R E P O R T

EURASIAN OTTERS IN MICRO DAMS OF SOUTHERN BULGARIA: WHERE TO PLACE THE MONITORING ZONES?

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ABSTRACT: Ten micro dam sites were studied in Southern Bulgaria between 2005 and 2007. They were situated below 700 metres above sea level in the Upper Thracian Valley and the Sredna Gora mountain. All the bank perimeters, totaling 24.72 kilometres, were walked searching for otter spraint sites. Most of them were found in the area around the river inflow (n=53, 40.5%) followed by those near the wall of the dam (n=39, 29.8%). The other spraint sites were found in the two other zones of equal length in the middle part of the basins. The average levels of preference index showed the highest levels in the river inlet and dam wall zones. They were highest at the river inflow end, 1.6 (min-max=0.7–4.0) and a little lower near the wall, 1.2 (min-max=0.0–3.0). The middle zones of the basin were not so preferentially selected as spraint sites by otters, having index values about three times lower. We recommend otter monitoring at such basins to be focused on the areas close to the main river filling them.

INTRODUCTION

The Eurasian otter (*Lutra lutra*) occurs in a variety of habitats (Kruuk, 2006) that can be divided into two groups: – permanent (used throughout the year) and temporary (used for restricted periods) (Georgiev, 2005). The so-called "standard" method for otter population monitoring was developed for rivers (Reuther et al., 2000) where 600m lengths of river are selected at intervals of 5 – 8 km and searched for evidence of otter presence. Until now it has not been adapted for standing waters (Chanin, 2003), despite some data on the otter signs occurring around lakes (Erlinge, 1967, 1968) and large dams (Georgiev and Stoycheva, 2006).

The micro dam lakes of Bulgaria are man made otter habitats built mainly during the communist regime in the country (1944-1989). According to the accepted classification by Nankinov et al. (2004) used to calculate breeding numbers of water birds in Bulgaria, these structures have a mean water surface area of 10.3 hectares (min-max = 1.01–184.42 ha) and an average perimeter of 1463.05 metres (min-max = 367.85–16124.61 m). There are now over 2000 in number (Uzunov, 1982, Nankinov et al., 2004) and is one of the possible reasons for the growth of the national otter population in the 20th century (Spiridonov and Spassov, 1989). The micro dam density is highest in lowland areas there being, for example, about 4-5 basins (min 1-2, max 10-12) per one 10 x 10 UTM grid square in the Upper Thracian Valley. These dams create more living space for otters by converting the small temporary streams into

permanently usable sites. At the same time they enhance the carrying capacity of medium sized rivers by creating more suitable bank line and increase the "edge effect" between two ecotones. This improves the habitat for fish, thereby increasing fish number and diversity, which in turn provides more available food for both otters and man. This habitat mimics the old native landscape around Bulgarian rivers, such as large marshlands and flood forests, especially in the lowlands. Despite the high levels of poaching nowadays (Georgiev, 2007) these habitats are preferred by otters in Bulgaria (Georgiev, 2005). Standing waters are also preferentially selected by resident reproductive females otters for their natal holts (Liles, 2003).

Theoretically, otters can inhabit the micro dam basins in the south of Bulgaria during the whole year (all four seasons) depending on the human activities. At some dam sites, after harvesting the fish stocks, the owners open the dams and allow the impounded water to escape leaving only the original feeder stream flowing. This happens during the autumn/winter season when even a small river or stream has enough water to maintain a constant flow. Very often in Southern Bulgaria the winters are mild, and where standing waters exist they do not freeze (or freeze only for short periods). During colder winters, if the dam basin is still full of water, owners keep open holes in the ice to provide fresh air to the fish, or lower the water level beneath the ice surface for the same reason. Such human activities support the otter by allowing access to water during the winter. Also, in areas with rich littoral vegetation, when the plant material breaks down and rots, thinner ice is observed in which otters can easily make holes. Such otter-made gaps were observed in roots of *Juncus* sp. (Borisov, pers.comm.) and *Typha* sp. (Dulev, pers.comm).

