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1. New data on presence and distribution of the otter (*Lutra lutra*) in two Natura 2000 Sites of Community Interest (SCI), from Iași county (Romania)

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ABSTRACT. The Eurasian otter (*Lutra lutra*), listed in Annex II and IV of the Habitats Directive and in IUCN Red List as near threatened, used to be widespread till XXth Century through Europe. Now its distribution is scarce as result of pollution and habitat loss. In Romania, the industrial development, from socialist era, led to a decline of the otters population. The negative effect is increased by the lack of real interest in nature protection and biodiversity conservation. This fact led to serious damage of the inland waters. All of these unfortunate events caused the limitation of the otter distribution. After 1990s, many sources of pollution have dissapeared and has appeared the natural restocking of the inland waters which determined the increasing number and the expansion of the otter population in Romania. As a result of this improvement of habitats and natural restocking, I identified signs of otter presence (spraints, tracks, anal jellies, dens) in two Natura 2000 Special Areas of Conservation (SCI) from Iași County: Dealul Mare – Hârlau and Bârnova - Repedea Forest. Otter was not mentioned in the standard form of the sites. From December 2011 to August 2012, using the standard method in otter surveys recommended by the IUCN/SSC Otter Specialist Group, I determined the area of otter distribution in the two sites.

Key words: *Lutra lutra*, eurasian otter, distribution, presence, Natura 2000, Sites of Community Interest, Romania

INTRODUCTION

The Eurasian otter (*Lutra lutra*) is listed on Annex II and Annex IV of the EU Habitats Directive ([***13***]; [***14***]) and in IUCN Red List as near threatened [***19***]. The Annex II listing requires Member States to designate Sites of Community Interest (SCI) for the protection of the species. 99 such SCIs have been designated in Romania [***18***]. However, otter is missing from the standard forms of many SCIs, we have a clear example in the two sites from this study [***2***].

Once, otter had a broad distribution in Europe, but it has declined substantially in the last century [***2***].

Otter population become limited to small areas in central western countries [***3***].

In Romania, the economical development from the socialist era, determined a decline of the otters population, by the occurence of many polluters, such as: large chemical plants and industrialized agriculture. The negative effect is increased by the lack of real interest in the protection and conservation of biological diversity. Fact that led to serious damage to the physico-chemical inland waters. Many rivers and streams in Romania have become unsuitable for life [***8***]. Therefore, the otter distribution area, was considerably limited in our country. Since the 1990s, many sources of pollution have dissapeared, due to the adoption of environmentally friendly technologies or by stopping production process, which contribute to the natural restoration of affected habitats and biocenoses. Natural restocking of fishes, crustaceans and amphibians determined the increasing number and the gradual expansion of the otter population in Romania.

As an top predator of the freshwater ecosystem, it becomes an umbrella species, and thanks to its charismatic image, plays an important role as flagship species in protection of the freshwater species. Otter could be used in an awareness raising campaign focusing on the importance of wetlands and also as an indicator species: the presence or absence of the otter used to evaluate or monitor an area. The presence of the eurasian otter in this two protected areas from Iasi County, confirm the good ecological quality of the water resources.

MATERIALS AND METHODS

Study area

The study was carried out, in two SCIs from Iași County: Dealul Mare – Hârlau and Bârnova Repedea Forest, between December 2011 to August 2012 along the main rivers and their tributaries (**Fig. 1**).

One of the SCI, Dealul Mare –Hârlău is situated in the northwest of Iași County, and the another one (Bârnova Repedea Forest) in the opposite side, in southeast of the County.

The two study areas are similar, both of them are situated around 300 m a.s.l., are located in the same relief unit: Central Moldavian Plateau and the vegetation cover is more than 90 % deciduous forest.

Hydrography is characterized by rivers and streams with low flow, with slow flowing which often in drought periods dries up.

The climate is temperate with strong continental influences the rainfall is between 500 – 700 mm [***1***].

