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RESULTS OF HUNGARIAN WOODCOCK MONITORING

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ABSTRACT

Hunting woodcock in spring is a centuries-old tradition in Hungary. However the EU Birds Directive (79/409/EEC) prohibits hunting during the migration to breeding areas. In order to regularly derogate the EU Birds Directive it was essential to start and maintain a country-wide monitoring system, and to estimate the size and the mortality of woodcock population migrating across Hungary. As there were no similar studies earlier we had a) to develop and test the workability of a long term monitoring programme of Woodcock migration in Hungary in spring and in autumn; b) to describe the dynamics of the migration; c) to detect and evaluate differences among years; d) to estimate the size of migrating population in spring and in autumn; e) to calculate the mortality as the difference of autumn and spring population.

The monitoring programme started successfully, and it is running on a national scale for five years now. We have chosen synchronous observation of flying birds from fixed points during the whole migration period. The observations were performed by local hunters weekly, they observers recorded data on standardized forms. We calculated the mean densities of contacts (woodcocks seen/hectare/hour) for each observation date in each county. Their distribution represents the temporal dynamics and intensity of migration. We estimated the migrating population size in two different ways. First, the densities at the peaks of migration were used for the estimation of a minimal population size. Second, the total population size was estimated using the densities calculated in the whole season. In both cases, the estimation relied on the densities multiplied by the total size of the forested areas in the country.

We detected high variability of contacts in space and time, which fits to the former experience of woodcock hunters. It reflects the highly flexible migratory behavior of woodcocks. Observations in autumn can provide information about migration, but the simple comparison with spring data is problematic because of the behavioral differences. We were constrained to use literature data for the calculation of minimum and total number. According to our results, the hunting bag in Spring in Hungary may be far under the 1% limit that was determined in the Guidance document of Birds Directive. We suppose that such a quantity does not threat the woodcock population.

Keywords: Woodcock, migration, monitoring, game management unit (GMU)

INTRODUCTION

Hunting woodcock (*Scolopax rusticola*) in spring is a centuries-old tradition in Hungary. The annual hunting bag in the last decade (Csányi et. al, 2009) was always less than 10.000 individuals. However the EU Birds Directive (79/409/EEC) prohibits hunting during the migration to breeding areas. An autumn hunting season seems to be a legal solution, but in the Hungarian context, it also could cause more difficulties than it would solve and its influence on the population dynamics is not clear. The Directive allows derogations under controlled conditions and only for a small number of birds [1% of total mortality (natural + hunting) at maximum]. Basic population parameters: size and mortality is needed to estimate the 'small number'. Although there are data about the size of the population – by the official data of Birdlife International it is 10.000.000-26.000.000 individuals globally – these may be very inaccurate and based on experts guesses in most cases. Only a few countries (France, Russia, Belarus, UK and Portugal) run regular monitoring programs (FOKIN ET AL., 2004; SANDAKOV, 2004; FERRAND ET AL., 2008; MACHADO ET AL., 2008). Moreover, the size of the breeding or wintering population is estimated usually, but insufficient data are available during migration. Several migration routes are known among the wintering areas in South-West Europe and Mediterranean region and breeding areas from Scandinavia to Ural Mountains (FARAGÓ, 2008), but the distribution of migrating woodcocks among different flyways are not well known. In order to regularly derogate the EU Birds Directive was essential to start and maintain a country-wide monitoring system to estimate the size and the mortality of woodcock population migrating across Hungary.

As there were no similar studies earlier we had a) to develop and test the workability of a long term monitoring programme of Woodcock migration in Hungary in spring and in autumn; b) to describe the dynamics of the migration; c) to detect and evaluate differences among years; d) to estimate the size of migrating population in spring and in autumn; e) to calculate the mortality as the difference of autumn and spring population.

