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Influencing factors of the occurrence of otters on southern and south-western catchment of Lake Balaton

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Lanszki, J., Nagyapáti, N., Széles, L.G.: *Influencing factors of the occurrence of otters on southern and south-western catchment of Lake Balaton.*

Abstract: The aim of the study was to test the survey method of the otter (*Lutra lutra*), recommended by the IUCN/OSG on the southern and south-western catchment of Lake Balaton. The survey was performed in winter. 118 out of 144 surveyed locations showed positive presence (81.9%). The otters inhabited all studied stagnant waters (n=36, including 14 sections near Lake Balaton) while it occurred rarely in watercourses (n=108 sites, positive 75.9%). Occurrence of the otters was less frequent along narrower (especially <1 m) water courses, in shallow (<30 cm) water, with declining naturality of the bank side, at pipe bridge or bridge without berm and on the locations where the intensity of the human disturbances was high. The experiences can be used for the conservation program of the otter and in the habitat management plans. With 9 figures.

Keywords: *Lutra lutra*, Lake Balaton, survey, environmental factors, conservation plan

Introduction

The Eurasian otter (*Lutra lutra* Linnaeus, 1758) is an important species of the European Ecological Network. In the EU Habitat Directive (92/43/EEC) it is listed as a species in need of strict protection (Annex IV.), and also on the list of species of community interest whose protection requires the designation of special areas of conservation (Annex II. (a). It is a Natura 2000 indicator and a flagship species of nature conservation. Its European distribution data and population trends, as well as results of ecological research, strongly support the fact that the otter is a vulnerable species, an important indicator of wetland habitats and a keystone species too (Mason & Macdonald 1986, Kruuk 1995, 2006). The survival of its populations depends primarily on human activities. The otter conservation actions also assist the protection of other species and the important habitats for nature conservation.

In Hungary the otter was declared as legally protected in 1974, and since 1982 it has been a strictly protected species. According to the Hungarian Red Data Book (Rakonczay et al. 1989) it is currently endangered (for more details see Lanszki et al. 2006, 2007, 2008, 2009). However, in Hungary the otter is a countrywide distributed species (Kemenes 1991, 2005, Lanszki 2009, Heltai et al. 2012), can potentially occur in wetland habitat where fish supply is sufficient, and where waterside vegetation is suit-

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able for retreating. In Hungary the otter population has been considered to stable (HELTAI et al. 2012) with high level of genetic diversity (LEHOCZKY et al. in press).

In Hungary the most important otter habitats are artificial fishponds and fish-producing pond systems, bigger lakes, rivers, oxbow lakes and marshlands, because in these areas fish are available throughout the year. Small watercourses linking otter habitats are very important migration routes for the otters. In areas where food supply is insufficient, and vegetation is sparse, or the habitat dries up periodically, the otters show up occasionally. The occurrence of the otter and the condition of its habitats were investigated earlier on the catchments of River Dráva, River Kapos and the lower section of the Danube in Hungary (LANSZKI 2007, 2008a, 2008b, 2009), following the recommendation of the IUCN Otter Specialist Group (REUTHER et al. 2000). The aim of this study was to test the survey method of the otter, recommended by the IUCN/OSG on the southern and south-western catchment of Lake Balaton.

Material and methods

The survey was performed in February 2010 (south-western catchment of Lake Balaton) and between January 2013 and March 2013 (southern catchment of Lake Balaton), on the waterside and near the bridges if it was possible. There were 144 locations surveyed with one survey per location. The types of the habitats surveyed (and the number of cases in each of the localities) were as follows: 1 – Lake Balaton (14 localities), 2 – Small-Balaton, as marshland (15), 3 – fishponds (6) and angling ponds (1) as other stagnant waters, 4 – streams (89), canals (17) and River Zala (2) as watercourses. Geographic coordinates of the sampling sites were recorded by GPS.

The species-level otter population assessment and habitat evaluation is actually an adaptation of the Information System for Otter Surveys, as jointly recommended by the German Association for Otter Protection and IUCN/SSC Otter Specialist Group (REUTHER et al. 2000). This methodology was supplemented with certain evaluation criteria (e.g. steepness and vegetation coverage of the waterside) specified in the surveys by KEMENES & DEMETER (1994, 1995) in Hungary, and combined with experiences from otter monitoring and surveys (LANSZKI 2009).

