



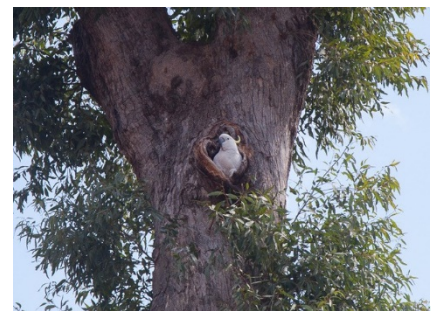
SAVING OUR SPECIES

Techniques to maximise ecosystem function and adaptive capacity in threatened ecological community restoration

2018–19 annual report card

Summary

Action implementation	11 out of 11 research actions were fully or partially implemented as planned for the financial year
Total expenditure	\$88,120 + \$42,899 in kind
Partners	University of Wollongong (UoW); Australian Catholic University (ACU)



Project name:

Techniques to maximise ecosystem function and adaptive capacity in threatened ecological community (TEC) restoration

Funding stream:

Science and research

A tree hollow in the Warrumbungles.
Photo: Liz Tasker

Techniques to maximise ecosystem function and adaptive capacity in threatened ecological community restoration

Project description

This project will examine past and future resilience in Warrumbungle National Park by studying genetic diversity of plantings, rates and source of natural regeneration and response of fauna to manipulations of key habitat features (hollows, mistletoe and coarse wood debris (CWD)). The project will identify management actions to bring about the recovery of ecosystem complexity in highly disturbed TECs. The project is a collaboration involving staff from Science Division, National Parks and Wildlife Service (NPWS) Castlereagh Area, ACU and UoW.

Target threatened species, communities, and threats

The target TEC is White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community. This TEC has been 95% cleared and was once widespread throughout the slopes of New South Wales. It is critically important habitat for a wide range of threatened fauna, including the regent honeyeater and koala.

Hollow entrance additions may be suitable for squirrel gliders, pale-headed snakes, turquoise parrots, brown tree creepers and greater long-eared bats. Mistletoe additions could provide an important food resource for regent honeyeaters and painted honeyeaters, and nesting habitat for diamond firetails, painted honeyeaters, grey-crowned babbler and red-capped robin.

A range of other TECs will benefit from the results of this research, because the findings on the importance of genetic diversity, hollows, mistletoe abundance and CWD will also apply to other grassy woodland types.

Outcomes or major successes

We have made substantial progress to date. In our study site, the central valley of Warrumbungle National Park, we have:

- compiled documentation of previous woodland restoration planting by NPWS, and commenced assessment of survival rates and plant species composition of the plantings
- documented the location and identity of large old relictual paddock trees (trees that escaped clearing of the central valley prior to its inclusion in the park)
- performed genetic analysis of relictual trees, planted trees and post-planting recruits to determine their relatedness (see below for more details)
- surveyed relictual trees and commenced surveys of plantings for presence of tree hollows and mistletoe
- commenced the trial addition of drilled entrances to internal tree hollows (see below for more details)
- commenced supervision of an Honours student at UoW, who is doing the genetic analysis. His project is on track for completion in early October 2019.

The **genetic analysis** of the relictual, planted and post-planting recruits is well underway. We have completed leaf sampling of 190 yellow box trees including:

- 32 relictual yellow box trees within the central valley identified from 1955 aerial photographs
- approximately 40 remnant plants from the valley fringes
- approximately 30 planted yellow box trees from plantings done in at least two different years
- approximately 90 juvenile or young adult trees adjacent to relictuals and planted trees in two locations
- two white box relictuals.

The report on this work (UoW student Honours thesis) is due in October 2019.

The experiment **creating hollow entrances** in trees with existing internal (inaccessible) hollows has commenced. An Animal Research Authority has been received for this work allowing for holes of three sizes (30mm, 60mm or 90mm) to be added to up to 45 Myrtaceous trees (eucalypts and angophoras). Twenty trees have been found and had holes drilled into them. One tree was destroyed by a neighbouring tree falling on it and 19 cameras are currently running. Additional cameras have been sourced to replace the Pixcontroller cameras initially allocated to this work that proved inadequate for this study.

So far the holes have been visited by a pale-headed snake, geckoes, skinks, goannas, dasyurids, feathertail gliders, sugar gliders, squirrel gliders, brushtail possums, sacred kingfishers, pardalotes and treecreepers, with the sacred kingfishers actively excavating the debris from inside the stem to enlarge the cavity.

