Measuring our understanding of threats to Australian birds and progress towards alleviating their impacts

In brief

Robust and broadly applicable measures of what has been achieved in conservation are required to ensure ongoing support, efficient resource allocation and to improve policy development, yet currently no standards exist for such assessment and reporting.

We built on an existing framework and developed metrics to provide an overview of the achievements and continuing needs for research, management and threat alleviation for an entire class of animals on a continent.

We applied this framework in an assessment for all Australian bird species and subspecies that have been listed as threatened or near threatened at any time within the past 25 years (238 total).

For these 238 species we identified 181 threats. The most serious threat to threatened birds overall was invasive species (chiefly, feral cats and black rats). For over half of all threats, research is providing a strong direction to management. About 43% of the threats affecting the birds have some management underway, with one-third no longer needing active management.

Our results showed some remarkable successes in bird conservation, but also that few threatened Australian birds have had all their threats adequately reduced. Without the decades of investment in research, management and policy that they have received, the conservation status of Australian threatened birds would be far worse.

Background

Robust and broadly applicable measures of what has been achieved in conservation are required to ensure ongoing support and efficient resource allocation and to improve policy development. Yet few existing methods compare and track investments in conservation among species or for different types of threats. Further still, currently no standards exist for reporting threat management and reduction, or rates of recovery. Therefore, scientists have limited ability to compare conservation progress between different groups of animals.

The Royal Society for the Protection of Birds (RSPB) developed a framework for assessing progress towards an explicit conservation target that involves a set of defined progress categories. When applied consistently, it can allow for comparison of the management effectiveness among different species. However, it provides no clear instructions about how to apply the framework, or the way in which different categories (e.g. "no monitoring, research or management" through to "species status secured") should be assigned to a given species.

LEFT: The Endangered black-throated finch is threatened by the loss and fragmentation of habitat by agriculture, urban developments, and mining. Image: Eric Vanderduys, CC BY 2.0 Flickr

Mining is a key threatening process for 49 bird species. Image: Marcus Dawson; CC BY SA 3.0 Wikimedia Commons

Research aims

We aimed to extend the RSPB framework in a way that would allow for easy comparison of species and different taxonomic groups. Using this framework, we then aimed to quantify the success of threat alleviation measures and provide the means to most effectively allocate resources to conserving threatened species.

Invasive species such as the feral cat threaten 644 species and subspecies of birds. Image: Nicolas Rakotopare

What we did

From 2016 to 2018, researchers from a dozen Australian and international univeristies, along with scientists and private researchers from all around the world, collaborated to provide a solution to this problem.

We compiled a database with information about all Australian bird species and subspecies that have been listed as threatened or near threatened at any time within the past 25 years (238 total). Using this database, we applied a number of metrics to quantify the effectiveness of measures to alleviate threats and inform resource allocation to maximise benefits for threatened species.

We identified and categorised threats for each of the 238 threatened Australian bird species. We made assessments of the progress that has been made toward understanding and managing these threats.

We created a modified version of the threat impact scoring assessment that is part of the listing process for the IUCN's Red List of Threatened Species. This threat impact scoring system is based on defined thresholds related to the timing, extent or scope, and severity of threats. From these assessments, we produced an impact score that reflected the total population decline over 10 years or three generations.

We defined five metrics of conservation progress. Each metric had seven categories for the degree of existing knowledge, amount of research and management for the species, and progress in reducing threats. We identified and compared 11 measures of research and management progress.

We then measured these metrics against the threat impacts to determine the overall need, and achievement, in research and management progress. We calculated success in management as the difference between potential rate of decline without management actions and the current, estimated rate of decline.

From this, we were able to prioritise management needs with greatest benefits to reducing threats for threatened species.

Key findings

Across each of the 238 species and subspecies of threatened birds, we identified 181 threats, with an average of 7.8 threats per species.

For 52% of threats affecting the birds, research is providing a strong direction to management. For the remaining 48%, however, it provides little or no understanding. About 43% of the threats affecting the birds had some management underway, with one-third no longer needing active management.

Research need was lower for those birds with larger ranges, on offshore islands, or with a current recovery plan. Research need was higher for shorebirds than for passerines (perching birds), and for birds listed as threatened under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

We found that better monitoring improves our understanding of how to manage threats. Management need was greater for birds that have larger ranges and are

EPBC-listed, but lower for birds on islands, seabirds and passerines.

High scores for research achievement were evident for birds with larger ranges, shorebirds and those listed as Endangered or Critically Endangered. High management achievement was seen for well-monitored and EPBC-listed species. Lower research achievement scores were seen for species that are easy to detect and for non-passerines other than seabirds, shorebirds or parrots. Low management achievement was seen for highly detectable species, shorebirds and birds with old recovery plans.

Threat reduction had been achieved for over half of all species. The most serious threat we identified was invasive species (chiefly, feral cats and black rats). Urban development, agriculture, biological resource use and natural system modification (e.g., fire) had moderate impact threat scores. See Figure 1.

Though needs for research understanding, management and

threat reduction were high for each of climate change, weather and pollution, these showed almost no achievements.

