Size does not matter (much): habitat connectivity matters more than local habitat quantity for urban tit reproduction

François-Marie Martin*[1,2,3], Jean-Christophe FoltÊte[4], Bruno Faivre[5], and Gilles Vuidel[6]

[1]ThéMA, UMR 6049 – Centre National de la Recherche Scientifique, Université de Franche-Comté – France

[2]Biogéosciences, UMR 6282 – Centre National de la Recherche Scientifique - CNRS, Université de Bourgogne EA7317 – France

[3]PUCA – Ministère de la Transition écologique et de la Cohésion des territoires – France

[4]ThéMA, UMR 6049 – Université de Franche Comté, Centre National de la Recherche Scientifique - CNRS – France

[5]Biogéosciences, UMR 6282 – Centre National de la Recherche Scientifique - CNRS, Université de Bourgogne EA7317 – France

[6]ThéMA, UMR 6049 – Centre National de la Recherche Scientifique, Université de Franche-Comté – France

Résumé

To maintain viable populations within cities, species need space. Yet, space is a scarce and valuable resource in urban areas, thus constraining the local quantity of semi-natural habitats that organisms may find in such environments. Individuals living in small habitat patches may still maintain their fitness by finding resources in nearby habitat patches, provided a sufficient connectivity of their foraging habitats. Nevertheless, if the combined effect of local habitat quantity and configuration on biological diversity has sometimes been examined, its effect on the reproductive parameters of urban taxa has seldom been investigated, despite the importance of breeding success for ensuring sound population dynamics.

In this study, we evaluated the importance of the connectivity of foraging habitat patches compared to the local quantity of habitat in explaining the breeding performances of two tit species (*Parus major* and *Cyanistes caeruleus*) whose nestlings are preferentially fed with preys that are found in deciduous woody vegetation (i.e. their foraging habitat). For four years, we measured the variations in nestling survival and nestling mass of urban tits using a network of 240 nestboxes located along a multivariate urban gradient. We analysed data using GLMM and LMM while controlling for many confounding factors (e.g. urban intensity, noise and light pollution, microclimate, clutch size, vegetation management).

Our analyses indicated that connectivity was important to explain both reproductive traits while the patch size of nesting habitats was not a good predictor of breeding success. We furthermore found that the positive effect of connectivity on nestling survival was only strong when the size of the nesting patch was small. It means that urban tits can still breed successfully in small habitat patches if those are well connected to the network of foraging habitats. Promoting the connectivity of urban greenspaces could thus partly compensate for their frequently insufficient sizes.

*Intervenant

Mots-Clés: Landscape ecology, food, limitation hypothesis, habitat network modelling, greenspace, passerine birds, planning and management of urban ecosystems