COMPARISON OF SELECT PARAMETERS
OF MALLARD (*Anas platyrhynchos*) POPULLATION
IN URBAN AND RURAL AREAS IN THE VICINITY
OF LUBLIN

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Summary. The aim of this study was to compare selected population parameters (density and gender structure) and behavioral (escape distance) mallards in rural and urban areas. The study was conducted on two sections of Bystrzyca river flowing through Lublin and adjacent agricultural areas. Higher average density was found in urban areas (22.5 n/1 km river of length) compared to agricultural land (14.5 n/1 km river of length). It also showed lower average flight distance of mallards in urban area (11.3 m) compared to agricultural ones (30.0 m). The results confirm that the mallard in the investigated territory demonstrated typical synurbanic behavior and became a permanent feature of Lublin urban fauna.

Key words: the mallard *Anas platyrhynchos*, population, density, synurbisation

INTRODUCTION

Mallard (*Anas platyrhynchos*) is the most frequent wild duck in Poland and is referred to as locally numerous hatching bird cell over the country [Tomiałojć and Stawarczyk 2003]. Despite the great popularity of mallard ducks, the knowledge of its wanderings is not yet complete. Research based on ringing indicate that mallards migration from Central Europe are characterized by dispersion in the direction of the Atlantic and the Mediterranean, but are not regularly associated with a particular migration route [Krupka (ed.) 1989]. The mallard is a species that uses different environments such as wetlands as well as other areas far away from water. Great potential for adaptation, make mallards increasingly popular in urban areas [Wójciak *et al.* 2005]. In quantitative research most commonly used methodology of stocktaking breeding pairs counting the number in assessing on the basis of males and females, but this method can be applied to the whole complex of pouds with simultaneous penetration of the entire area [Borowiec *et al.* 1981]. For the purposes of hunting, the size of mallards is based on spring

counts of males and multiplication of the resulting number by a factor of 1.8 based. It is based on the fact that in this period, males represent about 55% of the population of this species [Kamieniarz *et al*. 1992].

The aim of this study was to compare select population (density and structure of gender) and behavioral (escape distance) parameters of mallard in rural and urban areas.

STUDY AREA

The study was conducted on two sections of Bystrzyca river flowing through agricultural lands and urban areas. The first study area was agricultural land of the commune Wólka (section of Bystrzyca between Hajdów purification plant and the village Turka – about 5 km in length). The second test area was located within administrative borders of Lublin (the section of Bystrzyca between Graf Manor-house near the Fabryczna Street and the Zemborzyckie Lake – about 10 km long). Bystrzyca Valley landscape has two different parts – the left bank is uneven terrain, deep valleys and old loess gorges while the right-bank, which is part of the Plateau Świdnik is that. Bystrzyca is a left tributary of Wieprz river and one of the major rivers of the Lublin Upland. Average annual temperature is 8.0°C. The warmest month is July, with the average temperature of 18.7°C, the coldest one is January with -5.0°C. Periods of summer and vegetation last 210–220 days 100–110 [Kondracki 1998].

MATERIAL AND METHODS

The researech was performed based on counting of a mallards in the period from April 2010 to March 2011. Birds were counted at checkpoints along Bystrzyca river, which were located in the way to cover the entire stretch of river. In first research area (agricultural areas) 10 checkpoints were established and in the second area (urban area) 19 checkpoints. Counting was held once a month at all checkpoints points on the same day. In total, at each checkpoint there were 13 counts. While counting attention was drawn to the number of males and females, which allowed the calculation of the gender structure, defined as number of females per one male. Data from the checkpoints allowed the calculation of the average annual number of mallards (n) and their average annual density (n/1 km of the river length) on the compared areas. Researches paid attention to the degree of shyness of mallard in various checkpoints, which was assessed as the average escape distance. Escape distance was defined as the shortest distance (in meters) at which the observer was able to approach the chosen individual. In addition, a point value (from 0 to 10) was assigned to each checkpoint, indicating the degree of penetration of the area by humans. This value was defined on the basis of the number of people in the location of the checkpoint. On this basis

the relationship between escape distance and the degree of penetration of the area by people was assessed by calculating the Pearson correlation coefficient. Differences between average values of density and escape distance in the compared areas were calculated using Student's t test for significance level $\alpha = 0.01$.

RESULTS AND DISCUSSION

Based on the counting it was assessed, that in agriculture areas the average annual number of mallard in the examined period amounted to 69.8 individuals, which (in terms of density) gives 14.5 individuals per 1 km of river length. However in urban areas the average annual number of mallards was 213.7, giving 22.5 individuals per 1 km of river lenght. The difference found was statistically significant for the level of $\alpha = 0.01$ (Fig. 1). The results obtained in Lublin densities are similar to the density of mallards in the Lower Valley of Narew [Rzępała *et al.* 1999]. Most individuals were observed in the agricultural areas at checkpoints located near the wastewater treatment plant Hajdów, which confirms that the sewage treatment plants and irrigation fields in large cities are an attractive feeding territory [Tomiałojć and Stawarczyk 2003]. In the urban area most individuals were observed at checkpoints located on the bridges or footbridges over Bystrzyca, where ducks are regularly fed [Biaduń 1994a, b].
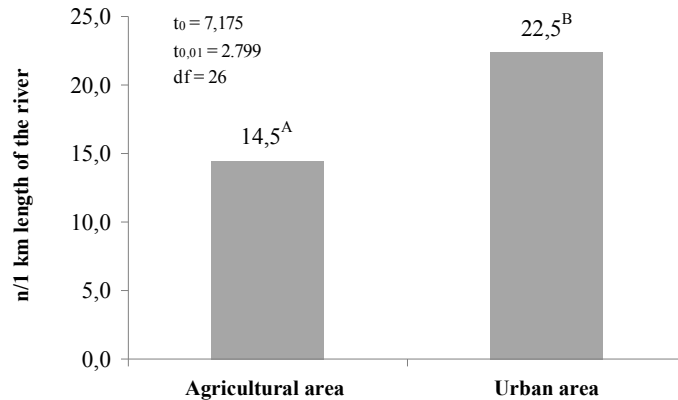

Fig. 1. Comparison of annual escape density of mallards (n/1km length of the river) in agricultural and urban areas, [AB]significant for $\alpha = 0.01$

In agricultural areas also showed lower average share of females in gender structure (1:0.6), compared to urban areas (1:0.7), but this difference was not statistically significant.

