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## THE OCCURENCE OF THE EURASIAN OTTER *LUTRA LUTRA* IN AQUATIC HABITATS OF DIFFERENT TROPHY IN WIGRY NATIONAL PARK

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**Abstract.** The standard method was used for the first field survey of the Eurasian otter *Lutra lutra* distribution in all aquatic habitats in Wigry National Park (WNP) in northern Poland. Total of 59 study sites (48 on lakes, 8 on rivers and 3 on drainage ditches) were visited twice between 12th and 18th of March and between 8th and 13th of May 2018. Signs of otters were found in 42 (71.2%) sites located throughout the whole area of Wigry National Park. The percentage of positive sites reached 100% in mesotrophic and eutrophic lakes as well as in rivers and meliorated canals. No signs of otter presence were recorded in dystrophic lakes located in the centre of peat-bogs. This marked difference in otter occurrence can be explained in the terms of different food availability: high in mesotrophic and eutrophic habitats and low in dystrophic lakes.

**Key words:** nature monitoring, otter survey, Wigry National Park.

### INTRODUCTION

After the decline of the European populations of the Eurasian otter *Lutra lutra* (Macdonald and Mason 1988, 1994; Mason 1989), the recolonization process was recently observed in several European countries including Poland (Kranz et al. 2001; Mason and Macdonald 2004; Romanowski 2006; Prigioni et al. 2007). Consecutive regional surveys carried out in central and eastern Poland in 1996–1998, 2003 and 2007 documented an increase in the percentage of otter occurrences in sites surveyed (Brzeziński et al 1996; Romanowski 2006; Romanowski et al 2013). Otters were especially common in the Lakelands in northern Poland, along the western and eastern country borders, and in Carpathian Mountains (SE Poland). So far, since the confirmation of the presence of otters in Wigry National Park during national otter survey in 1996–1998, no following regular surveys of the area were conducted. The only evidence of tracks or otters killed by traffic on roads in the area was collected in a casual manner. Therefore, the aim of this study is to examine the Eurasian otter occurrence in Wigry National Park in all aquatic habitats of different trophy.

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## MATERIAL AND METHODS

The study was undertaken in the Wigry National Park (151 km<sup>2</sup>) in north-eastern Poland. The area covers parts of the Masurian Lake District and Augustów Primeval Forest. The landscape, shaped by a glacier, is dominated by forests (95 km<sup>2</sup>) and aquatic habitats (29 km<sup>2</sup>), the remaining land is mostly agricultural. The aquatic network is well developed and includes 42 lakes of different size and trophy, including the largest lake Wigry, covering the area of 21.87 km<sup>2</sup>.

Data on otter distribution were collected by visiting a total of 59 study sites (48 on lakes, 8 on rivers and 3 on drainage ditches). Each study site was surveyed twice: between 12th and 18th of March and between 8th and 13th of May 2018. The standard otter monitoring technique was used to provide compatible results (Romanowski et al. 1996, Reuther et al. 2000). Each survey usually started at a bridge (if present at the site) and the maximum distance of 600 m was searched for the spraints (excrements) and clear tracks of otters (Lenton et al. 1980). If no otter signs were detectable, the site was considered “negative”. At the majority of sites, as soon as otter signs were detected, the site was classified as “positive” and further search was omitted. In all cases at least 200 m of river banks were surveyed to evaluate the characteristics of the site.

At each site type of aquatic habitat and availability of food resources were described according to national monitoring scheme (Romanowski et al. 2015). Data on the trophy and richness of fish species of lakes and rivers surveyed were obtained from Operat ochrony zasobów... (1999).

## RESULTS AND DISCUSSION

Signs of otters were found in 42 (71.2%) sites located throughout the whole area of Wigry National Park. Otters inhabited aquatic habitats located as well in strict reserves in the Park, as in agricultural and developed areas. This result corresponds well with earlier data on otter occurrence and habitat selection in central and eastern Poland (Romanowski 2006). The percentage of positive sites was very high (100%) in mesotrophic and eutrophic lakes as well as in rivers and meliorated canals (Table 1).

