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Population density and habitat preferences of the Collared Flycatcher (*Ficedula albicollis* Temminck, 1815) in floodplain forests – A case study from the Donau-Auen National Park, Lower Austria

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Abstract

The Collared Flycatcher (*Ficedula albicollis*) is one of a few insectivorous long distance migrants with a slightly positive population trend. In spring 2015 we examined habitat preferences of a population in the Donau-Auen National Park. Singing males were counted at randomly chosen points in six survey rounds. Additionally, possible breeding competitors and/or cavity providers, woodpecker holes, standing dead wood, flying insects, vegetation parameters (forest surface roughness, forest type, forest age) and landscape variables (distance to water bodies and open land) were recorded. A model selection approach was used to identify important factors for territory presence. 57% of the points contained territories resulting in a population density of 7.28 territories/10 ha in the sampling area. The Distance Sampling -Method estimated similar or even higher densities. Forest surface roughness was the best predictor for territories; also, presence of Great Spotted Woodpecker, cavity availability and dead wood stems had an impact. Territories with higher surface roughness showed a tendency to early establishment. As forestry measures were stopped just 20 years ago and canopy roughness increases with stand age, the habitat quality of the remaining Danube floodplain forests east of Vienna for Collared Flycatchers will likely remain similar or even increase in the mid to long term.

Keywords

cavity breeder, forest structure, playback, territory establishment, canopy surface roughness, deadwood

Introduction

In terms of disturbance, edge-richness and productivity, floodplain forests offer diverse opportunities for birds (BRAWN et al. 2001; Iwata et al. 2003) and are important habitats for woodpeckers and secondary cave-breeders (REMM et al. 2006) like the Collared Flycatcher (*Ficedula albicollis*, Temminck 1815, Muscicapidae). This small, insectivorous, long-distance migrating, facultatively polygynous passerine has a mainly Eastern European distribution (BAUER et al. 2012; BIRDLIFE INTERNATIONAL 2004). It returns from its wintering grounds in tropical Africa earliest by end of March; most of the individuals arrive at their breeding areas by mid-April up to May and leave earliest by June. Cavities are occupied and defended by the earlier-arriving males and are shown to the later arriving females. The conservation status is NT on the Austrian red list of endangered species; on the EU's Birds Directive, the species is listed on Appendix 1, Spec E (BAUER et al. 2012; SACHSLEHNER 1995; LUNDBERG & ALATALO 1992; LÖHRL 1951). Natural-cavity breeding populations are regarded to be threatened on a long-term scale due to land use (e.g. SACHSLEHNER 1995).

This study was conducted in the the Donau-Auen National Park southeast of Vienna. It covers one of the last free-flowing sections of the Danube river and its surrounding floodplain forests hold a substantial proportion of Austria's Collared Flycatcher population. We addressed the following questions, assuming that in high quality habitats territories will be established earlier than in less suitable habitats: (1) In what order are the territories established? (2) What are the most important features of a high-quality habitat? (3) Is there a relationship between early territory establishment and habitat variables such as distance to water and insect density?

Methods

From April 3-May 24, 2015 multiple 5 min counts were done at 147 randomly chosen points. Each point was visited six times to document the order of territory occupation by Collared Flycatchers. Tits, European Nuthatches and woodpeckers were additionally counted to consider their potential role as breeding competitors and/or cavity suppliers.

At the points, we measured standing dead wood, counted woodpecker holes and estimated the density of flying insects. Forest type (soft wood vs. hard wood forest) and forest age were obtained from data provided by Österreichische Bundesforste AG and the governmental unit MA 49 of the province Vienna. Distance to water bodies and to open land was calculated using ArcGis 10.2. Forest surface roughness (standard deviation of mean vegetation height in a radius of 50 m) was obtained from data from a LiDAR surveying flight (available for 111 points). We used a model selection to detect important factors for territory establishment (generalized linear models with territory incidence as response variable).

Results

Collared Flycatchers are very abundant in the survey area and could be observed at least once at the majority (87.8 %) of points. The first individual was observed on April 4, the main arrival started in mid-April. At 57 % of our census points, we found a total of 84 territories within a 50 m radius resulting in a population density of 7.28 territories per 10 ha. Estimates based on the Distance-Sampling method (e.g. LLOYD et al. 1998) support even higher densities. Forest surface roughness was the best predictor for the occurrence of territories (Fig. 1); a higher surface roughness increased the probability for territories. Other important factors were the presence of Great Spotted Woodpeckers (negative effect), cavity availability (positive effect) and standing dead wood (negative effect).