As it is obvious that micro dams create important otter habitats, they should be monitored for proper conservation of the species in Bulgaria. In this paper we want to answer the question as to where the monitoring transects of the "standard" method have to be undertaken when carrying out surveys in such habitats. According to Chanin (2003) priority has to be given to surveying sections most favoured by otters. As the spraints are known as the most frequent otter field signs we investigated otter site marking preferences in different parts of the micro dam basins in our survey area.

MATERIALS AND METHODS

Ten micro dam sites were studied in Southern Bulgaria between 2005 and 2007. They were situated below 700 metres above sea level in the Upper Thracian Valley (near the villages of Podlson, Konush, Zlato Pole and the town of Stara Zagora – Zagorka dam) and the low mountain of Stredna Gora (near the villages of Malka Vereya, Kolena, Starozagorski Bani, Matenitza, Starosel and Krastevich). All the perimeters, totalling 24.72 kilometres, were walked in a search for otter spraints. Only spraint sites were counted and their location noted. A spraint site was defined as a place where spraints were found at least 1m from other spraints (Kruuk et al., 1986). All marking sites found were mapped using a GPS receiver. Our study was focused on otter preference for placing their marking sites in four micro dam basin stretch units measured from the point of the river inflow to the centre of the dam wall using the computer programme Map Source (Garmin Inc., 2003) to calculate the centre line of the basin. The line was then divided into four equal parts numbered I, II, III, IV starting at the river inflow end and following the direction of water flow (Figure 1). Site preference (PI) for marking was determined using the Robel et al. (1970) index:

$$PI=OUPi/HAPi$$

Where OUPi is the observed proportion of marking sites in each site expressed as the number of spraint sites found in each site over the total number of sites, and HAPi is the proportion of each dam basin segment length studied over the total dam basin's length (Carugati et al., 1995). The Mann-Witney U-test was used to evaluate the statistical difference between two different areas at the micro dams for which spraint sites were totalled: the two central bank segments of the dam basins (2 and 3 in Fig. 1) against spraint sites at inflow and wall zone (1 and 4 in Fig. 1).

RESULTS AND DISCUSSION

A total of 131 otter spraint sites were recorded at the 10 micro dam basins surveyed. Most were found in the areas close to the river inflow (n = 53, 40.5%), followed by those near the wall of the dam (n = 39, 29.8%) (Table 1). The rest of the spraint sites were found in the two other equal length zones in the middle parts of the basins. The average levels of preference index showed highest levels at the river inflow zone: - 1.6 (min-max = 0.7 – 4.0) and a little lower near the wall: - 1.2 (min-max = 0.03-3.0) Table 1, Fig. 1). The middle zones of the basins were not so preferred as spraint sites having an average index level about three times lower. The two end zones (total results for all spraint sites at the inflow and wall zones on the one hand and in both central ¼ zones of the basins on the other) differed significantly (U-test, U = 26, *P* = 0.03). From all dam zones used in this study, spraint was always found in the zone covering the river inflow. The possible reasons for otter preference in marking the dam end zones and river inflow zones were proposed by Georgiev (2005) and Georgiev and Stoycheva (2006) – good bank slope, denser bank and littoral vegetation and low human disturbance, all of which favour holt site selection, plus the provision of a good food base. Also, Erlinge (1967, 1968) highlighted the running water between standing waters as important migration corridors for otters, which could explain the high marking density near the dam walls in our area.

Table 1. Micro dams in Southern Bulgaria surveyed for otter preference in spraint site selection. Each dam bank and water surface length, each ¼ zone length, number of spraint sites, and preference index per zone are given.

