Intern. Stud. Sparrows 2012, 36: 88-94

DOI: 10.1515/isspar-2015-0017

Adam ZBYRYT[1], Anna SUCHOWOLEC[1], Rafał SIUCHNO[2]

[1]The Polish Society for Birds Protection, Ciepła 17, 15-471 Białystok
e-mail: adam.zbyryt@wp.pl, asuchowolec@gmail.com
[2] *Biology* Students *Scientific Circle*, University of Białystok, Świerkowa 20B, 15-950 Białystok
e-mail: rafalsiuchno@wp.pl

SPECIES COMPOSITION OF BIRDS COLLIDING WITH NOISE BARRIERS IN BIAŁYSTOK (NORTH-EASTERN POLAND)

ABSTRACT

Until now in Poland there was no relevant data about the species composition of birds colliding with reflective plate glass in building construction and noise barriers. The research was conducted in 2010-2012. For the first two years the research was conducted only in breeding season, field control was carried out from 2 to 5 days. Since November 2011 an all year-long monitoring was started and the area was controlled once a week. In winter 2011/12 and spring 2012 there was conducted an experiment on time of carrion loss.

In total there were 269 dead birds representing 43 species. The victims of window strikes were mainly common species, small or medium size passerines, residing and foraging in the low vegetation up to several meters above the ground (89%). According to the status of the species: 55% were resident or partially resident, 38% were short-distance migrants and 7% were long-distance migrants. At the base of the experiment on speed of carrion loss (N = 30), it was found that 17% of dead birds were removed after 1 week, 43% after 2 weeks and 23% after 3 weeks.

There were 4 injured and stupefied birds found, despite the first aid all birds died from 3 to 48 hours after collision.

Key words: species composition, noise barriers, collisions, Białystok, carrion.

INTRODUCTION

Transparent and reflected glass or plastic surfaces used in the construction industry, including noise barriers, are the significant threat for wild birds. Klem (2006, 2009) claims, that it is the second human-related factor of avian mortality, after habitat loss. He estimates, that avian mortality from collisions, across the United States was from 100 million to billion birds per year. Some scientists claim, that the number might be five times higher (Hager et al. 2008). Apparently, almost all bird species are exposed to collision with glass panes, from common birds to rare and endangered ones (Klem 2009, Zbyryt 2012). Collisions occur due to two main factors: (1) reflection of the light

and as a result the mirror effect and (2) transparency of glass. This issue appeared also in Poland, especially in bigger cities. It is caused by the civilization development which introduces technological innovations like modern glass architecture (blocks, skyscrapers, transparent noise barriers). Currently in Poland, there is almost no available data about the scale of this phenomena and the list of the bird species striking glass panes. Therefore, this paper is an attempt to fill the gap.

STUDY AREA

Białystok (53°07'N 23°10'E, 102 km^2) is the largest city in NE Poland. Population density is 2.9 people per km^2. The city has a warm summer continental climate, characterized by warm temperatures during summer and long and frosty winters. The region is one of the coldest in Poland, with the average temperature in January being – 4.3°C and the average temperature in a year 6.8°C. Mean annual rainfall values oscillate around 590 mm and the vegetation period lasts 200 to 210 days. Forests are an important part of Białystok's character, and occupy around 1750 ha (17% of the administrative area of the city). There are two nature reserves: Las Zwierzyniecki (with a dominant assemblage hornbeam *Carpinus betelus*) and Antoniuk (with a dominant mixed forest of Scots pine *Pinus sylvestris*, Spruce *Picea abies* and Hazel *Corylus avellana*). The road along which the study was conducted was built a few years ago. The noise barriers installed are surrounded by houses, allotments and part of the nature reserve "Las Zwierzyniecki".

