



Australian Government  
Department of Agriculture,  
Water and the Environment

# Noisy Miner management across jurisdictions

Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant noisy miners (*Manorina melanocephala*)

*A review of the need for a Threat Abatement Plan*

# DRAFT FOR COMMENT

November 2020

© Copyright Commonwealth of Australia, 2020

This document is licensed by the Commonwealth of Australia for use under a Creative Commons By Attribution 3.0 Australia licence with the exception of the Coat of Arms of the Commonwealth of Australia, the logo of the agency responsible for publishing the report, content supplied by third parties, and any images depicting people.

For licence conditions see: <http://creativecommons.org/licenses/by/3.0/au/>.

This DRAFT report should be attributed as 'Noisy Miner management: Review of the decision on a Threat Abatement Plan for the Key Threatening Process of Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant Noisy Miners (*Manorina melanocephala*)'.

The contents of this document have been compiled using a range of source materials and are valid as at November 2020.

While reasonable efforts have been made to ensure that the contents of this publication are factually correct, the Commonwealth does not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication.

# Contents

Introduction.....	3
Culling of Noisy Miners .....	4
Table 1.1 – State and Territory Culling Legislation .....	5
Relative Humaneness of Bird Control .....	9
Shooting.....	10
Trapping and gassing .....	11
Effectiveness of culling programs.....	11
Table 1.2 Effectiveness of culling programs .....	13
Key research findings on culling.....	18
Culling Recommendations .....	19
State and Territory Noisy Miner Projects .....	20
Table 1.3 State and Territory Noisy Miner Projects.....	20
Revegetation to reduce the impact of threatening processes.....	25
Preferred Habitat of Noisy Miners.....	26
Does size and shape matter? .....	27
Revegetation and Restoration Recommendations .....	28
Table 1.4 Effectiveness of Revegetation and /or Restoration Programs.....	29
Avian species adversely affected by Noisy Miners .....	33
Regent Honeyeater ( <i>Anthochaera phrygia</i> ) .....	34
Table 1.6 Stakeholder Consultation .....	37
References .....	39

## Introduction

*Manorina melanocephala* (Noisy Miner) is a native species which has rapidly multiplied since European colonisation. Its over-abundance has been assisted by human-led landscape changes such as land clearing and habitat fragmentation. There is a significant body of scientific literature which finds Noisy Miners negatively influence species richness where they are present. They are aggressive, non-discriminatory medium-sized nectivorous birds which are a threat to other threatened bird species.

In 2013 the Threatened Species Scientific Committee (TSSC) recommended listing Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant Noisy Miners (*Manorina melanocephala*) as a Key Threatening Process and determined that a national scale Threat Abatement Plan (TAP) was unlikely to be a feasible, effective and efficient way to abate the process (EPBC Act section 270A) as it would necessarily be broad in scope and coarse in resolution. The Noisy Miner was deemed to be readily identified and the circumstances under which it exerted its effects were well-known. The Threat Abatement Plan recommendation was unique because the Noisy Miner is a native species and, as such, a Threat Abatement Plan would require considerably greater co-ordination, planning and management. At that time the TSSC also discussed barriers to efficacy and feasibility such as jurisdictional native culling legislation, humaneness of culling methods and public sentiment.

Ultimately, the TSSC recommended the development of a non-statutory Threat Abatement Advice (TAA) drawing on the ongoing research into the process and tailored to specific circumstances. Since that decision there has been ongoing research into the effects Noisy Miners produce for small woodland birds, and threatened species. There has also been considerable time dedicated to researching revegetation efforts and maintenance of existing land to encourage other bird species to nest and enable them to resist the pressure and aggression of Noisy Miners. Despite these new publications, the research findings remain similar to those published before 2014. However, there have also been advances to our understanding of Noisy Miner influence on threatened bird species, such as the Regent Honeyeater (*Anthochaera phrygia*). Unlike the Noisy Miner, the Regent Honeyeater is a species which has not thrived in cleared and fragmented land. Research published by Crates et al. (2019) and Beggs et al. (2019) shows Regent Honeyeater nesting success is negatively impacted by the presence of Noisy Miners. New research published on these inter-species interactions shows the impact Noisy Miners may have on the long-term conservation success of a threatened species.

## **Culling of Noisy Miners**

In the Committee's 2014 consideration of a TAP for the 'Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant Noisy Miners (*Manorina melanocephala*)', culling was suggested as a very specific, and cost-effective means of abating the threatening process under some circumstances. However, this option was limited by legislation in some states and the likely resistance of some stakeholders. The

humane culling of birds was also raised as a concern.

Table 1.1 shows Noisy Miners (*Manorina melanocephala*) are a protected species in all states of Australia and the ACT and may only be culled with a permit from the appropriate state or territory wildlife agency. All jurisdictions can provide permits for culling Noisy Miners.

<b>Table 1.1 – State and Territory Culling Legislation</b>	
<b>Queensland</b>	<b>Relevant Legislation</b>
<p>Queensland's native wildlife is protected by legislation that aims to conserve biodiversity by protecting wildlife and its habitat. All native birds, reptiles, mammals and amphibians are protected, along with some invertebrates (certain butterflies, spiders and scorpions), freshwater fish and the grey nurse shark.</p> <p>Queensland has several licenses related to the harvest, research, culling and commercial uses of protected species. A Damage Mitigation Permit would be the most relevant tool for the management of Noisy Miners. A damage mitigation permit is needed to cull and disperse wildlife, remove and relocate wildlife and lethally take flying foxes for crop protection.</p> <p>Under the <i>Nature Conservation (Animals) Regulation 2020</i>, a permit must not be granted unless the chief executive has considered and is satisfied that uncontrolled, or unprevented damage would result in people suffering significant economic loss; or the ecological sustainability of nature is likely to be harmed; and action under the permit would not adversely affect the survival of the animal in the wild; and the proposed way of taking the animal is humane. Permits are managed by the Queensland Department of Environment and Science. Permits are easily located and accessed.</p>	<p><i>Nature Conservation Act 1992</i></p> <p><i>Nature Conservation (Animals) Regulation 2020</i>, (Ch 4, pt 10, div 1)</p>
	<b>References</b>
	<p>Queensland Government. Department of Environment and Science. Damage mitigation permits. 2020. Webpage available <a href="#">here</a>.</p> <p>Queensland Government. Permits, licences and authorities. 2020. Webpage available <a href="#">here</a>.</p>

<b>New South Wales</b>	<b>Relevant Legislation</b>
<p>It is an offence under Division 1(2.1) of the <i>Biodiversity Conservation Act 2016</i> to harm any animals that are native to Australia or that periodically or occasionally migrate to Australia (including their eggs and young). However, if protected native animals are shown to be a threat to human safety, damaging property and/or causing economic hardship, the National Parks and Wildlife Service (NPWS) may grant a licence to the owner or occupier of a property, to harm (for example, cull or catch and release) the animals. A public register of all licences to harm is kept by NSW, but it does not list the species for which the licenses were permitted. The NPWS manages multiple licences relevant to the management of Noisy Miners.</p> <ul style="list-style-type: none"> <li>○ General Licence (site-specific) for a person to assist a landholder to control a native animal on their property, usually in accordance with a Landholder’s Licence.</li> <li>○ Landholder Licence, for owners or occupiers of a property to mitigate threats to human safety, property damage or economic hardship. There are specific Landholder Licences such as Landholder’s Licence to Harm Protected Animals: Aggressive Birds</li> <li>○ General Licence (non-site specific) for a person with demonstrated training/or experience such as working in animal control business, to enable them to assist licenced landholders.</li> </ul>	<p data-bbox="1023 667 1501 701" style="text-align: center;"><i>Biodiversity Conservation Act 2016</i></p> <hr/> <p data-bbox="1023 909 1283 943" style="text-align: center;"><b>References</b></p> <p data-bbox="1023 958 1501 1104">Department of Planning, Industry and Environment. Landholder’s Licence to Harm protected Animals: Aggressive Birds. 2019. Pdf available <a href="#">here</a>.</p>