Micro dam	Bank line length [km]	Water surface length [meters]	Each zone lenth [meters]	Sprainting site number per zone				Preference index per zone			
				I	II	III	IV	I	II	III	IV
vill. Podslon	2.07	922	230.5	1	0	0	0	4.00	0.00	0.00	0.00
vill. Malka Vereya	0.92	347	86.8	2	1	1	3	1.14	0.57	0.57	1.71
vill. Kolena	3.43	1048	262.0	3	1	0	2	2.00	0.67	0.00	1.33
Zagorka dam	2.17	226	56.5	10	0	0	0	4.00	0.00	0.00	0.00
Starozagoski Bani	0.84	358	89.5	6	2	4	7	1.26	0.42	0.84	1.47
vill. Konush	2.92	1027	256.8	11	7	1	1	2.20	1.40	0.20	0.20
vill. Zlato Pole 1	2.66	1036	259.0	4	1	0	1	2.67	0.67	0.00	0.67
vill. Zlato Pole 2	4.60	2013	503.3	2	0	0	6	1.00	0.00	0.00	3.00
vill. Starosel	2.50	603	150.8	6	9	4	8	0.89	1.33	0.59	1.19
vill. Matenitza	1.22	466	116.5	1	1	2	2	0.67	0.67	1.33	1.33
vill. Krastevitch	1.39	428	107.0	7	3	2	9	1.33	0.57	0.38	1.71
Total/average	24.72	8474		53	25	14	39	1.62	0.76	0.43	1.19

Having these results, we searched for otter signs at the end zones on 42 micro dam sites in Southern Bulgaria (the Upper Thracian Valley, Sakar, Dervent, Sredna Gora

and Rhodopes mountains). We found spraint on 34 of them (81%) and no otter signs on 8 (19%). As the Bulgarian otter population is well known to be numerous over the last twenty years (Spiridonov and Spassov, 1989; Georgiev and Koshev, 2006), and the "standard" monitoring results interpretation states that having over 70% sites positive the population is in good condition (Chanin, 2003), we could conclude that surveying the end zones of micro dam basins is giving satisfying results. Accordingly we recommend otter monitoring at such basins to be focussed on the nearby river areas. The walls of the dams, which are readily accessible, can have priority, and only in case of a negative result need the next search involve the river inflow to the dam basin.

