

STUDENT INITIATIVE CONTRIBUTION TO THE AVIFAUNA  
RESEARCH IN EASTERN SOFIA PLAIN FOR 2016

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**Abstract:** The following work presents the results of year-round avifauna monitoring of selected parts of Eastern Sofia plain, executed by mentor and members of students' Club Skorec, Faculty of Biology, Sofia University. The area was selected for its high biodiversity level, good accessibility and strong human influence on all habitats. A transect route with length of 55 km. was monitored twice every month by vehicle and partially by walking (the latter in the area of Ognyanovo reservoir). Information on species, numbers, behavior, weather conditions and conservation threats were gathered. As a result, we observed 117 bird species during 2016. The highest diversity was registered in the area of Ognyanovo reservoir (98 species). Monthly dynamics of species and number of individuals are also presented.

This research aimed to contribute to the biodiversity knowledge for Sofia plain, a valuable and highly urbanized nature area, but also to improve the research skills of the students in biology. Their involvement in scientific activities is very important educational and motivational tool, which should be included as an official activity option in the universities program. The monitoring of the area should continue in order to identify the full species lists and trends in their presence, the conservation threats and the possible solutions for them. The widening of the research period will also provide the opportunity for inclusion of new young research.

## INTRODUCTION

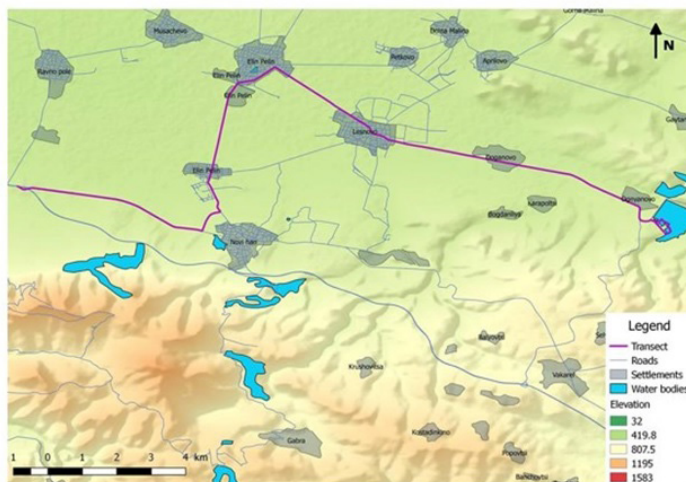
The geographic location of Sofia plain and the variety of habitats in the area are a prerequisite for large bird species diversity. The region lies along the second largest bird migration road in Bulgaria - Via Aristotelis. At the same time, the high human population density in the area largely impacts the territories, causing different ecological problems in many parts. Previous investigations of the avifauna in this area were made by Grozdanov and Delov (1995); Nankinov et al. (1998); Savova *et al.* (2016, 2017); Gerasimov (1993); Nankinov (1982); Sarov & Rogev (2004); Simeonov & Bogdanov (1967); Yankov (1983, 1984). Most of them are either outdated or were focused only on the water birds around Ognyanovo reservoir and do not include all seasons or longer periods.

This study represents a year-round study of the birds in the eastern parts of Sofia plain, including Ognyanovo reservoir. During this period, we aimed to characterize the species presence and their seasonal dynamics, to identify the environmental threats, and to involve university students in non-mandatory scientific activities, improving their experience.

## MATERIALS AND METHODS

During this study we selected a transect route with a total length of 54.86 km (Figure 1). It was monitored two times every month by vehicle and partially by walking (the latter in the area of Ognyanovo reservoir). Variety of habitats were included in this transect: urban fabrics, industrial, commercial and transport units; arable lands; permanent crops; heterogeneous agricultural areas; inland waters etc. Information was also gathered from bird sounds for broad-leaf forests. The habitat classes were defined according the CORINE Land Cover (CLC) nomenclature and the CLC 2012 shapefile. The transect, which was covered with vehicle includes 52.92 km. and was monitored while driving with an average speed of 30 km/h. The part walked by feet at the Ognyanovo reservoir was 1.94 km.