South Australia	Relevant Legislation
<p>Native birds are protected under the National Parks and <i>Wildlife Act 1972</i> (NPW Act) unless listed on Schedule 10. Noisy Miners are not currently listed in Schedule 10 and remain a protected species. A permit to cull protected wildlife can be issued under Section 53(1)(c) of the <i>National Parks and Wildlife Act 1972</i>. Compliance with the Code of Practice (2007) is a condition of acquiring a permit. The Code of Practice outlines the standards of humane conduct for the destruction of birds by trapping, shooting and carbon dioxide narcosis, and applications are assessed on case-by-case basis by the Department of Environment and Heritage. A permit may be issued when birds are causing economic, social and/or environmental damage. Written permission of the landowners is required in cases where the shooter/trapper is neither the landowners nor his/her agent.</p>	<p data-bbox="1023 322 1453 400"><i>National Parks and Wildlife Act 1972</i></p> <hr/> <p data-bbox="1023 521 1283 555"><b>References</b></p> <p data-bbox="1023 613 1485 842">South Australian Department of Environment and Heritage, Code of Practice for the humane destruction of flocking birds by trapping and carbon dioxide narcosis in South Australia. 2007. p1-4. Pdf be accessed <a href="#">here</a>.</p>
Victoria	Relevant Legislation
<p>All native wildlife is protected in Victoria. It is an offence to kill, take, control or harm wildlife under the <i>Wildlife Act 2017</i>. It is also an offence to use poisons to kill, destroy or take wildlife. Anyone wishing to control wildlife in Victoria must have an authorisation from the Department of Environment, Land, Water and Planning (DELWP). The most common authorisation is an Authority to Control Wildlife (ATCW). ATCWs are lethal and non-lethal authorisations to control wildlife. Applications are individually assessed against many factors, including the current local and broader environmental context. Lethal control applications will only be considered when all practical non-lethal methods have been investigated (DELWP 2020) Between 2009 and 2018 there were 78 ACTWs issued for the control of a total 2,526 Noisy Miners.</p>	<p data-bbox="1023 1240 1259 1274"><i>Wildlife Act 2017</i></p> <hr/> <p data-bbox="1023 1395 1283 1429"><b>References</b></p> <p data-bbox="1023 1442 1501 1547">Victoria State Government, Department of Land, Water and Planning. How many ACTWs are issued? 2020. Pdf located <a href="#">here</a>.</p> <p data-bbox="1023 1599 1493 1749">Victoria State Government, Department of Land, Water and Planning. Wildlife management and control authorisations. 2020. Webpage located <a href="#">here</a>.</p>

<b>Tasmania</b>	<b>Relevant Legislation</b>
<p>It is an offence for an unlicensed person to take, buy, sell or have possession of any protected wildlife or any product of protected wildlife. The Noisy Miner is listed as a protected species in the Tasmanian Wildlife (General) Regulations 2010 (Sch 2, Part 4). Permits may be issued under the Tasmanian Wildlife (General) Regulations 2010, although it is unclear which type of permit is most relevant to the depopulation or management of Noisy Miners. Hunting and recreational game licenses are inappropriate, but an application for a research permit may be the most relevant. Scientific permits also require approval from the Animal Ethics Committee. For administration purposes, a bird species movement notification form must be filled out and returned to the Wildlife Management Branch of the Department of Primary Industries, Parks, Water and Environment (DIPWE) to notify authorities of the transfer, purchase, sale, breeding, death and/or receipt of protected species.</p>	<p><i>Nature Conservation Act 2002</i> <i>Wildlife (General) Regulations 2010</i></p> <p><b>References</b></p> <p>Tasmanian Government, Department of Primary Industries, Parks, Water and Environment. Forms, Permits and Fees. 2018. Webpage located <a href="#">here</a>.</p> <p>Tasmanian Government, Department of Primary Industries, Parks, Water and Environment. Scientific Permits and Authorities to Collect or Disturb Native Fauna. 2020. Webpage located <a href="#">here</a>.</p>
<b>Australian Capital Territory</b>	<b>Relevant Legislation</b>
<p>Under Chapter 6 of the <i>Nature Conservation Act 2014</i> it is an offence to conduct activities in relation to native species (flora and fauna). However, some activities may be carried out under a licence issued by the Conservator of Flora and Fauna. It is the responsibility of the applicant to apply for licences for proposed activities that may be an offence under the Act. The ACT can grant permits for native animals that are dangerous and damaging, however culling a native animal for conservation purposes is less clear. Presently, the ACT Government is investigating the amendment of existing legislation so that all management of native animals, for both damage reduction and conservation purposes, would occur under the NC Act and the <i>Animal Welfare Act 1992</i>.</p>	<p><i>Nature Conservation Act 2014</i> <i>Animal Welfare Act 1992</i></p> <p><b>References</b></p> <p>ACT Government, Environment and Sustainable Development. ACT Pest Animal Management Strategy 2012-2022, p 47 – 52. PDF located <a href="#">here</a>.</p>



## Relative Humaneness of Bird Control

Noisy Miners can be culled by shooting, trapping (net or cage) and gassing. All culling methods are required to follow a Code of Practice to reduce undue fear, stress and suffering in captive birds. Figure 1 shows the comparative humaneness of culling methods.

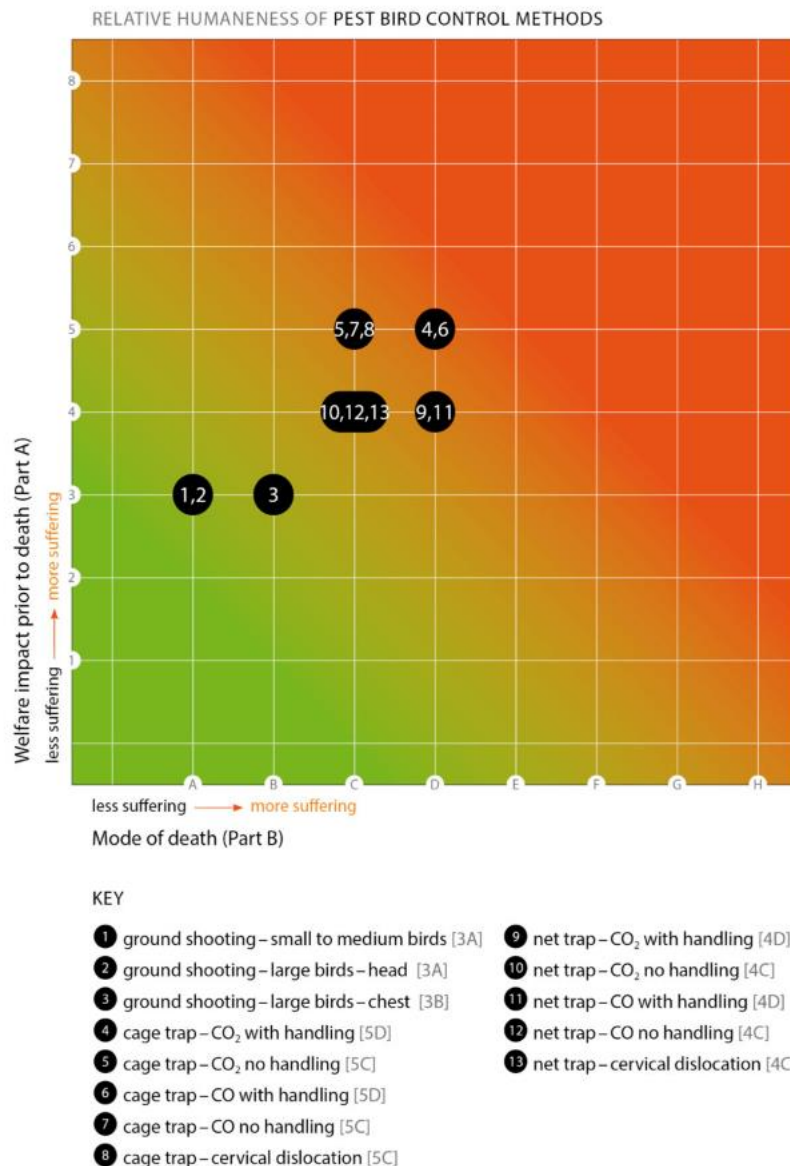


Figure 1 – Humaneness of bird culling methods (Sharp and Saunders 2008)

## Shooting

Shooting is often used as a scaring strategy to train birds to associate the sharp, sudden noise with real danger and subsequently, a fear of humans and human activities. Some birds can be frightened away without attempts to kill them although small numbers of birds are usually killed with a view to enhance the scaring effect (Sharp 2012).

Shooting of pest birds should only be performed by skilled operators who have the necessary experience with firearms and who hold the appropriate licences and accreditation.

Shooting may have short-term advantages, but the technique is often labour intensive and may have limited long-term value in reducing bird populations. Shooting should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained effective control (Sharp 2012).

