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SPATIAL - TEMPORAL DISTRIBUTION OF THE EURASIAN OTTER (*Lutra lutra*) POPULATION SOMOVA AQUATIC COMPLEX - PARCHEȘ, ROMANIA

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Abstract

The purpose of this study was to obtain information about otter population in terms of spatio-temporal distribution, abundance and/or density and other ecological characteristics of the otter population in the Somova - Parcheș aquatic complex. Because the otter is a solitary, nocturnal animal with a large distribution area, direct methods of assessing population numbers are difficult. That is why indirect methods were used in this study, such as: counting footprints, feces, latrines, territory marking places. The abundance of presence signs is considered a measure of the activity of the species. During the study period, a number of 256 signs of presence were inventoried (spraints, jellies, footprints) and 2 specimens of otter were identified (1 dead adult and a live chick both found in fishing nets). The greatest abundance of presence signs is found on the wooded inner hills of the lacustrine complex. Starting from the west to the east of the complex we can consider 4 areas with a high density of signs of presence. The most abundant signs of presence were found in the winter season (33.2%).

Key words*: aquatic complex, eurasian otter, Somova - Parcheș, spraint.*

INTRODUCTION

The European otter is a top semi - aquatic predator, highly adaptable, which had a wide distribution across the Eurasian continent. Due to a complex of local and regional factors (such as habitat loss, pollution, and hunting) in the 1960s and '70s, populations of this species underwent a dramatic decline. Therefore, ongoing conservation efforts have been undertaken, either by restoring suitable habitats where populations have declined, or by reintroducing wild otters to areas from which they had disappeared.
Strict protection measures have led to some otter populations expanding and recovering naturally (Kruuk, 2006).
The Eurasian otter (*Lutra lutra*) is a territorial animal, marking and defending its territory against conspecific individuals. Their territories can vary depending on food availability and other vital resources. It is worth noting that otter territories can be affected by human activities, such as deforestation or water pollution, which can lead to conflicts between otters and humans or changes in their territorial behaviour. As semi-aquatic species, their distribution and density are influenced by all biotic and abiotic factors of both aquatic and terrestrial environments.
In Romania, the Eurasian otter is part of our country's wildlife. It is mainly found in mountainous and hilly areas, along rivers and streams with flowing water, where they find food and optimal habitats for shelter, reproduction, and raising their young.
It is recognized that the most important factor influencing the distribution and density of a wild population is food availability (Manly et al., 2002).
Legally, the European otter is a protected species in Romania, included in the annexes of the Bern Convention and the Habitats Directive. This entails conservation and habitat protection measures, as well as population monitoring to ensure their survival and well-being in the wild. Despite legal protection and conservation efforts, otters are still threatened by pollution, habitat degradation, territory fragmentation, and other disturbances caused by human activities. Thus, the continuation of conservation efforts and raising awareness of the importance of preserving natural habitats is crucial for the future of this species in Romania and across Europe. The aim of this study is to present aspects regarding the abundance and distribution of otter signs within the Somova -

Parcheș aquatic complex and to identify the main factors influencing this distribution.
This study used otter spraints densities to estimate the density of this population. Although this indirect method is less accurate and some authors consider it a poor method, it is still an effective method considering the elusive character of the otter.
The increasingly used environmental DNA (eDNA) appears effective to detect cryptic aquatic species (Yonezawa et al., 2020).
However, DNA degradation over time and the time lag between species presence and eDNA sampling can also lead to false negatives (Barnes et al., 2014).
Therefore, the search for presence signs remains a powerful method for detecting species presence (Lerone et al., 2015). Also, there are studies where it has been shown that there are high correlations between the number of genotyped individuals and the number of spraints ($r^2 = 72$, after Lanszki et al., 2008).

