

ARE RESULTS OF ENVIRONMENTAL MONITORING OF THE MIDDLE SPOTTED WOODPECKER (*LEIOPICUS MEDIUS*) INFLUENCED BY THE METHOD USED?

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ABSTRACT

The Middle Spotted Woodpecker is listed among bird species of European importance (Annex I of the Birds Directive) for which Special Protection Areas (SPA) are designated in forest habitats of Europe as a part of the Natura 2000 network. In one of these areas, in SPA Litovelské Pomoraví, a study of abundance of the Middle Spotted Woodpecker in a floodplain forest during the breeding season was investigated. The number of individuals counted at the point transect, using the standard method of monitoring of this species in SPAs in the Czech Republic, was assessed. The results of the standard method were compared with those obtained by the special playback technique. The latter method has increased the number of recorded individuals of the Middle Spotted Woodpecker considerably: twice in 2007 and 2008 and even three times in 2010. Authors discuss the reactions of the Middle Spotted Woodpecker to the reproduced recordings of its calls and differences in vocalisation in the Great and Middle Spotted Woodpeckers. Differences in vocalisation of juveniles of the Great Spotted and Syrian Woodpeckers are also shortly discussed. The importance of application of a proper method for population monitoring of the Middle Spotted Woodpecker in SPAs is suggested in the context of management of its breeding habitats.

KEYWORDS:

Point count method, playback technique, monitoring of Special Protection Areas, Natura 2000, Litovelské Pomoraví.

INTRODUCTION

The Middle Spotted Woodpecker (*Leiopicus medius*), distinctive in the forest bird community of forest ecosystems due to the signalling character of its colourful plumage [1], is considered to be a biological indicator of sustainability of management of lowland deciduous forests in the European temperate zone [2]. Presence and abundance of the Middle Spotted Woodpecker can be regarded an

indicator of the “wildlife-friendly” forest management [3]. The distribution of the Middle Spotted Woodpecker in forest habitats is markedly aggregated [4]. An extensive analysis of factors affecting the occurrence of the Middle Spotted Woodpecker based on the use of forest inventory data has shown that the proportion of old oaks in the stand and the uneven-aged structure of the forest are very important predictors of the species occurrence [5]. Despite the Middle Spotted Woodpecker prefers forests dominated by old oaks, the predictive model of habitat suitability in three forest types in Poland suggested that the species shows a certain level of flexibility in habitat use [6]. Due to its habitat preferences, the Middle Spotted Woodpecker is a good model species for predictions of shifts in the species distribution ranges in forest landscapes as a result of climate changes [7]. The Middle Spotted Woodpecker is listed in Annex I of the Birds Directive [8] as one of the species for which Special Protection Areas (SPAs) are designated in the European Union member states as a part of the Natura 2000 network. All SPAs established for the conservation of the Middle Spotted Woodpecker include deciduous lowland forests as a dominant habitat type, and the forest management is significantly influenced by the protection regime of the SPA [9]. Exact data on the presence and abundance of the Middle Spotted Woodpecker in old forest stands [10] are important not only for the establishment of SPAs but also for regular monitoring and planning of forest management focused on protected phenomena in the SPAs [11].

In the Czech Republic, altogether 7 SPAs were designated to protect the populations of the Middle Spotted Woodpecker in lowland forests [12]. For monitoring of the Middle Spotted Woodpecker in these SPAs, the standard point count method is used [13]. In one of these areas, in Litovelské Pomoraví [14], we compared the results of this standard method with the results of monitoring of the species based on the playback technique, using the reproduced recordings of its calls [15]. The aim of the study was to identify an optimal method of monitoring of the Middle Spotted Woodpecker in floodplain forests, which will provide more precise information on abundance of the

target species in the forest ecosystem. The reactions of the Middle Spotted Woodpecker to the reproduced recordings of its calls and differences in vocalisation of the Middle Spotted Woodpecker and other forest woodpeckers in the floodplain forest environment are also discussed in the paper. The importance of monitoring data on the Middle Spotted Woodpecker populations for the management of lowland deciduous forests in the temperate zone of Europe is stressed in the end.