Shooting is generally prohibited in public and the recommended method is a single shot to the brain. Humaneness of shooting as a control technique depends almost entirely on the skill and judgement of the shooter. If properly carried out, it is one of the most humane methods of destroying pest birds. On the other hand, if inexpertly carried out, shooting can result in wounding, which may cause considerable pain and suffering. Therefore, shooters should not shoot at a bird unless it is clearly visible, and they are confident of killing it with a single shot (Sharp 2012). Only one bird should be targeted at a time. Shooting with a shotgun at a group of birds flying overhead often results in welfare problems as the birds aligned with the central cluster of pellets will usually be fatally injured, but those at the perimeter of the volley may only be hit by one or two pellets and stand a good chance of surviving. These birds are likely to experience suffering. Wounded birds must be located and killed as quickly and humanely as possible with either a second shot preferably directed to the head or in restrained or immobile birds, a blow to the rear of the skull to destroy the brain. If left, wounded birds can suffer from the disabling effects of the injury, from sickness due to infection of the wound, from pain created by the wound or from thirst or starvation if unable to drink or eat. Wing fractures, which increase the likelihood of being taken by a predator, are common in wounded birds.

Despite the skill and experience of the shooter, there is always a risk of injuring or killing non-target animals, including protected birds that have been mistaken for a pest bird.

This can be mitigated by only shooting positively identified birds, and never shooting out of the line-of-sight (over hills, or ridges) as projectiles may hit or injure people or wildlife (Sharp 2012).

## **Trapping and gassing**

Birds can be killed with nitrogen, but carbon dioxide (CO<sub>2</sub>) is commonly used because it is cost-effective and easy to procure. Euthanasia with inhaled gases is slow due to the requirement for any gas inhaled to reach the required concentration in the lungs before taking effect. Therefore, birds must be contained in an enclosed environment (wire cage suitable for birds) with a weighted tarpaulin or sheet covering the container to prevent gas leakage.

Research conducted by Tidemann & King (2009) has shown carbon monoxide (CO) is also a cost-effective and humane euthanasia agent. Tidemann & King (2009) found trapped Indian Mynas (*Acridotheres tristis*) and Starlings (*Sturnus vulgaris*) euthanised with CO<sub>2</sub> showed substantially more signs of distress (gaping and head-shaking) before recumbency than birds which were euthanised with CO, although this was less pronounced if the concentration was increased slowly. No signs of distress were observed in any birds euthanised with CO, irrespective of the rate at which the concentration was increased. CO produced a comparably rapid, more humane death than did CO<sub>2</sub> in all three study species. The researchers concluded CO from cold petrol engine exhaust is a more practical and humane euthanasia agent than CO<sub>2</sub> for Indian Mynas, Starlings and Sparrows (*Passer domesticus*). Although trapping Native Miners is not as efficient as shooting, this method has practical implications for community groups and local government officers who may wish, and have permits, to humanely euthanise pest birds.

## **Effectiveness of culling programs**

Noisy Miner numbers are now greater than before Europeans arrived in Australia, and on top of the loss of 80% of southern temperate woodlands, this is having a devastating impact on many other species of woodland birds (Media Release by NESP (2019)). In addition, research conducted by Thomson et al. (2015) and MacNally et al. (2012) identified that a threshold negative effect of Noisy Miners on the richness and

abundance of small bird species occurs reliably at densities of just 0.6 and 0.8 individuals per ha, respectively (less than one Noisy Miner needs to occupy an area before they produce negative effects on other bird species). Thompson et al. (2015) also found the presence of even small numbers of Noisy Miners during breeding risks decreasing reproduction of co-occurring species through nest destruction or disturbance.

Noisy Miners forage on the by-products of psyllids, sap-sucking insects which live on the leaves of Eucalypt trees. Psyllids produce a waxy sap called a 'lerp', which is harvested by the Noisy Miner (Williamson 2015). Noisy Miners harm Eucalyptus trees because their aggression prevents other lerp-eating birds from accessing the shared food source, which defends the Psyllids from other birds (Low 2016). Their defence allows an increase in the number of Psyllids causing greater insect damage to the leaves of eucalyptus trees such as the Grey Box (*Eucalyptus macrocarpa*). A measurable improvement in tree health in small woodland remnants has been recorded after the removal of Noisy Miners.

Similarly to the management of other invasive species, culling Noisy Miner populations has been researched as a potential threat mitigation strategy. Please see (Table 1.2) for findings, and summary of the key points below the Table.

**Table 1.2 Effectiveness of culling programs**

Paper Title	Author(s)	Findings
<p><b>Short-term response of a declining woodland bird assemblage to the removal of a despotic competitor</b></p>	<p>Davitt et al. (2018)</p>	<p>Removal of 3,552 Noisy Miners in three sessions of systematic shooting.</p> <p>No statistical support for a reduction in Noisy Miner abundance, indicating rapid recolonisation.</p> <p>However, potential disruption of social structures may have limited the ability of recolonising Miners to harass smaller bird species.</p> <p>Short-term increase in abundance and species richness of small birds but the effect on small birds is unlikely to persist in the long term.</p>
<p><b>Initial Changes in the Avian Communities of Remnant Eucalypt Woodlands following a Reduction in the Abundance of Noisy Miners, <i>Manorina melanocephala</i></b></p>	<p>Grey et al. (1997)</p>	<p>Noisy Miners were removed from three small remnant patches of woodland. The removal – or partial removal - of Noisy Miners from these sites resulted in a major influx of honeyeaters and other insectivorous birds in the following three months. At two of the three removal sites there was an increase in both avifaunal abundance and diversity. The third site had an increase in diversity. Noisy Miners did not recolonise the sites in the following 16 months.</p>

<p><b>Sustained and delayed Noisy Miner suppression at an avian hotspot</b></p>	<p>Crates et al. (2020)</p>	<p>In 2017 Noisy Miners were removed over a period of three months in a treatment area of the Goulburn River, NSW. This area was monitored again in 2018 and expanded to include a second treatment site. Removals were performed again in 2019 and the treatment areas were expanded.</p> <p>Noisy Miner remained suppressed in the 2017 treatment area for 27 months post-removal. Noisy Miner abundance was still significantly reduced in the 2018 and 2019 treatment areas after one year.</p> <p>Observed Regent Honeyeaters (<i>Anthochaera phrygia</i>) nesting and 100% increase of Painted Honeyeaters (<i>Grantiella picta</i>) occupying treatment areas.</p> <p>Songbird abundance increased.</p>
<p><b>An empirical test of the mechanistic underpinnings of interference competition</b></p>	<p>Beggs et al. (2020)</p>	<p>Immediate recolonization of treatment sites by Noisy Miners after each cull. Final abundance in treatment sites in the post-cull breeding season was higher than expected.</p> <p>No evidence of a change in harassment rates following the cull in spite of the decline in <i>M. melanocephala</i> abundance.</p> <p>There was a two-fold increase in foraging rates for target species (small</p>

		<p>woodland birds) in treatment compared to control sites following the cull.</p> <p>Foraging rates increased in the post-cull breeding season in treatment sites and the relative increase in treatment sites was greater by a factor of two than in control site.</p> <p>Where culls occurred, the numbers of three species observed foraging increased by a factor of between 7.4 and 54.6, the White Plumed Honeyeater (<i>Lichenostomus penicillatus</i>), Weebill (<i>Smicrornis brevirostris</i>) and Willy Wagtail (<i>Rhipidura leucophrys</i>).</p>
<p><b>Patch-scale culls of an overabundant bird defeated by immediate recolonization</b></p>	<p>Beggs et al. (2019)</p>	<p>A licensed shooter was employed to cull all Noisy Miners in eight areas of woodland totalling 208 ha. Culling on the sites was conducted twice and monitoring was over 12 months.</p> <p>Each cull created a ‘vacuum effect’ where nearby Noisy Miners migrated into the areas after culling.</p> <p>Pre-cull there were 510 birds, post-cull there were 512. Beggs et al. (2019) concludes culling is ineffective and management should focus on other approaches, such as revegetation.</p>
<p><b>Spatially and temporally targeted suppression of despotic noisy miners has conservation benefits for</b></p>	<p>Crates et al. (2018)</p>	<p>Experimental removal of Noisy Miners from known breeding sites of the Regent Honeyeater (<i>Anthochaera</i></p>

<p><b>highly mobile and threatened woodland birds</b></p>		<p><i>phyrta</i>).</p> <p>350 Noisy Miners were culled over 430 ha of land, over 145 treatment sites over a five-day period.</p> <p>Culling significantly decreased Noisy Miner abundance throughout the breeding season, when 15–18 Regent Honeyeaters nested in the Noisy Miner removal area.</p> <p>Songbird abundance and species richness increased significantly in the Noisy Miner removal area, relative to the control areas.</p>
---	--	--



