means a virtually slight decrease compared to the previous surveys. Also including search effort these data show a slight increase of the population size. The estimated population size in 2019 is 854 (95% CI: 36.75-1670.8). Factors of risk are the removal of old oaks and the shading of old oak trunks on the wood pasture near Livada. Conservation recommendations include the preservation of old, attacked oaks, the maintenance of the wood pasture near Livada and of the old oaks on the southern-east border of Noroieni forest near Micula. *C. cerdo* populations must be continuously monitored in the protected area.

***Lucanus cervus***: we found one female *L. cervus* in Livada forest, and four males in Micula in June. We identified a number of 52 *L. cervus* carcasses along roads which cross the forests and under old oaks. These roadkill specimens were found mostly early in the morning in the following forests: Noroieni, Turulung-Vii, Livada, Mujdeni. The estimated population size in 2011-2012 was 6126 (95% CI: 5763.63-6488.07) based on 167 individuals encountered on different transects. In 2019 on the same sites, we encountered a total of 57 individuals, which means an almost threefold decrease compared to the previous surveys, which with the inclusion of search effort reduces to at most a twofold decrease (Fig. 2). The estimated population size is 3659 (95% CI: 3442.65-3875.36). Factors of risk are the removal of old trees and trunks, the fragmentation of forest habitats, and the traffic on roads crossing habitats. Conservation recommendations include preservation of old trees and that the construction of new public/private roads should be avoided in the protected area. *L. cervus* populations must be continuously monitored in the protected area.

***Leptidea morsei major***: we did not find the species *L. morsei*. All the captured specimens belonged to *L. sinapis*. The species *L. morsei* was neither found in 2011-2012.

***Lycaena dispar***: we found a number of 76 specimens (Fig. 3) including females belonging to the first generation, and males belonging probably to the second one. Specimens were found along Tur river (near Turulung and Turulung - Vii), Talna river (near Râul Mare, Coca, Călinești Oaș) and along Meghii channel near Agriș. The estimated population size in 2011-2012 was 493 (95% CI: 302.57-683.63) based on 103 individuals encountered on different transects. In 2019 on the same sites, we encountered a total of 76 individuals, which means a virtually slight decrease compared to the previous surveys. The estimated population size is 473 (95% CI: 290.23-655.75). Factors of risk are overgrazing, flooding, chemical weed and pest control in the surrounding agricultural areas. Conservation recommendations include avoidance of overgrazing and chemical weed/pest control in the surrounding agricultural areas of creeks and other flowing water bodies. *L. dispar* populations must be continuously monitored in the protected area.

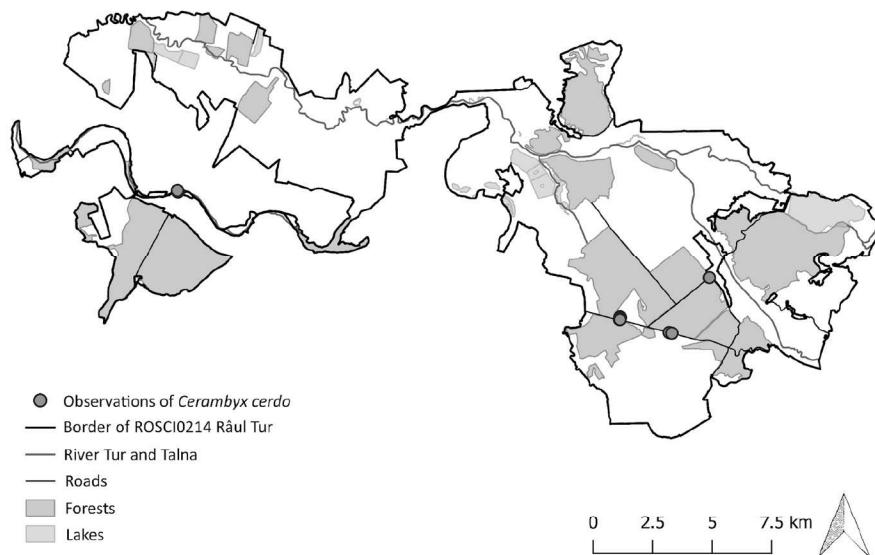


Fig. 1. Observations of *Cerambyx cerdo* within the surveyed area.