Observations were performed using specialized field optics - Nikon 10x50 binoculars, Nikon 25x50 spotting scope and photographic evidence was made with Canon DSLR cameras, equipped with Canon 70-300 and Canon 100-400 telephoto lenses. On terrain, data was collected in a field log, and all information was subsequently transferred to Microsoft Excel tables and a Microsoft Excel database created for the uses of the current research. Data on species numbers, weather conditions and conservation threats were gathered and grouped into different generalized categories. The information was analyzed by statistical software SigmaStat 3.5 (Systat Software, 2007) and the results were visualized with SigmaPlot 11.0 (Systat Software, 2008). Maps and GIS analysis were made with QGIS 2.18.10 (QGIS Development Team, 2017) and GRASS GIS 7.0.4 (GRASS Development Team, 2017).



**Fig. 1.** Map of the work region and the transect (marked with a purple line).

## RESULTS AND DISCUSSION

As a result of the present study, we identified 117 species of birds for 2016. The observed bird species and their monthly dynamics are presented in Table 1. Seven of those species (*Buteo buteo*, *Falco tinnunculus*, *Columba livia domestica*, *Streptopelia decaocto*, *Pica pica*, *Corvus monedula*, and *Carduelis carduelis*) were presented during the whole twelve months of the research period, while other species were observed seasonally, or in single instances.

The significant bird diversity of the region is influenced by the fact that this part of Sofia plain combines both habitats with heavy anthropogenic influence and habitats, suitable for wintering, breeding and resting of non-synanthropic species.

**Table 1.** List of the observed species for 2016, and their monthly presence.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Cygnus olor</i>	+	+								+		+
<i>Anser albifrons</i>	+											
<i>Anas acuta</i>										+		
<i>Anas platyrhynchos</i>	+	+				+	+	+	+	+	+	+
<i>Anas penelope</i>	+	+								+	+	+
<i>Anas crecca</i>	+											+
<i>Anas querquedula</i>								+				
<i>Aythya farina</i>	+										+	+
<i>Netta rufina</i>											+	+
<i>Coturnix coturnix</i>										+		
<i>Perdix perdix</i>	+											+
<i>Podiceps cristatus</i>	+		+								+	+
<i>Podiceps nigricollis</i>												+
<i>Tachybaptus ruficollis</i>		+							+	+	+	+
<i>Phalacrocorax carbo</i>	+	+	+	+		+			+	+	+	+
<i>Ardea alba</i>	+	+	+					+			+	+
<i>Ardeola ralloides</i>								+				
<i>Egretta garzetta</i>				+	+			+		+		
<i>Ardea cinerea</i>	+	+		+	+	+	+	+	+	+	+	+
<i>Ciconia ciconia</i>			+	+	+	+	+					
<i>Ciconia nigra</i>			+	+	+	+						
<i>Platalea leucorodia</i>						+						
<i>Plegadis falcinellus</i>							+					
<i>Aquila pomarina</i>				+	+		+	+	+			
<i>Pandion haliaetus</i>										+		
<i>Circaetus gallicus</i>									+			
<i>Hieraetus pennatus</i>				+	+							
<i>Circus aeruginosus</i>							+	+	+			
<i>Circus cyaneus</i>	+	+									+	+
<i>Buteo buteo</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Accipiter nisus</i>	+		+	+					+	+	+	+
<i>Falco tinnunculus</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Falco vespertinus</i>								+	+			
<i>Falco peregrinus</i>								+				
<i>Fulica atra</i>	+	+					+			+	+	+
<i>Gallinula chloropus</i>						+	+	+				
<i>Himantopus himantopus</i>				+		+						
<i>Charadrius dubius</i>			+	+		+	+					
<i>Vanellus vanellus</i>										+		
<i>Arenaria interpres</i>								+				
<i>Calidris alpina</i>								+	+			
<i>Calidris temminckii</i>								+				
<i>Actitis hypoleucos</i>			+	+			+	+				
<i>Tringa glareola</i>				+		+	+	+				