<p><b>An experimental test of a compensatory nest predation model following lethal control of an overabundant native species</b></p>	<p>Beggs et al. (2019)</p>	<p>Noisy Miners were responsible for around a fifth of total identified nest predation events.</p> <p>No significant change in artificial nest predation rates following the treatment, despite a 28% reduction in Noisy Miner abundance in treatment compared to control sites.</p> <p>There was no evidence of a post-cull difference in the change in artificial nest predation rates in treatment compared to control sites. The authors hypothesise this finding suggested some form of compensatory response from other nest predators. Which is problematic for management. It means that, where culling is done with a view to improving breeding potential of target species by reducing nest predation, removing one nest predatory species may not result in a commensurate reduction in nest predation.</p> <p>Despite substantial culling effort and expense the researchers failed to reduce the density of Noisy Miners below the impact threshold identified by other researchers of 0.6–0.8 individuals/ha due to recolonization.</p>
--	----------------------------	--

<p><b>Demographic shifts in Noisy Miner (<i>Manorina melanocephala</i>) populations following removal</b></p>	<p>Vickers (2017)</p>	<p>Dispersing immatures comprised the majority of recolonists following the breeding season, whilst matures from neighbouring colonies provided the majority of recolonists beforehand. These findings demonstrate that the time of culling has a significant effect on the type of recolonisation and can be used to assist the development of an effective threat abatement plan.</p>
---	-----------------------	---

### Key research findings on culling

Research published following the no-TAP decision in 2014 identify several key findings related to the culling of Noisy Miners:

- Recent research suggests it is prohibitively expensive to undertake long-term, repeated Noisy Miner culling programs in landscapes where woodlands and shrubs have been extensively cleared, and highly degraded. Repeated culling efforts in these environments provides low conservation returns, particularly in locations where Noisy Miners are now widespread and threatened species have already disappeared (Beggs 2019 cited in Crates 2018)
- Ecological release has been observed following the culling of Noisy Miner populations. Whereby empty areas create a vacuum effect and are almost immediately colonised by nearby Noisy Miner family-groups. Some studies observed higher number of Noisy Miners in treatment areas post-cull.
- Crates et al. (2020 suggest site-specific (high conservation value area) culls occurring during Spring to minimise the impact of Noisy Miners on woodland birds as new Noisy Miners don't immigrate to the site until after the breeding season. These culls can expand in range over time and must be sustained for longer than a single breeding season.

- There is evidence to suggest there are short-term benefits gained from conducting culls near the nesting sites of highly sensitive species, such as the critically endangered Regent Honeyeater (*Anthochaera phrygia*). This has been observed without restoration of the understory occurring (Davitt et al. 2018). This small-scale, targeted removal of Noisy Miners from sites may be a cost-effective method which immediately frees up important and declining habitat for vulnerable woodland birds.
- There have not been long-term observable benefits for species richness, or threatened species associated with culling Noisy Miners. However, there are no long-term (>3 year) studies on sustained Noisy Miner culling available.

## **Culling Recommendations**

- Although they are native birds, all State and Territory governments have case-by-case licenses and permits available to shoot or trap Noisy Miners. This indicates this management mechanism is already available and is unlikely to benefit from a Threat Abatement Plan. A communication plan is recommended, to inform stakeholders of the existence and requirements of the permits available.
- The de-population and disposal of native animals is an unpalatable concept for many Australians. Davitt et al. (2018) suggest passive management, such as habitat manipulation is generally more acceptable to the public.
- Culling alone has had varied success (Beggs 2019; Crates et al. 2019) and is unlikely to be an efficient method to manage the threatening process, particularly in agricultural areas. Springtime culling events in intact habitat may be effective, or if used in conjunction with vegetation regeneration to ease the pressure of Noisy Miner aggression towards small woodland birds. However, vegetation regeneration is not a short-term solution, and is challenging because the results of a program may not be observable for months or years.

## State and Territory Noisy Miner Projects

Table 1.3 is a collation of Noisy Miner-specific and adjacent projects (2014-2020) conducted since the release of the no-TAP decision in 2014. The table attempts to capture projects co-ordinated by the state and territory governments, local governments, landcare groups, research organisations and the Australian Government. Projects may not specifically reference Noisy Miners but may otherwise be designed to discourage Noisy Miner habitation and lead to increased positive outcomes for species affected by Noisy Miners. This section will be expanded to reflect input from stakeholder consultation.

<b>Table 1.3 State and Territory Noisy Miner Projects</b>	
<b>New South Wales</b>	
<p><b>Regent Honeyeater and Woodland Bird Surveys</b></p> <p><a href="https://www.ils.nsw.gov.au/regions/north-west/key-projects/national-landcare-program/protecting-woodland-bird-habitat-for-regent-honeyeaters">https://www.ils.nsw.gov.au/regions/north-west/key-projects/national-landcare-program/protecting-woodland-bird-habitat-for-regent-honeyeaters</a></p>	<p>This project aims to improve management on over 363 ha of Regent Honeyeater habitat and provide landscape connectivity by securing private landholder agreements across the North West NSW region. Noisy Miner overabundance will be targeted as recommended by BirdLife Australia for this region across 1,000 ha. Along with these actions, community awareness and landholder knowledge will be increased through one-on-one advice, holding events, media campaigns and signage.</p> <p>The project will run from July 2018 – June 2023</p>
<p><b>Saving Our Species</b></p> <p><a href="https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=1364&amp;ktp=true&amp;ReportProfileID=20271">https://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=1364&amp;ktp=true&amp;ReportProfileID=20271</a></p>	<p>NSW Key Threatening Process strategy for ‘Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners’.</p> <p>No critical actions listed for Prevention or Containment, some strategic and research actions listed, with monitoring outcomes reported on Saving Our Species database.</p>
<b>Queensland</b>	

	No projects found
<b>Australian Capital Territory</b>	
<p><b>ACT Native Woodland Conservation Strategy and Actions 2019</b></p> <p>Environment, Planning and Sustainable Development. Canberra Australian Capital Territory. ACT Native Woodland Conservation Strategy and Actions 2019. 2019. 01 – 191. Available <a href="#">here</a>.</p>	<p>State-level policy document detailing plans for animal and ecological community conservation in the Australian Capital Territory.</p>
<p><b>Restore ACT and Greater Gorooyarroo Woodlands</b></p> <p>Project links <a href="#">here</a> and <a href="#">here</a>.</p>	<p>This six-year project will consolidate and connect 60,000 hectares of the largest remaining box-gum grassy woodland landscape in Australia. The project will protect and enhance the box-gum woodlands through on-ground restoration and regeneration works in ACT nature parks and the Greater Gorooyarroo area, which straddles the ACT and NSW border and includes rural residential and urban areas and three nature reserves. Since commencing in 2012, over 127 landholders have signed up to be involved in the project. 75 landowners were accredited for animal control and helped conduct three district-wide group baits covering 8200 ha. Over 336 ha of land has been enhanced and revegetated, and over 5,000 tubestock planted.</p>
<p><b>ACT Woodlands Restoration</b></p> <p><a href="#">Project links here, here</a> and <a href="#">here</a>.</p>	<p>The ACT Government allocated \$2.155 million for the woodland restoration of 60,000 ha of key landscape areas to provide additional connectivity between woodland patches and assist natural regeneration of woodland patches. The project was delivered by Greening Australia Capital Region in consultation with the state government and rural landholders. Evaluation of the project showed significant milestones has been exceeded. Between 2011 to 2015 the project</p>

	<p>revegetated 909 ha, enhanced 844 ha of woodland remnant and planted 28,548 seedlings. It engaged 18 rural landowners and 43 community groups, schools and organisations. The project also undertook 4,494 ha of invasive species control and established 12 monitoring sites (ACT Biodiversity Fund project 2012-2017 p 31).</p>
<p><b>Murrumbidgee River Corridor Million Trees Project and the Million Trees Project – ACT</b></p> <p>Project information available <a href="#">here</a> and <a href="#">here</a>.</p>	<p>The ACT Government received \$1 million funding under the Australian Government’s Million Trees program to restore 450 ha of key landscape over four years.</p> <p>The Act Government also received funding under the Australian Government’s Million Trees program to plant 300,000 native trees over ten years (2008-2018) in the Murrumbidgee River Corridor. The project focused on formerly drought-affected areas and where maximum benefit from connectivity can occur. Weed control in planted areas is an integral part of the project to help ensure tree survival. Since 2008, over 230,000 trees have been planted. The ACT government 2018 budget allocated \$175,000 to plant up to 5,000 more trees as part of the Murrumbidgee River corridor Million Trees project. The project was delivered by the ACTPS and Conservation Volunteers Australia (ACT Biodiversity Fund project 2012-2017).</p>
<p><b>Birdscaping Canberra</b></p>	<p>Canberra-based community group SEE-Change, supported by volunteers and ACT Government planted 2,000 shrubs, grasses and groundcovers in Canberran suburbs. The aim was to attract small insectivorous birds and create multi-layered understory to protect wildlife from aggressive bird species.</p> <p>The project was completed in 2018.</p>
<p><b>South Australia</b></p>	
<p><b>Little Corellas: social and ecological research for</b></p>	<p>Targeted at Little Corellas (<i>Cacatua sanguinea</i>) but contains threat abatement advice to minimise future impacts of</p>

