

Summary of the thesis

The thesis focuses on various aspects of bird-habitat relationships. We found that the positive correlation between local abundance and regional distribution of birds is not a universal pattern. Its strength and direction depends on the similarity of habitat cover at the locality where the species abundances are measured and habitat cover of the wider region where the species distribution is assessed. In the case of the Cameroon Mountains, many locally abundant species had relatively small ranges in subsaharan Africa. They were probably well-adapted to specific conditions of montane environment, and such tight habitat association precluded their occurrence in regions covered by savannah or humid lowland forest. At the same time, isolation and unusual environmental conditions of the montane forest in the Cameroon Mountains reduced possibilities of their colonization by species widespread within Africa. Such species were confined to deforested areas in the Cameroon Mountains. The strongest gradient in bird community structure was between birds of montane forest and birds of non-forest habitats, and this gradient is probably one of the most important bird-habitat gradients worldwide. Endemic species and species confined to afro-tropical mountains had the highest association with montane forest and, at the same time, these species had also wider local niche breadth than species widely distributed in Africa. These results show the importance of forest remnants for local occurrence of afro-montane bird species. On the other hand, these species can occupy strongly disturbed landscapes with high proportion of altered habitat. Sustainable management of such landscapes would enable persistence of many montane and endemic bird species in the Cameroon Mountains.

In the next step, we focused on gradients in species composition of bird communities in the Czech Republic. Habitat composition explained the highest proportion of variability in bird community structure at different scales of spatial resolution. This result implies that the effect of geographic factors connected with dispersal limitations or historical components of species distributions is rather weak in the Czech Republic if one applies a detailed habitat mapping. However, the observed habitat gradients are dependent on spatial scale which determines patterns of co-occurrence of particular habitats on sampling plots. The strongest gradient between forest and non-forest habitats becomes weaker at coarser scales of spatial resolution because most of larger plots contain mixture of forest and non-forest habitats. On the other hand, the effects of water and wetland

habitats have stronger effects on large-scale bird community structure despite their marginal local coverage. Field mapping of each bird individual into particular habitats revealed that birds of water bodies represent the most distinctive assemblage within the Czech bird fauna. Such an approach accounts for the effect of habitat co-occurrence which confounds all other analyses of bird-habitat associations.

Positions of particular species along major habitat gradients were related to their population trends. Although populations of forest birds generally increased between 1982 and 2003, there were contrasting population trends in species associated with different forest types. Specifically, the closer association with lowland broad-leaved forest, the more positive population trend, and the closer association with montane and coniferous forest, the more negative population trend. This pattern could be explained by changes in tree species composition in forests during last decades, characterized by the replacement of coniferous species with deciduous ones. Population increase was more prominent in forest specialist species and we attribute it to the increase of total forest cover and increasing dominance of older vegetation classes in Czech forests during 20th century. On the other hand, farmland birds experienced a general population decline, the most severe in farmland specialists. Different factors probably affected changes in farmland bird populations in different time periods. We assume the agricultural intensification was the most important driver of the population decline prior 1990. Agricultural intensity dropped markedly after 1990 resulting in lower rate of bird population decline but the overall negative trends did not reverse. We hypothesize that the reduction of the total area of arable land had detrimental effects on populations of farmland specialist species. On the other hand, scrubland species could benefit from land abandonment, and their population increased after 1990.

Habitat changes could also have a prominent role in the explanation of the last pattern described in the thesis. There was a negative relationship between population trends in the Czech Republic and latitudinal midpoints of European ranges in Czech birds. Such relationship is often treated as an evidence of the effect of climate change on animal populations. The Czech Republic is too small to detect climatically determined range shifts but increasing temperature could modify spatial distribution of abundance of particular species within their ranges due to differential survival and recruitment in different latitudes. Therefore, we predicted that northern species should have declined and southern species should have increased within the territory of the Czech Republic as a result of climate change. The analysis confirmed this expectation but we interpret this

result with caution. The abovementioned pattern in habitat-determined differences in forest bird population trends could be an alternative explanation. Northern species could be more closely associated with montane and coniferous forest and southern species could be more closely associated with lowland broad-leaved forest. Under this scenario, the effect of climate change would not be recognisable from the effects of changes in forest management.