LIVING ON THE EDGE
THE SURVIVAL OF THE NOISY SCRUB-BIRD

Species close to extinction are often thought of as being 'on the edge'. Now a formal program is aimed at raising awareness and focussing conservation action for those species that are considered the most **Evolutionary Distinct and Globally Endangered (EDGE)**.

by Sarah Comer, Alan Danks, Abby Berryman, Saul Cowen

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Main The view from Bald Island to Mt Manypeaks, which is noisy scrub-bird habitat.
Inset left Abby Berryman processing a noisy scrub-bird.
Photos – Sarah Comer/DBCA

Above A noisy scrub-bird.
Photo – Jiri Lochman

Initiated by the Zoological Society of London, the EDGE of existence program scores each species according to the amount of unique evolutionary history it represents and its global threat status. Among the world's almost 10,000 bird species, the noisy scrub-bird (*Atrichornis clamosus*) or 'tjimiluk' to the Minang people of Albany, is ranked as number 25, putting it among a handful of iconic, globally threatened and evolutionarily distinct birds such as New Zealand's kakapo and the Californian condor. Despite its position on the EDGE list, the noisy scrub-bird has long been heralded as one of the icons of conservation success in WA and we are continuing to work towards securing a future for this enigmatic songbird.

The story of the scrub-bird's rediscovery at Two Peoples Bay in 1961 following some 70 years of being missing and 40 years of being presumed extinct is well known (see 'Back from the brink: 50 years of conservation at Two Peoples Bay', *LANDSCOPE*, Spring 2011), as are the significant efforts that have gone into scrub-bird conservation. Together with fire and introduced predator management, translocations have been a key strategy used to establish populations in suitable habitat east of Albany. The success of this program has buffered the scrub-bird against the impact of bushfires, and seen the status of the species improve since its rediscovery. Despite these successes, bushfires remain a very real threat and at times have taken a significant toll on the population. This occurred most recently in 2015 when a bushfire burnt through 90 per cent of the scrub-bird habitat on Mt Gardner in Two Peoples Bay Nature Reserve, which supports the original rediscovered population.

The two species of scrub-birds, the noisy scrub-bird in WA and its eastern cousin the rufous scrub-bird, are certainly an evolutionary distinct and ancient lineage. Taxonomic research shows they sit at the base of the songbird radiation, along with their closest relatives the lyre-birds. This is supported by genetic work that suggests that scrub-bird differentiated from lyre-birds around 30–35 million years ago. This ancient history means that they are effectively a Gondwanan relict, or 'living fossil'. Scrub-birds share with lyre-birds a syrinx (the structure where song is produced), which is different from all the other songbirds of the world. Scrub-birds are functionally flightless with short rounded wings and a vestigial clavicle, and this lack of ability to disperse through flight has been a key reason why translocation has been so important.

THE POWER OF SONG

The noisy scrub-bird is rarely seen but often heard, and their distinctive songs provide the only practical means of monitoring them. Only the males sing, and they are territorial, occupying a discrete area and defending this with their unique song. Monitoring the population by counting the number of singing males has been a core part of the recovery program, and commenced soon after rediscovery, with the first full count completed in 1965. The success of translocations has also been gauged by song, with the persistence and growth of the number of males singing in new areas indicating that breeding is taking place at the new site.

Understanding the role that song plays in scrub-bird behaviour and how it relates to social structure and breeding systems was one of the challenges faced by Abby Berryman when she started her PhD in 2004. Having been intrigued by the beautiful scrub-bird song during her Honours studies, Abby's PhD work looked at song sharing. Investigating the very loud and delightfully melodic scrub-bird song gave Abby a convenient and non-intrusive mechanism to study the species, and to investigate the patterns of song sharing and repertoire change in the noisy scrub-bird to provide clues about the social structure. It was found that groups of up

"…translocations have been a key strategy used to establish populations in suitable habitat east of Albany."

Above The 2015 fire on Mt Gardner, in Two Peoples Bay Nature Reserve, had a significant impact on the population.
Photo – Abby Berryman/DBCA

Above right A male noisy scrub-bird with a band, which enables the team to identify individual birds.

Right A noisy scrub-bird being fed a mealworm prior to release.
Photos – Alan Danks/DBCA

to 10 territorial males shared the same set of about five song types. Song groups were discrete, with members of a song group sharing most, if not all, of their song types. What was particularly interesting was that males from different song groups had no song types in common with birds from neighbouring song groups.

Within each song group the changes to the different songs in their repertoire was rapid and occurred simultaneously, with all males in a song group making the same changes to their shared songs. The source of repertoire change was mainly modification of existing song types. Occasionally a single song type would diverge into two distinct song types, or a new song type would emerge through innovation. The average life of a song type was approximately six months. Although some song types persisted for the entire 16-month sampling period, they were continually modified and a year later could no longer be recognised as the same type.

The striking feature of noisy scrub-bird song groupings was their discreteness and cohesiveness even in the presence of continual repertoire change. This led to the development of the 'sexy song hypothesis' where it is suggested that each song group consists of a dominant male whose songs are perhaps more attractive to females or effective in territory defense, or both. It is proposed that this dominant male is surrounded by subordinate males that copy his songs, and it is the dominant male who leads the change in repertoires by continually making changes to his songs, with the other males copying these changes to retain their mimicked effectiveness. While it is difficult to find hard evidence to support the sexy song hypothesis in a bird that is as difficult to see and study as the noisy scrub-bird, what we have learnt by studying their songs provides some tantalising glimpses into how their social system may function.

This scenario to explain noisy scrub-bird song groupings bears striking similarities to the hotshot hypothesis to explain lekking behaviour, or showing off, whereby males cluster around a successful and 'star' male who is likely attractive to females. Lekking behaviour has been described for various groups of animals, including mammals, fish, insects and birds and can include signals other than song, such as chemical or dancing behaviours.

