



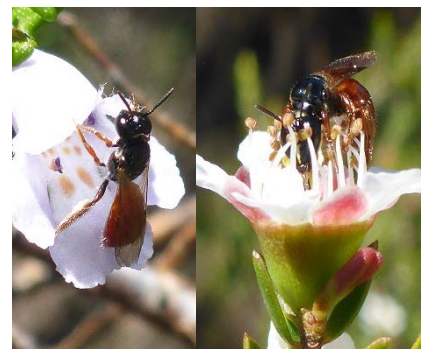
SAVING OUR SPECIES

Pollination systems as indicators of fire regimes – a study of thresholds

2018–19 annual report card

Summary

Action implementation	1 out of 1 research actions were fully or partially implemented as planned for the financial year
Total expenditure	\$20,000 grant + \$53,583 in kind
Partners	University of New England



Project name:

Pollination systems as indicators of fire regimes – a study of thresholds

Funding stream:

Science and research

Exoneura bicolor (a native bee).
Photo: David Mackay

Pollination systems as indicators of fire regimes – a study of thresholds

Project description

This project will study the response of pollinator systems to different fire regimes by measuring pollinator networks, abundance and diversity, fruit to flower ratios and irreplaceability risk to mutualisms in Threatened Ecological Communities (TECs) from eucalypt forests and heathlands. This will lead to better informed management by considering ecosystem functional responses to fire.

Target threatened species, communities and threats

- *Grevillea masonii*
- Howell Shrublands is an endangered ecological community that includes the threatened species *Homoranthus prolixus*, *Boronia granitica*, *Eucalyptus mckieana*, *Monotaxis macrophylla*, *Leionema rotundifolium* and *Acacia granitica*.
- *Prostanthera staurophylla* at Mount MacKenzie Nature Reserve.
- *Eucalyptus scoparia*

Outcomes or major successes

Prostanthera staurophylla

We have identified the main pollinators of *P. staurophylla*: a native bee (*Exoneura bicolor*) and a clerid beetle (*Eleale* sp.). A third likely pollinator, a bee (*Megachile* sp.), was a less frequent visitor. The two most frequent visitors/pollinators are both common species and, therefore, are likely to be found at proposed translocation sites for *P. staurophylla*.

Propagation of *P. staurophylla* has been successful from cuttings. Currently, we have approximately 100 *P. staurophylla* cuttings growing in the University of New England glasshouse, which will be used for breeding system experiments in spring 2019.

Preliminary heat and smoke germination trials have shown that *P. staurophylla* responds to low heat (80° for five minutes) but not to smoke, consistent with adaptation to cool fires. Such fires would be expected on the granite outcrop at Mount Mackenzie but have not occurred there for at least twenty years. This heat response by seeds in the seed bank suggests the species (or at least, species from the seed bank) would respond well to a controlled burn scenario.

A meeting was held with a Project Officer from the *Saving our Species* program and other stakeholders at Tenterfield Park, the proposed 'back-up' translocation site, on 13 March 2019 followed by a site visit to Mt Mackenzie to discuss further work.

Grevillea masonii

Three sites have been set up: two at open sites (one in a power-line easement beside Summerland Way and one in a firebreak at the northern edge of pine plantations in Whiporie State Forest), and one in a less-open site in spotted gum-allocauarina woodland/forest north of this same firebreak.

In the two open sites, the plants have been observed flowering in low numbers at every visit. Peak flowering is in winter–spring. The plants in the less open woodland site have not yet been observed to produce any flowers. This suggests the species is disturbance-dependent. The plants in the open sites are not well-visited by pollinators and fruit production is low.

It is possible that honeyeaters, which we suspect (but have not yet proven) to be the main pollinators, are restricted in their visitation to *Grevillea masonii* by fear of predators in the open

situations. There are some plants that are situated closer to vegetation that provides cover to honeyeaters. We are now looking at whether these plants get visited more often and set more seed than those further away from cover. We have collected seed-bank samples and will be screening these for seed.

Eucalyptus scoparia

On every visit to the *Eucalyptus scoparia* (*E. scoparia*) site at Bald Rock/Ferndale, we have found very low numbers of *E. scoparia* individuals in full flower with most of individuals not in flower. This flowering asynchrony among individuals at the site is likely to be leading to greater self-pollination and inbreeding than if the trees flowered in greater synchrony.

There were always lots of floral visitors and likely pollinators visiting the flowers on every site visit. However, seed production is low, with only 713 seeds counted in 1000 mature fruit. Less than 50% of fruit produced seeds, so this count would be even lower if it included all fruit, i.e. a standard seed-to-flower ratio. We will do heat and smoke germination trials on the seed recovered to date.

Howell Shrubland threatened ecological community

At the Howell Shrubland site in 2018, we found flowering to be severely curtailed by drought compared with previous years, so this aberrant year will not be used for comparison of before-and-after fire flowering or pollinator recovery. A wildfire went through the site in early 2019. In a visit to the site in February 2019, we found the fire had burnt patchily at our field site. We will examine plant and pollinator recovery at the site in spring 2019.

We are in the process of choosing sites for before-and-after controlled burn surveys of plants and pollinators in consultation with Walcha Office of Environment and Heritage (now Department of Planning, Industry and Environment (DPIE)) fire-management officers. We are gathering floristic and pollinator data and will be conducting before-and-after surveys of plant and pollinator recovery at sites burnt prior to 2019 in the 2019 hazard-reduction season (July to August 2019) and the 2020 hazard reduction season (July to August 2020).

Research communication and engagement

- We gave a presentation on the project titled 'Pollination Systems as Indicators of Fire Regime Impacts – A Study of Thresholds' at a Joint UNE/OEH Spatial Science Workshop held on Wednesday 5 June at Ecosystem Management, University of New England.
- A presentation at DPIE during the *Saving our Species* Lunch and Learn sessions is scheduled for Thursday 21 November 2019.

Investment

Participant	Cash	In-kind
Department of Planning, Industry and Environment	\$20,000	\$53,583

Research actions

Research action	Implemented as planned?
Research into the response of pollinator systems to different fire regimes by measuring pollinator networks, abundance and diversity, fruit to flower ratios and irreplaceability risk to mutualisms in TECs from eucalypt forests and heathlands	Project currently on track but future progress is threatened by drought conditions which may require rescheduling if drought conditions continue

Saving our Species 2018-19 annual report card for 'Pollination systems as indicators of fire regimes – a study of thresholds'. For more information, refer to the specific strategy in the *Saving our Species* program.