BIRD OCCURRENCE IN SELECTED ECOLOGICAL CORRIDORS IN AUSTRIA: COMPLEMENTARY MONITORING WITH PHOTO TRAPS

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Abstract

Landscapes in Central Europe are currently facing many challenges related to human activities. Among the most serious impacts are the negative consequences of habitat conversion, resulting in habitat fragmentation, loss of connectivity between populations and decline in biodiversity. To mitigate these effects, a number of measures, such as supporting ecological corridors by implementing wildlife crossing structures across critical sections of linear transport, have already been realised or planned. Mitigation measures are mostly designed for umbrella species (usually mammal species). In two pilot areas in Austria, monitoring using photo traps was carried out for a period of more than a year, focussing primarily on mammals, but also providing a unique overview of the occurrence of bird species. A total of 28 bird species were recorded during these monitoring activities. The most common bird species recorded in the cultural landscape include common pheasant (32.55 %), followed by mallard (29.52 %) and pigeon (9.05 %). The majority of bird records were taken on ecological corridor sites in the cultural landscape (95.12 %) compared to sites located at wildlife crossings structures (4.88 %) across expressways and motorways. The highest bird activity was registered during June and July. The data obtained can be useful for nature and landscape conservation and for a better understanding of bird interactions in human-modified landscapes.

Key words: avian species, biodiversity, cultural landscape, habitat connectivity, wildlife crossings structures, temporal patterns

Introduction

Central Europe's landscapes are being used more intensively, leading to a number of problems such as landscape fragmentation, loss of biodiversity, climate change, and others. All these negative effects on landscape and nature directly affect people, whether in economic terms or in respect of their well-being. Investigating mitigation measures and the current state of the landscape, as well as biodiversity, is therefore essential. Our study focused on bird occurrence and species richness on ecological corridors and wildlife crossing structures (hereafter WCSs) in two Austrian pilot areas as a follow-up to a previous study (Jurečka et al. 2024).

Wildlife crossing structures are widely used to allow for safe terrestrial animal movement across roads. They are not so important for bird species, but they are also used by them. Bird data from photo traps placed primarily to monitor mammalian use of ecological corridors and WCSs can be used, for example, to analyse the distribution of bird activity during the day and year or to obtain further information on their biology.

Materials and methods

The monitoring of birds was carried out at a total of 49 selected locations along ecological corridors in the cultural landscape and at wildlife crossings structures (i.e. 6 underpasses and 3 overpasses) passing expressway and motorway infrastructure. The selected monitoring sites were located in two pilot areas, i.e. a) Kobernausser Forest Pilot Area, hereafter PA KF, b) Pöttsching Pilot Area, hereafter PA PÖ. The KF pilot area is located in Upper Austria near the

town of Haag am Hausruck and the second PÖ pilot area consists of an area in Burgenland and Lower Austria near the towns of Mattersburg and Eisenstadt. The monitoring of birds was carried out as a supplement to the primary focus of mammal monitoring using 56 automatic photo traps, whereby more detailed information on the methodology can be found in the primary study (Jurečka et al. 2024). General monitoring was carried out from 2 December 2021 to 28 January 2023. The records obtained were analysed in terms of bird species, abundance, time and date as well as location.

Fig. 1: Birds recorded by photo traps: a) common buzzard, b) common pheasant, c) great egret and grey heron, d) western marsh harrier. (photos: Mořic Jurečka)

Results

A total of 2.375 bird records were recorded during the monitoring, whereby 28 different species were identified (Table 1). More records and greater species richness of birds were recorded in PA PÖ compared to PA KF. The highest abundance in birds was recorded for common pheasant (*Phasianus colchicus*) (32.55 %), followed by mallard (*Anas platyrhynchos*) (29.52 %) and pigeon (*Columba spp.*) (9.05 %). Rare records of birds were observed for the species of black-crowned night-heron (*Nycticorax nycticorax*), black stork (*Ciconia nigra*), common kestrel (*Falco tinnunculus*), Eurasian goshawk (*Accipiter gentilis*), Eurasian hobby (*Falco subbuteo*), Eurasian sparrowhawk (*Accipiter nisus*) and fieldfare (*Turdus pilaris*). Seventeen more bird species were recorded in PA PÖ compared to PA KF. Conversely, only one bird species was recorded in the PA KF that was not already recorded in PA PÖ. The majority of birds was recorded on ecological corridors in landscape outside settlements (95.12 %) compared to WCSs (4.88 %). Only 10 bird species were recorded at or in close proximity to WCSs. Common pheasant (61.21 %) and common buzzard (16.38 %) dominated the WCS records. Bird activity was observed mainly during daylight hours (Fig. 2) and more or less evenly distributed. The highest activity of birds was recorded in June and July.

