

## Effects of climate change on competition for cavities between birds, small mammals and insects

Dr. Carina Scherbaum-Heberer, Bettina Koppmann-Rumpf, Dr. Karl-Heinz Schmidt,  
Semela Dukova, Heidrun Janka

In the course of a long-term study focusing on hole-breeding passerines data on birds, their broods and the presence of “non-bird” species in artificial nesting cavities, e. g. nestboxes, have been collected since the early 1970s at the Ecological Research Centre in Schlüchtern, Hesse, Germany (50° 19' N, 9° 28' E).

This study is based on data collected in three woodland sample areas near the towns of Schlüchtern and Steinau a. d. Straße (50° 31' N, 9° 46' E) comprising a total of roughly 500 nestboxes over a period of 38 years from the early 1970s until 2008. The analysis focuses on the development of both breeding bird and “non-bird” populations as well as on the beginning of egg laying and the time of first appearance of “non birds” in the nestboxes. Possible relations with the development of mean spring temperatures, precipitation and phenological data of oak (*Quercus robur*) and beech (*Fagus sylvatica*) in connection with availability of caterpillars as food for the nestlings are being investigated to draw conclusions on competition. The species focused on are Great Tit (*Parus major*), Blue Tit (*Cyanistes caeruleus*, Syn. *Parus caeruleus*), European Nuthatch (*Sitta europea*), Pied Flycatcher (*Ficedula hypoleuca*), Edible Dormouse (*Glis glis*), Common Dormouse (*Muscardinus avellanarius*) as well as *Apodemus spec.* (yellow-necked mouse *A. flavicollis* or wood mouse *A. sylvaticus*), bats (determined species: *Myotis bechsteinii* and *Plecotus auritus*), wasps (mainly *Dolichovespula saxonica*) und hornet (*Vespa crabro*).

Significant rises in European Nuthatch and Blue Tit breeding populations can be observed while the populations of Pied Flycatcher show a significant decline and Great Tit populations show no significant changes over the years. Rises in population densities can be found for all “non-bird” nestbox users. Advancement of egg laying and time of first appearance can be detected. The growing populations and the advancements are associated with temperatures. In addition, “non birds” show correlations with precipitation. The advanced egg laying shows different synchronization with caterpillars used as food for the nestlings. Rising populations, advancements and a resulting longer temporal overlap in the nestboxes cause a higher probability of encounters and increase competition.