<p><b>management in South Australia</b></p> <p>Scanlon, A., Roetman, P., Stead, M., Gray, S., Lethbridge, M. (2017) Little Corellas: social and ecological research for management in South Australia. Discovery Circle Initiative, University of South Australia, Adelaide.</p>	<p>current and emerging urban-adapting and urban exploiting species such as the Noisy Miner.</p>
<b>Tasmania</b>	
	No projects found
<b>Victoria</b>	
<p><b>Protecting Victoria's Environment – Biodiversity 2037 (2017)</b></p> <p>Link accessible here.</p>	<p>State-level policy document detailing Victorian project to increase environmental biodiversity.</p>
<p><b>'Bush for Birds' North East Catchment Management Authority &amp; Trust for Nature</b></p> <p>Links accessible here and here.</p>	<p>A five-year project using revegetation, habitat augmentation (e.g. weed control, enhancement planting and thinning) and Noisy Miner (<i>Manorina melanocephala</i>) control to address the key threatening processes impacting bird species, including the EPBC Act listed Regent Honeyeater.</p> <p>The project area contains core Regent Honeyeater habitat within a number of National Parks and private land remnants and is one of four main breeding areas remaining in Australia for the species. Guided by the Regent Honeyeater Recovery Team, NE CMA will work with a range of partners including; DELWP, Trust For Nature, local landcare groups, Traditional Owners, Parks Victoria, Birdlife Australia and private landholders. The project activities will also benefit the critically endangered Swift Parrot (<i>Lathamus discolor</i>).</p>
<b>Other organisations, research groups and community projects</b>	

<p><b>Australian Government's National Landcare Program</b></p> <p>Link accessible <a href="#">here</a>.</p>	<p>The project revegetated over 115 ha Buloke woodland using a combination of direct seeding and planting of tube stock. The project undertook complimentary threat abatement efforts, such as controlling rabbits, using herbivore proof guards, fencing to exclude stock and drip irrigation on tube stock planting. Funded by the Australian Government National Landcare project.</p>
<p><b>Birdlife Australia</b></p> <p>Link accessible <a href="#">here</a>.</p>	<p><b>Cowra Woodland Birds Program</b></p> <p>Habitat restoration and avian responses around Cowra, Western Slopes NSW. The project was started in 2001 and has been run for 15 years by members of BirdLife Southern NSW and local landholders and land managers. The project aims to increase vegetation to benefit native birds, while reducing avian invaders of small, degraded sites, such as the Noisy Miner.</p>
<p>(funded by NSW government)</p> <p>Link accessible <a href="#">here</a>.</p>	<p><b>Capertee Valley, NSW</b></p> <p>Between 2016 – 2018, Birdlife Australia implemented a series of Noisy Miner removals in the Capertee Valley. The removal sites were chosen because they were known habitat of the Regent Honeyeater. Four sites were treated in 2016, and five in 2017 and 2018. Initial data showed Noisy Miner removal resulted in increased species richness, but post-removal surveys later showed Noisy Miners quickly recolonised the sites. Overall, the Noisy Miner removals did result in increased nesting success for Regent Honeyeaters.</p>



<p>Link accessible here.</p>	<p><b>Woodland Birds for Biodiversity</b></p> <p>The project aims to enhance the conservation of threatened and declining woodland birds in the temperate region of south-eastern Australia. The high-profile Swift Parrot and Regent Honeyeater will be used as flagships to achieve outcomes that will also benefit at least 38 other threatened woodland birds, 18 endangered ecological communities, and numerous threatened flora species. While not specifically listed in the project outline, the improved habitat restoration and revegetation initiatives will reduce the threat from aggressive exclusion by Noisy Miners.</p>
<p><b>Threatened Species Recovery Hub – National Environmental Science Program (NESP)</b></p> <p>Webpage accessible here, and link to paper here.</p>	<p><b>Can culling Noisy Miners benefit threatened woodland birds?</b> 1.2.1.2. Project lead is Lindenmayer, D.</p> <p>The project is designed to determine whether culling is an effective method to manage the impacts of Noisy Miners on threatened woodland birds. The project ran from 2016 to 2019. Data collected from the NESP project was published by Beggs et al. in 2019 and concluded patch-scale culls were unsuccessful due to immediate Noisy Miner recolonisation.</p>

## Revegetation to reduce the impact of threatening processes

Several threatening processes have contributed to the overabundance of Noisy Miners across Eastern Australia. Processes such as Eucalyptus die-back (*Phytophthora cinnamomi*), competition and habitat degradation by feral goats and rabbits, land clearing and fragmentation, logging, grazing, weed management, altered fire regimes, climate change (also resulting in altered fire regimes and hydrological factors) have shaped the landscape and provided Noisy Miners with a niche they have exploited, to the detriment of other native species.

Efforts to improve ecosystem function through vegetation restoration, in particular by increasing structural complexity, may ensure a more effective and long term benefit for declining small woodland birds (Grey et al. 2011; Lindenmayer et al. 2018; Beggs et al. 2019)

## Preferred Habitat of Noisy Miners

The Noisy Miner has been reported to prefer fragmented woodland edge habitat, making the bird assemblages of smaller remnants particularly susceptible to their indiscriminate aggression. Noisy Miners are known to establish in Eucalypt woodlands with a high perimeter ratio and low structural complexity. They are strongly associated with corridors of vegetation extending into paddocks, clumps of trees in paddocks within 100m of the remnant edge and corner sites with higher proportions of Eucalypts such as Yellow Gum (*Eucalyptus leucoxylon*) and White Box (*Eucalyptus albens*) which produce nectar.

Unlike other honeyeaters, Noisy Miners also feed on the ground among short grass (<5 cm), usually in paddocks or parklands within 25 m of Eucalypts (Grey & Clarke 2011). Noisy Miners are known to penetrate 300 m or more into the interior of large remnants, resulting in a large portion of remnant habitat unsuitable for smaller birds (Grey & Clarke 2011). Therefore, restoration should focus on maximising levels of shrub cover and establish mixed stands of Eucalypt and non-Eucalypt tree species to facilitate habitat for other bird species, with research showing increasing levels of woody vegetation cover can benefit local bird populations (Bain 2020).

The invasion of restored habitat by Noisy Miners poses significant risk to avian biodiversity objectives (Bain 2020), therefore restoration activities should include small patches with a relatively intact shrub layer which are less favourable to Noisy Miners and can retain high richness of small passerine species, even in areas with introduced weeds (e.g. dense understorey of Lantana supporting high-species richness) as opposed to sites with open understorey.

Noisy Miners also colonise areas with broad-leaved trees such as Eucalypts with Psyllids. Noisy Miners do not favour small remnants of Buloke or 'Bull-oak' (*Allocasuarina luehmannii*) woodland with few Eucalypts, which have been found to support far richer avifaunal diversity than larger Eucalypt woodland remnants, despite their lack of a shrub layer (Maron 2007). The open foliage of the Eucalypts may allow Noisy Miners to patrol and survey their territory with greater ease.

Revegetation is a long-term strategic process which may not yield positive results for several years. Lindenmayer et al. (2018) found restoration resulted in negative overall

species richness, however this effect was mitigated in later years (over a 15-year period).

## **Does size and shape matter?**

There are two broad strategies to vegetation restoration: Increasing the overall amount of vegetation cover; and improving the quality of existing habitat.

Maron (2008) cites the work of Radford et al. (2005) whose research found landscape scale - the total area of vegetation present in a landscape - has far more influence on the landscape's bird community than whether it is configured in large or small patches. Lindenmayer et al. (2018) found the size of vegetation patches has been found to increase biodiversity, and different bird species had variable responses to enhanced vegetation. For example, some species responded positively to increased woodland patch size, others to a combination of enhancements or agnostic to any intervention which was implemented. Noisy Miners responded negatively to vegetation enhancement and this response was maintained over time (Lindenmayer et al. 2018). The authors advise that immediate effects of vegetation enhancement often appear to be negative, and positive effects often occurred up to six to eight years after intervention. This research indicates the condition and scale of restored vegetation has a substantial influence on the effectiveness of the areas for biodiversity conservation. Interestingly, Mortelliti et al. (2016) conducted a long-term field study that found woodland bird species preferred native woodland patches over restoration plantings with established Noisy Miners, and that plantings did not appear to act as refuges for bird species. This recent research is contradictory to the listing advice provided by the TSSC in 2014, and further exploration of these findings would be valuable

Due to land clearance, small remnants of bushland may be very high value, as they provide the only accessible resources (such as nectar) for native birds (Maron 2008). Patches, or small remnants of bushland may act as 'stepping stones' to other scattered remnants and form extended territories for birds. These small patches are at risk from native-vegetation clearing, which vary in governance and regulation. Shape appears to influence bird preferences, with research conducted by Belder et al. (2019) finding linear patches provide suitable habitat for some bird species, and species of 'conservation concern' may benefit from block shaped revegetation patches.

