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SHORT COMMUNICATION

The hazards of overhead electric lines to Black Storks *Ciconia nigra*

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Abstract Almost every year the death or serious injury of Black Storks *Ciconia nigra* caused by overhead electric lines is recorded in the Hungarian ringing database. Among the Black Storks with satellite transmitters from Hungary the prevalence of electrocution and collision with overhead electric wires is very high. This is a considerable threat not only near the breeding grounds but along migration routes as well. MME BirdLife Hungary has been working for years in order to decrease the risks posed by overhead electric lines, as the threat affects other species as well (including the White Stork *Ciconia ciconia* and different raptors). Communication and co-operation with electricity providers and the importance of international co-operation is also outlined.

Keywords Black Stork, *Ciconia nigra*, electric line, electrocution, collision.

Introduction

Overhead electric line (OEL) networks constitute a very big threat to all large bird species worldwide (e.g. Bevanger 1998; APLIC 2006; Biasotto and Kindel 2018). The problem of OEL is long known and affects many birds of bigger size as well in Hungary. The first documented OEL-related Black Stork *Ciconia nigra* casualty in Hungary happened in 1973, when a first-year Black Stork wearing a Czechoslovakian ring was found electrocuted. As the OEL network was constantly developing and bird-related field activities became more frequent, especially after the founding of MME BirdLife Hungary in 1974, more cases of electrocution and eventually collisions were discovered.

Study area and methods

The study area was mostly the area of Hungary. There is an outlook on the birds that were affected by casualties in Hungary of known origin, as well as on the locations of casualties of the birds that were marked in Hungary and suffered casualties outside of the country.

Several methods have been used for data collection, namely (1) we collected the data of marked (ringed and/or tagged) Black Storks where the cause of the fatal event was recorded in the Hungarian Bird Ringing Database Tringa (T-ring application), (2) we collected the data of Black Storks that were discovered during the Survey of Medium-voltage pylons organized by MME BirdLife Hungary (3) we collected the data of Black Storks that were recorded in the TOTEM database (The TOTEM database serves to collect mortality cases of wild animals that died for various reasons). This database targets the main causes of destruction that affect wild amphibian, reptile, bird and mammal species; e.g. poisoning, electrocution, collision with vehicles, window collisions, shooting, etc.). It must be mentioned that Black Storks that had been tagged and suffered fatalities with a known location have been collected by us, personally visiting the locations and getting information about the circumstances of the casualty.

After data collection, we investigated the age distribution of the Black Storks that suffered fatal OEL casualties, with simple frequency analysis.

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Results

We have presented every case of marked Black Storks that suffered OEL casualties which are registered in the Tringa database in Figure 1, altogether 25 individuals. We have also presented the cases of non-marked individuals found in Hungary in Figure 2, altogether 13 individuals.

Out of eight tagged Black Storks which were originating from Hungary, three have been proven to have suffered fatal electrocutions and one collision. Koppány, a breeding male bird that was tagged in frame of the FlyingOver Natura2000 project in 2005, has been electrocuted near Yumurcakli, Turkey in the same year. Jenő, a breeding male bird that was tagged in frame of the project of the Gemenc Forestry and Game Management Company in 2015, has been electrocuted near Konya, Turkey in the same year. Bea, a breeding female bird that was tagged in frame of the project of the Gemenc Forestry and Game Management Company in 2015, has been electrocuted near Yesilova, Turkey in the same year. Finally, Mari, a first year bird that was tagged in frame of the project of the Gemenc Forestry and Game Management Company in 2017, has suffered fatal collision with OEL in Hungary, before the first autumn migration.

The data on the marking and finding of the Black Storks that suffered fatal casualties on OEL are presented in Table 1.

Discussion

We found 38 Black Stork individuals in the Hungarian databases which suffered fatal casualties (electrocution or collision) on overhead electric line networks.

As the majority of the data are originating from the ringing database and the registration of non-marked individuals has only been possible in the past few years, it is very likely that the number of Black Storks that lost their lives because of OEL fatalities is much higher than registered. An important factor is that Black Storks usually use habitats distant from human settlements, this may also influence the number of registered cases as there may be numerous carcasses which are never found.

