THE CURRENT STATE OF COLONIAL WATERBIRDS IN SREBARNA MANAGED RESERVE

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Abstract: The colonial waterbirds in Srebarna Managed Reserve was studied in 2001-2003. The direct counting of individuals was used to estimate the number of breeding pairs. In Srebarna Reserve breed 13 colonial waterbirds (Pelecanus crispus, Phalacrocorax carbo, Phalacrocorax pygmeus, Nycticorax nycticorax, Ardeola ralloides, Egretta garzetta, Egretta alba, Ardea cinerea, Ardea purpurea, Plegadis falcinellus, Platalea leucorodia, Larus ridibundus and Chlidonias hybrida) distribute in five colonies. The total number of breeding pairs in 2002 and 2003 showed 50 % decrease of pairs compared to that of 2001. These differences are probably due to variations of the water level. The great decrease of breeding pairs was observed in the heronry. The less change was estimated in the colony of other bird species. The water level is an important factor for the number and distribution of waterbird species because it affects other environment factors such as the feeding sites and water surface area.

Introduction

The world-wide loss of wetlands has significantly increased the needs to manage these types of habitats to sustain their biodiversity especially that of birds. Many factors determine the viability of wetlands but the water depth proves to be the most important one [1-2]. The state of other wetland parameters like water surface area, suitable feeding sites, vegetation cover, depend, on the water level and the alteration of these parameters can affect bird species diversity and numbers [3-9].

The Srebarana Lake is situated in Northeast Bulgaria. It is a Ramsar site (1975), UNESCO biosphere reserve (1977), Monument of World Cultural and Natural Heritage (1983) and Important Bird Area (1990) due to its very rich bird fauna and particularly due to the breeding of the globally threatened species Dalmatian Pelican (Pelecanus crispus), Pygmy Cormorant (Phalacrocorax pygmeus) and Ferruginous Duck (Aythya nyroca). Many European and Bulgarian scientist were stimulated by the high bird diversity and mainly the permanent colony of the
Dalmatian Pelican and mixed heronry [10-17]. Comprehensive studies on the ornithofauna of the Srebarna Lake were carried out by Paspaleva-Antonova [18-19] and Michev [20-23].

The aim of this work is firstly, to examine the distribution of colonial waterbirds in the reserve and, secondly tried to look for the possible influence of the water column variations on the number of birds and their distribution.

Materials and methods

The research was carried out in the Srebarna Managed Reserve (902.2 ha). The lake is situated at the Danube River, 18 km west of the town of Silistra, NE Bulgaria. In the northern part of the reserve is situated Devnia Island.

The observations were made during the breeding period (April-June) in 2001 - 2003. The census of the number of breeding birds in the colonies was made in the beginning of the reproduction period (April), when the nests were well discernable from the places with very good visibility. The observations of individual numbers which left the heronry were made in the breeding period (May) of three consecutive years (according to the method of Jozefik [24]. We also measured the average water column of the lake in the studied years. We examined the differences between the numbers of the breeding pairs in these three studied years according to t-test.