MATERIAL AND METHODS

The Litovelské Pomoraví was designated as SPA in 2005 in order to protect the breeding populations of the Common Kingfisher (*Alcedo atthis*), Collared Flycatcher (*Ficedula albicollis*) and Middle Spotted Woodpecker. Totally, 239 bird species have been recorded in this SPA. Of them, 117 species breed in the area at present [16]. Hardwood floodplain forests are the prevailing type of forest ecosystem in the study area [17]. They reach 54 km² in size and are surrounded by intensively managed agricultural landscape of the Morava river alluvium. From the phytosociological point of view, the studied forest area belongs to the hardwood elm-oak floodplain forests of the *Quercus-Ulmetum* association, with local representation of willow shrubs of soil and sand deposits of the *Salicetum triandrae* association, softwood floodplain forests of lowland rivers of the *Salicetum albae* association and alder carrs of the *Calamagrostio canescentis-Alnetum* association [18].

Monitoring of birds using the point count method with a transect of twenty census points, delimited by the coordinates 49°42'19.38"N, 17° 6'4.35"E and 49°41'22.40"N, 17° 8'19.64"E, was carried out in the years 2005–2012. At each census point, acoustically and visually detected birds were recorded for the time interval of five minutes. Immediately after the five-minute observation was finished, a recording of the contact and territorial call of the Middle Spotted Woodpecker 47 seconds in length [19] was reproduced and the number of individuals of the Middle Spotted Woodpecker (as well as other woodpecker species) which reacted to the playback and the type of their reaction were registered. The research focused on Middle Spotted Woodpecker was carried out in the years 2007–2008 and 2010.

The statistical analysis of data was based on the assumption that for each monitoring period (2007, 2008 and 2010), the mean number of recorded individuals of the Middle Spotted Woodpecker per one census point would be higher using the playback technique (mean μ_1) than using the standard point count method (mean μ_2). To verify this assumption, the null hypothesis „Mean number of individuals of the Middle Spotted Woodpecker per

one census point is the same using both methods (i.e. $H_0: \mu_1 = \mu_2$)“ was tested against the alternative one-tailed hypothesis ($H_1: \mu_1 > \mu_2$), which is based on the above assumption. Since this is a test of equality of means of two dependent samples, the pair t-test was used for each monitoring period separately. The analysis was carried out using the Stata 12 program [20].

RESULTS

The playback technique has increased the number of recorded individuals (registrations) of the Middle Spotted Woodpecker (MSW). Only in the first monitoring period (2007), the mean number of recorded individuals was not significantly higher using the playback technique than using the standard point count method. In the other three monitoring periods, the difference in favour of the playback technique was statistically significant, at 90% (second measurement in 2007), 95% (2008) and 99% (2010) levels of confidence, respectively, see Table 1.

In the year 2008, the MSW reacted to the recording at 12 census points (60 %), at 9 of them by approaching and emitting an alarm call and at 3 points by approaching without vocalisation. In the year 2010 at the census point no. 9, three individuals of the MSW reacted to the recording: one only approached without vocalisation, another one with a contact call and the other with a territorial call. Besides approaching, the reactions of the MSW to playback often included the contact call „kik kik“, which was emitted sharply and in short intervals. Quite exceptionally, the MSW reacted using the croaky territorial voice. Only rarely we recorded single cases when the MSW was registered during the standard point count but did not react to the subsequent playback. The Great Spotted Woodpecker (*Dendrocopos major*) and Black Woodpecker (*Dryocopus martius*) reacted to the recording of the MSW only exceptionally.

DISCUSSION AND CONCLUSION

Breeding sites and fidelity of MSW to European temperate oak-dominated forests is in the focus of ornithological research [21]. In the Czech Republic, the courtship in the MSW occurs intensively during March and April. At that time, the species is conspicuous due to its territorial call [22]. There is recommended the turn of March/April to be suitable as the first period and the turn of April/May as the second period for the standard species monitoring. However, in forest habitats, the MSW is rather inconspicuous and quiet, it rarely drums and its determination is complicated by the similarity of its contact call with that of the Great

TABLE 1
Comparison of recorded individuals of the Middle Spotted Woodpecker using two different counting methods

Date of the counting	16. 4. 2007		14. 5. 2007		15. 4. 2008		26. 4. 2010	
Point number	N1	N2	N1	N2	N1	N2	N1	N2
1						1		1
2				1		1		
3		1			2	2		
4				1				1
5		1		2	2	2	1	1
6			1			1		
7	1	1		1				2
8	2	3				4		
9		2			2	2	2	3
10	1	1			2			
11	1		1			1	1	2
12			1	2				1
13			1			1		
14								
15				1				
16	1			1		1		
17	1							1
18						1		
19					1	1		1
20								
Total number	7	9	4	9	9	18	4	13
Mean number (μ_1 ; μ_2)	0,35	0,45	0,2	0,45	0,45	0,9	0,2	0,65
pair t-test	0,623		1,422		1,831		3,328	
(H_0 : $\mu_1 = \mu_2$) vs.								
(H_1 : $\mu_1 > \mu_2$)								
p-value for t-test	0,27		0,086		0,041		0,002	