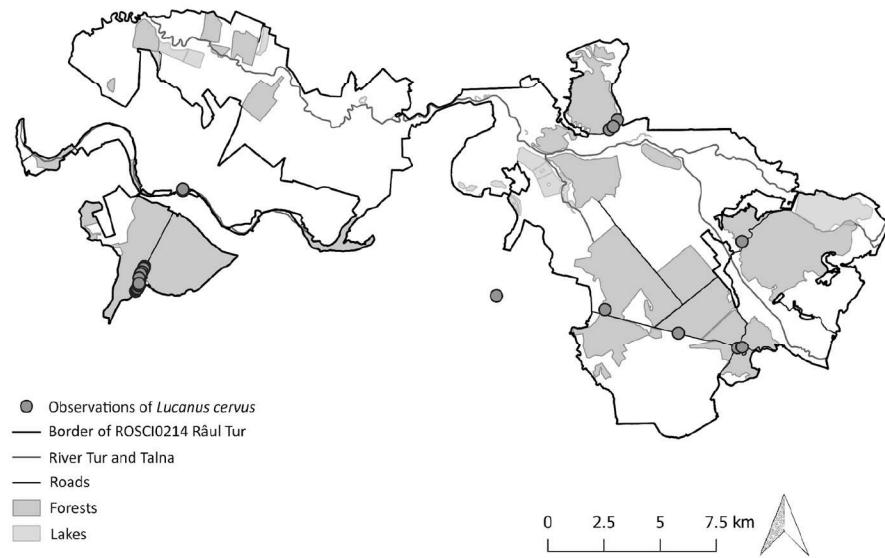


Fig. 2. Observations of *Lucanus cervus* within the surveyed area.

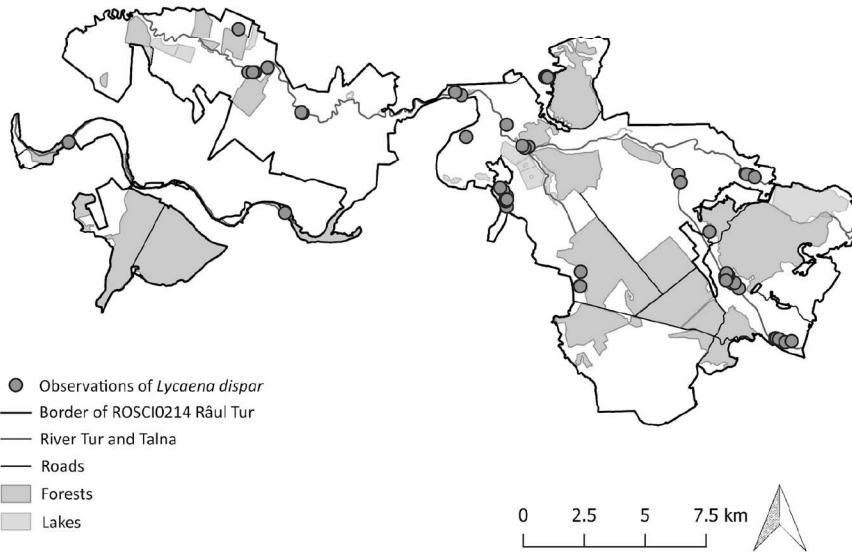


Fig. 3. Observations of *Lycaena dispar* within the surveyed area.

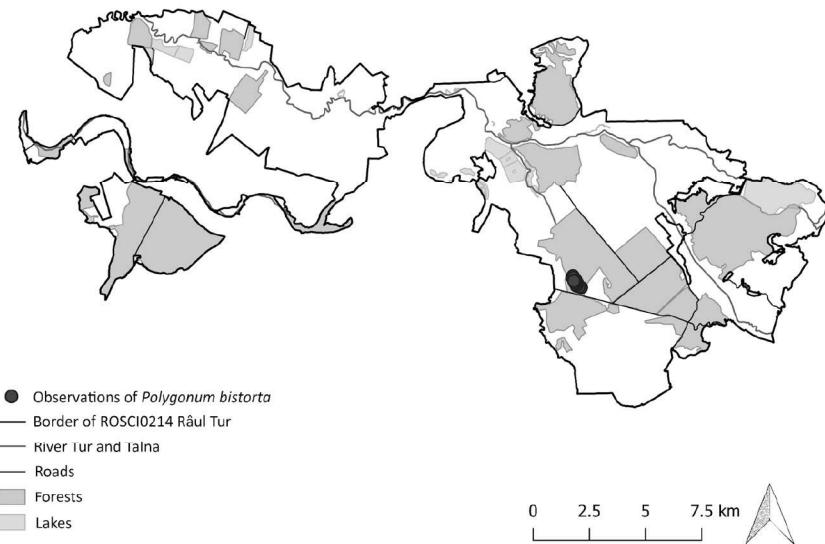


Fig. 4. Observations of *Polygonum bistorta* within the surveyed area.

