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Research on nesting birds on the territory of Kaliakra Wind Farm

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Abstract. The study presents data about the status of the nesting ornithofauna in the region of Kaliakra wind farm (Kaliakra Cape, northeast Bulgaria). The data shows the number and the density of the birds observed in this region in 2005, before the construction of the wind farm, and in 2009 after it's commissioning. Transect method was applied to establish the species composition, numbers and density of the nesting birds. A total amount of 24 nesting species was established. In 2005 the recorded nesting bird species were 17, and in 2009 - 20. Although the number of nesting species in 2009 is slightly higher as compared to 2005, they were established in lower numbers and density. In May the density was lower compared to this in April. The data collected in May show about the same density for the two compared years.

Key words: nesting birds, wind farm, Kaliakra.

Introduction

Through the last years the alternative, renewable sources of energy are being the main aim in the economy of many countries. On the Black Sea coast the winds are relatively strong, with constant direction and are present through the whole year. The area of the study is located in one of the easternmost territories of Bulgaria. It encompasses the steppe territories from Balgarevo village to Kaliakra Cape. In this area is located the "Kaliakra" wind farm (Fig. 1).

The study presents data about the status of the nesting ornithofauna in the region of Kaliakra wind farm. The data shows the number and the density of the birds observed in this region in 2005, before the construction of the wind farm, and in 2009 after it's commissioning.

The publication summarizes the results, collected during the two month periods, from the years 2005-2009 in order to represents data about the birds, nesting in the area. The aim of the study is to establish the species composition and to characterize the nesting communities over the territory of "Kaliakra" wind farm

Another aim of the study was to clarify the effect of the wind farms in the area of Black Sea coast over the nesting birds.

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Fig. 1. Location of "Kaliakra" wind farm.

Material and Methods

The method used during the research is based on methods in the "Atlas of European Breeding Birds" (Ward et al. 1997) and "Bird Census Techniques" (Bibby *et al.* 1992).

Transect method was applied to establish the species composition, numbers and density of the nesting birds. The transects were 2150 m in length and their total area was 43 ha. The observations were made in April and May during the breeding season in 2005 and then in 2009.

The habitat is steppe phytocenoses along the Northern Black Sea Coast. An open low-grass steppe area with bushes or single bushes, with significant anthropogenic influence.

Results and Discussion

A total amount of 24 nesting species was established. In 2005 the recorded nesting bird species were 17, and in 2009 – 20. During April 2005 thirteen species were established and identified, during May 2005 the number of species recorded is fourteen.

During April 2009 the species were 15 and during May the same year the species recorded were 14. During May in both 2005 and 2009 the Red-backed Shrike (*Lanius collurio* Linnaeus, 1758) was not recorded in the previous month.

Although the number of nesting species in 2009 is slightly higher, they were established in lower numbers. The average density through 2005 was 26,98 p/10ha and during 2009 it drops to 19,54 p/10ha. Highest density rate was recorded during April 2005 – 40,93 p/10ha (Table 1 and Table 2).

Table 1. Density and dominant structure of birds during April. Legend: p - density of pairs per 10 ha; d - dominance.

№	Species	April 2005		April 2009	
		p/10 ha.	d	p/10 ha.	d
1	*Alauda arvensis* Linnaeus, 1758	11,63	28,4	1,86	7,72
2	*Melanocorypha calandra* (Linnaeus, 1766)	9,53	23,3	7,44	31,68
3	*Sturnus vulgaris* Linnaeus, 1758	6,74	16,48	4,88	20,79
4	*Calandrella brachydactyla* (Leisler, 1814)	5,35	13,07	0,23	0,99
5	*Oenanthe oenanthe* (Linnaeus, 1758)	2,09	5,11	1,16	4,95
6	*Passer domesticus* (Linnaeus, 1758)	1,86	4,54	0	0
7	*Burhinus oedicnemus* (Linnaeus, 1758)	1,4	3,41	0	0
8	*Cuculus canorus* Linnaeus, 1758	0,7	1,7	0	0
9	*Corvus monedula* Linnaeus, 1758	0,46	1,14	0	0
10	*Saxicola rubetra* (Linnaeus, 1758)	0,46	1,14	1,16	4,95
11	*Miliaria calandra* (Linnaeus, 1758)	0,23	0,57	2,56	10,89
12	*Upupa epops* Linnaeus, 1758	0,23	0,57	0,93	3,96
13	*Anthus campestris* (Linnaeus, 1758)	0,23	0,57	1,63	6,93
14	*Streptopelia turtur* (Linnaeus, 1758)	0	0	0,46	1,98
15	*Oenanthe isabellina* (Temminck, 1829)	0	0	0,23	0,99
16	*Pica pica* (Linnaeus, 1758)	0	0	0,23	0,99
17	*Luscinia megarhynchos* Brehm, 1831	0	0	0,23	0,99
18	*Carduelis carduelis* (Linnaeus, 1758)	0	0	0,23	0,99
19	*Passer montanus* (Linnaeus, 1758)	0	0	0,23	0,99
	Total:	**40,93**	**100%**	**23,49**	**100%**