MATERIALS AND METHODS

Study area

The study was carried out between 2019 and 2022 and 252 transects were surveyed.
The study area is represented by the aquatic complex Somova - Parcheș, part of the Danube Delta included in the Danube Delta Biosphere Reserve. It is also part of the site of community importance ROSCI 0065 (Figure 1).
The Somova - Parcheș aquatic complex is an important ecosystem in Romania, located in Tulcea County, in the southeastern part of the country. This aquatic complex is part of the Danube Delta, one of the largest and best-preserved deltas in Europe.
Scientifically, the Somova - Parcheș aquatic complex is characterized by a variety of wetland habitats, including lakes, ponds, marshes, channels and streams, surrounded by reed and bulrush vegetation, as well as floodplain forests. These habitats provide optimal conditions for a wide diversity of plant and animal species adapted to aquatic environments.
The total area of the complex under free water circulation is S = 9170 ha.
The main types of habitats in the Somova - Parcheș aquatic complex are big lakes (19.3%), channels (3.8%), small lakes, shallow waters (~2.2%) (Török, 2006). The rest of the complex is covered predominantly by reeds (either in compact form or floating in association with trees and other vegetation) (~60%).
Also, 10.36% are forested areas, 2.72% meadows and 1.63% floating aquatic vegetation.

Data collection and analysis

For data collection, the linear transect method was employed to observe various otter signs along the banks of waterways (including both lakes and channels). The transects had a length of 1200 meters. Otter presence signs encountered (such as jellies, spraints, and footprints) along with coordinates were recorded on a field datasheet. Additionally, the freshness of the feces, habitat characteristics, distance of signs from the water's edge and the type of substrate on which the sign was identified (sand, rock, soil, tree trunk) were noted.

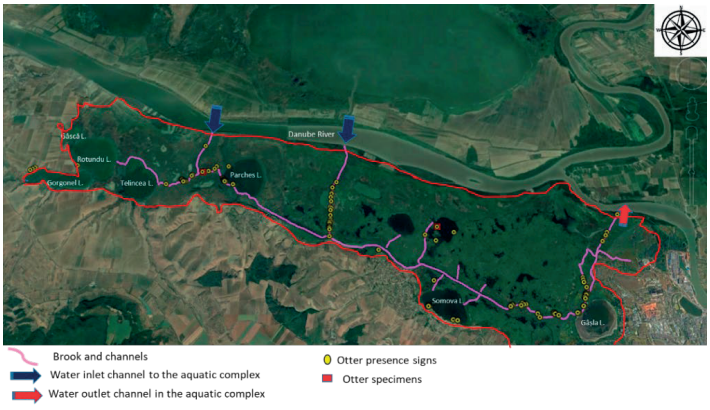


Figure 1. Map of the Somova - Parcheș aquatic complex and the spatial distribution of otter presence signs (processed in Google Earth Pro)

RESULTS AND DISCUSSIONS

A total of 256 presence signs of the studied specie were identified during the study period. The presence signs found included spraints, annal jellies, footprints and tracks in the substrate. Two specimens were also identified: a live cub caught in fishermen's nets (which was released) and a male specimen adult found dead and discarded on a brook (most likely found drowned in nets and then discarded by fishermen) (Figure 2).

Figure 2. Other signs of otter presence than spraints (original photos)

Spraints were the most abundant, found either individually or in latrines, representing 91.01% of the total signs. Footprints accounted for 4.69%, annal jellies for 2.34%, and tracks 1.17% (Figure 3).