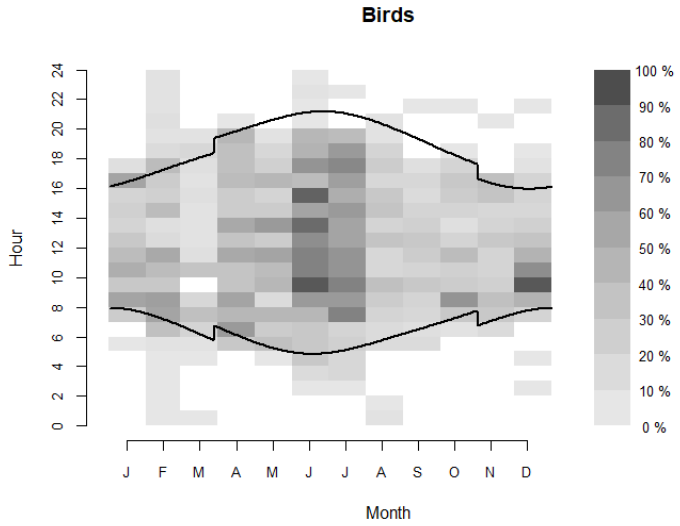

Fig. 2: Annual and daily time distribution of bird activity. The solid black line shows sunrise and sunset times throughout the year.

Tab. 1: Bird occurrence in pilot areas on ecological corridors incl. WCSs

Species	PA KL		PA PÖ		Total	
	n	%	n	%	n	%
black-crowned night-heron (*Nycticorax nycticorax*)	–	–	1	0,05	1	0,04
black stork (*Ciconia nigra*)	3	0,97	2	0,10	5	0,21
black woodpecker (*Dryocopus martius*)	15	4,84	8	0,39	23	0,97
carrion crow (*Corvus corone*)	–	–	22	1,07	22	0,93
common buzzard (*Buteo buteo*)*	14	4,52	42	2,03	56	2,36
common kestrel (*Falco tinnunculus*)*	–	–	3	0,15	3	0,13
common magpie (*Pica pica*)*	–	–	123	5,96	123	5,18
common moorhen (*Gallinula chloropus*)	–	–	9	0,44	9	0,38
common pheasant (*Phasianus colchicus*)*	177	57,10	596	28,86	773	32,55
common starling (*Sturnus vulgaris*)	2	0,65	15	0,73	17	0,72
Eurasian goshawk (*Accipiter gentilis*)	1	0,32	–	–	1	0,04
Eurasian hobby (*Falco subbuteo*)*	–	–	2	0,10	2	0,08
Eurasian jay (*Garrulus glandarius*)	8	2,58	11	0,53	19	0,80
Eurasian sparrowhawk (*Accipiter nisus*)	–	–	1	0,05	1	0,04
European green woodpecker (*Picus viridis*)	–	–	8	0,39	8	0,34
European turtle dove (*Streptopelia turtur*)	–	–	8	0,39	8	0,34
fieldfare (*Turdus pilaris*)	–	–	3	0,15	3	0,13
great egret (*Ardea alba*)	–	–	79	3,83	79	3,33
great tit (*Parus major*)	1	0,32	2	0,10	3	0,13
grey heron (*Ardea cinerea*)*	–	–	131	6,34	131	5,52
hooded crow (*Corvus cornix*)*	–	–	32	1,55	32	1,35
mallard (*Anas platyrhynchos*)	–	–	701	33,95	701	29,52

pigeon (*Columba sp.*)*	79	25,48	136	6,59	215	9,05
purple heron (*Ardea purpurea*)	–	–	16	0,77	16	0,67
red-backed shrike (*Lanius collurio*)*	–	–	2	0,10	2	0,08
short-eared owl (*Asio flammeus*)	–	–	27	1,31	27	1,14
tawny owl (*Strix aluco*)*	10	3,23	1	0,05	11	0,46
western marsh harrier (*Circus aeruginosus*)	–	–	84	4,07	84	3,54
Total	310	100	2065	100	2375	100
Species richness	10	–	27	–	28	–

Note: Species that were also recorded on WCSs are marked with "*".