METHODS

From 2010 to 2012 studies were conducted in order to estimate the avian mortality caused by collisions with transparent acoustic barriers at the St Pio's Street in Białystok. On the southern part of the road both sides of the barriers were controlled, on the northern part, because of the private property, only the inner side of the barriers was controlled. The total length of the study route of the single field control was about 1800 meters. In 2010-2011 the research was conducted only in summer (breeding season), field control were carried out from 2 to 5 days. In November 2011 an all year-long monitoring has started and the area was controlled once a week in order to better recognize the scale of the phenomena. The data recorded were: species, sex, age, victim's location and the background of the acoustic barrier panes (sky, trees, shrubs, buildings). Additionally, in winter and spring an experiment was conducted on the speed of carrion loss. All victims were noted and left in the controlled area in order to verify their presence in subsequent field visits.

RESULTS

In total there were 269 dead birds representing 43 species (Tab. 1). It is almost 10% of Polish avifauna (state on 30th of June 2012). The dominant species among victims of

Tabel 1. Species composition of birds colliding with noise barriers along the St Pio's Street, Białystok in 2010-2012

Species	Summer 2010	Summer 2011	Winter 2011/12	Spring 2012	Summer 2012	Total	Domination [%]
Anas platyrhynchos		1				1	0.4
Accipiter nisus	1	1				2	0.7
Scolopax rusticola				1		1	0.4
Columba livia forma urbana				1	1	2	0.7
Columba palumbus	4	2		2	1	9	3.3
Streptopelia decaocto	1					1	0.4
Jynx torquilla					1	1	0.4
Dendrocopos major	2			1		3	1.1
Dendrocopos medius	3	1				4	1.5
Hirundo rustica	2					2	0.7
Delichon urbica	1					1	0.4
Erithacus rubecula	1			1		2	0.7
Luscinia luscinia	1					1	0.4
Turdus philomelos	15	3		7	1	26	9.7
Turdus pilaris	8	10		5		23	8.6
Turdus merula	5	2		6	1	14	5.2
Sylvia nisoria		1				1	0.4
Sylvia borin	1					1	0.4
Sylvia atricapilla	3	3				6	2.2
Sylvia communis	1					1	0.4
Sylvia curruca		1			2	3	1.1
Acrocephalus arundinaceus					1	1	0.4
Hippolais icterina	1					1	0.4
Phylloscopus collybita	1				1	2	0.7
Ficedula hypoleuca	3					3	1.1
Parus major	17	8	3	2	3	33	12.3
Cyanistes caeruleus	12	3		1	5	21	7.8
Poecile montanus	1					1	0.4
Sitta europae	1	1				2	0.7
Certhia familiaris	1	1	1			3	1.1
Lanius collurio	2					2	0.7
Pica pica					2	2	0.7
Garrulus glandarius	2	1	1			4	1.5
Corvus monedula	1	1				2	0.7
Corvus frugilegus		1				1	0.4
Sturnus vulgaris	3	1		4	4	12	4.5

Passer domesticus	1	2				3	1.1
Passer montana	2	1			1	4	1.5
Fringilla coelebs	2	1		1		4	1.5
Carduelis cannabina		1				1	0.4
C. carduelis	1	2		4		7	2.6
Carduelis spinus				2		2	0.7
C. coccothraustes	20	7		10	10	47	17.5
Unidentified	4				2	6	2.2
Total	124	56	5	48	36	269	100.0

collisions was Hawfinch *C. coccothraustes* (17.5%), followed by Great Tit *Parus major* (12.3%), Song Thrush *Turdus philomelos* (9.7%), Fieldfare *Turdus pilaris* (8.6%), Blue Tit *Cyanistes caeruleus* (7.8%), Blackbird *Turdus merula* (5.2%), Starling *Sturnus vulgaris* (4.5%), Wood Pigeon *Columba palumbus* (3.3%), Goldfinch *C. carduelis* (2.6%), Blackcap *Sylvia atricapilla* (2.2%), unidentified (2.2%). A great majority of fatalities were common, small and medium passerines (89%), 55% were resident or partially resident, 38% were short-distance migrants and 7% were long-distance migrants. The majority of collisions (64%) were noted at the part of the study area adjacent to the nature reserve "Las Zwierzyniecki". The largest number of fatal collisions with acoustic barriers took place in summer 2010 (N = 124). In summer 2011 and 2012 there were 55 and 35 dead birds respectively.