Abby's study demonstrates the potential of using song to investigate aspects of the social system of a species

Discover more about noisy scrub-birds

Scan this QR code or visit Parks and Wildlife's *'LANDSCOPE'* playlist on YouTube.

Top The global distribution of the noisy scrub-bird, from Mt Gardner through to Waychinicup. This photo was taken on Bald Island.

Above Specially modified nets were used to capture scrub-birds.
Photos – Sarah Comer/DBCA

that is otherwise very difficult to observe. Management of species such as the noisy scrub-bird will always benefit from increased knowledge about their social system. For example, Abby's work showed that taking males from different song groups for translocation probably has little impact on their success at the new site because of their ability to rapidly alter their songs to form new song groups. An additional benefit of regularly monitoring the songs of translocated males was that it often enabled ongoing identification of individuals in their new homes, as they retained some unique song features in the short-term even though their songs were continually changing.

TRANSLOCATING TO MANAGE FITNESS

Understanding the biology and ecology of this semi-flightless bird was a core focus of early scrub-bird work, and these learnings provided the knowledge essential for managing and conserving the population since the 1960s. Of particular importance was the management of fire and introduced predators to provide the scrub-bird with safe habitat. However, one of the most significant and successful tools used in the scrub-bird program was translocations.

The Mt Gardner population, which was used as a source for all translocations between 1983 and 1999, consisted of fewer than 100 birds when rediscovered in 1961. Understanding the genetics of this population had been an objective of the South Coast Threatened Birds Recovery Team for some years, and managing genetics as part of the translocation program was particularly important given only small numbers of birds were used as founder groups for new areas. The recovery team was delighted when Saul Cowen, a Curtin University PhD student, took on the challenge of investigating the degree of genetic diversity in the scrub-bird population.

Learning more about the genetics of the noisy scrub-bird was of vital importance for understanding how to manage the population. In particular, we needed to know how the potential loss of genetic diversity had impacted the long-term fitness of both the parent population (Mt Gardner) and populations derived from the translocation program. Saul's findings were that genetic diversity, measured by the heterozygosity across populations, was generally low across all populations. This work has emphasised the significance of managing populations by boosting diversity through translocations.

Since the 2015 bushfire it has become increasingly important to supplement the Two Peoples Bay area, where the population remaining is now smaller than when rediscovered in 1961 and is at an increased risk of inbreeding. To help counteract this, birds from the eastern end of the current scrub-bird distribution (a population that was itself derived from translocation) were brought back into the Mt Gardner area in 2017. We hope that this mixing of relatively isolated populations will increase genetic fitness, or vigour, and enable the rapid recolonisation of Mt Gardner as the vegetation recovers from bushfire.

ANOTHER ISLAND HOME?

Despite the successful translocation program, scrub-birds remain restricted to an area between Two Peoples Bay

Nature Reserve and Cheyne Beach, with an additional population on the nearby Bald Island. Bushfire has always been an issue for managers of scrub-bird habitat, not only because scrub-birds don't fly but also as they require a well-developed leaf litter layer and associated invertebrates for feeding on. Bushfires have and always will impact scrub-bird habitat in their very small range (see 'From the ashes', *LANDSCOPE*, Winter 2016), and the recovery team has been keen to find another secure place for scrub-birds to safeguard against a single bushfire event having catastrophic consequences. The success of the Bald Island translocation has been phenomenal, with this 800-hectare island now supporting an estimated 400 birds. Looking further east to the islands in the Recherché Archipelago the team identified Mondrain Island as one potential translocation site for scrub-birds. A study of leaf litter invertebrates carried out in 2014 determined that the food resources required by the scrub-bird were comparable to the mainland, and it was agreed that an experimental translocation to test the habitat should be trialled. Plans to start this work in 2018 will be dependent on assessing the amount of suitable habitat remaining after a bushfire on the island, which started from a lightning strike in December 2017. If successful, a translocation to a new island will be an exciting prospect for expanding and securing the future for the noisy scrub-bird.

So while the remarkable territorial call of the male scrub-bird is still only heard in a small corner of the planet, we hope it will continue to echo in the gullies and roll across the hills for many years to come.

Above A noisy scrub-bird being released into Two Peoples Bay Nature Reserve.

Above right Sarah Comer and Deon Utber releasing a scrub-bird in Angove Reserve.
Photos – Alan Danks/DBCA

Right Alan Danks checking an acoustic recording device used to monitor scrub-birds after bushfires.
Photo – Abby Berryman/DBCA

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Alan Danks was the noisy scrub-bird project leader between 1986 and 1998, and the South Coast regional leader of nature conservation from 1999 until he retired in 2009. Alan still helps with scrub-bird recovery work and has been involved in recent monitoring and translocation work. He can be contacted by email (alandanks@westnet.com.au).

Abby Berryman completed her Honours and PhD studies on noisy scrub-birds before taking on a project officer role with the western ground parrot recovery program. Abby still works with the scrub-bird team and has helped with recent monitoring and translocations. She can be contacted on (08) 9842 4519 or by email (abby.berryman@dbca.wa.gov.au).

Saul Cowen worked as a volunteer on the western ground parrot and noisy scrub-bird program before starting his PhD, and then joining the nature conservation team in the south coast region. He is now working as a research scientist on Dirk Hartog Island. He can be contacted on (08) 9405 5119 or by email (sam.cowen@dbca.wa.gov.au).

In addition to the support for the management of scrub-bird habitat and implementation of the translocation program from DBCA staff and managers, South Coast NRM Inc continues to support the recovery program. Volunteers play a key role in implementing census and translocation work.