In Central-Europe the otter is a predominantly nocturnal, secretive animal, therefore it can be observed only occasionally in the nature. The tracing of the otter occurrence is mostly done by primary signs, such as spraints (faeces), anal jelly, footprints, scratch marks, grass balls and otter holts or nests. Otter presence is positive if primary signs or other proofs of the otter were found. Otter presence is negative if no sign or proofs of the otter were found during a systematic survey in a minimum 600 m long riverside section. However, it does not mean that there are no otters living there, just indicates the absence of such signs.

We classified the evaluating of the waterside vegetation which was found within 2-3 metres of the edge of water. 1 – The barren waterside category means paved shoreline or the embankment of the streams or the irrigation canals what regularly mowed and there were no woody plants. 2 – The waterside is categorised as covered by sparse vegetation when it had short weeds, or is sparsely vegetated with taller plants, i.e. it lacked suitable shelter for the otters. 3 – The waterside had dense vegetation with thin patches which means it had a patchy mosaic of densely overgrown and sparsely vegetated areas. 4 – The waterside vegetation is categorised as dense vegetation covering large areas, because there were extensive, dense gallery forests, willow bushes, reedbeds or sedges on the waterside or adjacent to it.

On the basis of the naturalness of the wetland habitats, locations were categorised in three major classes. 1 – Near-natural habitat: covered with the typical vegetation of the wetland habitats, where the edge of the water was not transformed considerably, i.e. was near-natural. For example, a waterside had a mosaic of softwood gallery forest, willow bush, reed/sedge/cattail association, or a combination of these. 2 – Mixed type of habitat: near-natural and artificial elements were both present. 3 – Artificial (man-made) habitat: the waterside was intensively transformed, and there was no original vegetation or only traces of its existence. On some studied locations, which are also resort areas, there was a stream or a canal on, or between the high embankments of agricultural lands, or surrounded by intensively used pastures, or bordered by mown grass in the case of an angling pond.

The typical (average) width of the watercourses near the survey plots is recorded by estimation or by measurement taken on the bridge. Depth is measured on streams using a plummet, measuring stick or other simple device.

Anthropogenic (disturbance) effects are evaluated both separately (e.g. nearby settlements, traffic intensity, typical direct human/management activities, degree of naturalness of the area, pollution - one by one), and combined. The reason for going into details with combined disturbance is that particular factors can have significant effects on their own, or, on the contrary, even the combined effects of the several factors can be negligible. Disturbance effects are evaluated on a gradient with the following categories: 0 – undisturbed, 1 – slight, 2 – medium and 3 – major.

The survey of the bridges is important because of the revealing of the otter presence (REUTHER et al. 2000, GROGAN et al. 2001, CHANIN 2003). The major bridge types are as follows: 1 – bridges standing on pillars (piers) that traverse a river without influencing the shape of the river's bed; 2 – bridges with berms (raised banks of concrete, rocks or earth) on both river banks which are not flooded at normal water level; 3 – bridges with a berm on one riverbank which is not flooded at normal water level; 4 – bridges having no berm and offering no possibility to pass under the bridge out of the water at normal water level; 5 – bridges formed from pipes.

Surveys are basically made, as recommended in the IUCN minimum standard methodology, along a 600 m long waterside section. The location and the direction of surveying is recorded (underlined) on the surveying sheet. These data provide guidance for the next surveys to be performed, as well as for statistical evaluation. In some cases it is not possible to perform the survey on the entire 600 m length, due to the inaccessibility of certain sections (for example, the waterside has been built, closed down or is bordered by a wide and thick reedbed). Such deviations must be accurately indicated on the survey sheet. The differences between the two types of the bridges surveys (near the bridge, close proximity to the bridge) are as follows: When we research near the bridge, we walk 50 metres in four directions (up and down on both shores, so this is 200 metres). However, when we check close to the bridge, that means only few metres.

Detailed guides are available for field surveys (LANSZKI 2007, 2009). Data recorded by several different aspects on the studied areas. The Chi-square (χ^2) test was used for distribution analysis of the occurrences (positive or negative) according to examined variables. The SPSS 10.0 for Windows (1999) statistical package was used for data processing.