The average escape distance of mallards was lower in urban areas compared to agricultural ones (Fig. 2). The difference between these averages, tested with the Student t test, was statistically significant for the level of significance

$\alpha = 0.01$ ($t_0 = 10.496$, $t_{0,01} = 2.771$). Shorter average escape distance in urban areas indicates lower shyness of mallards, which is probably linked to feeding of the birds [Biaduń 2004]. This means that with increasing degree of penetration of the area by people mallards' escape distance diminishes, i.e. their shyness, which is characteristic for synurbanic animals [Andrzejewski *et al.* 1978].
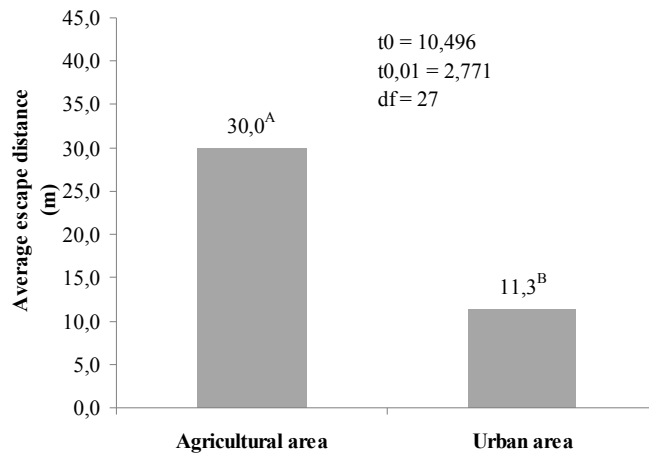

Fig. 2. Comparison of the average escape distance of mallards in agricultural and urban areas, [AB]significant for $\alpha = 0,01$
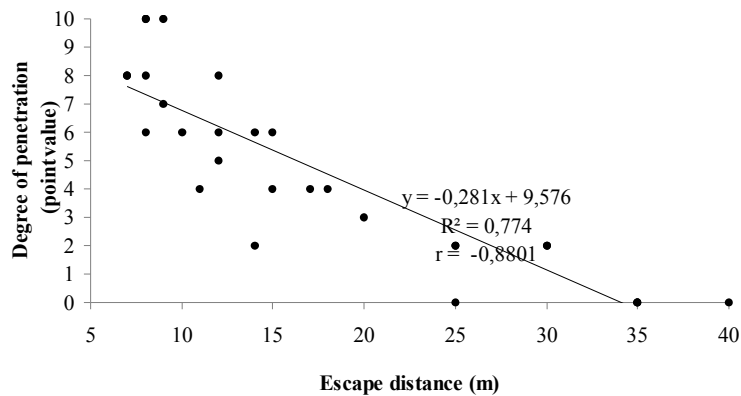

Fig. 3. The relationship between escape distance and the degree of penetration of ducks by people throughout the research

This interpretation is confirmed by the results of calculating the correlation coefficient between the escape distance of ducks and the degree of penetration by peaple (Fig. 3). The high and negative correlation coefficient ($r = -0.885$) indicates strong and significant correlation between these parameters.

CONCLUSIONS

1. Higher average number and density of mallards was found in urban areas compared to rural ones. These results suggest that ducks prefer to stay closer to the center of the urban area, especially in winter, which is associated with a milder urban microclimate, and often with people feeding them.

2. Most individuals in the agricultural section were observed near Bystrzyca Hajdów wastewater treatment plant, which is associated with the use of sewage sludge as food.

3. In urban areas most mallards were found near bridges and food bridges, which are places of constant feeding.

4. The average escape distance was lower in urban areas compared to agricultural ones.

5. The results indicate that mallards in the studied area showed typical synurbic behavior and became a permanent feature of urban fauna of Lublin.

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PORÓWNANIE WYBRANYCH PARAMETRÓW POPULACJI KRZYŻÓWKI
Anas platyrhynchos NA TERENIE MIEJSKIM I ROLNICZYM OKOLIC LUBLINA

Streszczenie. Celem pracy było porównanie wybranych parametrów populacyjnych (zagęszczenie i struktura płciowa) oraz zachowań (dystans ucieczki) krzyżówki na terenie rolniczym i miejskim. Badania prowadzono na dwóch odcinkach rzeki Bystrzycy przepływającej przez Lublin oraz sąsiedni teren rolniczy. Stwierdzono wyższe średnie zagęszczenie krzyżówki na terenie miejskim (22,5 n/1 km dł. rzeki) niż na terenie rolniczym (14,5 n/1 km dł. rzeki). Wykazano także niższy średni dystans ucieczki krzyżówek na terenie miejskim (11,3m) w porównaniu z terenem rolniczym (30,0 m). Wyniki badań potwierdzają, że krzyżówka na badanym terenie przejawia typowe zachowania synurbijne i jest stałym elementem fauny miejskiej Lublina.

Słowa kluczowe: krzyżówka *Anas platyrhynchos*, zagęszczenie populacji, synurbizacja