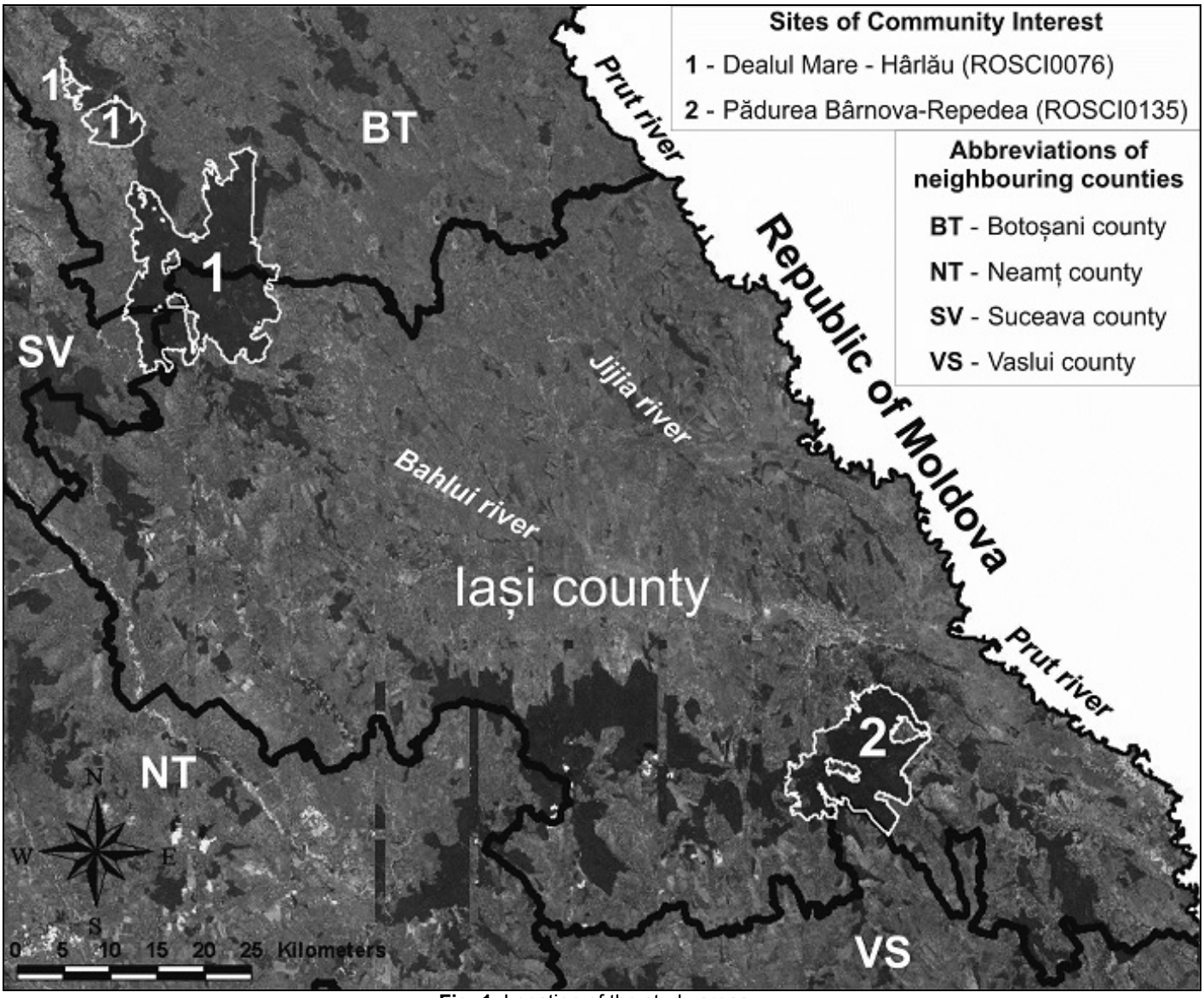

Fig. 1. Location of the study areas.
Note. black, thick line – county limits; white line – limit of the protected area; dark poligons – forested areas.

Site of Community Interest Dealul Mare – Hârlău

Located in the northwest of Iași county, it has a total surface of 25.112 ha and only 36 % is placed in Iași county [***16***]. The maximum altitude is 596 m a.s.l., the minimum altitude is 106 m a.s.l. and the average altitude is 340 m a.s.l. [***1***].

The site is located in Suceava Plateau – Dealul Mare – Hârlău Hill. It is located on slopes with an average relief energy of 10 - 12 degrees. The whole area is located in the Central Moldavian Plateau, the surface consisting of nearly horizontal sedimentary deposits. In general land is fragmented and traversed by a dense network of streams and rivers.

Site area fits in terms of climate,to the forested plateau of Moldavia. The climate is temperate continental with influences of continental climate. The average annual temperature is 8.5 °C. Average annual rainfall is of 550 - 700 mm [***1***]. In general, the temperatures are high in summer and the rainfall poor [***1***].

The hydrographic network within the site is very dense. During the spring because of snowmelt are formed numerous streams on the valleys from the area. Most of them dry up in summer or have low flow rate. Bahlui (**Fig. 2**) is the main river of the protected area. Otherwise, many of the streams in the southern part of the site are tributaries of Bahlui river and those from east part are tributaries of Siret river, like Pietros stream (**Fig. 3**). Water flow direction is generally from NW to SE.

The site is characterized by high degree of forest cover (97%), mainly deciduous forest. Inside of the site are two important habitats for otters: 91E0 – Aluvial forest with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*); 91F0 – Riparian mixed forests with *Quercus robur*, *Ulmus laevis*, *Fraxinus excelsior* or *Fraxinus angustifolia*, from the banks of the large rivers (*Ulmenion minoris*) [***1***].

Fig. 2. Bahlui River – Otter habitat

Fig. 3. Pietros Stream – Otter habitat

Site of Community Interest Bârnova - Repedea Forest

Observations were conducted in the SCI, Bârnova – Repedea Forest, located in the north - eastern Romania, in Iasi County (96 % of its surface), in the relief unit Central Moldavian Plateau. Site area is 124.26 km² [***17***], the minimum altitude is 106 m a.s.l. (in Nicolina Valley) and the maximum altitude is 419 m a.s.l. (on Rotunda Hill).