Results

118 out of 144 surveyed locations showed positive presence (81.9%) and there were no primary signs of the otters on 26 locations (18.1%). Location and evaluation of the study area are shown in Fig. 1. On 24 locations were found anal jellies (two of them were on the waterside of Lake Balaton (Fonyód, Fonyódliget).

Fig. 1: Locations are surveyed along the southern and south-western catchment of Lake Balaton, Hungary. 10 x 10 km UTM map, + – positive occurrence, - – negative occurrence

Otter was found to be present in 75.9% of watercourse locations surveyed, while in all of the stagnant water locations (Fig. 2). Significant difference in the otter presence distributions was found depending on habitat type ($\chi^2_3 = 10.58$, $P < 0.05$).

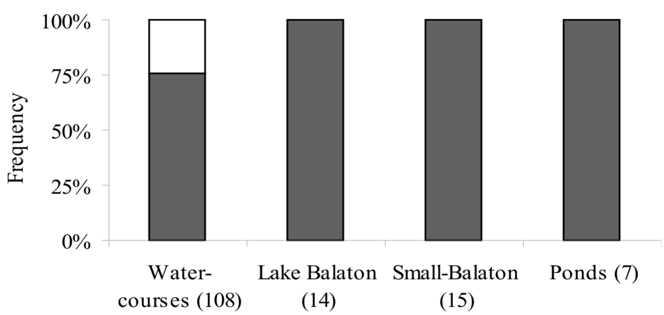

Fig. 2: Otter occurrence in relation to habitat type. Grey colour – positive occurrence, white – negative occurrence. Numbers in brackets show numbers of locations surveyed

The occurrence of the otter was higher (χ^2_3 = 15.40, P < 0.01) near the wider watercourses (Fig. 3), while near less than 1 metre-wide watercourses the occurrence was lower (62%). Those watercourses which were wider than 2 metres, we found primary signs in all cases. Similarly, the occurrence of the otter was higher (χ^2_2 = 27.87, P < 0.001) near the deeper water (χ^2_2 = 27.87, P < 0.001) (Fig. 4). Near the swallow water areas (less than 30 cm), the positive occurrence was 62.3%.

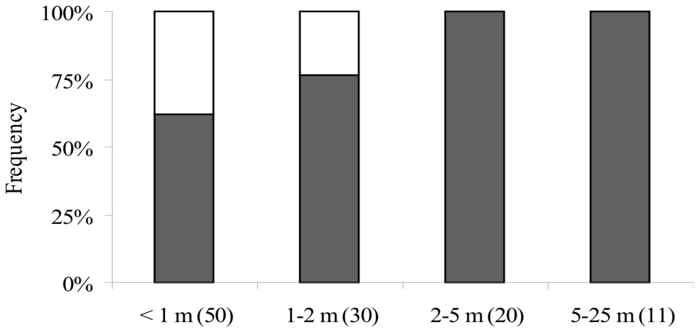

Fig. 3: Otter occurrence in relation to width of watercourse

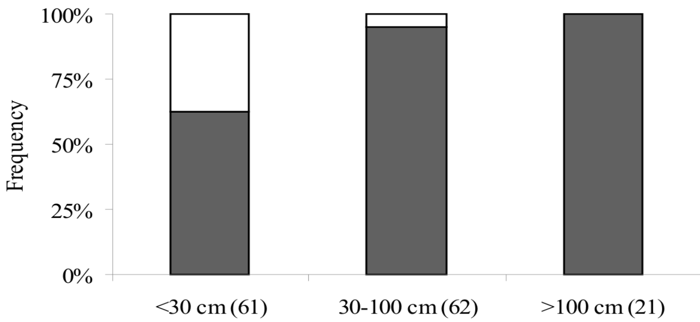

Fig. 4: Otter occurrence in relation to depth of water

Usually, the coverage of the waterside vegetation had a positive effect on the occurrence of the otter. However, this survey shows, the positive occurrences – despite of the different of the classes (χ^2_3 = 12.36, P < 0.01) – was high regardless of that one (71.8-95.3%, Fig. 5).

The occurrence of the otter was the highest on the near natural areas (Fig. 6). This occurrence was reducing together with the coverage of the naturalness waterside vegetation (χ^2_2 = 9.41, P < 0.01).

