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Editorial: Opportunities and challenges for wild bee conservation

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Editorial on the Research Topic

Opportunities and challenges for wild bee conservation

It is a tragic irony that the advancements in agriculture, technology, and industrialization that have afforded us the opportunity to study the diversity and ecology of wild bees are also driving the destruction of the habitats crucial to sustaining these species. The excitement of discovering previously unknown species or ecological interactions is tempered by an urgent need for research focused on developing effective conservation and restoration strategies. Without such efforts, many bee species and the vital services they provide could be lost from managed landscapes. Although human activities are driving a biodiversity crisis of historic proportions (Cowie et al., 2022), we are thankfully not helpless in this moment. The same spirit of innovation and discovery that fueled our dramatic successes in shaping landscapes and ecosystems around the world offers our best hope for achieving a sustainable and biodiverse future. The articles assembled in this Research Topic on “*Opportunities and Challenges for Wild Bee Conservation*” represent important steps in that direction.

Of key importance to wild bee conservation in mixed-use landscapes is the protection of semi-natural habitats. For example, Heuel et al. found higher bee richness and increased seed set near natural grasslands than near perennial wildflower strips in Germany. Other papers in this Research Topic underscore the value of forests to bee diversity. For example, Edelkind-Vealey et al. report on the diversity of bees associated with urban forest fragments in the southeastern United States and compare community composition between the forest edge and interior. Similarly, Ulyshen et al. characterize the diverse native bee community associated with fire-maintained pine savanna. Two papers highlight the unique bee fauna associated with forest canopies. Dorey et al. document eight new *Hylaeus* species from Fiji, all from the rainforest canopy. Similarly, Cunningham-Minnick et al. demonstrate that the canopies of North American temperate deciduous forests, historically dismissed as suboptimal pollinator habitats, support distinct assemblages of bees compared to those captured nearer to the forest floor.

Despite the immense importance of protecting and properly managing semi-natural habitats, such efforts alone may be insufficient to conserve bees in many degraded landscapes. As noted by Tetlie and Harmon-Threatt, neonicotinoids, which persist in

ecosystems long after their application, represent a potential long-term threat to bees. [Kueneman et al.](#) similarly stress the negative impacts of land-use changes on solitary ground-nesting bees, which are often overlooked in conservation efforts. Efforts to restore habitats, as discussed by [Payne et al.](#), are key to addressing habitat loss and fragmentation. These efforts must include both floral and nesting resources to support diverse bee communities. Similarly, [Kline and Joshi](#) argue that urban and agricultural landscapes, often seen as threats to biodiversity, may offer untapped potential for pollinator conservation if managed with bee-friendly strategies.

Improved monitoring techniques are essential to properly assess bee populations and understand how they respond to different habitat conditions. Studies like those by [Mathis et al.](#) and [MacLeod et al.](#) underscore the importance of non-lethal sampling methods, such as visual distance surveys, which provide more accurate data without introducing biases. Citizen science initiatives, like those described by [Kueneman et al.](#) and [MacLeod et al.](#), can also play an important role in increasing data availability and filling gaps in our understanding of bee distributions. Finally, [Rousseau et al.](#) report on how deficiencies in data quality and quantity are impeding efforts to assess population trends and prioritize conservation actions.

It is clear from these articles that much about wild bees remains to be discovered and that the survival of these species is increasingly threatened by anthropogenic changes. Effective conservation

strategies will require the protection and restoration of habitats, the improvement of monitoring techniques, and the sustained dedication of landowners, policy makers, and the general public.

Author contributions

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Conflict of interest

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