**Table 1.** List of the observed species for 2016, and their monthly presence.

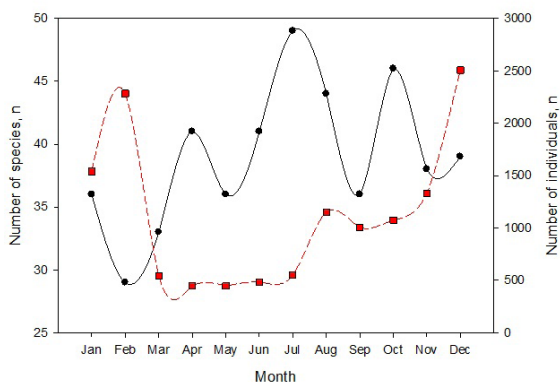
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Tringa ochropus</i>	+		+				+					
<i>Tringa nebularia</i>				+				+				
<i>Philomachus pugnax</i>				+								
<i>Chroicocephalus ridibundus</i>		+				+		+				+
<i>Larus michahellis</i>					+							
<i>Sterna albifrons</i>						+						
<i>Columba livia domestica</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Columba oenas</i>		+										
<i>Columba palumbus</i>	+					+	+				+	+
<i>Streptopelia decaocto</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Streptopelia turtur</i>						+	+					
<i>Cuculus canorus</i>					+							
<i>Apus apus</i>				+	+	+	+			+		
<i>Tachymarpis melba</i>				+								
<i>Alcedo atthis</i>										+	+	
<i>Upupa epops</i>			+									
<i>Merops apiaster</i>					+		+	+	+			
<i>Dryocopus martius</i>										+	+	
<i>Picus viridis</i>	+						+	+	+	+		
<i>Dendrocopos major</i>	+				+			+				
<i>Alauda arvensis</i>		+	+	+	+	+	+	+	+	+	+	+
<i>Galerida cristata</i>					+		+			+		
<i>Calandrella brachydactyla</i>							+					
<i>Riparia riparia</i>				+	+	+		+	+			
<i>Cecropis daurica</i>			+		+		+	+				
<i>Delichon urbicum</i>				+	+	+	+	+	+			
<i>Hirundo rustica</i>				+	+	+	+	+	+			
<i>Anthus campestris</i>										+		
<i>Anthus spinoletta</i>			+									
<i>Anthus trivialis</i>									+			
<i>Anthus cervinus</i>				+								
<i>Motacilla alba</i>			+		+	+	+	+	+	+		
<i>Motacilla flava</i>			+	+	+	+	+	+	+	+		
<i>Luscinia megarhynchos</i>				+								
<i>Oenanthe oenanthe</i>			+									
<i>Saxicola rubetra</i>									+			
<i>Turdus philomelos</i>			+									
<i>Turdus pilaris</i>	+											
<i>Turdus merula</i>	+							+		+		+
<i>Phylloscopus trochilus</i>								+	+	+		
<i>Sylvia communis</i>						+						
<i>Acrocephalus arundinaceus</i>						+	+					
<i>Phylloscopus collybita</i>								+				
<i>Muscicapa striata</i>								+				

**Table 1.** List of the observed species for 2016, and their monthly presence.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Parus major</i>	+	+		+				+	+	+	+	+
<i>Lanius excubitor</i>	+									+	+	+
<i>Lanius minor</i>							+					
<i>Lanius collurio</i>					+	+	+	+	+			
<i>Pica pica</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Garrulus glandarius</i>		+					+			+		+
<i>Corvus monedula</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Corvus corax</i>			+	+			+				+	+
<i>Corvus cornix</i>	+	+	+	+	+	+	+			+	+	+
<i>Corvus frugilegus</i>		+	+	+	+	+	+		+	+	+	+
<i>Oriolus oriolus</i>					+	+	+					
<i>Sturnus vulgaris</i>		+	+	+	+	+	+	+	+	+	+	+
<i>Passer domesticus</i>				+	+	+	+	+		+	+	+
<i>Passer hispaniolensis</i>				+	+	+	+					
<i>Passer montanus</i>		+	+	+	+		+	+	+	+	+	+
<i>Fringilla coelebs</i>	+								+	+	+	
<i>Fringilla montifringilla</i>	+	+								+	+	+
<i>Carduelis cannabina</i>	+	+	+	+			+			+	+	+
<i>Carduelis carduelis</i>	+	+	+	+	+	+	+	+	+	+	+	+
<i>Carduelis spinus</i>										+		
<i>Chloris chloris</i>	+			+	+	+	+				+	
<i>Coccothraustes coccothrauste</i>	+						+					
<i>Emberiza schoeniclus</i>		+	+							+	+	+
<i>Emberiza citrinella</i>	+	+				+				+	+	
<i>Emberiza melanocephala</i>						+						
<i>Emberiza calandra</i>			+	+	+	+	+			+		
<i>Gallinago gallinago</i>									+	+	+	
<i>Saxicola torquata</i>			+				+		+			
Number of species per month	36	29	33	41	36	41	49	44	36	46	37	38