MATERIAL AND METHOD

A long-term monitoring programme was initiated by the former Ministry of Agriculture and Rural Development and the Hungarian National Chamber of Hunters (HCH). The programme started in 2009. Data collection and processing have been designed and carried out by Szent István University, Institute for Wildlife Conservation (IWC) which also assumed to evaluate the results.

The area covered by monitoring and the minimal desired number of observation points were determined using annual hunting bag data of 1997-2007. The game management units (GMU), as individual samples, were classified into three categories: permanent (80-100%), occasional (10-70%) occurrence and no occurrence. We calculated the minimum number of samples by rarefaction analysis at 5%, 10% and 15% confidence level. The highest calculated number of samples was 425 at the 5% confidence for the 1st and 2nd zone together.

Table 1. Duration, number of GMUs, monitoring sites and forms of the woodcock monitoring in Hungary 2009-2013 (2013 autumn data are under processing)

Spring					
Year	**2009**	**2010**	**2011**	**2012**	**2013**
Duration (weeks)	10	12	12	12	12
Game management units	435	445	448	452	439
Monitoring sites	856	922	922	944	907
Forms	7140	9112	10066	10319	10013
Autumn					
Year	**2009**	**2010**	**2011**	**2012**	**2013**
Duration (weeks)	12	14	12	12	-
Game management units	388	422	443	436	-
Monitoring sites	756	846	906	893	-
Forms	7755	10364	10093	9913	-

More GMUs volunteered the monitoring programme, than it was expected (*Table 1*). As majority of GMUs undertook to collect data more than one observation points, the real number of monitoring sites were more than two times bigger than the requirement for the best confidence. The majority of observation points covered forested areas (*Figure 1*).
A network of specialists was organized for the administration of data. It included county coordinators (employees of the Hungarian Chamber of Hunters), representatives of GMUs and observers (participating hunters). GMU representatives collected the observation forms and sent those to the county coordinators each week. County coordinators uploaded the observation data each week to a web server created and maintained by IWC.
We have chosen synchronous observation of flying birds from fixed points during the whole migration period. The base of the monitoring programme was roding survey (FERRAND, 1993). The observations were performed by local hunters weekly (on every Saturday from the end of February to the first week of May in spring, and on every Tuesday from mid-September to early December in autumn). The observers recorded data on standardized forms. Data were: number of contacts (woodcocks seen and/or heard), estimated size of the visible area, duration of the survey, weather conditions and habitat types surrounding the observation point. These data give us snapshots about the different states of the migration. With the comparison of consecutive snapshots we can estimate the dynamics, speed and extent of the migration.

