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[1]Department of Zoology, Animal Ecology and Wildlife Management
University of Life Sciences in Lublin, Akademicka 13, 20-950 Lublin
ignacyk@autograf.pl
[2] Air Force Academy, Dywizjonu 303 12, 08-521 Dęblin

IGNACY KITOWSKI[1], GRZEGORZ GRZYWACZEWSKI[1], SZYMON CIOS[1],
JANUSZ ĆWIKLAK[2], STEFAN KROP[2], MAREK GRZEGORZEWSKI[2]

Falconer activities as a bird presence management tool at Dęblin military airfield – their influence on the flock size

Aktywność sokolnika jako metoda zarządzania obecnością ptaków na Lotnisku Wojskowym w Dęblinie – wpływ na wielkość stad wybranych gatunków

Summary. Bird flocks present a greater threat to aircrafts than individual birds. Observations carried out from 1 September 2007 to 31 August 2009 in the area of Dęblin Military Airfield were aimed at assessing the possibilities of using a falconer for the purpose of managing the maximum flock size of 5 selected bird species (European Starling, Jackdaw, Rook, Lapwing and Domestic Pigeon) present there. No significant changes in the maximum flock size of the studied birds were found between the control period and the time of his work at the airfield. Observation of long-term trends in the change of flock size indicates that for two of the studied species (Jackdaw and Domestic Pigeon) the maximum flock size decreased during the time of the falconer's work at the airfield. In the spring and summer periods, birds were more prone to the effects of falconer activity than in the fall and winter periods.

Key words: flocking, airfields, bird strikes, bird deterring, Poland

INTRODUCTION

Detailed studies of aircraft collisions with birds as well as theoretical considerations lead to the general conclusion that damage to aircrafts is proportional to the mass of the bird, and the likelihood of greater damage will also increase when birds display flocking behavior [ATSB 2002, Bell 2002, Allan 2006]. Thus, special attention has recently been given to flocking behavior as a factor influencing the likelihood and extent of birdstrike damage. For this reason, it is extremely important for the personnel responsible for bird-

strike prevention to be able to manage the flock size of birds that may threaten aircrafts. In the airfields of Central Europe, including Poland [Zalakevicius 1994, Krupka 2000, Kitowski *et al.* 2011], flocks are found formed mainly formed by Northern Lapwings *Vanellus vanellus*, European Starlings *Sturnus vulgaris*, Pigeons *Columba* spp., and some Corvids *Corvidae.*

Our study was aimed at assessing the possibilities of using a falconer in managing the flock size of selected target species of birds present at Dęblin Military Airfield.

STUDY AREA AND METHODS

The studies were carried out at the Dęblin Military Airfield (51° 33'N, 21° 53'E, Eastern Poland). Dęblin Military Airfield was chosen for the observations because for years it has been an area characterized by a high frequency of collision of birds with aircraft [Kitowski *et al.* 2011]. The area of the airfield is a rectangle with a length of about 4.5 km and width of about 1.5 km. In the further vicinity of Dęblin Military Airfield are the forks of the Wieprz and Vistula rivers. Through all of summer, the grassy area of the Airfield is mowed. The Dęblin Military Airfield is a place of stationing of several dozen training airplanes of the Iskra class and several helicopters used for training by the Air Force Academy.

In the first period of studies, from 1 September 2007 to 31 August 2008, bird counts (n = 25) were conducted in a transect method in the entire area of the Airfield. The bird counts were conducted every two weeks. During the counting, all birds present at the airfield were recorded in their position at the moment they were noticed. The positions of the birds noted for the first time were drawn on maps (1 : 10.000). The first period of studies will further be referred to as the control period of studies. During the second period of studies, from 1 September 2008 to 31 August 2009, bird counts (n = 26) were conducted in the considered area in accordance with the method mentioned above.