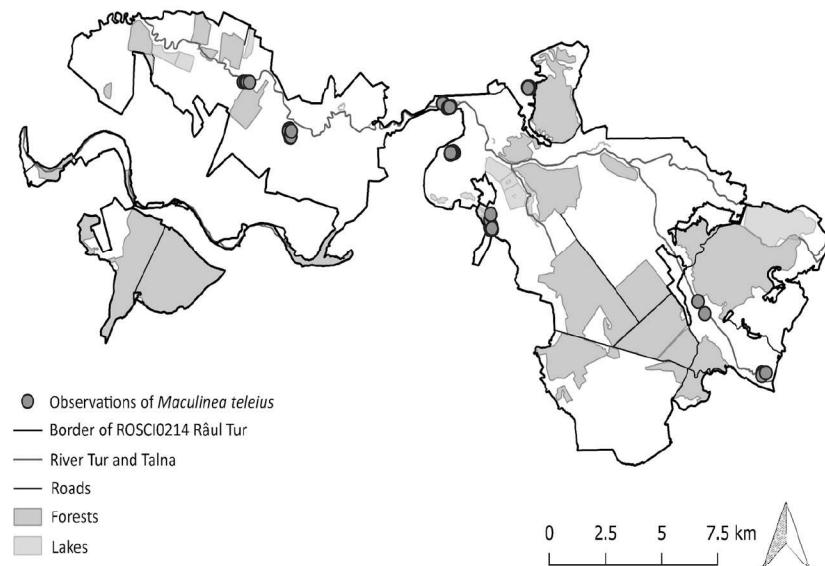


Fig. 5. Observations of *Phengaris teleius* within the surveyed area.

***Lycaena helle***: the first generation of the species *L. helle* was surveyed in Livada forest near Livada town in May and June, while the second generation was surveyed in July. We did not find any specimens in spite of the fact that we identified its host plant: *Polygonum bistorta*. We found a number of 22 plants in the clearings of the forest (Fig. 4). The estimated population size in 2011-2012 was 8 (95% CI: -6.85-22.12), based on 2 individuals encountered on different transects of habitats with *P. bistorta*. In 2019 on the same site we encountered no individuals, which means a virtually decrease compared to the previous surveys, but because of the rainy weather in May and July the adults may have had an extremely short flying period. In the closest known population (Maramures county) were neither

seen flying adults in 2019 (pers. comm. Rákosi László). Factors of risk are the lack of appropriate management of forest habitats and the abandonment of forest management causing canopy closure which both lead to decline in *L. helle* populations. Minimum conservation measures include the maintenance of the existing controlled deforestation (logging in a small number) in the Mocear and Mujdeni forests where the host plant (*Polygonum bistorta*) is found while the habitats are continuously monitored. *L. helle* populations must be continuously monitored in the protected area.

***Phengaris (Maculinea) teleius***: we found near Halmeu 10 specimens, between Porumbesti and Drăgușeni 7 specimens, near Turulung 33 specimens,

between Drăgușeni and Livada 13 specimens, near Adrian 9 specimens, near Turulung-Vii 6 specimens, near Pășunea Mare 2 specimens and near Orașu Nou 9 specimens (Fig. 5). The estimated population size in 2011-2012 based on 138 encountered individuals on different transects was 4342 (95% CI: 4089.96–4653.64). In 2019 on the same sites, we encountered a total of 96 individuals, which means a considerable decrease compared to the previous surveys, including also the search effort. The estimated population size in 2019 is 2416 (95% CI: 2276.15-2589.852). Factors of risk are the inadequate timing of mowing, chemical weed and pest control in the surrounding agricultural areas. Conservation recommendations include avoidance of wrongly timed mowing and of chemical weed/pest control in the surrounding agricultural areas. We recommend the application of mowing at most once a year, in order to maintain habitats with open vegetation, moreover mowing should be done either before the second week of June or in the second half of September. There must be kept approx. 20% of uncultivated habitats for the maintenance of suitable habitats for host ant colonies of caterpillars of the species. The habitats must be monitored in the next period.

***Euphydryas aurinia* and *E. maturna*:** we did not find the species *E. aurinia*, although we have found specimens of *Scabiosa* spp. and *Plantago* spp. We have found 2 specimens of *E. maturna* in Livada forest in May 2019 (Fig. 6). Habitats must be monitored in the next period for a more detailed evaluation of the species.