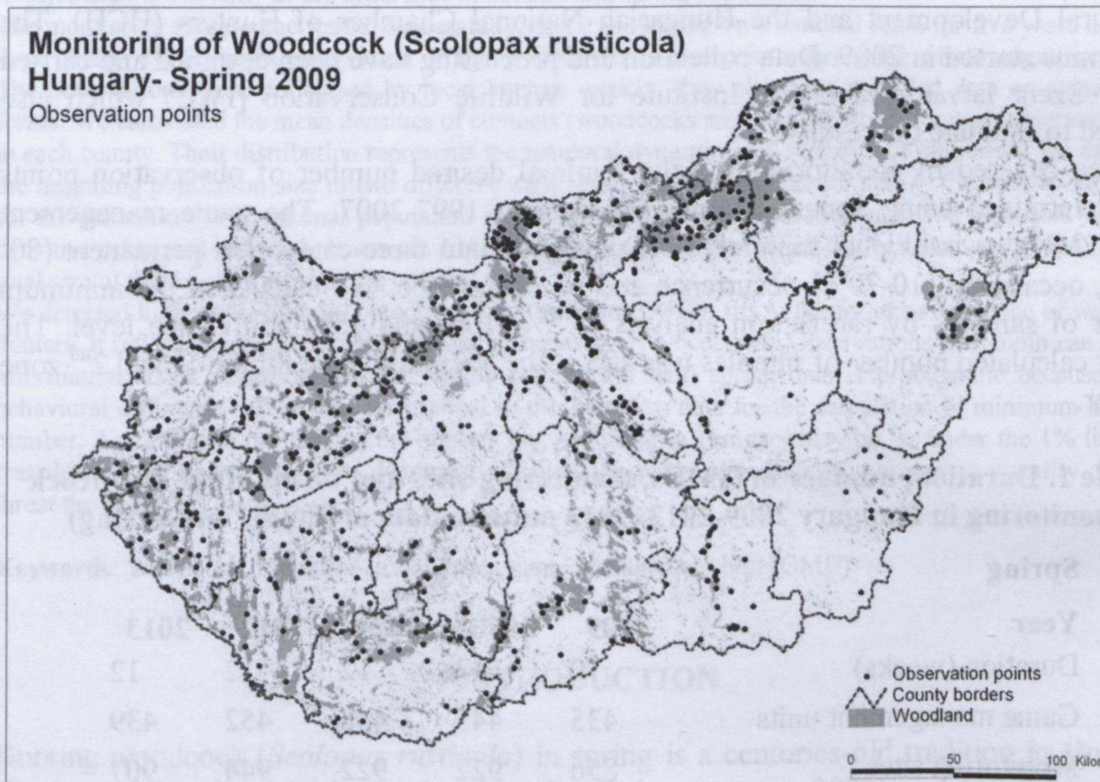

Figure 1. Spatial distribution of the observation points

We calculated the mean densities of contacts (woodcocks seen/hectare/hour) for each observation date in each county. Their distribution represents the temporal dynamics and intensity of migration. We used Kruskal-Wallis test with Dunn's multiple comparisons test to detect differences among the number of contacts reported at the annual peaks of roding intensity.

We estimated the migrating population size in two different ways. First, the densities at the peaks of migration were used for the estimation of a minimal population size. Second, the total population size was estimated using the densities calculated in the whole season. In both cases, the estimation relied on the densities multiplied by the total size of the forested areas in the country.

Data management and statistical analyses were performed using Microsoft Excel 2003; R (v2.15.0) and GrahPad InStat (v3.05)

RESULTS

The observation data were highly variable not only in time (annual, seasonal and weekly) but also geographically. In Spring, the temporal progression of the number of contacts was unimodal in every year (*Figure 2*). We have found difference among the annual peaks (Kruskal-Wallis Statistic KW = 339.95 P <0.0001) (*Figure 2*). The number of contacts in 2013 differed from the data of 2009, 2011 and 2012, but no difference was found compared to the data of spring 2010.