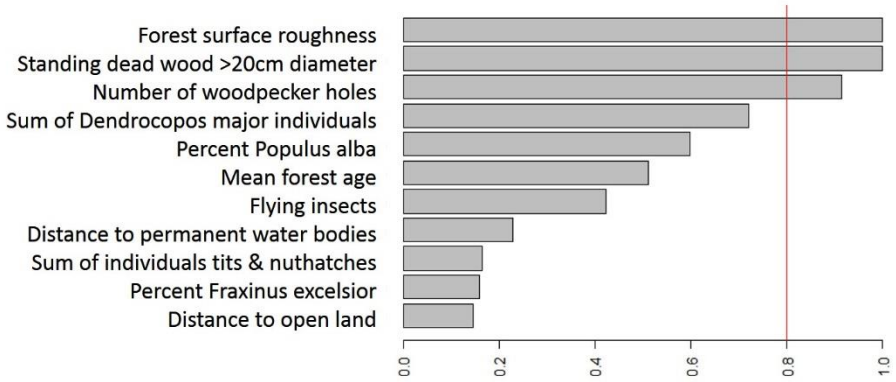

Figure 1: Model averaged importance of terms for predicting the occurrence of Collared Flycatcher territories.

There was a tendency of earlier territory establishment at points with higher surface roughness compared to those with a more homogenous tree layer (Fig. 2).

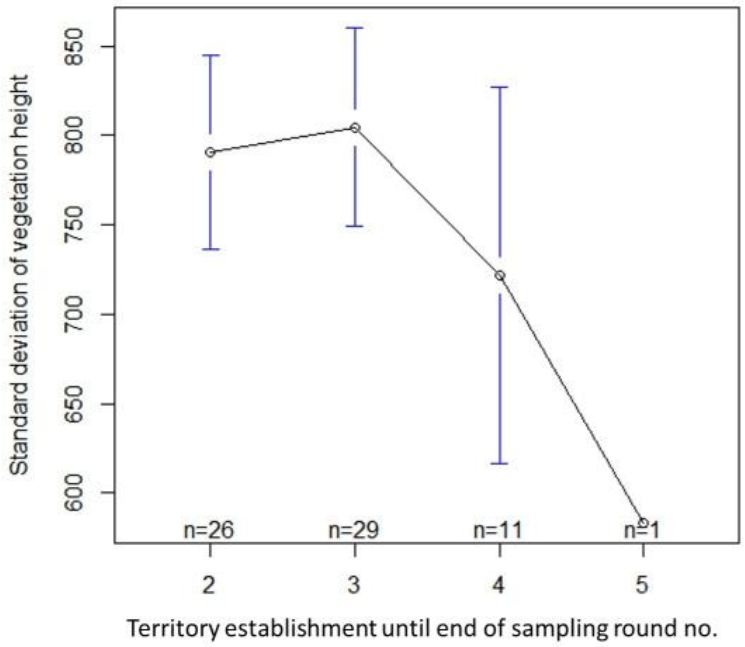

Figure 2: Mean surface roughness at territories with different establishment-time.

Discussion

The observed density of 7.28 territories per 10 ha in the riverine forests southeast of Vienna is surely exceeding the Central European average. Since the 1980ies, the population seems to be stable in the lower Austrian Donau-Auen (1983: 1.8-7.3 territories/10 ha, WINDIG & STEINER 1988).

A clear relationship between food supply, distance to water bodies and habitat quality, as documented for other flycatcher species (IWATA et al, 2003), could not be found in this study. Canopy surface roughness as best predictor for Collared Flycatcher occurrence could be an indicator for the primevalness of forest stands and is mirroring the management history, respectively. The higher light influx at forest sites with higher surface roughness could offer better foraging opportunities for Collared Flycatchers. Potential breeding competition with tits and European Nuthatches (*Sitta europaea*) had little effect, at least at the spatial scale of our study. However, as known from long term-studies from Poland, competition plays a minor role in near-natural systems (e.g. WESOŁOWSKI 2003).

Conclusion

Our study shows not only the great importance of riverine forests for Collared Flycatchers but offers hints on the high potential of remote sensing data for habitat analysis of forest bird species. In the Donau-Auen floodplain forests, which are protected since 1996, the population of Collared Flycatchers could even increase in the following years as more suitable habitats may develop due to the implemented process-orientated conservation approach. Canopy roughness – a factor most likely related to forest age and floodplain dynamics – was identified as the most important factor for predicting the presence of territories. Hence, the Collared Flycatcher could be a reliable indicator for monitoring the conditions of floodplain forest ecosystems.

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