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conserving forest birds

The benefits of protected area status

Forests support more terrestrial biodiversity than any other habitat. We don't know the full extent of forest diversity; there are probably hundreds of thousands of species still awaiting description in little-studied groups, such as endophytic fungi. But nearly 8500 bird species live in forests – more than three-quarters of all birds! By comparison, grasslands, wetlands and savannas each support just over 2000 species. Conserving forest birds is a top priority, especially given the many threats to forests from human activities.

Loss of forest habitat has been a key conservation concern since the 1970s. The estimates that we are losing hundreds to thousands of species each year, far in excess of the number of extinctions documented by the IUCN's Red List, are largely extrapolated from rates of tropical forest loss. From 1990 to 2015, forest cover decreased by three per cent globally; the only good news is that the rate of loss from 2010 to 2015 was half that experienced in the 1990s.

Forests are threatened by clearing for agriculture and commercial forestry, as well as mining, unsustainable exploitation and a host of other threats, including invasive species. Often these threats interact – once there is access to an area for logging or mining, other human activities follow. This leads to increasing fragmentation; a 2015 study estimated that the world's forests had been disrupted to such an extent that only 30 per cent of forest area is now more than one kilometre from a forest edge (Haddad et al., *Science Advances*, doi: 10.1126/sciadv.1500052). This is worrying because many specialist forest birds avoid forest edges, where they are more likely to interact with generalist competitors and predators from surrounding habitats.

above *Specialist forest species such as this Spotted Ground Thrush tend to suffer more from forest fragmentation than generalist species do.*

Numerous studies have documented how species richness decreases in small forest fragments. This led to the so-called SLOSS debate in the 1980s: is it better to conserve a single large or several small habitat patches? Like many debates, there is no clear-cut answer – it depends on the nature of the patches. However, a new study by Robert Timmers and colleagues (*Frontiers in Ecology and Environment* 2022, doi:10.1002/fee.2485) sheds some light on how forest patch size and protection status interact to influence the persistence of birds in patches.

The paper synthesised data from 741 forest patches at 44 study sites around the world, including six in Africa. The patches exhibited a range of conservation status, from unprotected to strictly enforced reserves. Unsurprisingly, the best predictor of species presence was forest size. Yet even in forests larger than 100 square kilometres, those with protected area status supported roughly 10 per cent more bird species than forests that were not formally protected.

The benefits of protected area status were evident down to forest patches as small as one square kilometre, although these small forests typically supported only about half the total diversity found in larger forests. The study confirmed that obligate forest species are more sensitive to fragmentation than more generalist species and forest protection is particularly effective for threatened species. Among large forest patches, threatened species are almost twice as likely to occur in protected than unprotected forests.

The study highlights the importance of active protection for ensuring the persistence of forest birds in the face of habitat loss and fragmentation. Protection is most effective in large reserves, probably because it is increasingly difficult to offset edge effects in very small reserves. However, even small forest patches can be valuable for forest bird conservation. It would be interesting to see whether these results also apply in other habitats.

PETER RYAN

TOO SOON TO panic

Are false-alarm flights beneficial?

KYLE DE NOBREGA

To flee or not to flee...? Red-billed Queleas flock tightly to evade a Yellow-billed Kite. The 'fire-drill' hypothesis proposes that the frequent false-alarm flights by foraging flocks of birds help to prepare them for the real thing.

Many birds feed in flocks to reduce the risk of predation. By doing so, they benefit in three ways. First, because there are more eyes scanning for threats, the probability of detecting an approaching predator increases with group size. A linked benefit of this collective vigilance is that by having others to help spot predators, birds in flocks can spend more time feeding.

Secondly, by forming a cohesive group that twists and turns together in flight, flocking birds confuse predators, reducing their success. And thirdly, even if the predator succeeds in killing one member of the group, the risk of predation to any one individual decreases with group size. For group foraging to persist, these benefits have to outweigh the potential disadvantages, such as competition for food and the distraction of social interactions.

Some birds alert their neighbours to impending danger with specific signals such as alarm calls. This can benefit the signaller and the recipient if there is a coordinated group response to a predator. However, such signalling opens the door for cheating. For example, Fork-tailed Drongos falsely alert suricates to impending danger, causing them to drop particularly large prey items that are then scooped up by the drongos.

If there is no specific alarm signal, it is left to individual group members to decide whether they should react when another member of the group takes flight. This can be inefficient. Most birders will have observed how mixed-species flocks of sparrows, waxbills, widows, weavers and canaries frequently retreat to cover without any apparent threat.

A study of foraging groups of Common Redshanks attacked by Eurasian Sparrowhawks at a Scottish estuary found that false alarms accounted for 80 per cent of all alarm flights (Cresswell et al. 2000, *Proc. R. Soc. B* 267: 733–737). Some of these false alarms resulted from redshanks mistaking other birds for sparrowhawks, but in most cases the birds panicked needlessly.

In Australia, the Crested Pigeon has evolved modified flight feathers that make a distinctive whistling noise when birds take off rapidly to escape a predator (Hingee and McGrath 2009, *Proc. R. Soc. B* 276: 4173–4179). Other Crested Pigeons only react when they hear this note, suggesting that it is an honest signal of impending threat. Further studies are needed to assess the extent to which wing noise signals the urgency of escape in other birds.

Models of flocking behaviour suggest that false alarms incur a substantial cost, both in terms of lost feeding opportunities and the energy spent in taking flight. Redshanks try to avoid making the wrong decision; they react more quickly when several birds take off at once. When only one bird takes off, other birds often pause to check for confirmation that there is indeed a threat to the group.

You could argue that the cost of making the wrong decision is potentially so high that it pays to err on the side of caution. However, Meredith Root-Bernstein recently proposed that there might be advantages to reacting to false alarms (*Birds* 2022, 3: 29–37). She suggests that young birds need to learn how to take off rapidly when threatened and that even adults need to practise because weight fluctuations affect their ability to take off quickly. She likens false-alarm flights to fire drills in that they teach birds how to respond promptly and efficiently when threatened.

If Root-Bernstein is correct, false-alarm flights should be more frequent in flocks containing large numbers of juvenile birds, as well as newly formed flocks that have yet to learn how best to respond to threats. False-alarm flights should also be less frequent in habitats where birds can readily take cover when threatened. Standardised observations of the behaviour of seedeater flocks might be one way to test these predictions.

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