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Conservation and ecology of woodpeckers. Foreword to the 8th International Woodpecker Conference Proceedings

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Woodpeckers vary widely in their life history characters. Many think of woodpeckers as denizens of deep, dark forests, probing among rotting logs and digging for grubs. However, woodpeckers are not only found in forests but also occur in deserts, open fields, urban areas, and farmland. Woodpeckers as a group are tremendously diverse and occupy habitats on all continents except Australia and Antarctica (Winkler et al. 1995). This taxonomic group has traditionally been thought of as keystone species (Daily et al. 1993; Bednarz et al. 2004) or ecosystem engineers (Robles & Martin 2014) within some forests of North America. As studies from other parts of the world have demonstrated, the role that woodpeckers play varies widely. What has been portrayed for several forests in North America is very different elsewhere. Recent work has demonstrated, for example, that many taxa that rely on cavities in some forests of South America and Eurasia use mostly cavities created by decay; often mediated by fungi, insects, or weather; rather than being created by woodpeckers (Cockle et al. 2011).

From 16 to 19 March 2019, the 8th International Woodpecker Conference was held in Białowieża, Poland. This conference with the theme „Conservation & Ecology of Woodpeckers" gathered together 108 participants from 4 continents and 21 countries. The scientific program consisted of 55 contributions, including 4 plenary talks, 26 other oral contributions (with sessions in conservation, cavity ecology, habitat use, evolutionary ecology and population biology, climate and weather effects, and space use and movement ecology), 25 posters, a workshop that focused on the basics of ecological niche modelling and phylogeography, and a roundtable discussion on the threats to the Białowieża Forest. The plenary lectures were given by esteemed researchers: Tomasz Wesołowski spoke about the local importance of the Białowieża Forest to woodpeckers; Kristina Cockle summarised long-term studies on nest web communities at Riske Creek, British Columbia, Canada and the role of woodpeckers and wood decay in predicting hole-nesting in the Atlantic Forest of Argentina; Jérome Fuchs discussed current understanding of phylogenetic relationships among the Picidae, based on new genetic work; and Victoria Saab described her long-term work on forest disturbances and the role of fire, bark beetles, and timber harvest in western forests of North America.

The following special issue features a subset of papers that materialised out of the woodpecker conference. Two of the studies focus on global woodpecker biodiversity hotspots and the relative

importance of medium- to large-sized woodpeckers. Kumar et al. (2020) describe ten of the seventeen species of woodpeckers found in sub-Himalayan forests of India. They highlight the reliance of larger species on larger diameter trees and emphasise the importance of managing such forests for larger, more mature trees to maintain the diverse communities that are currently under threat. Similarly, Lammertink et al. (2020) describe the nesting habits of three species of Atlantic Forest woodpeckers in Argentina and conclude that the globally threatened Helmeted Woodpecker *Celeus galeatus* would benefit from the protection of larger trees and more intact mature forests. Besides the size of trees, Aszalós et al. (2020) demonstrate how deadwood plays a critical role in maintaining suitable habitat for woodpeckers that live in oak-dominated forests of Hungary. The work described by Schaaf et al. (2020) highlight the importance of snags to small- and medium-sized woodpeckers of the subtropical piedmont forests of northwestern Argentina. The largest species, the Cream-backed Woodpecker *Campephilus leucopogon*, requires live trees.

Stański et al. (2020) discuss how male Great Spotted Woodpeckers *Dendrocopos major* forage higher in trees, and among thinner branches, than females in the Białowieża National Park. Other papers in this issue highlight the role of behaviour in woodpecker life history. Turner (2020) describes how Middle Spotted Woodpeckers *Dendrocoptes medius* in France use drumming to communicate with mates, but with reduced amplitude. This modification of the typical territorial role of drumming is an example of the variability in behaviour among picids globally. Finally, Campion et al. (2020) address the utility and potential bias of using GPS tagging to delineate home range in a medium-sized woodpecker, the Lilford Woodpecker *Denrocopos leucotos lilfordi*, found within the Spanish Pyrenees. Many management recommendations are based on older estimates of space use, and more accurate estimates of habitat use have important implications for endangered subspecies like the Lilford Woodpecker.

Despite the great strides that have been made in woodpecker research, the major issue facing picids globally is the loss of habitat. The 8th International Woodpecker Conference highlighted the importance of the Białowieża Forest to both the rich history of Poland but also globally as a UNESCO World Heritage site. Conference attendees signed a resolution affirming the group's support that the Białowieża Forest represents the largest remnant of lowland old-growth forest in Europe and that it should be protected based on the irreplaceable biodiversity that it yields. In particular, participants were concerned that forestry operations continue in much of the Polish portion of the forest and thus pose a risk to both sustainable development of local communities and the natural processes inherent within the intact forest. As such, signees urged Polish, European, and international entities to protect this unique world heritage site for current and future generations. Without the strong support of forest managers, researchers, and citizens; many of the species described in this special issue may also face conservation threats as demand for land increases over time.

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