Conservation status. From the established bird species in the area of the “Kaliakra” wind farm 7 are object of conservation of the wild birds in the territory of protection area “Kaliakra” BG0002051 - Calandra Lark (*Melanocorypha calandra*), Greater Short-toed Lark (*Calandrella brachydactyla*), Eurasian Thick-knee (*Burhinus oedicnemus*), Tawny Pipit (*Anthus campestris*), Red-backed Shrike (*Lanius collurio*), Lesser Grey Shrike (*Lanius minor*) and the Woodlark (*Lulula arborea*). Among them with highest density is the Calandra Lark with average numbers for the both years is 7,15 p/10ha.

Tree bird species are included in the Red Book of Bulgaria and two species are with protected status of “Vulnerable” - Eurasian Thick-knee (*Burhinus oedicnemus*) and Greater Short-toed Lark (*Calandrella brachydactyla*). One of the species is with status of “Endangered” - Calandra Lark (*Melanocorypha calandra*).

The species composition and the numbers of the birds in the territory of “Kaliakra” wind farm are close and identical to those of the ornitocomplexes in the similar habitats (Karaivanov, 2015; Karaivanov et all, 2006; Ivanov et all, 1998; and also Zehtindjiev, 2009: Monitoring of breeding birds on the territory of the wind farm "St. Nikola", Kavarna in 2009. Report AES Geo Energy, unpublished report).

The density of the nesting birds in 2009 was also much lower than in 2005, although the species composition is a little bit richer

In May the density was lower compared to this in April. The data collected in May show about the same density for the two compared years.

The species whose numbers have decreased the most are the Skylark (*Alauda arvensis*), the Short-toed lark (*Calandrella brachydactyla*) and the Calandra lark (*Melanocorypha calandra*). As opposed to 2005, in 2009 the Stone curlew (*Burhinus oedicnemus*) was not found to breed on the territory of the wind farm.

Table 2. Density and dominant structure of birds during May. Legend: p - density of pairs per 10 ha; d - dominance.

№	Species	May 2005 г.		May2009 г.	
		p/10ha.	d	p/10ha.	d
1	*Melanocorypha calandra* (Linnaeus, 1766)	7,21	55,37	4,42	28,36
2	*Alauda arvensis* Linnaeus, 1758	1,16	8,93	1,16	7,46
3	*Upupa epops* Linnaeus, 1758	0,46	3,58	0,46	2,98
4	*Sturnus vulgaris* Linnaeus, 1758	0,93	7,14	2,32	14,92
5	*Lanius collurio* Linnaeus, 1758	0,7	5,36	0,93	5,97
6	*Miliaria calandra* (Linnaeus, 1758)	0,23	1,78	1,16	7,46
7	*Oenanthe oenanthe* (Linnaeus, 1758)	0,23	1,78	0,7	4,48
8	*Streptopelia turtur* (Linnaeus, 1758)	0,46	3,58	0,23	1,49
9	*Pica pica* (Linnaeus, 1758)	0,23	1,78	0	0
10	Turdus merula Linnaeus, 1758	0,23	1,78	0	0
11	*Cuculus canorus* Linnaeus, 1758	0,23	1,78	0	0
12	*Burhinus oedicnemus* (Linnaeus, 1758)	0,46	3,58	0	0
13	*Anthus campestris* (Linnaeus, 1758)	0,23	1,78	0,46	2,98
14	*Calandrella brachydactyla* (Leisler, 1814)	0,23	1,78	1,63	10,45
15	*Oenanthe isabellina* (Temminck, 1829)	0	0	0,46	2,98
16	*Lanius minor* Gmelin, 1788	0	0	0,46	2,98
17	*Passer domesticus* (Linnaeus, 1758)	0	0	0,46	2,98
18	Emberiza melanocephala Scopoli, 1769	0	0	0,46	2,98
19	*Lulula arborea* (Linnaeus, 1758)	0	0	0,23	1,49
	Total:	**13,02**	**100%**	**15,58**	**100%**

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