The landscape is mostly plateau with many anthropic interventions. The climate is temperate with strong continental influences [***1***].

The hydrographic network is represented by the streams: Cocoara, Nastea, Pârâul Pietros, Cărbunăria, Vasluieț and Nicolina. All these streams have their source and gathers the waters from the surface of the SCI Bârnova - Repedea Forest. The streams shall be characterized by a torrential course during rainfall and and in periods of drought by reducing the flow and dry up, downstream. In periods without precipitation when baseflow phenomenon appears [***9***], in the study area streams dry up, being present only isolated puddles.

Predominates deciduous forests, about 70% Dacian beech forest and 20% Dacian oak forests of and hornbeam [***17***]. Riparian vegetation is generally made up of alder (*Alnus glutinosa*), sometimes appears beech (*Fagus sylvatica*), hazelnut tree (*Corylus avellana*) and hornbeam (*Carpinus betulus*) [***1***].

Fig. 4. Cărbunăria Stream

Fig. 5. Nastea Stream

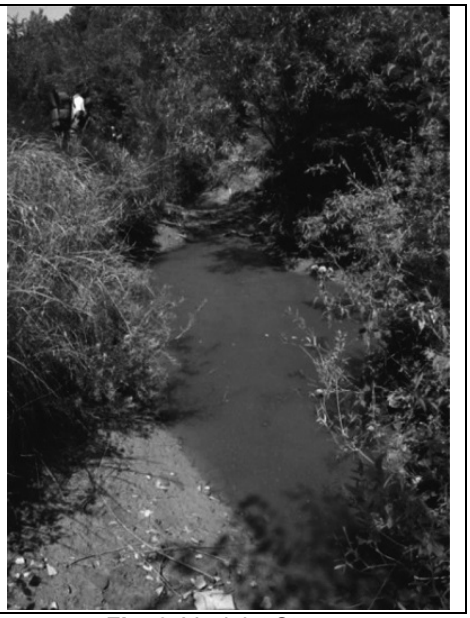

Fig. 6. Vasluieț Stream

Methodology

For this study we use an adapted standard field survey method recommended by IUCN/SSC Otter Specialist Group [***11***], based on the search for otter (*Lutra lutra*) signs of presence: tracks, spraints, anal jellys, holts and other signs that indicate the presence of species ([***10***]; [***12***]).

This method has been succesfully used in many European countries [***6***]. The survey is usually carried out based on the system of 10 x 10 km² grid, where about 6 sites are visited in each grid [***5***]. In each site, 600 m were walk along the waterside and were searched for spraints and tracks of the otters that inhabit the area. Were the signs of otter presence were found the site is considered positive, were signs were not found, site is declared negative [***11***].

The standard method is used for large areas, mainly for national surveys, but we needed to make the otter survey for this two small SCIs. So we selected the main streams for the survey and we walk along them, collecting all the signs of presence of the otters using a GPS device, Garmin Etrex H, a photo camera Olympus E-410 (14 – 42 mm, 40 – 150 mm and 400 mm lenses), a ruler for tracks measurement and standard data forms. In standard forms was recorded the following data: name of the observer, name of the river, the geographical coordinates of all the otter presence signs, the size (cm) and length of the tracks, spraints type (wet, dry intact, dry fragmented), habitat types, otter holts, meteorological and hydrological conditions and anthropogenic impact.

Signs of otter presence, were searched in some specific places where, with the previous experience, we could easily identify the signs of otter presence: footprints were left in the sand or on mud, otter holts in the the banks of the water covered by riparian vegetation, spraints were found most often on prominent objects such as mounds, rocks, fallen trees in the the river bed, under bridges, dams or heaps of grass on the waterfront or on other prominent objects near the river.

Going through all main streams, we mapped the river sectors where there were identified signs of otter presence, as positive and those where signs of otter presence were not identified, as negative.

RESULTS AND DISCUSSION

Evidence of otter presence such as footprints, spraints and otter holts were recorded on main streams and rivers from the two SCI. At first sight of these small streams with slow and intermittent flow, you would not be able to say that otters can live in such a habitat, usually because of the lack of trophic resources. But to our surprise we found signs of its presence, the otter was never mentioned in these two locations [***7***]. Even if the flow of the river was lower in Bârnova - Repedea Forest the density of otter signs was higher than in Dealul Mare – Hârlău, were the river flow was higher.

Dealul Mare – Hârlău (ROSCI0076)

The presence of Otter (*Lutra lutra*) was found only on two water sectors from: Pietros Stream and Bahlui river, which are the most significant water courses from the southern part of the SCI.

Compared with Pietros stream were we could identify only one single spraint, on Bahlui river we discovered a high density of otter signs: tracks (**Fig. 8**), spraints (**Fig. 7**), anal jellys and holts, that suggests a permanent presence and a continuous use of this habitat, whereas in the case of the Pietros stream is just about a temporary use.