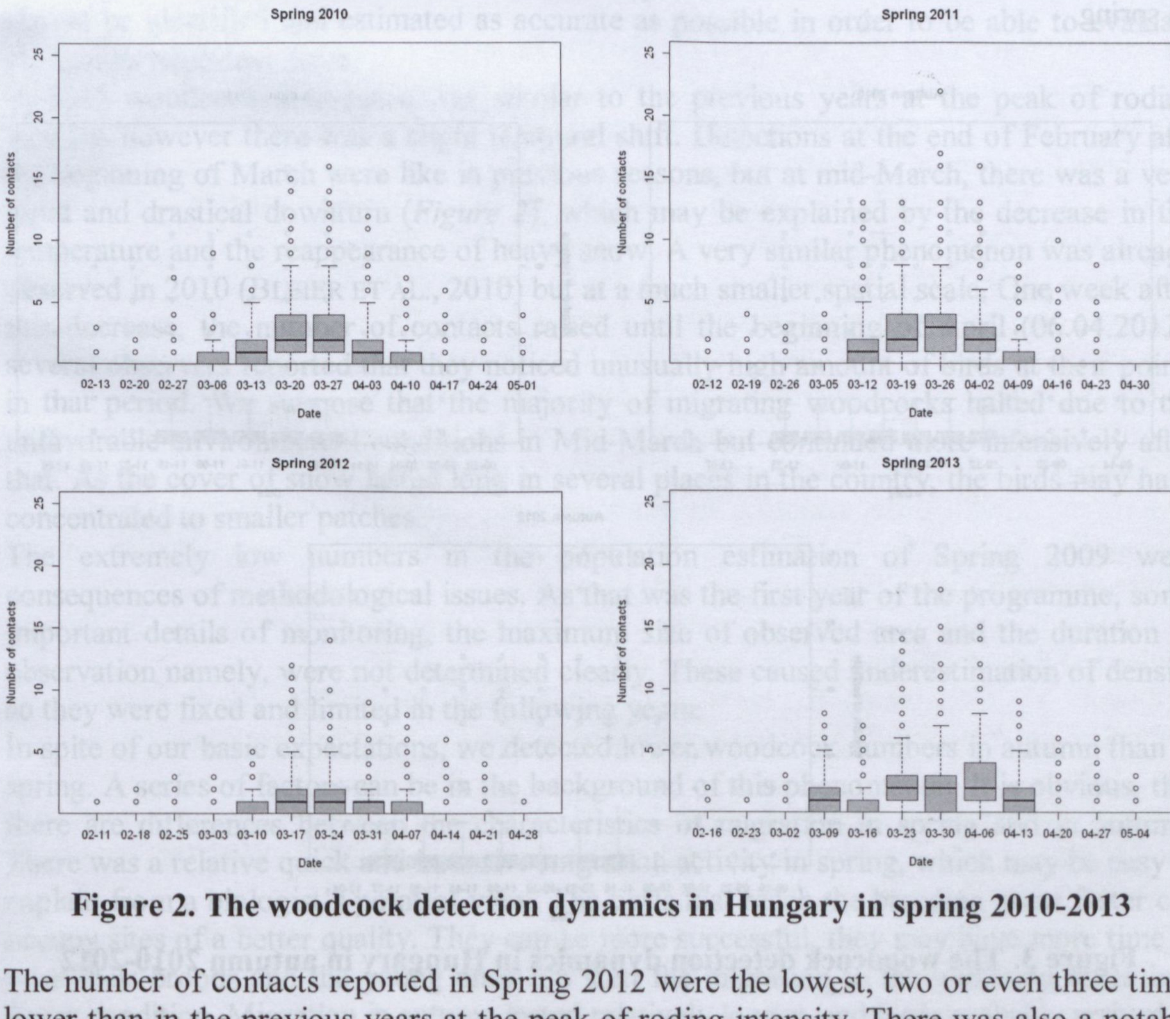

Figure 2. The woodcock detection dynamics in Hungary in spring 2010-2013

The number of contacts reported in Spring 2012 were the lowest, two or even three times lower than in the previous years at the peak of roding intensity. There was also a notable decrease in the rate of sites where at least one woodcock was detected at the peak that year. Whilst it reached even 90% in the previous years (90.93% in 2009, 88.61% in 2010, 89.98% in 2011) it was only 73% that year. Moreover the rate of sites with at least five detections at the peak was also the lowest so far (19.13% in 2009, 14.81% in 2010, 17.26% in 2011 8.71% in 2012).

The migration dynamics showed less obvious peak in autumn, than in spring (*Figure 3*). The migration seems to be long-drawn-out and more balanced at that time. The numbers of contacts were lower in Autumn than in Spring in each year (*Figure 3*). Consequently, mortality cannot be estimated by a simple comparison of Spring and Autumn values. We were constrained to use literature data for the calculation of minimum and total number. According to the Guidance document on hunting under Council Directive 79/409/EEC on the conservation of wild birds (HTTP1) the mortality of the young birds (<1 year old) varied between 54-72%, and 39-54% by adult woodcocks. So, we used 50% as general mortality ratio.