However, at that time, in contrast with the first period of study, a falconer was hired at the airfield. He worked 5 days per week, from 8:00 AM to 8:00 PM. In field work, he alternatingly used 3 individuals of trained raptors during the day: an adult Goshawk *Accipiter gentilis,* a Saker *Falco cherrug* and a Peregrine *Falco peregrinus*. Of these, the Goshawk was always used to deter birds in mornings, the Saker at middays, and the Peregrine in afternoons and evenings. The falconer was not informed about the course of the transect by which the birdwatchers moved during the counting, nor of the evaluation of his work. Both during the first period of observation and when the falconer worked in the airfield, there were practically no other methods used in deterring birds, except for a very few short sessions of using one small gas cannon, whose location (southwest end of the airfield) was unchanged for years. With the purpose of evaluating the falconer's work in the context of flock size management, analysis of the harvested data in the airfield was conducted with regard to 5 species of birds forming flocks. They were: European Starlings , Jackdaws *Corvus monedula,* Rooks *Corvus frugilegus*, Lapwings and Domestic pigeons *Columba livia f. domestica.* The basic reason was that they pose a real threat in this airfield and others in Central Europe [Zalakevicius 1994, Krupka 2000, Kitowski *et al.* 2010, Kitowski *et al.* 2011]. The second reason for such a choice of the considered species was that they accounted for more than 60% of the total number of

birds observed in the airfield studied [Kitowski *et al.* 2010]. The number of birds making up maximum size flocks in the two study periods was compared using the the Student's *t*-tests. Trends in flock size were ascertained using Pearson correlations [Sokal and Rohlf 1981].

RESULTS

No significant changes in the maximum flock size of the studied birds were found between the time of the falconer's absence and the time of his work (Tab. 1).

No such changes between the control period and the period when the falconer deterred birds were found, either, when the flocks of all the studied species were considered jointly, although flock size decreased by 69.3 ±94.3 individuals vs. 58.4 ±84.9 individuals, (Student's *t*-test: $t = 0.898$, df = 217, $p = 0.370$).

Table 1. Maximal daily flock size of bird species before and during falconer activity at Deblin Military Airfield
Tabela 1. Maksymalna dzienna wielkość stad w okresie poprzedzającym obecność sokolnika i w okresie jego aktywności na lotnisku wojskowym w Dęblinie

Species Gatunki	Maximal daily flock size before falconer activity Maksymalna dzienna wielkość stad w okresie poprzedzającym obecność sokolnika			Maximal daily flock size during falconer activity Maksymalna dzienna wielkość stad w okresie obecności sokolnika			*t*-Student statistics test *t*-Studenta		
	N_1	mean	SD	N_2	mean	SD	*t*	df	P
Vanellus vanellus	17	41.2	54. 8	12	64.9	54.1	-1.152	27	0.259
Sturnus vulgaris	22	148.5	149.6	20	86.9	118.8	1.47	40	0.150
Corvus monedula	25	65.2	62.3	26	68.2	111.4	-0.115	49	0.909
Corvus frugilegus	25	69. 4	81.6	26	52.8	63.8	-0.810	49	0.421
Columba livia	23	18.7	15.1	23	25.5	19.3	-1.34	44	0.256

We checked the significance of trends in maximum flock size during the control period and the falconer presence period. Among the species analyzed, we noted a significant decrease in maximum flock size for domestic pigeons during the control period (Tab. 2). In the period of the falconer's activity, we noted a significant downward trend in maximum flock size not only for Domestic pigeons but also for Jackdaws. In the case of the latter, this meant a reversal of the trend.

We also compared the maximum number of birds constituting the flocks of the 5 considered species taken together in the fall and winter period with the corresponding figure for the spring and summer period. In the fall and winter period, when migrations and wintering take place and when the falconer was not employed at the airfield, the average

Table 2. Trends in maximal daily flock size of target species before and during falconer activity at Dęblin Military Airfield
Tabela 2. Trendy zmian maksymalnej dziennej wielkość stad w okresie poprzedzającym obecność sokolnika i w okresie jego aktywności na lotnisku wojskowym w Dęblinie

Species Gatunki	Trends in maximal daily flock size before falconer activity Trendy zmian maksymalnej dziennej wielkość stad w okresie poprzedzającym obecność sokolnika			Trends in bird numbers on airfield during falconer activity Trendy zmian maksymalnej dziennej wielkość stad w okresie obecność sokolnika		
	r	n	P	*r*	n	P
Vanellus vanellus	0.513	17	0.035	-0.320	12	0.310
Sturnus vulgaris	0.367	22	0.147	-0.276	20	0.385
Corvus monedula	0.328	25	0.199	**-0.606**	**26**	**0.036**
Corvus frugilegus	-0.424	25	0.090	-0.145	26	0. 654
Columba livia	**-0.515**	**23**	**0.034**	**-0.611**	**23**	**0.031**

In bold trends statistically significant/Trendy istotnie statystycznie pogrubiono

maximum number of individuals forming these flocks was 63.9 ±75.11 individuals, and during the time of the falconer's employment the maximum flock size increased to 75.1 ±94.6 individuals. The differences between these values were not significant (Student's *t*-test: $t = -0.622$, df = 96, p = 0.534). In the spring and summer period, when bird breeding takes place, the maximum number of birds forming a flock significantly decreased from 72.3 ±103.8 to 38.7 ±67.7 individuals due to falconer activities Student's *t*-tests: $t = 1.997$, df = 119, p = 0.048).