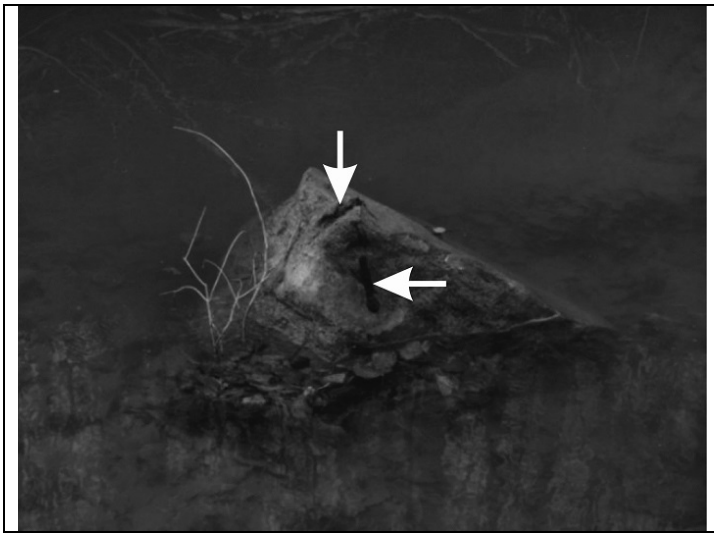

Fig. 7. Otter spraints in Bahlui river.
Note. tip of arrow points to the spraint.

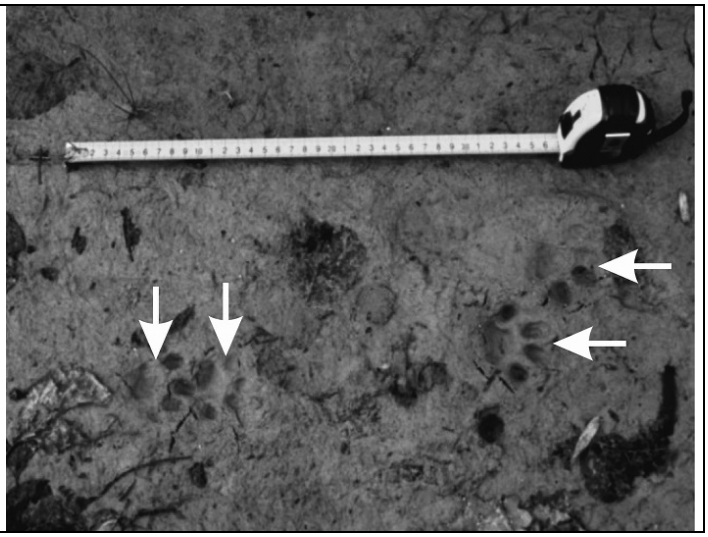

Fig. 8. Otter tracks on the shore of Bahlui river.
Note. tip of arrow points to the footprint.

The food availability was very scarce inside the site, one feeding area could be Siret river, for the otter that use Pietros stream, which is located in the eastern part of the SCI. An important feeding area in the south-westrn part of the SCI of the is Pârcovaci Lake (**Fig. 9**), a reservoir made on Bahlui river, which is also a natural reserve which aims to protect several species of fish fauna from the area, including: trout (*Salmo spp*.), european chub (*Squalius cephalus*), common nase (*Chondrostoma nasus*), common carp (*Cyprinus carpio*), bighead carp (*Arystichthys nobilis*) and Prussian carp (*Carassius gibelio*) [***15***].

We observed that Eurasian Otters use the Pârcovaci lake for feeding and upstream of Bahlui river for holts and resting places, a fact confirmed by the identification of otter holts (**Fig. 10**) on this river.

Using the data collected from the field I realised a map with the otter distribution inside the SCI (**Fig. 11**), which shows the favorite habitats and areas used by otters.

Fig. 9. Pârcovaci Lake.

Fig. 10. Otter holt on the shore of Bahlui river.