The estimated minimum population size varied between 4 174 929 (2012) and 6 890 809 (2010) individuals, except in 2009 when it was 1 483 224 only. The estimated total number of migrating woodcocks was the lowest in 2012 with 15 210 835 individuals and the highest in 2013 with 28 317 756 individuals. The 2009 data was also extremely low 5 924 688 individuals.

The rate of the hunting bag in Hungary (CSÁNYI ET AL., 2011; CSÁNYI ET AL., 2012; CSÁNYI ET AL. 2013) compared to the annual mortality rate estimations (birds shot/1% of estimated mortality)varied between 0.36% and 0.52% calculated from numbers of the annual peaks of migration and 0.11% up to 0.14% concerning the whole migration period in spring.

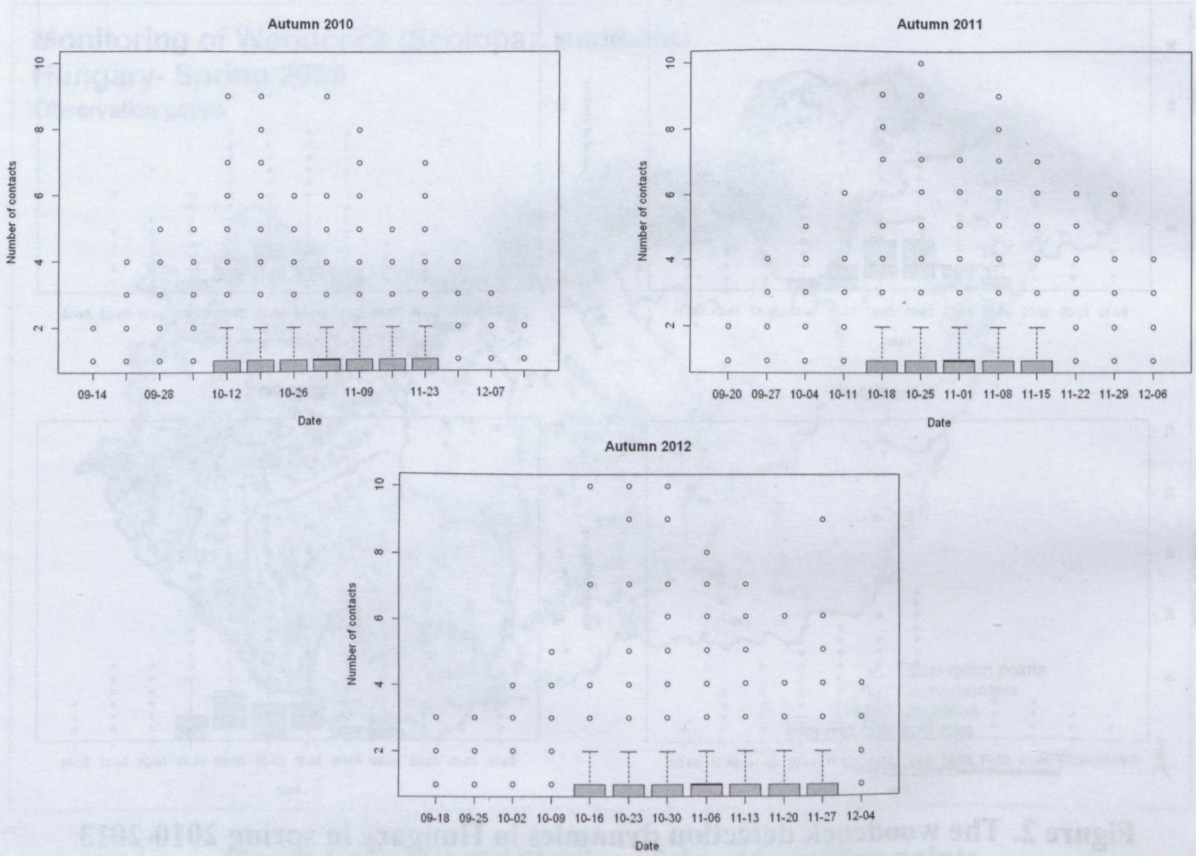

Figure 3. The woodcock detection dynamics in Hungary in autumn 2010-2012

DISCUSSION AND CONCLUSIONS

The monitoring programme started successfully, and it is running on a national scale for five years now. Testing the workability, gathering methodology experiences and further development were the most important goals in its first period. It is clear now that the