Table 1. Occurrence of otter signs in aquatic habitats in Wigry National Park

Habitat type	Number of study sites	Number of positive sites	Percentage of positive sites
Dystrophic lake	17	0	0
Mesotrophic lake	15	15	100
Eutrophic lake	8	8	100
Other lakes	8	8	100
River	8	8	100
Drainage ditch	3	3	100
Total	59	42	71,2

Dystrophic lakes located in the centre of peat-bogs (locally called “suchary”) were the only habitat where no signs of otter presence were recorded. This marked difference in otter occurrence can be explained in the terms of different food availability. The main prey of otters consist of fish, supplemented with amphibians and crayfish (Brzeziński et al. 2006; Jędrzejewska et al. 2001). The otter is a species in whose diet fish constitute a large share

(Macdonald 1990). Aquatic habitats of Wigry National Park are inhabited by 31 species of fish and 2 species of crayfish (Operat ochrony zasobów... 1999). The highest fish species richness was recorded in mesotrophic and eutrophic lakes (up to 28 species) and rivers (up to 18 species, Table 2).

Table 2. Characteristics of aquatic habitats surveyed for the presence of otters in Wigry National Park

No.	Name	Habitat type	Number of fish species	Inventory result
1	Białe Pierciańskie	mesotrophic lake	12	positive
2	Białe Wigierskie	mesotrophic lake	19	positive
3	Błotniste	lake	unknown	positive
4	Czarne near Gawrych Ruda	mesotrophic lake	unknown	positive
5	Czarne near Bryzgiel	mesotrophic lake	7	positive
6	Długie Wigierskie	eutrophic lake	18	positive
7	Gałężyste	lake	9	positive
8	Kłonek	mesotrophic lake	7	positive
9	Konopniak	dystrophic lake	1	negative
10	Królowek	eutrophic lake	14	positive
11	Krusznik	mesotrophic lake	12	positive
12	Leszczewek	eutrophic lake	11	positive
13	Mulaczysko	mesotrophic lake	12	positive
14	Muliczne	eutrophic lake	16	positive
15	Okrągłe	eutrophic lake	9	positive
16	Omułówek	eutrophic lake	10	positive
17	Pierty	eutrophic lake	18	positive
18	Pietronajcie	dystrophic lake	2	negative
19	Postaw	mesotrophic lake	10	positive
20	Przetaczek	lake	5	positive
21	Samle Duże	lake	9	positive
22	Samle Małe	lake	9	positive
23	Suchar Dembowski	dystrophic lake	2	negative
24	Suchar I	dystrophic lake	1	negative
25	Suchar II	dystrophic lake	4	negative
26	Suchar III	dystrophic lake	1	negative
27	Suchar IV	dystrophic lake	2	negative
28	Suchar Rzepiskowy	dystrophic lake	1	negative
29	Suchar V	dystrophic lake	1	negative
30	Suchar VI	dystrophic lake	no fish	negative
31	Suchar VII	dystrophic lake	1	negative
32	Suchar Wielki	dystrophic lake	5	negative
33	Suchar Wschodni	dystrophic lake	2	negative
34	Suchar Zachodni	dystrophic lake	no fish	negative
35	Sucharek near Bryzgiel	dystrophic lake	2	negative
36	Ślepe (Krzyżańskie)	mesotrophic lake	no fish	positive
37	Ślepe (Zielone)	dystrophic lake	no fish	negative
38	Wądołek	dystrophic lake	1	negative
39	Widne	eutrophic lake	6	positive
40	Wigry	mesotrophic lake	28	positive
41	Wygorzele	dystrophic lake	no fish	negative
42	Czarna Hańcza	river	17	positive
43	Gremzdówka	river	no fish	positive
44	Kamionka	river	18	positive
45	Maniówka	river	9	positive
46	Piertanka	river	9	positive
47	Wiatrołuża	river	9	positive

Data on number of fish species after Operat ochrony zasobów... (1999).