***Eriogaster catax*:** during our survey in march 2019 targeting the larval stage of this species we found a total of 36 larvae (Fig. 7.). All specimens were found exclusively on *Prunus spinosa* bushes. The

typical habitat where the larvae were found contained mostly *Prunus spinosa*, with scattered bushes of *Rosa* spp. and *Crataegus* spp. surrounded by forests. We found the larvae on two sites near Turulung-Vii and on one site near Porumbăști. The estimated population size based on 28 caterpillars and nests encountered on different transects in 2011-2012 was of 238 (95% CI: 0 – 639.48) individuals. In 2019 on the same sites, we encountered a total of 36 caterpillars, which means a considerable decrease compared to the previous surveys, including also the search effort. The estimated population size is 184 (95% CI: 0 – 493.31). Factors of risk are the clearings of pastures, chemical weed and pest control in the surrounding agricultural areas. Conservation recommendation includes the avoidance of clearings in bushy areas (maintaining if clearings are indispensable of a minimum 25% area with bushes) and of chemical weed/pest control in the surrounding agricultural areas. We recommend the maintenance of bushy areas with *Crataegus* sp., *Prunus spinosa* and *Pyrus pyraster* in their current form with moderate pruning. The moderate thinning of shrubs is needed to avoid closure and afforestation. *E. catax* populations must be continuously monitored in the protected area.

***Coenagrion ornatum*:** we found no adults belonging to this species in the surveyed habitats along the Tur and Talna river, Egherul Mare stream in May-June 2019.

***Ophiogomphus cecilia*:** no adults belonging to this species were found. There were surveyed the Tur and Talna river, Egherul Mare stream in May-June 2019 for adults.

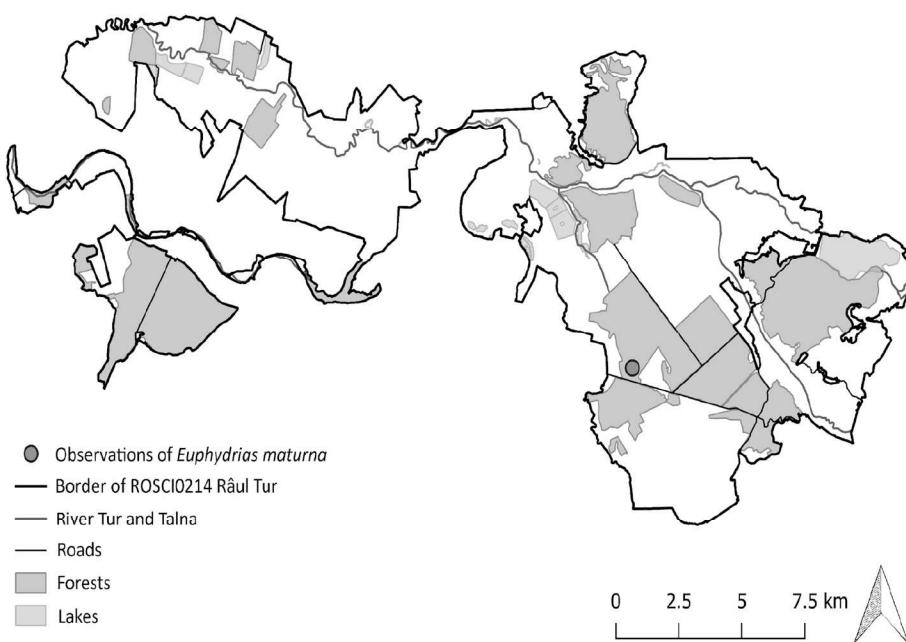


Fig. 6. Observations of *Euphydryas maturna* within the surveyed area.