We are behind schedule with some of the milestones, primarily due to the late approval (15 February 2019) and subsequent release of funding for the project (to ACU and UoW in March 2019), but are on track to make up this time in the second half of 2019. These milestones are:

- appointment of a research assistant at ACU. This has progressed, with a part-time assistant, appointed in late May 2019. She will commence fieldwork in July
- population structure assessment of standing woody vegetation. This has progressed in correspondence with the CWD experiment, with a dedicated fieldtrip planned for July 2019
- commencement of the CWD addition experiment. We have located enough relictual trees for the experiment (a quarter of the plots) and have fieldtrips scheduled to locate the remaining plots in July 2019. CWD and fencing materials have been obtained and stockpiled ready for use. We expect the experiment will be in place in August 2019
- monitoring of fauna at the experimental plots. Because of the late commencement, we missed the autumn survey season, and will now commence the fauna surveys when the conditions improve in early spring of 2019.

One final milestone scheduled for completion in 2018–19 has not yet commenced. We had planned to start addition of mistletoe (an essential component of habitat for many animals, and for nutrient recycling), but there has not yet been seed on the source mistletoe in the central valley. We did, however, see numerous flowers in May 2019, so anticipate that seeds will be available to commence the mistletoe reintroduction experiment in late winter to spring 2019.

Research communication and engagement

Communication and engagement with park neighbours and local and former NPWS staff took place this calendar year to locate physical and oral records of what planting has occurred in the past. We also spoke to the public and participants about the planned work at a fieldtrip organised by the Linnean Society of NSW held in Warrumbungle National Park in September 2018.

The Honours student gave an introductory seminar on his genetic analysis project at UoW on 28 March 2019.

In 2019–20, the Honours student will give his final project seminar at UoW, and we anticipate that we will give at least one seminar on the tree hollow addition project at a scientific conference and as part of the *Saving our Species* lunchtime seminar series. The focus, however, of 2019–20 will be fieldwork, including implementation, assessment and analysis of the experimental components (addition of hollows, CWD and mistletoe to enhance habitat restoration), with the following year (2020–21) being the one in which the majority of the project communication and engagement will occur.

Investment

Participant	Cash	In-kind
Department of Planning, Industry and Environment	\$88,120	\$42,899

Research actions

Research action	Implemented as planned?
Assessment of previous restoration activities	Compilation of existing records, map and draft report of history and current status of restoration in Warrumbungle National Park prepared
Population structure assessment (woody plants)	Delayed project funding and the resulting delayed recruitment of a field assistant have delayed progress on this milestone. CWD experiment relies on these pre-data so this is a priority for 2019–20
Establish coarse woody debris experiment and monitor	Progress made with pre-CWD surveys (e.g. more than 100 relictual trees mapped, field survey of two plantings complete), but delays in project funding delayed recruitment of the field assistant, and hence fieldwork. CWD has been stockpiled ready for use. Baseline surveys are due to be completed by early August 2019, and the CWD addition by late August
Field tissue sampling (round 1) of relictual and planted woodland trees	Initial genetic field sampling of remnant and planted trees complete
Sequencing of round 1 tissue samples	Sequencing complete (see student entry below for more details)
Install hollows trial	Twenty suitable trees have had hollows drilled (one has since been lost to a neighbouring tree falling on it), and 19 cameras are currently recording hollow use. A wide range of fauna (including threatened species) have already used the new hollows
Monitor establishment and mortality of mistletoe	Mistletoe surveys carried out in plantings and relictual trees. Most were dead (due to the 2013 fire), but some were alive and flowering (suggesting fruit will be available in late winter or spring 2019)
Mistletoe seed collection and reintroduction	No mistletoe seed yet available in the study site, but predicted to be available in late 2019 for this component to be carried out
Monitor habitat sites – bird, reptile and small mammal sampling	Delays with funding delayed recruitment of a field assistant (to May 2019), which has set back this component. It will now be carried out in winter–spring 2019
PhD student or series of Honours projects	A first Honours student is half-way through his project (a genetic analysis of planted and relict woodland trees). We will seek a second Honours student in 2020
Research assistant to contribute to intensive field monitoring program [HEW5 L4, full time]	Delays with funding (project funding did not come through until March 2019) meant that the field assistant was not recruited until mid-May 2019

Saving our Species 2018–19 annual report card for 'Techniques to maximise ecosystem function and adaptive capacity in threatened ecological community restoration'. For more information, refer to the specific strategy in the *Saving our Species* program.