## Revegetation and Restoration Recommendations

- Landowner education and broader incentives to reduce vegetation clearing on private property. For example, projects co-ordinated by Greening Australia provide financial stipends to farmers and landholders to compensate them for paddocks and fields that cannot be grazed while restoration efforts occur (at cost per hectare).
- Seek improved State and Territory legislation to protect ecologically high-value remnant patches.
- The joining of remnant patches after they have had their structural complexity restored.
- Revegetation and restoration of sites with naturally low occurrence of Eucalyptus and directing restoration efforts towards features that deter patch utilisation of Noisy Miners, such as dense understorey and high abundance of conifers (*Callitris* species) which have high stem density and do not support carbohydrate rich dietary resources, such as lerps (Chubb 2011). Similarly, Hastings and Beattie (2006) found a combination of native acacias, exotic conifers and exotic deciduous corridors with shrubby understorey supported small bird species and were less appealing to Noisy Miners.
- Exotic weedy shrubs should be replaced with native shrubs that offer comparable vegetation cover.
- Artificial nest boxes used to replicate tree-hollows in restoration areas.
- The best outcomes for biodiversity are often from simultaneously increasing the size of the restored habitat and improving the quality of the habitat. However, this option is expensive and may not produce short-term benefits.
- There must be an acknowledgement that threat mitigation benefitting one species may be detrimental to another, therefore vegetation selected for restoration planting must be considered carefully (i.e. Sites with high foliage projective cover and leaf litter may be better for insectivorous birds).

- Revegetation is more likely to be successful if it is conducted in conjunction with complimentary projects. Tulloch et al. (2015) found addressing multiple threatening processes at the same time was the most effective threat-mitigation strategy, as opposed to focusing on a single process. This finding is supported by Mortelliti et al. (2016) who concluded that restoration efforts must be undertaken in synergy with the treatment of indirect effect of fragmentation (i.e. any conservation strategy should include the de-population of Noisy Miners).

Table 1.4 provides the key findings from each paper.

<b>Table 1.4 Effectiveness of Revegetation and /or Restoration Programs</b>		
<b>Paper Title</b>	<b>Author(s)</b>	<b>Findings</b>
<b>Stop the bullying in the corridors: Can including shrubs make your revegetation more Noisy Miner free?</b>	Hastings & Beattie (2006)	<p>The findings showed that Noisy Miners dominated corridors of eucalypts, virtually excluding small birds, whereas native acacias, exotic conifer and exotic deciduous corridors had small birds and no resident Noisy Miners.</p> <p>The greatest abundance and richness of small birds occurred in plantings combining eucalypts with at least 15% acacias, in this case bipinnate species.</p> <p>The authors recommended eucalypt plantings should be supplemented with both acacias (preferably bipinnate) and a shrubby understorey.</p>
<b>Surviving with a resident despot: do revegetated patches act as refuges from</b>	Mortelliti et al. (2016)	Nine-year survey examining the extent to which revegetated patches act as refuges for

<p><b>the effects of the noisy miner (<i>Manorina melanocephala</i>) in a highly fragmented landscape?</b></p>		<p>woodland bird species affected by Noisy Miners.</p> <p>The spread of Noisy Miners is the main driver of bird distribution patterns. The presence of Noisy Miners increased the risk that birds would become extinct in patches and prevented birds colonising new patches.</p> <p>Restoration plantings rarely acted as a refuge for bird species, instead, birds colonised and persisted more in regrowth or old growth sites where abundance of Noisy Miners was relatively low.</p>
<p><b>Changing bird communities of an agricultural landscape: declines in arboreal foragers, increases in large species</b></p>	<p>Bain et al. (2020)</p>	<p>The presence of Noisy Miners had strong negative effects on the abundance and richness of small birds.</p> <p>Authors found increasing levels of wooded cover could have significant benefits for native birds, and there was a positive association between wooded cover and birds with significantly lower abundance.</p>
<p><b>Restoring habitat for woodland bird communities of the Tasmanian Midlands</b></p>	<p>Bain (2019)</p>	<p>Surveys of 72 sites and use of historical and contemporary data to examine how birds have responded to land use change</p>

		<p>over the last two decades. Bain found the amount of woodland cover, structural complexity of vegetation and the presence of Noisy Miners had the strongest effects on birds. Bain also found numbers of small to medium-sized arboreal foragers had declined, while numbers of large-bodied granivorous birds had increased.</p> <p>Bain focuses on examining how Noisy Miners affect birds, and tested interference competition hypothesis, finding that the presence of Noisy Miners resulted in higher levels of physiological stress in other bird species. Bain suggests further experiments should be conducted to clarify.</p>
<p><b>Size or quality. What matters in vegetation restoration for bird biodiversity in endangered temperate woodlands?</b></p>	<p>Lindenmayer et al. (2018)</p>	<p>A 15-year controlled experimental study to re-establish understorey and vegetation enhancement in woodland patch size.</p> <p>Native birds responded positively to woodland enhancement, but the positive effects were often not realised for six-eight years.</p> <p>Noisy Miners responded negatively to enhancement and remained so over time. The</p>

		<p>researchers find that underplanting and/or increases in woodland patch size may help to mitigate the threat of Noisy Miners.</p>
<p><b>Revegetation and reproduction: do restoration plantings in agricultural landscapes support breeding populations of woodland birds?</b></p>	<p>Belder et al. (2020)</p>	<p>Two-year study monitoring breeding success (as opposed to occupancy) of woodland birds in restoration plantings in a fragmented landscape. Breeding success was used as an indicator of habitat quality.</p> <p>Research found that woodland birds bred at least as successfully in restoration plantings as they did in remnant woodland patches and large reference sites.</p> <p>Woodland bird species of conservation concern were more likely to breed successfully in restoration plantings than in remnant woodland patches.</p>
<p><b>Using empirical models of species colonization under multiple threatening processes to identify complementary threat-mitigation strategies</b></p>	<p>Tulloch et al. (2016)</p>	<p>Found 57% of bird species in sample areas were negatively affected by more than one threatening process.</p> <p>All species were found to colonise areas when grazing frequency and intensity was reduced + Noisy Miners were removed + Trees were restored</p>



		Noisy Miners were most effectively mitigated when ongoing threatening processes of tree cover loss and habitat degradation due to grazing were also addressed by interventions.
<b>Size isn't everything: The importance of small remnants to the conservation of woodland birds in Australia</b>	Maron (2008)	Small remnant patches of woodland can hold high biodiversity value and their preservation is important for threatened bird species.  State and Territory vegetation legislation is a threat for remaining patches.
<b>The noisy native: a miner menace? Noisy miner habitat preferences and influence on woodland bird species richness</b>	Chubb (2011)	Recommendations include maintaining or increasing woody vegetation, protecting sites with an intact understorey from modification and degradation, revegetation and restoration efforts in sites with naturally low Eucalyptus occurrence (to avoid attracting Noisy Miners) and directing revegetation and restoration activities at habitat features that deter patch utilisation by Noisy Miners.

### **Avian species adversely affected by Noisy Miners**

Research conducted by Bain et al. (2020) in Tasmanian woodland found small-bodied bird species were reduced by the presence of Noisy Miners. Chubb (2011) also argues

that small woodland birds respond strongly to Noisy Miner invasion, with substantial reductions in bird species richness even at very low levels of Noisy Miner abundance.

Pre-cull surveys conducted by Beggs et al. (2019) found Noisy Miners were responsible for 65.7% of observed harassment events, with the next biggest aggressors being white-plumed honeyeater (*Lichenostomus penicillatus*) (7.5%) and Australian magpie (*Cracticus tibicen*) (7.1%).

Scientific literature has shown that the Noisy Miner aggressively excludes other birds from the remnants it occupies, and that small nectivorous and insectivorous birds are particularly vulnerable to Noisy Miner aggression (Grey et al. 2011; Beggs et al. 2019).

The ability for other bird species to tolerate Noisy Miners is strongly associated with size and diet, with the Noisy Miner having the same dietary preferences as 75% of smaller birds, predominantly feeding on foliage and bark dwelling invertebrates, compared with only 7% of larger species (Piper & Catterall 2003 in Chubb 2011).