Results and Discussion

During the three-year study period a total of 13 colonial waterbird species were established in the Srebarna Managed Reserve. They belonged to three orders: Pelecaniformes (3 species), Ciconiiformes (8 species) and Charadriiformes (2 species). The data on the bird species composition and their participation percent (abundance) in the study area for 2001 - 2003 are shown in Table 1. In 2001 the highest number of breeding pairs (1599) was found and in 2003 - the fewest number (660). The three years differ not significantly from one another in number of breeding pairs ( 2001-2002: t = 1.44, p = 0.16; 2002-2003: t = 0.33, p = 0.74; 2001-2003: t = 1.71, p = 0.09). In 2001 fifty percent of the breeding pairs were Cormorants (*Phalacrocorax carbo*) and Pygmy Cormorants, in 2002 – Cormorants and Dalmatian Pelicans but in 2003 – there was only one species – Cormorant. The highest abundance for the three years has the Cormorant, Pygmy Cormorant, Dalmatian Pelican and Little Egret (*Egretta garzetta*) (Fig. 1). The dynamics of colonial waterbird numbers for the studied period is shown in Fig. 2.
The thirteen colonial waterbirds were distributed in five colonies in different parts of the reserve (Fig. 3). The mixed heron colony situated in the northern part of the reserve (so-called Babushko blato) was the most numerous one. It comprised nine species - Squacco Heron (*Ardeola ralloides*), Little Egret, Pygmy Cormorant, Night Heron (*Nycticorax nycticorax*), Gray Heron (*Ardea cinerea*), Purple Heron (*Ardea purpurea*), Great Egret (*Egretta alba*), Spoonbill (*Platalea leucorodia*), and Glossy Ibis (*Plegadis falcinellus*). In 2001 the colony occupied an area of 35 000 m². About 90 % of the nests were built on Gray Willow (*Salix cinerea*) trees and the rest - on reed-beds. In 2002 and 2003 the heronry was much dispersed compared to 2001 and this made difficult the estimation of the exact size of the colony. The most numerous species in the colony
for the three years are Pygmy Cormorant, Little Egret and Squacco Heron (Table 1). In 2001 the heronry comprised 62% of all colonial waterbirds while in 2002 and 2003 37% and 34%, respectively. The decrease of the breeding pairs in 2002 compared to 2001 was the highest for Pygmy Cormorant (80%), Purple Heron (80%), Squacco Heron (75%), Little Egret (70%) and Gray Heron (62.5%). The colonial bird species feed in the coastal parts of the lake and in the Romanian wetlands nearby. The evaluation of the number of individuals leaving the heronry during the day shows that as a whole in 2002 and 2003 there were more birds (644 and 495 respectively) which went to the Romanian wetlands than in 2001 (460).

Fig. 3. Spatial Distribution of Colonial Waterbird Species in Srebarna Managed Reserve (2001-2003): 1/ Mixed heron colony (2001); 2/ Cormorant (*Phalacrocorax carbo*) colony; 3/ Colony of Dalmatian Pelican (*Pelecanus crispus*); 4/ Colony of Whiskered Tern (*Chlidonias hybridus*); 5/ Colony of Black-headed Gull (*Larus ridibundus*)

The colony of the Cormorant is situated in the northern part of the reserve, on Devnia Island. The number of breeding pairs for the period 2001-2003 remains almost constant (Table 1). This is the species with the highest average number of breeding pairs (367) in comparison with other colonial species.
The colony of the globally threatened Dalmatian Pelican is situated on the floating reedbeds in the central part of the reserve. The nests are placed on the floating reed platform on an area of 120 m$^2$ and on the pile platform on an area of 24 m$^2$. The number of breeding pairs varied for the three studied years. The highest number was estimated in 2001 (128). The colony of this species comprises of 10% of all colonial waterbirds. For the first time in 2001 adult pelicans were observed to eat in central water parts of the reserve together with Cormorants just like Crivelli (1987) described for the Prespa Lake.

### Table

**Number of Pairs (N) and Abundance (N%) of Colonial Waterbirds in Srebarna Reserve, 2001-2003**

<table>
<thead>
<tr>
<th>Species</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>Mean 01-03</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N%</td>
<td>N</td>
<td>N%</td>
</tr>
<tr>
<td>Cormorant <em>Phalacrocorax carbo</em></td>
<td>400</td>
<td>26</td>
<td>350</td>
<td>44</td>
</tr>
<tr>
<td>Dalmatian Pelican <em>Pelecanus crispus</em></td>
<td>128</td>
<td>8</td>
<td>102</td>
<td>13</td>
</tr>
<tr>
<td>Pygmy Cormorant <em>Phalacrocorax pygmeus</em></td>
<td>300</td>
<td>20</td>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>Night Heron <em>Nycticorax nycticorax</em></td>
<td>100</td>
<td>6</td>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>Squacco Heron <em>Ardeola ralloides</em></td>
<td>200</td>
<td>13</td>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>Little Egret <em>Egretta garzetta</em></td>
<td>200</td>
<td>13</td>
<td>60</td>
<td>8</td>
</tr>
<tr>
<td>Great Egret <em>Egretta alba</em></td>
<td>12</td>
<td>0.8</td>
<td>3</td>
<td>0.4</td>
</tr>
<tr>
<td>Grey Heron <em>Ardea cinerea</em></td>
<td>80</td>
<td>5</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>Purple Heron <em>Ardea purpurea</em></td>
<td>50</td>
<td>3</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Glossy Ibis <em>Plegadis falcinellus</em></td>
<td>28</td>
<td>2</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Spoonbill <em>Platalea leucorodia</em></td>
<td>24</td>
<td>2</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Black-headed Gull <em>Larus ridibundus</em></td>
<td>35</td>
<td>2</td>
<td>40</td>
<td>5</td>
</tr>
<tr>
<td>Whiskered Tern <em>Chlidonias hybrida</em></td>
<td>42</td>
<td>3</td>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1599</td>
<td></td>
<td>815</td>
<td></td>
</tr>
</tbody>
</table>