The experiment on the speed of carrion loss (N = 30) found that 17% of dead birds were removed after 1 week, 43% after 2 weeks and 23% after 3 weeks. In one case the disappearance of carrion took 20 weeks. In winter 2012, tracks and visual observation of carrion feeders were noted. Cats and dogs were found the most often at the study area (recognition by tracks during 12 field visits). There were no corvids Corvidae like Magpie *Pica pica* or Hooded Crow *Corvus cornix* and no martens *Martes* sp. or foxes *Vulpes vulpes*, which could influence the speed of carrion loss.

There were 4 injured and stupefied birds found, despite the first aid all birds died from 3 to 48 hours after the collision.

DISCUSSION

There are no prior data on the species composition and the scale of bird mortality from collisions with reflective plate glass in building construction in Poland. Some casual information can be found on ornithology internet forums or in the daily press (Zbyryt, 2012). We can conclude from the analysis of the "Records Of Dead And Weakened Birds", conducted by Eagles Conservation Committee in 1998-2009, that out from 546 cases of specific cause of death or mutilation of falconiformes and owls, 6% were the victims of window collisions (Anderwald 2009). Unfortunately, there are no data on the species composition of birds colliding with this kind of man-made structures. Recently,

Polish scientists have shown much more interest in the influence of power plants on birds, which may be noticed e.g. in the environmental impact assessment (EIA) (PSEW 2008). It has been estimated that each year 10-40 thousand birds die due to the collision with wind turbines, however in the case of striking transparent architectural objects, those numbers could be in the billions (Klem 2009).

In this study, the main factor that affected the number of bird collisions was the transparency of noise barriers which reflected trees and shrubs, the so-called *mirror effect*. The use of bird silhouettes appeared to be ineffective, and the location of noise barriers along the edge of a nature reserve may have exaggerated the collisions. In 2010 additional bird silhouettes were fastened to soundwalls. This time they mimicked falconiformes (previous ones resembled rooks). Following this there was a reduction in bird strikes caused by the mirror effect and transparency during summer. Nevertheless, mortality rates were still high, which suggested that even using the silhouettes of birds of prey with a view to protecting birds from the collisions with reflective plate glass in building construction is ineffective (Trybus 2003). Collisions often occur a short distance from bird figures applied to the noise barriers (*pers. obs.*) and the applied figures aroused a lot of controversy among local residents (Zbyryt 2012).

It was found during the studies that only a small percentage of dead birds were long-distance migrants. This may indicate that the analyzed barriers were not on a bird migration route. In addition our data suggest that transparent noise barriers are a bigger threat to resident or partially resident birds. The location of reflective barriers should take into account both bird density close to the soundwall (Klem 1989, Klem et al. 2004), and also the attractiveness of the area (Hager et al. 2008). The largest number of collisions were recorded in the immediate vicinity of the nature reserve, which is the most appealing site for birds. During studies conducted in Switzerland (Sierro and Schmid 1999) researchers showed that most, (34%), collisions with noise barriers occurred in the spring season (April-May) and then systematically decreased. A similar situation happened during our studies. In our study 6% of collisions were recorded in the winter season 2011/12 compared to 40% in the summer of 2012 and 54% in the spring of 2012, confirming significant differences between the seasons. Just as in the Swiss research, the victims of window strikes were mainly common species, birds of small or medium size passerines, residing and foraging in the low vegetation up to several meters above the ground.

The studies affirm that transparent architectural objects can be a significant source of bird mortality, especially for local populations. It has been proven in Australia that each year 1,5% of the globally endangered Swift Parrot *Lathamus discolor* breeding population dies as a result of collision with reflective plate glasses (BirdLife International 2000, Klem et al. 2004). In 2010 three dead specimens of Middle Spotted Woodpecker *Dendrocopos medius* were found next to a noise barrier. One of the birds had a brood patch, indicating that as a consequence of her death, the nestlings probably also died.