In contrast, dystrophic lakes in the area are inhabited by low numbers of fish representing maximum five species (Operat ochrony zasobów... 1999). Their water contains high amount of humic acids – organic substances created during the decomposition of the foliage and soil rinsed from the surrounding coniferous forests. Therefore the water in the dystrophic lakes is acidic or slightly acidic. The majority of dystrophic lakes in the Wigry National Park are characterized by the presence of the anaerobic zone starting at the 2.5 m depth and containing hydrogen sulfide (Operat ochrony zasobów... 2014). These water characteristics result in low number and species composition of fish and therefore are not permanently colonised by otter. Consequently, in order to demonstrate the potential infrequent appearance of the otter in this type of water reservoirs, it is necessary to use different inventory methods, such as thermal imaging cameras and photo-traps.

Otter presence on the examined drainage ditches indicates that they function as migration corridors for the species in the park area. All drainage ditches were created in the period preceding the creation of the park. Currently their total length in the Wigry National Park is 19.5 km (Operat ochrony zasobów... 2014), with the average width of about 0.5 m. They are usually not considered as optimal food sources and therefore are settled by otters only after saturation of optimal habitats, i.e. in conditions of high population size (Romanowski et al. 2013).

## CONCLUSIONS

The mutual conditions between the various components of the Wigry National Park lake ecosystems are variable in time and space (Operat ochrony zasobów... 1999). The main reason for this variability is the succession of lakes resulting from eutrophication. In the case of the Wigry National Park, the species diversity and abundance of fish decide on the area settlement by the otter. Therefore, all rivers and lakes, excluding dystrophic ones, are inhabited by otter. This species penetrates evenly the waters banks, regardless of the degree of anthropopressure of the studied area. Despite the fact that the banks cover with tree vegetation and forest cover are high for all rivers and lakes, including dystrophic lakes, these are not the parameters of the habitat condition that are evenly affecting the presence of otters. In the case of non-draining dystrophic lakes, it is surrounded by high-growing forest covering these lakes from the wind, shading their surface and directly acidifying water. In general, in most dystrophic lakes of the Wigry National Park, hydrochemical habitat conditions favour the maintenance of the disharmonicism of the analysed group of aquatic ecosystems, which affects the small species diversity of fish as the basic otters food. For this reason, dystrophic lakes are the only water reservoirs in the Wigry National Park not inhabited by otters.

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## WYSTĘPOWANIE WYDRY *LUTRA LUTRA* W ŚRODOWISKACH WODNYCH O RÓŻNEJ TROFII W WIGIERSKIM PARKU NARODOWYM

**Streszczenie.** W pierwszych badaniach terenowych wydry euroazjatyckiej *Lutra lutra*, prowadzonych w Wigierskim Parku Narodowym (WPN) w północnej Polsce, zastosowano metodę standardową we wszystkich siedliskach wodnych. Łącznie 59 miejsc badań (48 jezior, 8 rzek i 3 rowy odwadniające) było odwiedzanych dwa razy między 12 a 18 marca oraz między 8 a 13 maja 2018 r. Ślady bytowania wydry stwierdzono w 42 (71,2%) miejscach na terenie Wigierskiego Parku Narodowego. Odsetek miejsc z pozytywnymi stwierdzeniami osiągnął 100% w jeziorach mezotroficznym i eutroficznym, a także w rzekach i kanałach melioracyjnych. W jeziorach dystroficznym położonych w centrum torfowisk nie stwierdzono oznak obecności

wydry. Tak znaczną różnicę w występowaniu wydry można wytłumaczyć różną dostępnością pokarmów – wysoką w siedliskach mezotroficznym i eutroficznym, niską w jeziorach dystroficznym.

**Słowa kluczowe:** monitoring przyrody, inwentaryzacja wydry, Wigierski Park Narodowy.

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