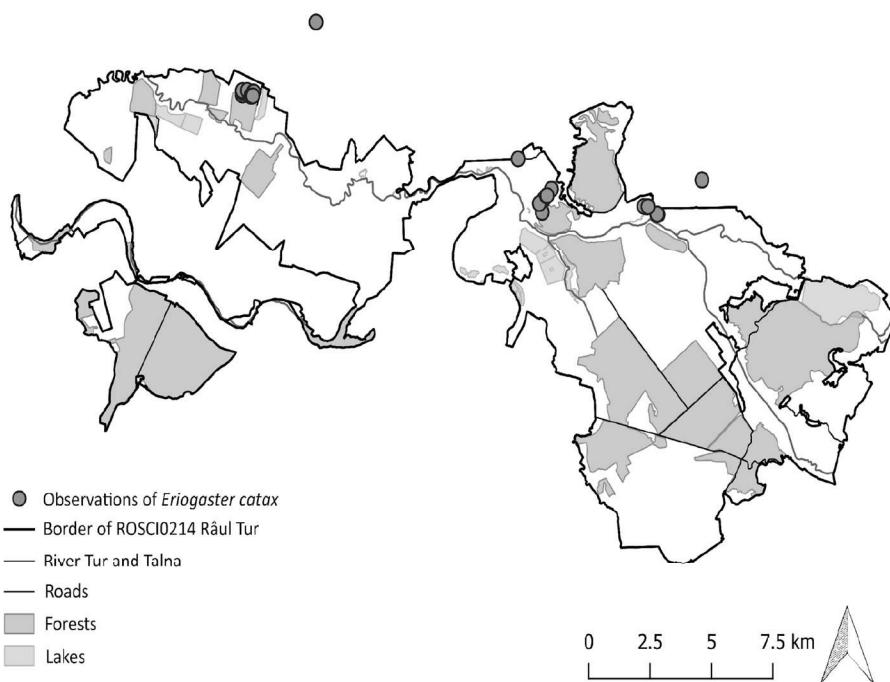


Fig. 7. Observations of *Eriogaster catax* within the surveyed area.

**Recommendations on the establishment and operation of a Natura 2000 compatible monitoring system considering cross-border location of land invertebrate populations and the relevant protected areas**

Monitoring activities should be carried out based on the following species-specific frequencies on the enumerated locations of the Natura 2000 sites and with the described methodology (collected data types):

***Lucanus cervus***

Frequency: biannually, from May to July.

Locations: in ROSCI0214, HUHN20054 and HUHN20050 forests, roadkill evaluations along roads crossing the forests belonging to ROSCI0214.

Method: searching for adults under and on oaks in the species habitat, counting specimens at dawn along roads crossing forests on 500 m long sections.

Collected data: presence-absence, frequency, estimated population sizes.

***Cerambyx cerdo***

Frequency: yearly, from June to September.

Locations: in ROSCI0214, HUHN20054 and HUHN20050 forests, wood pastures.

Method: searching for adults under old oaks; searching for trees with exit holes.

Collected data: presence-absence, frequency, estimated population sizes.

***Lycaena dispar***

Frequency: biannually, from early May to mid-September.

Locations: in ROSCI0214, HUHN20054 and HUHN20050 riverbanks, stream banks, wet meadows and ditches nearby Nagyar, Szatmárcseke, Fehérgyarmat where its larval food plant *Rumex* sp. is present.

Method: searching for adults along transects on riverbanks and wet meadows in the species habitat.

Collected data: presence-absence, frequency, estimated population sizes.

***Lycaena helle***

Frequency: yearly, from early May to mid-June and from mid-July to mid-August.

Locations: in ROSCI0214 forest clearings, where its larval food plant *Polygonum bistorta* is present.

Method: searching for adults along transects crossing the species habitat.

Collected data: presence-absence, frequency, estimated population sizes.

***Phengaris (Maculinea) teleius***

Frequency: yearly from early July to the end of August.

Locations: in ROSCI0214, HUHN20054 and HUHN20050 pastures, meadows nearby Szatmárcseke, Tisztaberek and abandoned arable lands on habitats where its host plant, *Sanguisorba officinalis* grows.

Method: searching for adults on *S. officinalis* flowers along transects crossing the species habitat and mark-release-recapture study to estimate population size.

Collected data: presence-absence, frequency, estimated population sizes.

***Euphydryas maturna***

Frequency: yearly, from May to June.

Locations: in ROSCI0214, HUHN20054 and HUHN20050 forests, where its larval food plants (*Fraxinus excelsior*, *F. angustifolia*, *Ligustrum vulgare*) are present.

Method: searching for adults along transects crossing the species habitat and mark-release-recapture study to estimate population size.

Collected data: presence-absence, frequency, estimated population sizes.

### ***Eriogaster catax***

Frequency: yearly, between April and May.

Locations: in ROSCI0214, HUHN20054 and HUHN20050 pastures and meadows with bushes of *Prunus spinosa* and *Crataegus monogyna* nearby Olcsvaapáti, Panyola, Kisar, Nábrád and Sonkád areas.

Method: searching for larvae before dispersion from nests on 500 m to 1 km transects crossing the species habitat.

Collected data: presence-absence, frequency, estimated population sizes.

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