The colonies of Whiskered Tern (*Chlidonias hybrida*) and Black-headed Gull (*Larus ridibundus*) are the sparsest ones. In 2001 the Whiskered Tern colony was situated on the leaves of the Water lily (*Nymphae alba*) on an area of approximately 40 m$^2$ in the western part of the reserve, but in 2002 – in the southeast part on an area of 25 m$^2$. Unfortunately, in 2003 the breeding of this species in the reserve was interrupted because of an unknown reason. For the studied period the Whiskered Tern colony comprised of 2% of all colonial bird species. In 2001 the colony of Black-headed Gull was situated in the northern part of the reserve in the so-called
Babushko blato while in 2002 breeding pairs were observed in the northern and southeastern part of the reserve. The nests are placed on old floating reed rootages and the average nest measurements (n = 10) are: nest height – 15.4 cm, nest diameter – 30.9 cm and diameter of cup – 13.5 cm. The nest material is old crumbled leaves of reed. For the first two years the average breeding pairs were 37.5, but in 2003 only 5 were observed.

The total number of breeding colonial waterbirds in 2002 and 2003 showed 50 % decrease of pairs compared to 2001 (Table 1). These differences could be probably due to variations of the water column. In May 2001 the observed water depth was 13.03 m (according to the Baltic system) and in May 2002 it was almost 1 m lower, i. e. 12.28 m, in 2003 the water column was 12.73 m. The changes in water depth obviously have an affect on the habitats and these changes influence the number of water birds in the reserve. The greatest decrease was observed in the heronry. The declining of water depth caused the disappearance of the shallow shore part of the reserve, which is the major feeding site for the heron species. As a result in 2002 the individuals that flew away to the Romanian wetlands increased by 184 individuals. Paspaleva-Antonova [18-19] also determines the reduction of the number of all species in mixed colony in comparison with the observation of [10] and [12]. According to her this was a result from the building of a dike (in 1949) between the lake and the Danube River, which interrupted the entering of Danube water in the reserve. The great role of water depth for the species from the heronry was demonstrated again in 1993 (the water column in the lake was 0.20 m), when the Pygmy Cormorant and heron species (without Glossy Ibis and Spoonbill) left the colony site and bred on the Devnia Island [25].

![Figure 4](image-url)

**Fig. 4.** Breeding Numbers of Dalmatian Pelican in Srebarna Managed Reserve in the period 1955-2003
The little changes in the number of pairs of the Cormorant colony in the three studied years is maybe due to the fact that the colony is situated on the Devnia Island and the breeding and feeding is not affected by the water level fluctuation.

The observed fluctuations (Table 1) in breeding numbers of Dalmatian Pelican are within the framework of between-year variations (Fig. 5). This is confirmed by [26] who found that the Dalmatian Pelican colony in Srebarna reserve is not influenced by the decreasing of depth of the water column. Crivelli [7] however declared that the water level and the degradation of nest islands are the most important factors affecting the spatial distribution of the breeding units of Dalmatian Pelican.

The variation in number and spatial distribution of Whiskered Tern and Black-headed Gull for the three studied years are probably due to the fact that something in their nesting and feeding habitats has changed during the years.

Conclusions

Obviously, water depth is an important factor for the number and distribution of colonial waterbirds because it affects other environment factors such as the feeding sites and water surface area. If the process of decreasing water level, which began in 2001 in the Srebarna Lake continue, we may expect that many of the species in heronry will disappear or their number will decrease to a great extent. But the different species have quite different responses to habitat changes and it is necessary to continue monitoring the numbers of waterbirds, the fluctuation in water column and the food condition, to enable the lake to be managed in such a way that the favorable conditions for birds will be maintained.

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References

12. Reiser, O. 1894. -In Commission bei CarlGerold's Sohn. 204
17. Geissler, K. 1962. -Der Falke, 9 (10), 327-331
19. Paspaleva-Antonova, M. 1961b. -Izvestiya na Zoologicheskiya Institut s Muzey, 10, 139-163

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