According to the analysis of the age distribution of these birds, we found that 64% of them died on their first migration, before leaving Europe (see

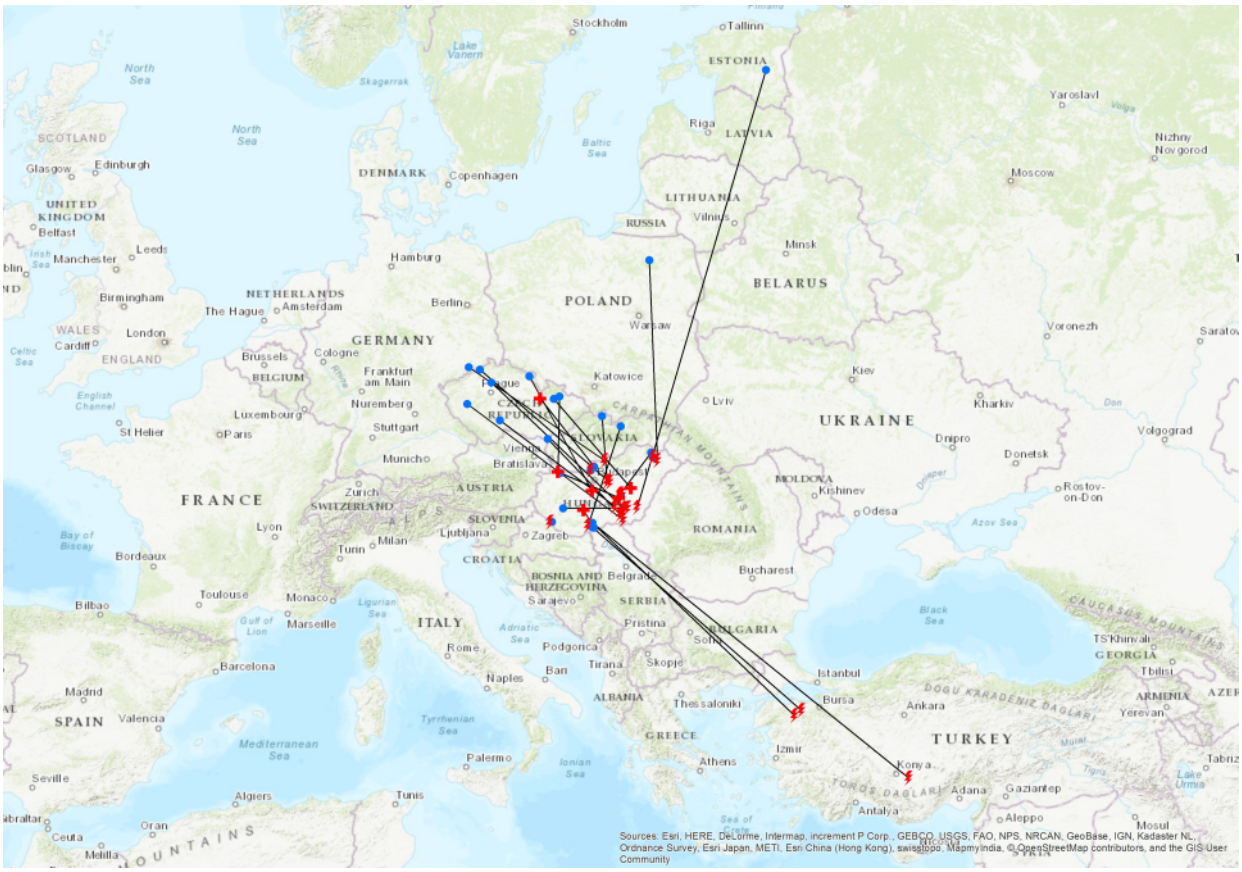

Figure 1. Marked Black Storks that died on overhead electric lines in the Hungarian database. Blue dot: site of tagging; red cross: places where the cause of death was collision with electric overhead lines; lightning mark: places where electrocution was confirmed.

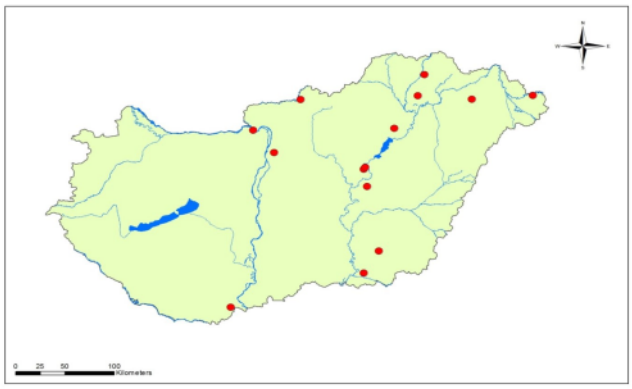

Figure 2. Non-marked Black Storks that died on overhead electric lines in Hungary from the Hungarian database. Red dot: site of the fatality.

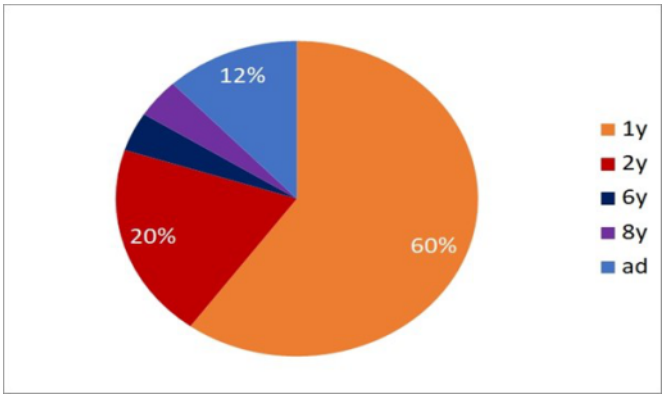

Figure 3. Age ratio of marked Black Storks that died on overhead electric lines in the Hungarian database. (y: year.)