DISCUSSION

The behavior of birds is the least known factor influencing the frequency of their collisions with aircrafts and still requires numerous field studies. However, observations to date make it possible to point to the capability of forming flocks and the very fact of their presence near runways – for various reasons (e.g. foraging, roosting, resting, etc.) – as an important factor contributing to collisions [Thorpe 2008, ATSB 2002, Transport Canada 2002]. Thorpe's [1994] comparison between continents shows that although a straight majority of the 22.3 thousand collisions analyzed were caused by individual birds, from 23% to 41% of all the accidents, depending on the location, were caused by bird flocks. The proportion of collisions caused by bird flocks was the lowest for Europe and Africa and the highest for South America.

Our studies so far have shown that falconer activity is an effective bird dispersal tool at the Dęblin airfield, with reference to the total number of birds present at the airfield [Kitowski *et al.* 2011]. Their results testify to the undeniable benefits of using this sustainable method at the considered airfield.

The raptors used at Dęblin Military Airfield, such as Peregrine, Goshawk, and Cherrug, really threaten the birds whose flocks they were used to managed. The dispersed

birds constitute a very important component of the diet of these raptors [Mearns 1983, Toyne 1998, Rutz 2003, Bagyura *et al.* 2004], which creates the ethological base for the falconer's work.

The presence of trained raptors triggers defensive reactions in the species observed. Apart from escape reactions, these also include flocking together. The above explains the falconer's low effectiveness in reducing the size of bird flocks, which we have demonstrated. At the same time, we should note that the maximum flock size decreased during the time of the falconer's work, which corresponds to the observations of other authors, who point out that using a falconer at an airfield has to be a long-term and systematic process [Briot 1984, Transport Canada 2002, Ericson *et al.* 1990].

Our experiments and the studies of other authors [Ericson *et al.* 1990] show that the falconer's work should be strongly reinforced with other bird management techniques.

In the conditions of the Dęblin airfield, it is the implementation of the Long Grass Policy (LPG) on a large scale that seems to be the most suitable and the least costly. The Long Grass Policy, implemented by the omission of mowing the grassy areas in the vicinity of the runways, can limit birds' access to food resources in these sensitive areas by effecting a decrease in the comfort and efficiency of foraging for many species [Brought, Bridgman 1980, Deacon Rochard 2000]. Naturally, in some areas grass needs to be mowed because navigation tools, necessary for plane take-offs and landings, must be visible.

Trained raptors can generally reduce the number of birds in the airfield. Yet, they also can be an effective tool for managing the maximum flock size of some bird species. The effectiveness of the falconer's work at the airfield measured by the capability of managing the maximum size of bird flocks is higher in the spring and summer period than in the fall and winter period.

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Streszczenie. Stada ptaków podczas zderzeń z samolotami wywołują większe straty niż pojedyncze osobniki. Przeprowadzone obserwacje na lotnisku wojskowym w Dęblinie miały na celu ocenę możliwości wykorzystania sokolnika w zakresie zarządzania maksymalnym rozmiarem stad. Dla 5 wybranych gatunków (szpak, kawka, gawron, czajka, gołąb domowy) nie wykazano istotnych zmian maksymalnej wielkości stad pomiędzy okresem kontrolnym a okresem pracy sokolnika na lotnisku. Śledzenie trendów długoterminowych zmian wskazuje jednak, że dla dwóch badanych gatunków (kawka, gołąb domowy) malała maksymalna wielkości stad z upływem czasu pracy sokolnika na lotnisku. W` okresie wiosenno-letnim ptaki były bardziej podatne na oddziaływanie sokolnika niż w okresie jesienno-zimowym.

Słowa kluczowe: stada ptaków, lotniska, kolizje samolotów z ptakami, odstraszanie ptaków, Polska