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COMMENTARY

Defensible management decisions to overcome action paralysis in the face of uncertainty

Dejan Stojanovic & Ross Crates

Fenner School of Environment and Society, Australian National University, Canberra, Australia

Correspondence
Dejan Stojanovic, Fenner School of Environment and Society, Australian National University, Canberra, Australia.
Email: dejan.stojanovic@anu.edu.au

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The need to make management decisions in the context of limited information is unavoidable in endangered species' conservation. This is especially so in the case of species with extremely small population sizes in need of intensive intervention. Managers may need to throw every possible solution at a crisis in the hope that something is effective enough to avoid extinction (Jones, 2004). Once a recovery programme has moved beyond the emergency phase, it is important to step back and assess whether individual actions are sufficiently cost-effective to justify their continued implementation. Reducing wasted effort and resources in conservation projects is essential since saved resources can be reallocated to benefit other threatened species (Goble et al., 2012). It is this refinement phase of a recovery programme that is the focus of Ferrière et al. (2021) in this issue of *Animal Conservation*.

In their study, Ferrière et al. (2021) consider a translocated population of a critically endangered songbird – the Mauritius olive white-eye *Zosterops cholorothonos* – that experienced several years of population growth thanks to conservation intervention. The study combined an experiment with decision-making tools to evaluate whether a cheaper supplementary feeding regime would jeopardize population recovery. As is common for small populations of endangered species, there were important practical limitations to consider, namely the lack of an obvious control group. The beauty of the work of Ferrière et al. (2021) is to show how even within tight constraints, it is possible to identify a specific conservation action (in this case replacing expensive nectar supplements with sugar water) and design a field experiment to inform decision analysis. By showing that subsequent population growth aligned with modelled predictions, the authors show how to make clear and defensible management decisions in the face of uncertainty.

Our own experience working on some of Australia's most threatened birds has highlighted that risk aversion is a pervasive issue in many conservation programmes (Canessa et al., 2020; Stojanovic et al., 2018). Conservation managers often suffer action paralysis to avoid potential blame for exacerbating population declines or jeopardizing population recovery, if management decisions produce perverse outcomes (Meek et al., 2015). Yet there are many instances where current management actions nevertheless fail to achieve population recovery (Webb et al., 2018). By generating evidence and accounting for uncertainty in a decision framework, Ferrière et al. (2021) show how to identify management options that have the greatest probability of success. Making management decisions more defensible helps to reach consensus amongst recovery teams and reduce pressure on individuals, thus overcoming action paralysis.

The real challenge for conservationists that seek to implement a similar approach to Ferrière et al. (2021) lies in the practicalities. Many threatened taxa, and particularly those not restricted to small island ecosystems, have life history traits such as high mobility and low territoriality that make them more challenging to study experimentally (Runge et al., 2014). The threats facing such species are often more complex and intertwined than would appear to be the case for the Mauritius olive white-eye. This would make it harder to tease apart the effects on population growth of an intentional change in management versus stochastic fluctuations in other threats. An important next step will therefore be to identify taxa for which an approach similar to that of Ferrière et al. (2021) is likely to be effective, and how the current approach could be adapted for species where levels of uncertainty are higher. Either way, the results of Ferrière et al.'s study will help encourage a much-needed philosophical shift in approaches to conservation decision making. It is up to conservation scientists to help facilitate that shift, and in turn maximize on-ground returns on conservation investment.

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