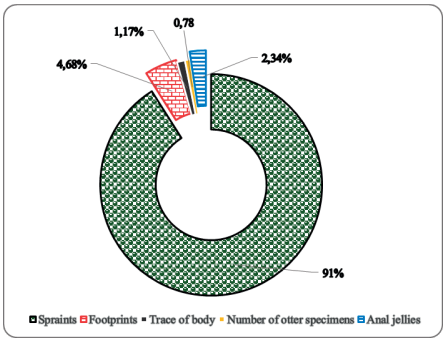
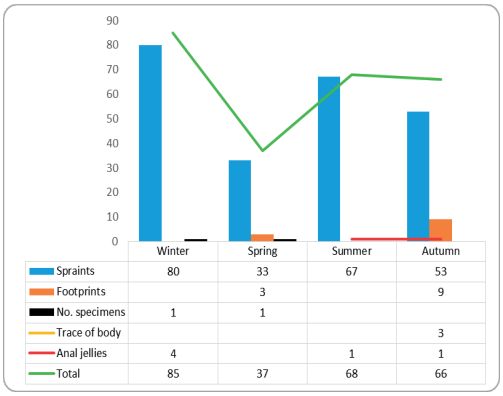


Figure 3. Abundance of presence signs

From the point of view of temporal distribution, the highest number of signs of presence was reported in winter and summer and the lowest number of signs in spring (Figure 4).



	Winter	Spring	Summer	Autumn
Spraints	80	33	67	53
Footprints		3		9
No. specimens	1	1		
Trace of body				3
Anal jellies	4		1	1
Total	85	37	68	66

Figure 4. Temporal distribution of presence signs

Somova - Parcheș is an aquatic complex with free water circulation.

The water coverage percentage of the complex depends on the levels of the Danube River.

The complex is flooded in the spring through the canals and backwaters that connect with the Danube and the main way of water circulation inside the complex is represented by the Somova backwater (an old branch of the Danube).

We consider the low abundance of otter presence signs in the spring was strongly influenced by this aspect because a large variation in the flow and water level leads to the washing of excrement (Charbonnel et al., 2015).

The two specimens were also found in the cold season (December, respectively the first days of March). The sub-adult specimen was found in the net by commercial fishermen (and released) and the adult specimen was found dead (by drowning) thrown on the water's edge (most likely it was also found in the fishing nets but was already dead).

The otter is an opportunistic species whose feeding behavior is determined by food abundance (Braña et al., 1993; Young et al. 2008) and according to optimal feeding theory it will hunt those prey that provide the most energy with the least search effort (Stephens & Krebs 1986). The opportunism of the species in terms of food procurement was highlighted by the fact that the identified specimens were found in fishermen's nets.

Based on the size of the otter tracks, which were measured and recorded, it was found that all the tracks belong to adult specimens (they were > 5 cm in size). The percentage of females was 58.33% and of males 41.67%. It is a high probability that it was included in the female population also some sub-adult males because at this age they have almost the same track size as the adult females (Bouroș, 2016).

44% of the total signs of presence were found on Lake Parcheș followed by Lake Câșla with 28.4%, Ivanova channel 17.69% and Lake Somova 9.87% (Figure 5).

Although, there are no significant differences in the abundance of signs of presence along the complex (from west to east) we can consider that we have three agglomerations of abundance: Lake Parcheș, Ivanova Channel, Câșla Lake (Figure 6).

Habitat features influence the abundance and availability of food, actually playing an important role in the ecology of this species, influencing: distribution, density, breeding period, reproduction success and mortality (Kruuk, 2006).