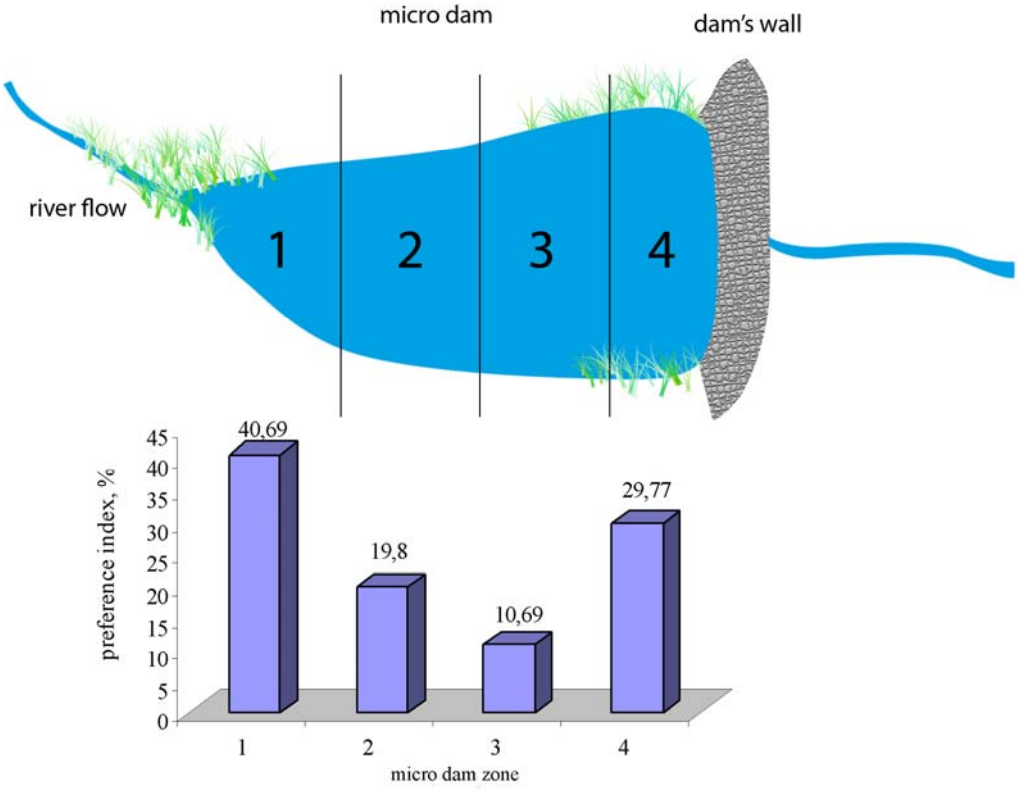

Figure 1. Plan of a micro dam basin separated into four equal units in length and the otter preference for placing spraint sites in each one of them (the mean values of the preference index was expressed as percent proportions for better visualisation).

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RESUME

LES LOUTRES EUROPÉENNES DANS LES MICRO BARRAGES DU SUD DE LA BULGARIE: OU DISPOSER LES ZONES DE MONITORING?

Dix sites de micro barrages ont été étudiés sans le sud de la Bulgarie entre 2005 et 2007. Ils sont situés à 700 mètres au dessus du niveau de la mer dans le haut de la vallée de Thrace et dans le massif de Sredna Gora. La totalité des berges a été étudiée à pied, soit 24.72 km, à la recherche de sites de marquage. La plupart d'entre eux ont été découverts le long des cours d'eau (n=53, 40.5%), puis d'autres près des barrages (n=39, 29.8%). Les autres sites de marquage ont été découverts dans deux autres zones de longueur égale au milieu des bassins. La moyenne des niveaux de l'index de préférence montre des valeurs plus élevées à l'arrivée des cours d'eau et sur les barrages. Elles étaient les plus élevées à la fin des cours d'eau, 1.6 (min-max 0.7-4.0), et un peu plus basses près des barrages, 1.2 (min-max=0.0-3.0). Les loutres ne déposent préférentiellement pas d'épreintes dans les zones au milieu des bassins, le valeurs de l'index y sont trois fois plus basses. Nous suggérons que le monitoring des loutres dans de tels bassins soit centré vers les zones d'afflux des rivières principales.

RESUMEN

NUTRIAS EURASIATICAS EN LAS MICRO PRESAS DEL SUR DE BULGARIA. DONDE COLOCAR LAS AREAS DE MONITOREO?

Diez sitios de micro-represas fueron estudiados en el sur de Bulgaria entre el 2005 y 2007. Estos estaban ubicados bajo los 700 m de altura en el Valle superior de Thracian y las montañas de Sredna Gora. Todo el perímetro de las riberas, el que totalizó 24.72 km, fue prospectado a pie para la búsqueda de fecas de nutrias. La mayoría de estas fueron encontradas en áreas alrededor del flujo del río (n=53, 40.5%), seguidos por aquellos ubicados en la pared de la represa (n=39, 29.8%). Fecas fueron también encontradas en otras dos zonas de igual longitud en la parte central de las cuencas. Los niveles promedio del índice de preferencia arrojaron los máximos niveles para la entrada del río y las áreas del muro de la represa. Ellos fueron mayores hacia el término de la entrada del río, 1.6 (min-max=0.7–4.0) y un tanto menor cercano al muro, 1.2 (min-max=0.0–3.0). Las áreas medias de las cuencas no fueron preferencialmente seleccionadas como áreas de defecación, teniendo valores de índice tres veces menores. Recomendamos que se realice monitoreo de las nutrias de esta cuenca poniendo mayor atención a las áreas cercanas a los ríos que llenan las represas.