**Bird Migration Advances More in Urban than Rural Areas**

**Abstract**

Urbanization has a marked effect on the reproduction and other ecological and behavioral traits of many living organisms, including birds. In migratory birds, urbanization has been shown to be influenced by the (mis)synchronization of arrival timing and the availability of resources at the breeding destination. Urban areas, with higher temperatures that influence invertebrate development, this should favour earlier arrival of migrant birds to cities rather than to cooler ones. Among birds, the timing of reproduction may be affected by urbanization. Therefore, we analysed differences between urban and rural habitats in mean first arrival dates of 18 species of migratory bird species in western Poland during 1983–2010.

**Introduction**

Urban development is increasing across the Globe and having a major impact on animal life-histories [1–4]. Sometimes changes in the environment are so extreme that adjustment to novel urban environments may even require genetic adaptation [2,4]. Responses to environmental pressures include the need to maintain growth rates, reproductive success, and survival. Among birds, the timing of reproduction may be altered by urbanization. Therefore, we analysed differences between urban and rural habitats in mean first arrival dates of 18 species of migratory birds in western Poland during 1983–2010.

**Materials and Methods**

**Study Area and Data Sources**

Observations on the first arrival dates (FAD) of 18 migrant bird species were carried out in the course of 26 experiments of the Wiener Neustadt Bird Observatory and Ziemia Lubuska regions (Western Poland, 2 Technical University Munich, Freising, Germany) 3 Faculty of Engineering and Computing, Coventry University, Coventry, United Kingdom. Within the study, data were originating from urban (three cities, with a typical dense structure, and with populations exceeding 75,000 inhabitants:)

**Results**

**Mean First Arrival Dates**

Mean first arrival dates in rural and in urban areas for common years are summarised in Table 1. As shown in previous studies, and based on all years recorded, there was a negative correlation between mean first date and standard deviation between years for urban records (r = 0.68, p = 0.01). A paired t-test on species confirmed that urban arrivals were significantly more variable than rural arrivals (t = 22.34, p = 0.032). Based on common...

**Analysis of the data collected by the methods described above.**

**Charts or Graphs**

Graphs and charts are often used to graphically depict the results of data collection.

**Conclusion**

Our study indicates that urbanization may significantly affect the presence and abundance of these particular species, and consequently populations. Furthermore, because of certain similarities in urban and climate change [3,9], we expect much wider relevance...

**References**

6. Møller AP (2010) Interspecific variation in fear responsiveness predicts urbanization...