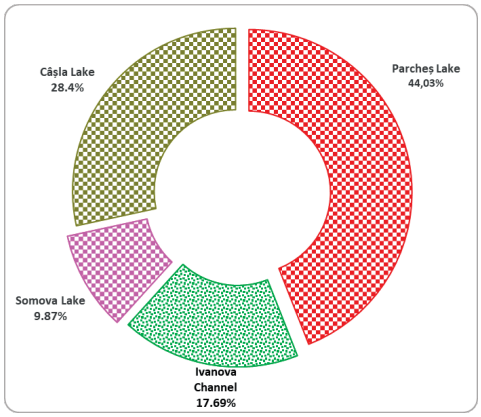


Figure 5. Abundance distribution of presence signs on the main lakes

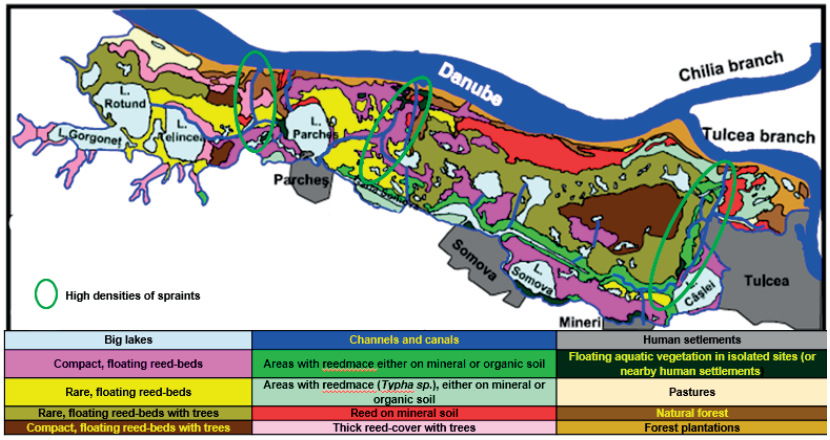


Figure 6. Spatial distribution of the main habitat types existing in the aquatic complex Somova - Parches (processed after Török, 2005)

By correlating the abundance of presence signs with the habitat types (Figure 6), we can see that they have the following characteristics in common:

- they are abundant on the brook and channels that maintain the connection between the aquatic complex Somova - Parches and the Danube River. This allows the otter to move easily between the lotic and lentic ecosystem depending on food availability. Remonti et al. (2008) found a positive correlation between fish consumption by otters, fish biomass and flow.
- the three aggregations are located in areas with a higher percentage of forest cover and woodland vegetation. Forests act as buffer zones, contributing to the improvement of physico - chemical water parameters (temperature, oxygen, pH). They also prevent the penetration of sunlight and precipitation, influencing the persistence of otter spraints (Biffi et al., 2019; Marcelli et al., 2012).
- all three zones are covered to a high percentage by dense floating reed beds, mixed with trees (or not), which, besides acting as

buffer and water purification zones, serve as feeding, resting, breeding, and nurturing shelters. Robitaille & Laurence (2002) demonstrated that areas covered with reeds have a strong positive influence on the densities of this species.

CONCLUSIONS

The Eurasian otter (*Lutra lutra*) is a top predator in aquatic ecosystems and plays a key role in its functioning. It is considered a bio-indicator species because its presence and abundance shows that it has something to eat and this means that that aquatic ecosystem has good water quality.

In the present study, the abundance of signs of presence demonstrates that the population of this species is well represented in the studied aquatic complex.

The aquatic complex Somova - Parcheș, through the multitude of habitats present, offers optimal conditions for the otter population both from the point of view of the surface of the complex but also of the vegetation and the abundance of food resources. The ichthyofauna of the complex is rich and diverse due to the permanent connection with the Danube River. Also, if the abundance of food resources and other conditions dictate it, the otter can easily migrate between the Somova - Parcheș aquatic complex and the Danube River.

In this complex he has no enemies except man. But human settlements are at a medium distance from its preferred habitats so this species can only come into conflict with commercial fishermen. In fact, the main anthropogenic impact on the population is only the interference between the activity of the fishermen and that of the otters (fishing gear placed on brooks and canals can lead to the catching and drowning of individuals).

Also, the high degree of coverage of the complex (with forest vegetation and reeds) positively influences the population of otters. Vegetated spaces are essential for otter populations that spend more than 50% of their time in woodland (Jefferies, 1986).

The Somova - Parcheș aquatic complex represents a vital aquatic environment for biodiversity conservation in the Danube Delta region and is essential for the survival and well-being of the otter population.

The protection and proper management of this ecosystem are particularly important for the conservation of nature and the maintenance of the ecological balance in the area.

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