As the degree of the summarised effect of anthropogenic disturbances grew, the cases of negative occurrence increased (Fig. 7; χ^2_3 = 16.11, P < 0.01). The high value of the positive occurrence (78.9%) at medium-level disturbance shows, the otter has a considerable adaptability (tolerance).

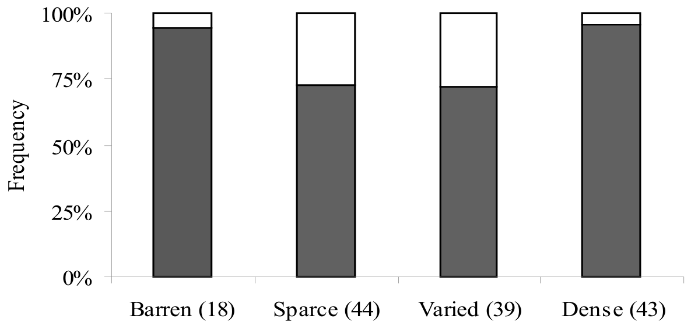

Fig. 5: Otter occurrence in relation to vegetation coverage

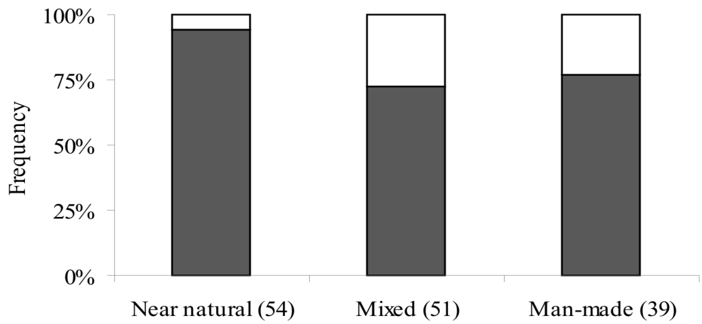

Fig. 6: Otter occurrence in relation to the status of vegetation at the waterside

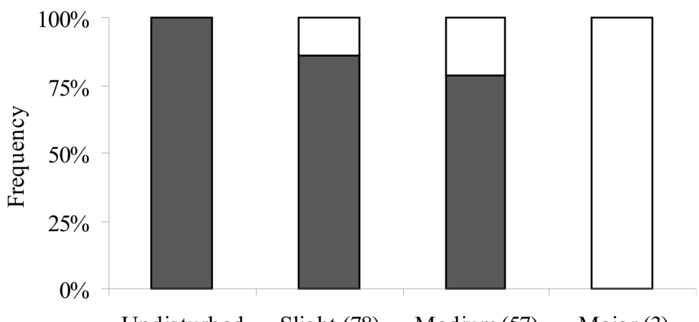

Fig. 7: Otter occurrence in relation to summarised effects of disturbance

On 30 out of the 144 locations that we studied, we carried out surveys near the lakes or ponds (not the bridges), and all of these places primary signs were found (Fig. 8). The occurrence of the otter was more than 95% near the wide bridges with pillars, or with berms (on one or two sides). While the occurrence was significantly ($\chi^2_5 = 33.87$, $P < 0.001$) lower near the bridges without berms/landing points (61.0%) and pipe bridges (57.9%; Fig. 8).

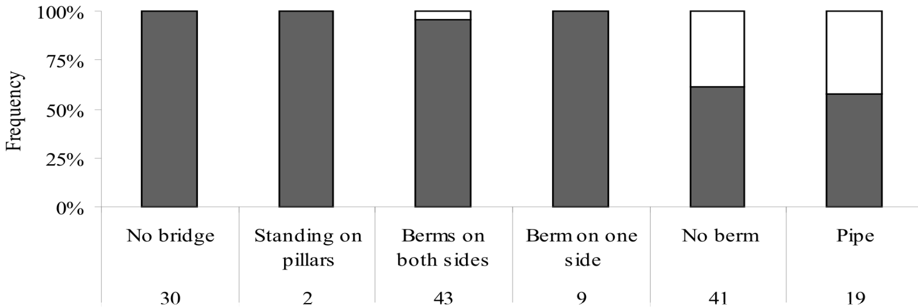

Fig. 8: Otter occurrence in relation to bridge types (surveyed locations)

Depending on the method of the survey (and the length of the surveyed waterside), difference between the distributions was significant ($\chi^2_4 = 13.11$, $P < 0.05$). On the optimal length (600 m) or more (average 1210 m), the positive occurrence was 100%, and on the waterside, which had less than 600 metres length (average 344 m), that was 96.2% (Fig. 9). We studied most of the locations (n=96) only near the bridges (200 m) or close proximity of the bridges. The positive occurrence was 77.5% and 71.4% in these cases.