The non-discriminatory hyper-aggressive behaviour of Noisy Miners functions as an effective interference competition strategy, whereby Noisy Miners reduce the ability of smaller bird species to use common resources. Their relatively large body size allows Noisy Miners to monopolise resources and pressure smaller bird species (Piper & Catterall 2003 in Chubb 2011). Bain et al. (2019) write that interactions between competing species may be intensified when they are restricted to small patches of remnant habitat, resulting in elevated stress levels of small birds. They tested this hypothesis by sampling Superb Fairy Wrens (*Malurus cyaneus*) for chronic stress and found sampled birds in Noisy Miner habitat were more likely to be stressed and generally in poorer condition than birds in areas without Noisy Miners, however further study is warranted.

### **Regent Honeyeater (*Anthochaera phrygia*)**

The effects of aggressive exclusion by Noisy Miners has been documented for several threatened bird species listed under both Commonwealth and state legislation. The Regent Honeyeater is particularly susceptible to Noisy Miner aggression, and its protection has been the focus of projects in NSW. The Regent Honeyeater (*Anthochaera phrygia*) is listed as Critically Endangered under the EPBC Act. The TSSC considered that Noisy Miners and other threats to Regent Honeyeaters were sufficient to warrant

reclassification of its status to Critically Endangered under the EPBC Act and this was done on 8 July 2015.

Since the KTP was made in 2014, the former Environment Minister Hon. Greg Hunt signed the National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) under section 269A(2) *Environment Protection and Biodiversity Conservation Act 1999* in 2016. The National Recovery Plan identifies Noisy Miners as a threat to the Regent Honeyeater (Commonwealth of Australia 2016).

The ability for native birds to breed is an essential process that must be supported and managed if threatened species are to recover (Beggs 2019). Noisy Miners have been observed destroying the nests of Regent Honeyeaters (*Anthochaera phrygia*) (Crates et al. 2019 cited in Beggs (2019), with observations indicating the presence of a single pair of Noisy Miners poses a risk to Regent Honeyeater nest survival. Conversely research compiled by Beggs et al. (2019) indicates the culling of Noisy Miners did not result in fewer nest predation events. However, experimental removal of Noisy Miners throughout the Regent Honeyeater breeding season was found to increase the number of nesting Regent Honeyeater pairs and have significant conservation benefits if culling is implemented at times and locations when both species are present, but before the negative impacts of Noisy Miners have fully manifested (Crates 2018).

There is also research available to suggest Swift Parrots (*Lathamus discolor*) are less likely to occur at known foraging sites with an abundance of large, aggressive nectar feeders, such as the Noisy Miner. The impacts of large honey eating avian species are expected to increase as habitat loss and woodland fragmentation continues. The Swift Parrot was granted a National Recovery Plan in 2011 (Saunders & Tzaros 2011).

<b>Table 1.5 Species adversely affected by Noisy Miners</b>			
<b>Listed threatened species</b>	<b>EPBC Act status</b>	<b>NSW status</b>	<b>Victoria status</b>
Regent Honeyeater ( <i>Anthochaera phrygia</i> )	Critically endangered	Critically endangered	Endangered

<b>Table 1.5 Species adversely affected by Noisy Miners</b>			
<b>Listed threatened species</b>	<b>EPBC Act status</b>	<b>NSW status</b>	<b>Victoria status</b>
Forty-spotted pardalote ( <i>Pardalotus quadragintus</i> )	Endangered		
Swift Parrot ( <i>Lathamus discolor</i> )	Endangered	Endangered	Endangered
Speckled Warbler ( <i>Chthonicola sagittata</i> )		Vulnerable	
Varied Sittella ( <i>Daphoenositta chrysoptera</i> )		Vulnerable	Within the Vic. temperate woodland community <sup>1</sup>
Painted Honeyeater ( <i>Grantiella picta</i> )		Vulnerable	
Black-chinned Honeyeater (eastern subspecies) ( <i>Melithreptus gularis gularis</i> ),		Vulnerable	Within the Vic. temperate woodland community <sup>2</sup>
Gilbert's Whistler ( <i>Pachycephala inornata</i> ),		Vulnerable	
Flame Robin ( <i>P. phoenicea</i> ),		Vulnerable	
Diamond Firetail ( <i>Stagonopleura guttata</i> )		Vulnerable	
Brown Treecreeper (eastern subspecies) ( <i>Climacteris picumnus victoriae</i> )		Vulnerable	
Little Lorikeet ( <i>Glossopsitta pusilla</i> )		Vulnerable	
Hooded Robin (south-eastern form) ( <i>Melanodryas cucullata cucullata</i> )		Vulnerable	

<sup>1</sup> See below for details on the ecological community.

<b>Table 1.5 Species adversely affected by Noisy Miners</b>			
<b>Listed threatened species</b>	<b>EPBC Act status</b>	<b>NSW status</b>	<b>Victoria status</b>
Turquoise Parrot ( <i>Neophema pulchella</i> )		Vulnerable	
Scarlet Robin ( <i>Petroica boodang</i> )		Vulnerable	
Grey-crowned Babbler (eastern subspecies) ( <i>Pomatostomus temporalis temporalis</i> )		Vulnerable	Endangered
Fuscous honeyeater ( <i>Lichenostomus fuscus</i> )			Within the Vic. temperate woodland community <sub>2</sub>
Dusky woodswallow ( <i>Artamus cyanopterus</i> )			Within the Vic. temperate woodland community <sub>2</sub>
Southern Whiteface ( <i>Aphelocephala leucopsis</i> )			Within the Vic. temperate woodland community <sub>2</sub>

<b>Table 1.6 Stakeholder Consultation</b>	
<b>Stakeholders</b>	<b>Consultation Status</b>
State and Territory Governments	Not yet consulted
Birdlife Australia	Not yet consulted
Regent Honeyeater ( <i>Anthochaera phrygia</i> ) conservation projects and Recovery Team	Not yet consulted
Greening Australia	Not yet consulted
National Landcare Program, Selected Projects	Not yet consulted

The Nature Conservancy	Not yet consulted
Conservation Volunteers Australia	Not yet consulted
Bush Heritage Australia	Not yet consulted
Researchers	- Bain has provided papers for the Listing and Threat Abatement team.

## References

- Bain, G. 2019. Restoring habitat for woodland bird communities of the Tasmanian Midlands. School of Natural Sciences. University of Tasmania, 01-201.
- Bain, G., MacDonald, M., Hamer, R., Gardiner, R., Johnson, C and Jones, M. Changing bird communities of an agricultural landscape: declines in arboreal foragers, increases in large species. 2020. *Royal Society Open Science*, 7 (3) Available at: [10.1098/rsos.200076](https://doi.org/10.1098/rsos.200076).
- Barati, A., Farzaneh, E., and McDonald P.G. 2016. Fragmentation in eucalypt woodlands promotes nest-tree occupancy by a despotic species, the noisy miner (*Manorina melanocephala*), *Austral Ecology*, 41(8): 897-905. Available at <https://doi.org/10.1111/aec.12382>
- Beggs, R., Pierson, J., Tulloch, A. I., Blanchard, W., Westgate, M. J. and Lindenmayer, D. 2019a. An experimental test of a compensatory nest predation model following lethal control of an overabundant native species, *Biological Conservation*, 231: 122-132.
- Beggs, R., Pierson, J., Tulloch, A. I. T., Blanchard, W., Westgate, M. and Lindenmayer, D. 2020. An empirical test of the mechanistic underpinnings of interference competition, *Oikos*, 129(1): 93-105. Available at: <https://doi.org/10.1111/oik.06583>
- Beggs, R., Tulloch, A., Pierson, J., Blanchard, W., Crane, M. and Lindenmayer, D., 2019. Patch-scale culls of an overabundant bird defeated by immediate recolonisation. *Ecological Applications*, 29 (3) Available at: <https://doi.org/10.1002/eap.1846>
- Belder, D.J., Pierson, J.C., Ikin, K., Blanchard, W., Westgate, M.J., Crane, M., and Lindenmayer, D. 2019. Is bigger always better? Influence of patch attributes on breeding activity of birds in box-gum grassy woodland restoration plantings. *Biological Conservation*, 236, pp. 134-152. Available at: <https://doi.org/10.1016/j.biocon.2019.05.015>
- Chubb, S. Noisy miner habitat preferences and influence on woodland bird species richness., 2011, BSec Hons, Fenner School of Environment and Society, Australian National University, 2011. Available at <https://www.birdlife.org.au/documents/CWB-noisy-native.pdf>.
- 'National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*). 2016. Commonwealth of Australia. 01 – 32.
- Crates, R., Rayner, L., Stojanovic, D., Webb, M., Terauds, A., and Heinsohn, R. 2019. Contemporary breeding biology of critically endangered regent honeyeaters: implications for conservation. *Ibis* 161 (3): 521-532. Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1111/ibi.12659>.
- Crates, R., Rayner, L., Webb, M., Stojanovic, D., Wilkie, C., and Heinsohn, R. 2020. Sustained and delayed noisy miner suppression at an avian hotspot, 2020. *Austral Ecology*, 45 (5): 636-643. Available at: <https://doi.org/10.1111/aec.12878>
- Crates, R., Terauds, A., Rayner, L., Stojanovic, D., Heinsohn, R. Wilkie, C and Webb, M. 2018. Spatially and temporally targeted suppression of despotic noisy miners has conservation benefits for highly mobile and threatened woodland birds. *Biological Conservation*, 227, 343-351. Available at: <https://doi.org/10.1016/j.biocon.2018.10.006>