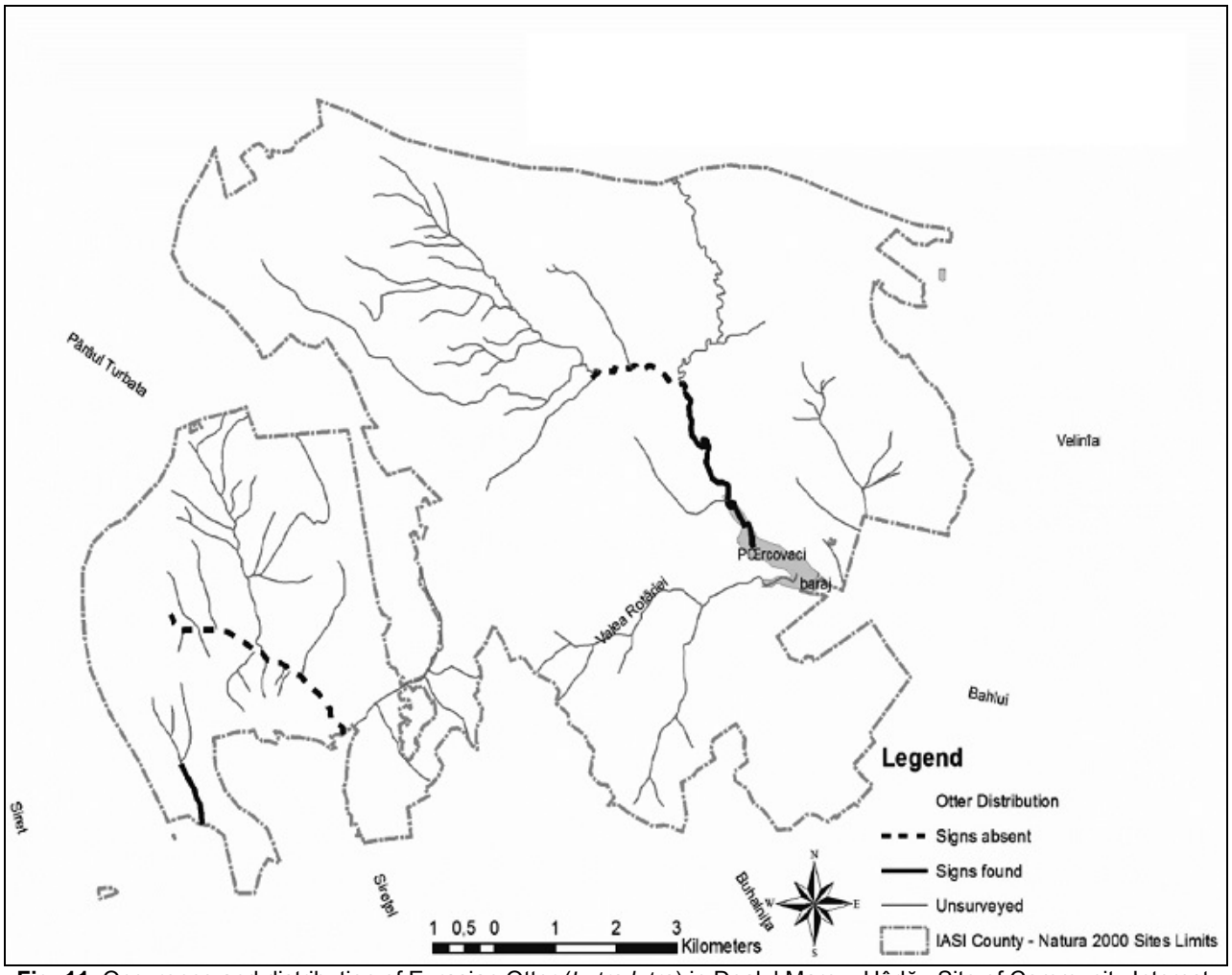

Fig. 11. Occurence and distribution of Eurasian Otter (*Lutra lutra*) in Dealul Mare – Hârlău Site of Community Interest.

Bârnova Repedea Forest (ROSCI0135)

During the survey the streams: Cocoara, Nastea, Pietros, Cărbunăria și Vasluieț were walked along. These were the waters with the highest flow rate of the Bârnova Repedea Forest SCI. Eurasian Otter was present on all this streams.

A general feature of of the rivers from this site are the banks that are covered by riparian vegetation, the roots prevent erosion of banks and are potential locations for otter holts, these streams are an important habitat for otters.

Another general characteristic of all the streams, was a permanent flow in the upstream and drought downstream.

Fig. 12. Eurasian Otter spraint at the shore of Pietros river.
Note. tip of arrow points to the spraint.

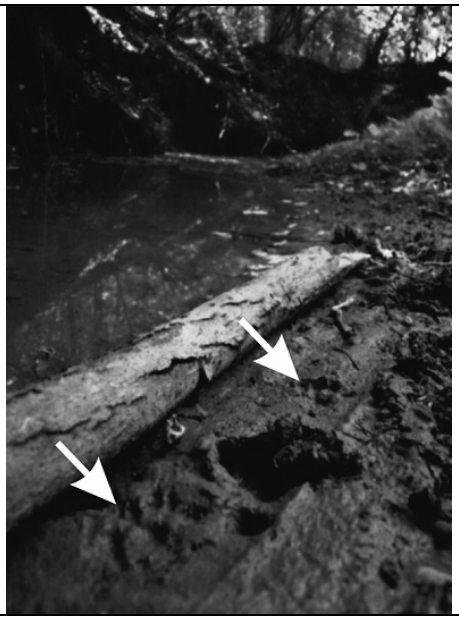

Fig. 13. Eurasian Otter tracks at the shore of Nastea river.
Note. tip of arrow points to the footprint.

Fig. 14. Eurasian Otter spraint at the shore of Vasluieț river.
Note. tip of arrow points to the spraint.

On the streams Cocoara, Pietros (**Fig. 12**) and Cărbunăria the density of tracks and excrements, left by Eurasian Otter, was low, only two or three presence signs, this could be explaine also by the flow of this streams which is very low. The streams with a low flow, have no trophic resouces for a top predator of the aquatic environment, like the Eurasian Otter.

The streams Nastea and Vasluieț have a high flow rate compared to other streams of the site, a semi-permanent drain and a rich trophic supply for Eurasian Otters. On Vasluieț stream were identified numerous marks left by the Eurasian Otters (**Fig. 14**), but many more were identified on Nastea stream (**Fig. 13**).