The total population of this species in the nearby nature reserve has been estimated to be 3-4 pairs. It is a species listed in Appendix I to the Bird Directive. Besides this, we have also found Red-backed Shrike *Lanius collurio*, which is also on that list, among the window victims. Surprisingly, the dominant species among the fatalities was Hawfinch which spend most of their time high up in the trees and flies at height (Svensson et at. 2009), while noise barriers reach 1/3 the height of the surrounding trees.

Predators and scavengers can significantly reduce the number of collision victims found (Klem 1990). If we take into account our experiment into the disappearance of carcasses, we can conclude that most of the birds, which suffered an instant death due to the window impact, were found. On the basis of direct observation (made during every control) and tracks in the snow (winter season) no increased scavenger activity was noted. In addition, no synurbic Corvidae populations exist in the vicinity which could remove dead birds (Sierro and Schmid 1999). The percentage of bird fatalities perceived more than once at the same place (66%) leads us to assume that at least 2/3 of the collision victims were found. It should be emphasized that this is only the number of specimens which died at the scene of the accident. It is still unknown how many birds died due to the complications resulting from the strike. In most cases the backbone does not get broken; a large number of victims die after some time as a result of created intricacies (Klem 1990, Veltri and Klem 2005), which additionally hinders estimating the scale of collision phenomenon. This was confirmed by the death of four birds (the small size of the body) discovered as the victims of collisions with screen that have died in the period from 3 hours to 2 days after they received aid.

REFERENCES

Anderwald D. 2009 – Causes of mortality birds of prey and owls on the basis of data analysis in "Records Of Dead And Weakened Birds" run by Eagle Conservation Committee – Stud. i Mat. CEPL, Rogów, 3 (22): 125-151 (in Polish).

BirdLife International. 2000 – Threatened Birds of the World – Barcelona and Cambridge, UK: Lynx Editions and BirdLife International.

Hager S.B., Trudell H., Mckay K.J., Crandall S.M., Mayer L. 2008 – Bird density and mortality at windows. The Wilson Journal of Ornithology 120: 550-564.

Klem, D. Jr. 1989 – Bird-window collisions – Wilson Bulletin 101(4): 606-620.

Klem D. Jr. 1990 – Bird injuries, cause of death, and recuperation from collisions with windows – Journal of Field Ornithology 61: 115-119.

Klem, D. Jr., Keck D.C., Marty K.L., Miller Ball A.J., Niciu E.E., Platt C.T. 2004 – Effects of window angling, feeder placement, and scavengers on avian mortality at plate glass – Wilson Bulletin 116: 69-73.

Klem, D., Jr. 2006 – Glass: a deadly conservation issue for birds – Bird Observer 34(2): 73-81.

Klem D., Jr. 2009 – Avian mortality at windows: the second largest human source of bird mortality on earth – Proceedings of the Fourth International Partners in Flight Conference: Tundra to Tropics 244-251.

PSEW. 2008 – Wytyczne w zakresie oceny oddziaływania elektrowni wiatrowych na ptaki – Szczecin.
Sierro A., Schmid H. 1999 – Impact des vitres transparentes antibruit sur les oiseaux: une saison d'expérience à Brig VS – Actes du 39e colloque interrégional d'ornithologie, Yverdon-les-Bains (Suisse), Nos Oiseaux, suppl. 5, pp. 139-143 (2001).
Svensson L., Mullarney K., Zetterström D. 2009 – Collins Bird Guide. 2nd Edition – Harper Collins, London.
Trybus T. 2003 – Wirksamkeit von Greifvogelsilhouetten zur Verhinderung von Kleinvogelanprall an Glasfronten – Die These des Masters, der Universität Wien. http://www.window-collisions.info.
Veltri, C.J., Klem D., Jr. 2005 – Comparison of fatal bird injuries from collisions with towers and windows – Journal of Field Ornithology 76: 127-133.
Zbyryt A. 2012 – Poradnik ochrony ptaków przed kolizjami z przezroczystymi ekranami akustycznymi i oknami budynków – Białystok, PTOP.