- Davitt, G., Maute, K., Major, R., McDonald, P and Maron, M. Short-term response of a declining woodland bird assemblage to the removal of a despotic competitor. 2018. *Ecology and Evolution*. 8 (10) 4771-4780. Available at <https://onlinelibrary.wiley.com/doi/full/10.1002/ece3.4016>
- Grey, M.J., Clarke, M.F., Loyn, R.H. 1997. Initial Changes in the Avian Communities of Remnant Eucalypt Woodlands following a Reduction in the Abundance of Noisy Miners, *Manorina melanocephala*. *Wildlife Research* 24, 631-648. Available at: <https://doi.org/10.1071/WR96080>
- Grey, M., Clarke, M., Davidson, Maron, M., Ingwersen, D and Tzaros, C. 2011. The Noisy Miner Challenges in Managing an Overabundant Species. 01 – 08. Available at: <https://www.latrobe.edu.au/ecology-environment-evolution/dept-of-zoology-documents/Final-low-res-LR-LatrobeUni-Birds-Broch.pdf>.
- Hastings, R and Beattie, A. 2006. Stop the bullying in the corridors: Can including shrubs make your revegetation more Noisy Miner free? *Ecological Management and Restoration*, 7(2): 105-112. Available at: DOI: 10.1111/j.1442-8903.2006.00264.x
- Lindenmayer, D.B., Blanchard, W., Crane, M., Michael, D., and Florance, D. 2018. Size or quality. What matters in vegetation restoration for bird biodiversity in endangered temperate woodlands? *Austral Ecology*. Available at: <https://doi.org/10.1111/aec.12622>
- Low, T. 2016. Native Problems. *Wildlife Australia*. 53(1): 01-05. Can be accessed: <https://search.informit.com.au/documentSummary;dn=893268772068178;res=IELAPISSN:0043-5481>
- Mac Nally, R., Bowen, M., Howes, A., McAlpine, C.A. and Maron, M. 2012. Despotic, high-impact species and the subcontinental scale control of avian assemblage structure. *Ecology*. Available at: <https://doi.org/10.1890/10-2340.1>.
- Maron, M. 2007. Threshold effect of eucalypt density on an aggressive avian competitor. *Biological Conservation*, 136 (1), pp. 100-107. Available at: <https://doi.org/10.1016/j.biocon.2006.11.007>.
- Maron, M. 2008. Nesting, foraging and aggression of Noisy Miners relative to road edges in an extensive Queensland forest. *Emu – Austral Ornithology*. 109 (1), pp. 75-81. Available at: <https://doi.org/10.1071/MU08064>.
- Mortelliti, A., Ikin, K., Tulloch, A.I.T., Cunningham, R., Stein, J., Michael, D., and Lindenmayer, D.B. 2016. Surviving with a resident despot: do revegetated patches act as refuges from the effects of the noisy miner (*Manorina melanocephala*) in a highly fragmented landscape? *Biodiversity Research*. Available at: <https://doi.org/10.1111/ddi.12444>.
- National Environmental Science Programme (NESP) Threatened Species Recovery Hub. 2019. Culling noisy miners fails in NSW trial, study. Media Release can be accessed: <https://www.nespthreatenedspecies.edu.au/news-and-media/media-releases/culling-noisy-miners-fails-in-nsw-trial-study>.
- Piper, S.D., and Catterall, C.P. 2003. A particular case and a general pattern: hyperaggressive behaviour by one species may mediate avifaunal decreases in fragmented Australian forests. *Oikos*. Available at: <https://doi.org/10.1034/j.1600-0706.2003.12292.x>.
- Radford, J.Q., Bennett A.F and Cheers, G.J. 2005. Landscape-level thresholds of habitat cover for woodland-dependant birds. *Biological Conservation*. 124(3):317-337. DOI:



10.1016/j.biocon.2005.01.039.

- Saunders, D.L. and Tzaros, C.L. 2011. National Recovery Plan for the Swift Parrot *Lathamus discolor*, Birds Australia, Melbourne.
- Sharp, T and Saunders, G. 2011. A model for assessing the relative humanness of pest animal control methods (second edition). Australian Government Department of Agriculture, Fisheries and Forestry, Canberra, ACT. Printed by: New Millennium Print . ISBN: 978-1-921575-26  
Publication :  
[https://www.agriculture.gov.au/sites/default/files/style%20library/images/daff/\\_data/assets/pdf\\_file/0008/929888/humaneness-pest-animals.pdf](https://www.agriculture.gov.au/sites/default/files/style%20library/images/daff/_data/assets/pdf_file/0008/929888/humaneness-pest-animals.pdf) and model:  
<https://pestsmart.org.au/toolkit-resource/pest-bird-control-methods-humaneness-matrix/>.
- Sharp, T. 2012. Shooting of pest birds. Standard Operating Procedure. Available at PestSmart website: <https://pestsmart.org.au/toolkit-resource/shooting-of-pest-birds>
- South Australian Department of Environment and Heritage, Code of Practice for the humane destruction of flocking birds by trapping and carbon dioxide narcosis in South Australia (2007) p1-4 webpage can be accessed:  
[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewi4qfKoz7LsAhUafX0KHQVWAdoQFjABegQIBRAC&url=https%3A%2F%2Fwww.environment.sa.gov.au%2Ffiles%2Fsharedassets%2Fpublic%2Fplants\\_and\\_animals%2Fcop\\_flockingbirds.pdf&usg=AOvVaw0GBksWE4KaTuuAC9\\_LurEn](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKewi4qfKoz7LsAhUafX0KHQVWAdoQFjABegQIBRAC&url=https%3A%2F%2Fwww.environment.sa.gov.au%2Ffiles%2Fsharedassets%2Fpublic%2Fplants_and_animals%2Fcop_flockingbirds.pdf&usg=AOvVaw0GBksWE4KaTuuAC9_LurEn)
- Sustineo. ACT Biodiversity Fund Project 2012-2017 Final Evaluation. 2017. 01-28. Report can be accessed [https://www.environment.act.gov.au/\\_data/assets/pdf\\_file/0010/1451296/act-biodiversity-fund-final-evaluation-report-2012-2017.pdf](https://www.environment.act.gov.au/_data/assets/pdf_file/0010/1451296/act-biodiversity-fund-final-evaluation-report-2012-2017.pdf).
- Thomson, J.R., Maron, M., Grey, M.J., Catterall, C.P., Major, R.E., Oliver, D.L., Clarke, M.F., Loyn, R.H., Davidson, I, and Ingwersen, D. 2015. Avifaunal disarray: quantifying models of the occurrence and ecological effects of a despotic bird species. *Biodiversity Research*. Available at: <https://doi.org/10.1111/ddi.12294>.
- Threatened Species Scientific Committee. 2013. Advice to the Minister for Sustainability, Environment, Water, Population & Communities from the Threatened Species Scientific Committee (the Committee) on Amendments to the List of Key Threatening Processes under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). 04 – 09.
- Tidemann, C.R., King, D.H. 2009. Practicality and humaneness of euthanasia of pest birds with compressed carbon dioxide (CO<sub>2</sub>) and carbon monoxide (CO) from petrol engine exhaust. *Wildlife Research* 36, 522-527. Available at: <https://doi.org/10.1071/WR09039>
- Tulloch, A.I.T., Mortelliti, A., Kay, G.M., Florance, D., and Lindenmayer, D. 2015. Using empirical models of species colonization under multiple threatening processes to identify complementary threat-mitigation strategies. *Conservation Biology*. Available at: <https://doi.org/10.1111/cobi.12672>.
- Vickers, Jacob A T, Demographic shifts in Noisy Miner (*Manorina melanocephala*) populations following removal, BEnvSc Hons, School of Earth & Environmental Science, University of Wollongong, 2017. <https://ro.uow.edu.au/thsci/145>  
<https://www.feralscan.org.au/docs/bir-001.pdf>