Otter presence was recorded along the entire length of the Nastea stream, here were identified fresh tracks and spraints (less than 24 hours). Most of the Eurasian Otter signs were footprints impregnated in the mud of the riverbed.

In the Nastea riverbed were identified small dams constructed by man from raffia bags filled with earth (**Fig. 15**),in order to achieve the accumulation of water, most probably for fishing. This kind of artificial bodies of water, are important feeding sites for Eurasian Otter in the area. The frequency of tracks and spraints around these reservoirs is higher (**Fig. 16**).

Fig.15. Small man made dam - Otter feeding site.
Note. tip of arrow points to the dam.

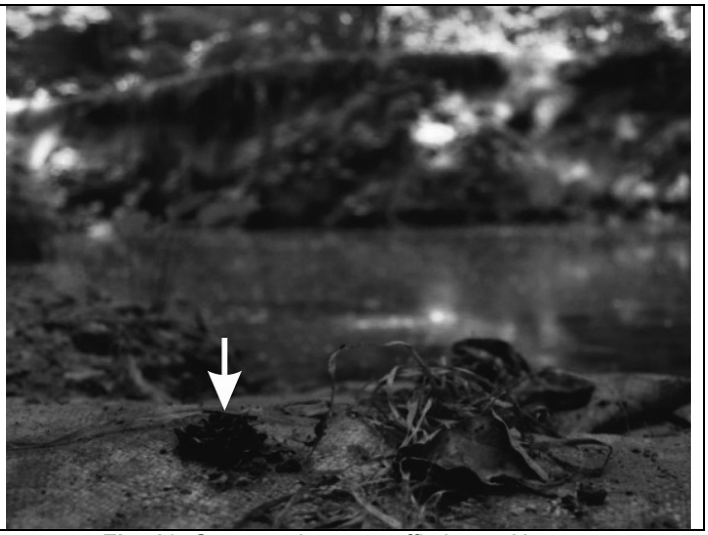

Fig. 16. Otter spraint on a raffia bag – Nastea.
Note. tip of arrow points to the spraint.

Fig. 17. European crayfish (*Astacus astacus*)

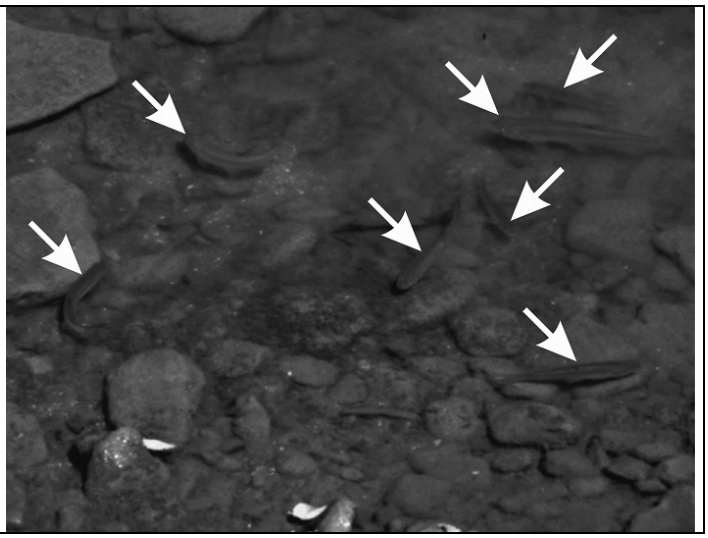

Fig. 18. European chub (*Squalius cephalus*)