Hungarian hunters are able to cooperate with each other and to solve a task of such a magnitude. Our aim is to continue and improve monitoring of the species in the future based on the knowledge gathered along that period.

We detected high variability of contacts in space and time, which fits to the former experience of woodcock hunters. It reflects the highly flexible migratory behavior of woodcocks. Migration can be affected by different abiotic factors like temperature, wind and snow cover.

The peak of spring 2012 was the lowest in the last four years. As the numbers of contacts in 2013 were similar to the ones of the previous years, the low values reported in 2012 (SCHALLY ET AL., 2012) might not indicate a negative trend in the population. According to our results we conclude that the decrease we noticed in the number of contacts in 2012 could be caused by a temporary, significant decrease in the size of suitable areas for woodcock. That year's spring and even the winter of 2011 was extremely dry which is known to be unfavorable for earthworm feeders such as the Eurasian woodcock. Due to such conditions the birds could have decided to avoid or escape these dry areas along their migration. It is not clear yet whether it was an extreme case or how often can it occur in the future. However it draws our attention on factors which can affect the migration of woodcocks dramatically and yet we can hardly influence. The effects of these factors should be identified and estimated as accurate as possible in order to be able to evaluate our results regarding them.

In 2013 woodcock abundance was similar to the previous years at the peak of roding activity, however there was a slight temporal shift. Detections at the end of February and the beginning of March were like in previous seasons, but at mid-March, there was a very rapid and drastical downturn (*Figure 2*), which may be explained by the decrease in the temperature and the reappearance of heavy snow. A very similar phenomenon was already observed in 2010 (BLEIER ET AL., 2010) but at a much smaller spatial scale. One week after this decrease, the number of contacts raised until the beginning of April (06.04.2013), several observers reported that they noticed unusually high amount of birds at their points in that period. We suppose that the majority of migrating woodcocks halted due to the unfavorable environmental conditions in Mid-March but continued more intensively after that. As the cover of snow lasted long in several places in the country, the birds may have concentrated to smaller patches.

The extremely low numbers in the population estimation of Spring 2009 were consequences of methodological issues. As that was the first year of the programme, some important details of monitoring, the maximum size of observed area and the duration of observation namely, were not determined clearly. These caused underestimation of density so they were fixed and limited in the following years.

In spite of our basic expectations, we detected lower woodcock numbers in autumn than in spring. A series of factors can be in the background of this phenomenon. It is obvious, that there are differences between the characteristics of migration in spring and in autumn. There was a relative quick and intensive migration activity in spring, which may be easy to explain from a biologist's point of view. The birds that reach the breeding areas faster can occupy sites of a better quality. They can be more successful, they may have more time to raise their broods and the young ones can start the migration to the wintering areas in a better condition. Migration in autumn lasted relatively longer, and birds probably arrived in Hungary in several smaller waves. It is also possible that some of them stay in the Carpathian basin for winter.

The detectability of woodcock in autumn is significantly lower than in spring. In spring, woodcocks can be detected by sight and listening but only by sight in autumn. The lower detectability can cause biased population size estimation. Observations in autumn can provide information about migration, but the simple comparison with spring data is problematic because of the behavioral differences.

Finally we conclude that the hunting bag in Spring in Hungary may be far under the 1% limit that was determined in the Guidance document of Birds Directive. We suppose that such a quantity does not threat the woodcock population.

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