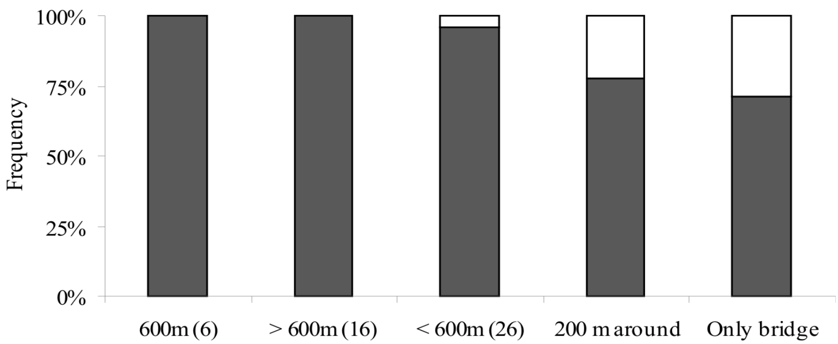

Fig. 9: Otter occurrence in relation to length of section surveyed (survey method)

Discussion

This study shows the condition of the southern and the south-western catchment of Lake Balaton in that given moment. We performed our survey on 28 UTM squares (10x10 km; 5 locations in each squares). 118 out of the 144 locations showed positive occurrence of the otter. It is a high ratio, but lower than the other results (Balaton: 81.9%; previous surveys in total: 88.2%) of the South-Trans-Danube areas (River Kapos and Dráva and the lower section of Danube in Hungary; n=390 locations; LANSZKI 2009). The frequency of the positive occurrence points indicate that the otter population in the southern catchment of Lake Balaton maybe stable. High genetic diversity is supported by findings of molecular genetic studies having been performed in the area (LEHOCZKY et al. in press).

The occurrence of the otter was more frequent near the deeper and the wider watercourses, like the results of the previous Hungarian surveys (KEMENES & DEMETER 1994, 1995, LANSZKI 2009). As the vegetation coverage on the waterside grew, the occurrence of the otter (presence of otter signs) also increased; however, it was also high by Lake Balaton, on the shores paved with large stones. This result didn't show a big difference contrary to the surveys mentioned. When the human distribution increased, the negative occurrence also increased; however, the primary signs of the otters were frequent on the moderate disturbed area. These results show the adaptability of the otter in Hungary (KEMENES & DEMETER 1994, 1995).

It's important to do a survey on the closed area of the bridges, as the otter typically marks its territory where its marking lasts a long time (e.g. REUTHER et al. 2000). On those Natura 2000 areas in Britain, where the otter is marking species, the surveys mostly take place near the bridges (CHANIN 2003). In our study the negative occurrence was higher near the pipe bridges and bridges without landing points under the bridges. These bridge types show deficiencies (MADSEN 1998, GROGAN et al. 2001), and may increase mortality of otters caused by traffic (LANSZKI 2009).

These bridge types, which are important and critical lines for the otters, draw the attention to their deficiencies. These mistakes can be repaired later with the evolving / shaping of the lines under the roads and the environment of the bridges. The studied locations were near watercourses and bridges. In these locations we found less frequently primary signs than along stagnant waters. Most of the negative points were near the narrow watercourses (19 out of 26 locations are less than 1 metre wide) and the shallow watercourses (less than 30 cm), where the human disturbance (for example: transformed riverbank, intensive crop production and animal keeping, rubbishes near the bridges) was also considerable. The small watercourses are potential habitats (e.g. migration routes) for the otters. For nature conservation, the future monitoring of the condition of the decreased and modified watercourses – even with new survey methods (e.g. BARBOSA et al. 2003, MACKENZIE et al. 2005, MARCELLI & FUSILLO 2009, CIANFRANI et al. 2010), - is very important. It is also important to rehabilitate the watercourses. In our opinion, all of the small watercourses must be put under *ex lege* protection or must be designated a protected area with sustainable use of natural resources (category IV: IUCN 2015).

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