The highest percentage threat reduction came from mining and agriculture, largely because critical habitats that could have been cleared were reserved for the purposes of conservation. One particularly successful translocation of Hutton's shearwater (*Puffinus buttoni*) following an earthquake led to high scoring of threat reduction for geological events.

Moderately high percentage scores for threat reduction were achieved for urban development, biological resource use and invasive species.

Our results show that we have had some remarkable successes in bird conservation, but that few threatened Australian birds have had all threats reduced to a stage where they no longer need at least some form of ongoing management to persist.
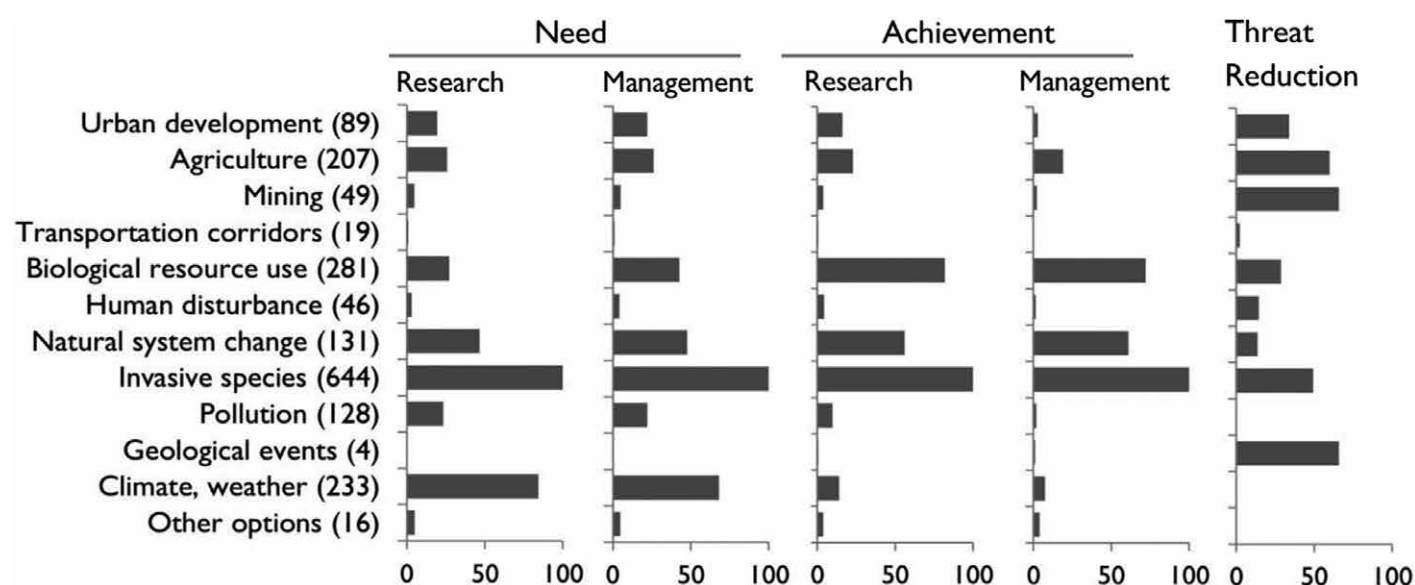

Figure 1: Values of performance for research and management needs and achievements and percentage reduction of threats for the 12 major threat classes affecting Australian threatened birds. The total number of bird species and subspecies times the number of threats is shown in parentheses.

Implications and recommendations

Our metrics allow for standardised, evidence-based prioritisation and comparison of conservation progress, both within species (identifying the most urgent threats that require immediate action), and among species (indicating where investments are likely to have the highest impacts). They also allow for systematic comparisons of the impact of conservation efforts across entire taxonomic groups.

The findings will be of most significance to conservation land managers, researchers looking to prioritise research and management actions, funding bodies and decision-makers. Used appropriately, these metrics can provide an overview for an entire class of animals for a whole continent, the needs for research and management to alleviate threats to each species, achievements

in reducing those threats and the percentage change in impact on the ground.

The contrast between current and counterfactual (i.e., what could have happened) threat impacts suggests that the conservation status of Australian threatened birds is far better than it would be had there not been investment in research, management and policy over many decades.

To refine or improve the method that we have proposed, we could:

- apply rules that accommodate synergies or overlaps in threat impact, for example, where fire might interact negatively with predation
- conduct sensitivity analyses to explore the impact of uncertainty in any of the parameters

- weight threats according to extinction risk to emphasise minimising extinction
- assess threats at regional scales, where wide-ranging species may have varying threat impacts across locations
- apply the metrics to assessing threat impacts for entire ecosystems or ecological communities.

Given how much has already been achieved for the conservation of threatened Australian birds, ongoing investment is warranted to complete the task of preventing extinctions. Much remains to be done and these metrics can be used to measure that progress.

The plains-wanderer is a Critically Endangered species. Their preferred habitats are highly threatened by grazing by invasive rabbits and weed encroachment. Image: Dominic Sherony, CC BY-SA 2.0 Wikimedia Commons

Cited material

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