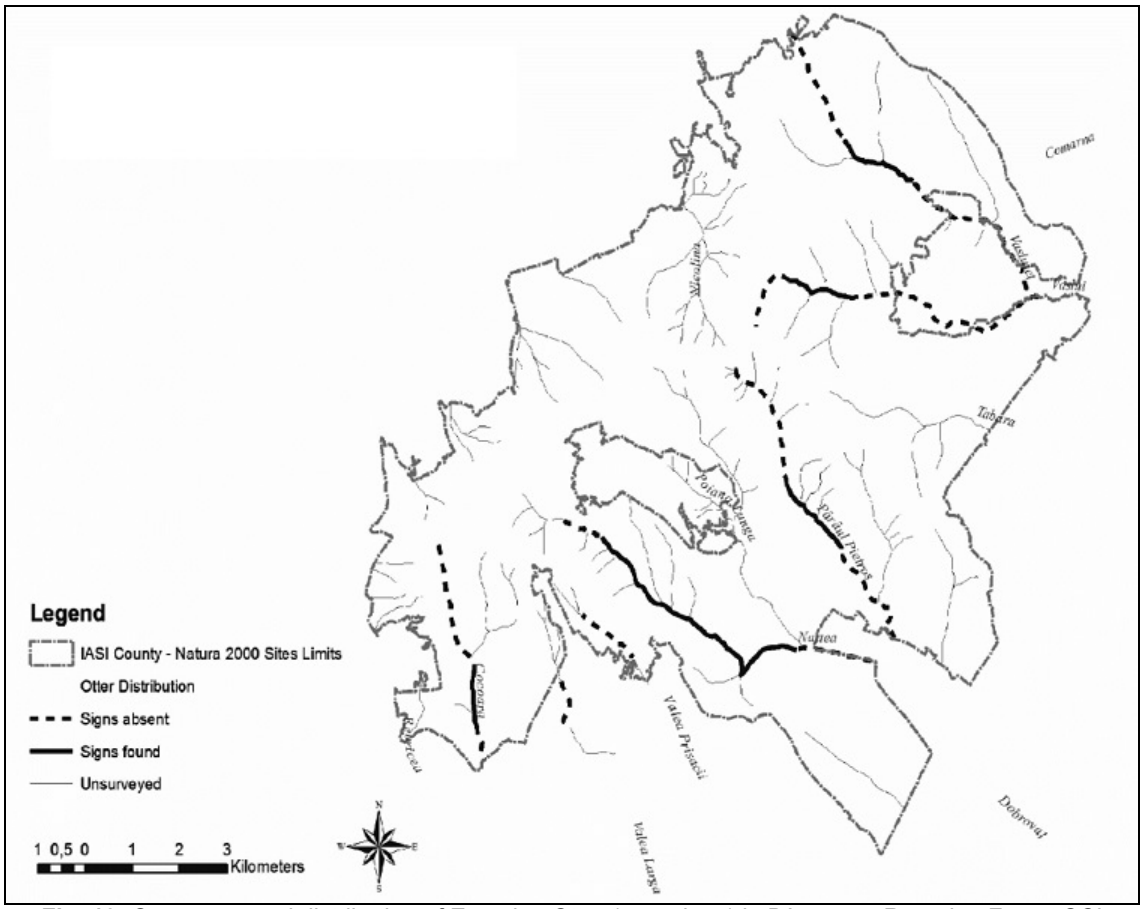

Fig. 19. Occurence and distribution of Eurasian Otter (*Lutra lutra*) in Bârnova – Repedea Forest SCI

A high trophic potential for Eurasian Otter was found in Nastea stream. Here I have been identified fish and crayfish species represented by: gudgeon (*Gobio gobio*), european chub (*Squalius cephalus*) in **Fig. 18** and European crayfish (*Astacus astacus*) in **Fig. 17**.

Amphibians are the most important trophic resource in Eurasian Otter diet in the study area, being distributed in all wetlands within the SCI Bârnova - Repedea Forest. Many insects and nymphs that are coming into otter diet have been identified, as those of the orders Ordonata, Plecoptera and Coleoptera. Nastea stream was the only one stream with high trophic potential, which could fulfill feeding necessities of the otter in all the.

The map from **Fig. 19** gives a good spatial image of the otter distribution in Bârnova – Repedea Forest SCI, we can observe easily that Nastea river has the longest river sector where Eurasian Otter was recorded.

Although this site has a dense hydrographic network, flow of the streams is very low, so we can not encounter a high diversity of aquatic species, on which depends the otter survival in this site.

CONCLUSIONS

Among all the signs of the otter presence, spraints were most easily identified, depending on the the age and their frequency we could identify the area of distribution of the Eurasian Otter.

Leaving the spraints in visible places it is part of the Eurasian Otter territorial behaviour [**10**], which is a method of marking the territory. The fact that in some areas was identified only one old excrement, means that the area is not part of its territory, areas frequently used by otters, have a large number of spraints (a latrine) in the marking places.

In our study areas, on certain streams, was a higher frequency of excrements, so we can say that the Eurasian Otter population is stable and resident here, the intensity of marking with excrements being an indicator of population size [**4**].

As a conclusion regarding the relationship between the frequency of marking of the territory and habitat characteristics, we observe that areas rich in food resources, mainly the existence of fish resources, have a high frequency of marking by excrements.

The Eurasian Otter presence in these two Sites of Community Interest (SCI), imposes rapid implementation of actions to improve the conservation status of the Eurasian Otter and its habitats.

The increasing number of Eurasian Otter and the territorial expansion of the population, requests a national distribution survey of Eurasian Otter population of Romania, which was not performed up to the present.

Eurasian Otter is listed in Anex II and IV of the Habitats Directive and is a species for which are necessary to be designated Sites of Community Interest and also is a species in need of strictly protection. Eurasian Otter, as Specis of Community Interest, must be introduced in all standard data forms of SCIs were its presence was confirmed. Also otter is a charismatic species and may become a valuable “tool” for conservation of aquatic species and habitats.