Figure 3). This finding is in accordance with a case described by Hormann and Richarz (1997). As the survival rate of first year Black Storks is very low (0.1696) based on ring recoveries (Tamás 2011), we suspect that OEL casualties have a significant role in this low number.

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Table 1. Marked Black Storks that suffered fatal overhead electric line casualties.

Ringer	Scheme	Ring	CR	Age when marked	Date of marking	Place of marking	Age when found	Date of finding	Place of finding	Finder
Suchy-Loucka	Praha	B15137		P	09/07/1973	Mezina	1y	15/10/1973	Lébénymiklós	A Bankovics
Suchy -Loucka	Praha	B16416		P	03/07/1981	Resov. Bruntál	8y	04/09/1988	Kenderes	G Máté
T Frank	Budapest	603264		P	05/06/1993	Sárospatak	6y	04/04/1998	Tiszavárkony	S Urbán
S Danko	Praha	B31079	82T	P	05/07/1996	Gerlachov	2y	29/09/1997	Dunafalva	B Kalocsa
F Pojer	Praha	BX486	67W	P	26/07/1997	Plzen	1y	15/09/1997	Maroslele	L Ács
M Demko	Praha	BX1618	8AW	P	14/07/1998	Zakamenne	1y	15/09/1998	Tápiószecső	F Mihályi
M Váczi	Budapest	Z647	50HN	P	28/06/2005	Abda	2y	13/01/2006	Nagyrév	A Virág
B Kalocsa- E A Tamás	Budapest	1834963	50F4 + tr	AD	03/07/2005	Csátalja	AD	28/09/2005	Yumurcakli TR	B Kalocsa – E A Tamás
J Vrána	Praha	BX13865	61AM	P	21/06/2006	Stárkov, Náchod	1y	16/09/2006	Ráckeve	Nagy I
J Jahelka	Praha	BX16788		P	01/07/2006	Nová Ves	2y	15/05/2007	Gátér	M Fodor
H A Török	Budapest	1834291	50R3	P	17/06/2007	Tiszabercel	1y	15/07/2007	Tiszabercel	F Herczeg
V Beran	Praha	BX19043	62LR	P	07/06/2010	Ústi nad Labem	2y	17/07/2011	Nagykáta	L Kossuth
H Matusik	Praha	YY260	631A	P	27/07/2010	Lanzhot, Breclav	2y	15/09/2011	Dóc	J Puskás
D Zawadzka	Poland	VN0291	07 + tr	1y	13/08/2012	Kadzidlowo	1y	02/09/2012	Nyírbogdány	K Nagy
Rc Hiddensee	Germany	CA0773	T612	P	14/06/2014	Mulda	1y	04/09/2014	Szécsény	F Papp
L Jakus	Budapest	PH06975	51V0	P	17/06/2014	Kisberény	1y	01/09/2014	Árpádhalom	Sz Kozma
Z Horváth	Budapest	PH05399	5208	P	27/06/2014	Berzence	1y	19/08/2014	Berzence	E Mezei
U Sellis	Estonia	A10324	712P	P	08/07/2014	Maramaa, Tartu	1y	07/10/2014	Telekgerendás	P Marik
Á Monoki	Budapest	PH06616	51MP	P	08/07/2014	Tiszaföldvár	1y	29/09/2014	Martfű	G Nagy
A Mórocz - E A Tamás	Budapest	PH09337	51XW + tr	AD	24/06/2015	Baja	AD	02/10/2015	Yesilova TR	B Kalocsa-E A Tamás
Kazi R	Budapest	PH08417	527J	P	09/07/2015	Nógrád	1y	26/08/2015	Zichlínek CZ	H Ales
A Mórocz - E A Tamás	Budapest	PH09347	520W + tr	AD	13/07/2015	Baja	AD	05/10/2015	Ismil TR	B Kalocsa-E A Tamás
B Kalocsa – E A Tamás	Budapest	PH00963	5415 + tr	1y	13/09/2017	Gara	1y	27/09/2017	Udvari	B Kalocsa
Ticháckova M	Praha	YH650	6625	P	16/07/2017	Horin	1y	08/11/2017	Szentes	N Farkas
Cs Spilák	Budapest	PH11401	543A	P	15/06/2018	Pilismarót	1y	25/07/2018	Pilismarót	Cs Spilák

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