(N1 = number of individuals recorded using the standard point count method, N2 = number of individuals recorded using the playback technique)

Spotted Woodpecker. Based on our field experience, during counts carried out in mid-April, the MSW uses the „croaky“ territorial call only rarely. E.g. in the Vrapac floodplain forest on 14 April 2007, we observed mating of the MSWs which did not show any vocal activity. At the turn of April/May, the species produces practically no territorial calls and its detectability decreases significantly. Therefore, the playback technique seems to be a suitable method for an objective assessment of its numbers.

When using the playback of MSW calls, we had the opportunity to compare the contact and alarms calls of the MSW and Great Spotted Woodpeckers. While the typical croaky territorial call of the MSW is unambiguous for species identification, determination of contact or alarms calls of the two species can be problematic. Glutz and Bauer [23] mentioned the one-syllable call „güg“ to be rather infrequent in the MSW, in comparison with the Great Spotted and Syrian Woodpeckers (*Dendrocopos syriacus*). These authors also mention that when disturbed (e.g. at a nest), the MSW produces a repeated row of syllables „geeg-gegegeg...“, which are higher pitched, shorter and louder. Based on our field experience, it seems that the MSW's call is a rather slow „kitkitkitkit“ or „kikkikkikkik“ and it sounds softer in comparison with other woodpeckers. The Great Spotted Woodpecker produces sharp and rather fast „kik“, or only one-

syllable „kik“ sometimes changing to rattling „trrrrr“. In the Great Spotted Woodpecker, the syllables are repeated in longer intervals and sound rather one-syllable. In the MSW, the syllables merge into a group and are connected freely. Both species can change the pitch and intensity of the call (in a syllable as well as in a series) according to the current situation. Therefore, species identification based on vocalisation is quite difficult in the forest habitat. The distance from which the call is coming is also important for the determination. Based on our field experience, the Great Spotted Woodpecker (unlike the MSW) reacts to human presence much more often and more intensively and its abundance can thus be overestimated during the standard monitoring. Determination of the two woodpecker species is further complicated by the fact that the calls of fledged juveniles of the Great Spotted Woodpecker are obviously softer than those of adult individuals, which was repeatedly verified in the field during this study. The call of a juvenile Great Spotted Woodpecker rather resembles the call of the Syrian Woodpecker. If the call sounds like a typical call of the Syrian Woodpecker or a typical call of the Great Spotted Woodpecker, the identification is unambiguous. If the call sounds softer and is between the call of the Syrian Woodpecker and that of the Great Spotted Woodpecker in pitch, the bird is a juvenile Great Spotted Woodpecker.

The assessment of abundance of the MSW using the playback technique and effectiveness of this method compared to the territory-mapping method was carried out by the study [24]. According to these authors, for the assessment of distribution, abundance as well as for monitoring of the MSW, three visits of the breeding site should be sufficient, provided that they include the use of playback. In south-eastern Poland, authors of the study [25] found out that the application of the playback method during March and April significantly increased the number of localised breeding territories of the MSW.

If the methods of field monitoring of the MSW are aimed to provide precise data on its population numbers in forest habitats and thus be an objective basis for preparation of forest management strategies (especially in SPAs of the Natura 2000 network), they should, in our opinion, include the playback technique based on reproduction of call recordings. Forest management taking account of conservation of the MSW populations should be focused on preservation of old oaks and their maintenance in forest stands [26]. Local breeding populations of the MSW can be strongly influenced by fragmentation of forest habitats and by introduction of coniferous tree species into oak-dominated forests. Dead very large trees are a limited resource for nesting of the MSW in lowland managed forests, because MSW (as weak excavator) may benefit from an increase in dead wood availability leading to nest niche shifts into more favourable substrates for cavity excavation [27]. An optimal approach to support of nesting population of MSW is probably to conserve selected large oak-dominated lowland forests in the form of strictly protected areas [28] from which no dead wood is removed [29].

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