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REFERENCES

[*1*]. BĂDĂRĂU (A. S.), HULEA (D.), MURARIU (D.), STAICU (C.), PATRICHE (N.), CIUBUC (C.), 2013 – Catalogul habitatelor, speciilor și siturilor Natura 2000. 784 p. Publishing house: Edit. Fundaţia Centrul Naţional pentru Dezvoltare Durabilă. Bucureşti, Romania. [in Romanian]
[*2*]. CHANIN (P.), 2003 – Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10 English Nature, 64p. Peterborough.
[*3*]. CONROY (J. W. H.), CHANIN (P. R. F.), 2002 - The status of the Eurasian otter (*Lutra lutra*) in Europe — A review. IN: *Journal of the International Otter Survival Fund*, vol. 1 [Conroy W. H. et al. (eds.) - Proceedings of the first otter toxicology conference], pp. 7 - 28.
[*4*]. JEFFERIES (D. J.), 1986 – The value of otter *Lutra lutra* surveying using spraints: an analysis of its success and problems in Britain. IN: *Otters: Journal of the Otter Trust 1985*, vol. 1, No. 9, pp. 25 - 32. Nature Conservancy Council, Northminster House. Peterborough, United Kingdom.
[*5*]. LENTON (E. J.), CHANIN (P.R.F.), JEFFERIES (D. J.), 1980 – Otter survey of England. IN: *Nature Conservancy Council London*, vol. 197, pp. 7 - 79.
[*6*]. MACDONALD (S. M.), MASON (C. F.), 1994 – Status and conservation needs of the otter (*Lutra lutra*) in the western Palaearctic. IN: *Nature and Environment*, vol. 67, pp. 1 - 54.
[*7*]. MURARIU (D.), MUNTEANU (D.), 2005 – Carnivora. IN: *Fauna României. Mammalia*, vol.16, fasc. 5, 223 p. Publishing house: Editura Academiei Române. București, Romania. [in Romanian]
[*8*]. NEAMTU (M.), CIUMASU (I. M.), COSTICA (N.), COSTICA (M.), BOBU (M.), NICOARA (M. N.), CATRINESCU (C.), VAN SLOOTEN (K. B.), DE ALENCASTRO (L. F.), 2009 – Chemical, biological, and ecotoxicological assessment of pesticides and persistent organic pollutants in the Bahlui River, Romania. IN: *Environmental Science and Pollution Research*, vol. 16, No. 1 (Supplement), pp. 76 – 85.
[*9*]. PIȘOTA (R.), ZAHARIA (L.), DIACONU (D.), 2005 – Hidrologie. 255 p. Publishing house: Editura Universitară. București, Romania. ISBN 973-749-002-9 [in Romanian]
[*10*]. PRIGIONI (C.), REMONTI (L.), BALESTRIERI (A.), SGROSSO (S.), PRIORE (G.), MISIN (C.), VIAPIANA (M.), SPADA (S.), ANANIA (R.), 2005 – Distribution and sprainting activity of the Otter (*Lutra lutra*) in the Pollino National Park (southern Italy). IN: *Ethology, Ecology & Evolution*, vol. 17, No. 2, pp. 171- 180. DOI: 10.1080/08927014.2005.9522606.
[*11*]. REUTHER (C.), DOLCH (D.), GREEN (R.), JAHRL (J.), JEFFERIES (D.), KREKEMEYER (A.), KUCEROVA (M.), MADSEN (A. B.), ROMANOWSKI (J.), ROCHE (K.), RUIZ-OLMO (J.), TEUBNER (J.), TRINDADE (A.), 2000 – Surveying and Monitoring Distribution and Population Trends of the Eurasian Otter (*Lutra lutra*). IN: *Habitat*, vol. 12, page152.
[*12*]. ROMANOWSKI (J.) BRZEZIŃSKI (M) CYGAN (J. P.), 1996 - Notes on the technique of the otter field survey. IN: *Acta Theriologica*, vol. 41, No. 2, pp.199 - 204.
[*13*]. ***, 1992 – Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. IN: *Official Journal of the European Union*, No. L 206 (22 July 1992), pp. 7 – 50. Luxembourg.
[*14*]. ***, 2006 – Council Directive 2006/105/EC of 20 November 2006 adapting Directives 73/239/EEC, 74/557/EEC and 2002/83/EC in the field of environment, by reason of the accession of Bulgaria and Romania. IN: *Official Journal of the European Union*, No. L 363 (20 December 2006), pp. 368 – 408. Luxembourg.
[*15*]. ***, 2008 - Mutual management Romania-Republic of Moldova for biodiversity conservation on the border between the two countries. IN: *Buletin informativ*, No. 2. Edited by: Agenţia pentru Protecţia Mediului – Iaşi.
[*16*]. ***, 2011 - Formularul Standard Natura 2000 al ROSCI0076 Dealul Mare – Hârlău [in Romanian]
[*17*]. ***, 2011 - Formularul Standard Natura 2000 al ROSCI0135 Pădurea Bârnova – Repedea [in Romanian]
[*18*]. ***, 2011 – Ordin al ministrului mediului și pădurilor nr. 2387/29.IX.2011 pentru modificarea Ordinului ministrului mediului și dezvoltării durabile nr. 1964/13.XII.2007 privind instituirea regimului de arie naturală protejată a siturilor de importanță comunitară, ca parte integrantă a rețelei ecologice europene Natura 2000 în România. IN: *Monitorul Oficial al României, Partea I*, year 179 (XXIII), No. 846 (29 November 2011), page 11. București, Romania. [in Romanian]
[*19*]. ***, 2014 – IUCN Red List of Threatened Species. Version 2010.3 (available at www.iucnredlist.org - accessed on 21 January 2014)

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