The variations of the number of species and individuals during months/seasons are presented in Figure 2 and Figure 3. As expected, the species variety is higher during the migration periods, with July being richest in diversity due to the combination of breeding species and the first migrants. The largest numbers of individuals were counted during winter time. The latter fact is mainly connected to the species, which form typical large gatherings during wintering like Hooded crow (*Corvus frugilegus*), Jackdaw (*Corvus monedula*), Coot (*Fulica atra*), Brambling (*Fringilla montifringilla*), Goldfinch (*Carduelis carduelis*), Mallard (*Anas platyrhynchos*), etc. The highest diversity was observed around the Ognyanovo reservoir with a total of 98 species.

There are four peaks in the bird diversity, that correspond to the meteorological seasons, with highest numbers during the middle of each seasons (April, July, October and December), and the low points between the seasons. Most bird species were observed in July (49 species), and least in February (29 species).

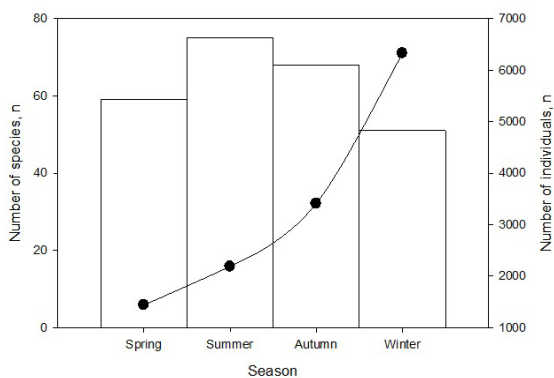


**Fig. 2.** Monthly number of observed species (black dots and black line) and number of all counted birds for each month (red squares and red dotted line).

From March to July the number of the individual birds remains relatively the same. With the beginning of the autumn migration in August there is a rise of the counted individuals. The highest numbers are during the wintering in December, when 2508 birds were observed.

The richest season for bird diversity is the summer (with 75 species) and the least rich season is the winter (with 49). The most birds were observed in the winter (with 6329 individuals) and the least in the spring (with 1439). From spring to winter there is a steep increase in the number of birds in the region.

These results can be explained by the fact that during the winter there is a lower expected bird diversity, because less typical species for the region spend the winter in Bulgaria. The wintering species formed large groups in the fields and the Ognyanovo reservoir waters, while during the breeding season most birds showed territorial behavior and dispersed on larger areas.



**Fig. 3.** Number of observed species for each season (white boxes) and number of all counted birds for each season (black dots and black line).

During the research, we identified two main groups of conservation threats: road connected deaths and tourists' exploitation of the Ognyanovo reservoir.

We observed three bird species that were killed on the roads (*Pica pica*, *Asio otus*, and *Sturnus vulgaris*). The traffic on the transect is heavy, and we suspect that many more birds fall victim to human vehicles.

Tourists use the reservoir for camping, fishing, water sports (both motorized and not). Also, there are many domestic and stray dogs, cats and pigs.

Studies in this region should continue in order for a complete checklist of the birds to be gathered. Furthermore, this would allow the tendencies of the population numbers to be observed and understood in connection to the anthropogenic influences and threats.

## CONCLUSIONS

A significant species diversity of the avifauna was found during the research in Eastern Sofia plain. The suitable habitats of the Eastern Sofia plain attract a number of species, some of which with conservational importance. There are many conservation threats in the region connected to the heavy traffic on the roads and because Ognyanovo reservoir is a popular tourist destination. Studies in this region should continue in order to gather a complete bird species list, to show trends and also to identify the environmental threats that could directly affect the biodiversity in Sofia plain.

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