Discussion

This study provides an indicative insight into the occurrence and activity of birds in two pilot areas in Austria and was prepared as a complementary study to the data obtained from mammal monitoring (Jurečka et al. 2024). Bird monitoring was based on the use of installed photo traps at selected sites, which however have their limitations and may not have captured all bird occurrences. When using photo traps for bird monitoring, the size of the bird and the distance from the photo trap are crucial for the effectiveness of the monitoring (Randler and Kalb 2018). For a more complete understanding and objective mapping of bird occurrence and activity, other monitoring methods (Bart 2005, Wix and Reich 2019, Pérez-Granados and Traba 2021) would be more suitable. To achieve the best efficiency in bird monitoring, a combination of different methods is therefore recommended (Wix and Reich 2019).

The diversity of birds recorded in PA PÖ was higher than in PA KF, especially associated with water areas and woody vegetation. The presence of green infrastructure showed a positive effect on biodiversity and bird abundance. The total number of bird records and the number of species were higher in landscapes on ecological corridors than on WCSs, where there is a higher level of human disturbance and fewer shelter sites. Open habitat types typically host fewer bird species than forest or urban habitats (Reif et al. 2022). Therefore, in cultivated agricultural landscapes, the applied management (Wrbka et al. 2008, Šálek et al. 2021) and the presence of natural vegetation (Haslem and Bennett 2008) have a crucial influence on bird biodiversity. Most records were registered for common pheasant, followed by mallard and pigeon. These findings are consistent with reports in hunting statistics and records of fallen game e.g. due to wildlife-vehicle collisions (Statistik Austria 2024). The peak of bird activity was recorded in two summer months – June and July, which may be related to the length of daylight and the associated increase in bird activity (Pokrovsky et al. 2021). This is supported by a study by Wix and Reich (2019), where peak bird activity has been recorded during summer, especially in the morning hours. Our finding of all-day bird activity without a noticeable peak is consistent with the biology of the eudominant bird species. Pheasants are active throughout the day, with a peak at midday (Viviano et al. 2024). Mallard activity is highest around sunrise and just after sunset. Between these two peaks (during daylight hours), their activity is somewhat reduced, but it stays relatively high (Sauter et al. 2012).

The results of this monitoring campaign provide a practical insight into the avifauna at the local and regional levels in Austria and can be useful in the areas of conservation biology, biodiversity research and understanding relationships within landscape ecology.

Conclusion

Our study shows insights into the species richness of birds in two pilot areas in Austria along ecological corridors and WCSs. The study presents (i) the occurrence of individual bird species and shows (ii) the general daily and annual activity of birds during the year. Bird occurrence was significantly higher on ecological corridor sites in cultural landscapes than in the vicinity of WCSs. The degradation and loss of natural habitats can lead to changes in the activity and occurrence of species. An overall understanding of interrelationships is essential at local, regional and international levels, enabling the results to be used for nature conservation and strategic landscape planning.

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Souhrn
Antropogenní činnost významně ovlivnila krajinnou strukturu a původní přirozená stanoviště ve střední Evropě, což generuje řadu výzev a problémů. Mezi nejzávažnější problémy patří negativní dopady na životní prostředí, přeměnu stanovišť, fragmentaci biotopů, narušení konektivity populací a úbytek biologické rozmanitosti. Za účelem zmírnění těchto dopadů jsou v kulturní krajině budována a plánována různá opatření, jako jsou ekologické koridory a přechody pro zvěř přes kritické úseky liniových staveb. Tato opatření jsou většinou navrhována pro tzv. deštníkové druhy, především savce. Ve dvou pilotních oblastech v Rakousku probíhal více než

rok monitoring pomocí fotopastí, zaměřený především na savce. Získaná data však poskytla i jedinečný přehled o výskytu ptačích druhů. Celkem bylo během monitoringu zaznamenáno 28 druhů ptáků. Mezi nejčastěji zaznamenané druhy v kulturní krajině patřil bažant obecný (32.55 %), kachna divoká (29.52 %) a holub (9.05 %). Většina ptačích záznamů pocházela z lokalit v rámci ekologických koridorů (95.12 %) ve srovnání s přechody pro zvěř (4.88 %). Druhová bohatost byla vyšší u vodních prvků a dřevinné vegetace. Zvýšená aktivita ptáků byla zaznamenána zejména během června a července. Získaná data mohou být cenným přínosem pro ochranu přírody a krajiny a pro lepší pochopení interakcí ptáků v člověkem pozměněné krajině.

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