

Enhancing habitat for the threatened pink-tailed worm-lizard

Background

Surface rock is loose and fragile rock that sits on rock or soil surfaces. It takes millions of years to form and plays a vital role in the environment. It provides critical habitat for a diverse range of plants and animals, with more than 80 reptile species in south-eastern Australia associated with this habitat.

It provides animals with shelter, protection from predators, and places where they can escape from fire and extreme weather conditions and also serves an important ecosystem function by helping to maintain macro and microenvironments by preserving soil moisture, stabilising slopes, reducing soil erosion, increasing seed germination rates and reducing the effects of fire.

Many species are negatively affected by the loss of these critically important microhabitats, including the threatened pink-tailed worm-lizard (*Aprasia parapulchella*), striped legless lizard (*Delma impar*), grassland earless dragon (*Tympanocryptis pinguicolla*), little whip snake (*Parasuta flagellum*) and broad-headed snake (*Hoplocephalus bungaroides*).

The removal of surface rock is listed as a key threatening process under the New South Wales Threatened

Species Conservation Act 1995, though this law does not cover the removal of rock from approved quarrying activities, or where the removal of the rock is necessary for carrying out a development or activity (with an existing approval under the Environmental Planning and Assessment Act 1979), or the removal of rock from paddocks when it constitutes a necessary part of the carrying out of a routine agricultural activity.

This habitat type is significantly disturbed in agricultural landscapes in some parts of Australia, including the box gum grassy woodlands

of south-eastern Australia, due to massive amounts of rock being quarried or removed from paddocks over time. This process has been attributed to declines in a range of ground-dwelling native small mammal and reptile species.

Surface rock continues to routinely be cleared in agricultural landscapes and on private property. New machinery is also speeding up the rate at which this critical habitat can be removed and destroyed on a broader scale. Machines such as the 'reefinator' and 'rock crusher' are towed behind large tractors ripping through rock beds and



Figure 1: A pink-tailed worm-lizard. Image: Dan Florance



Background (continued)

pulverising surface rocks to convert rocky paddocks into arable cropping land. Even low rock formations can be turned into gravel within a few hours. This emerging practice of 'renovating' rocky paddocks could push already imperilled small native mammals and reptiles into further decline.

Preventing further rock degradation and re-creating and re-establishing rocky habitat will be necessary to reverse the decline of some species

such as the nationally Vulnerable pink-tailed worm-lizard which is the focal species of this research. The pink-tailed worm-lizard inhabits grassy woodlands, and is commonly found beneath small, partially embedded rocks. It appears to spend considerable time in ant burrows beneath the rocks, where it feeds on ant larvae and eggs.

The pink-tailed worm-lizard is currently known from only a small number of locations which are

largely outside the national reserve system in New South Wales, but recent work by our research group has confirmed locations within the predicted range of this data deficient species, adding to our understanding of their actual range and presence. However, there is limited understanding of the actual distribution and population size of the pink-tailed worm-lizard within their predicted range given its highly cryptic nature.

Figure 2: A fenced experimental field site. Image: Jackie O'Sullivan



Main aim of the research

This project is examining ways in which rocky environments can be managed and restored to provide habitat for threatened reptile fauna, including the pink-tailed worm-lizard.

This project has two key aims. First, to increase the knowledge of the distribution and abundance of threatened reptile populations in agricultural landscapes in New South Wales. Second, to develop and trial

new habitat restoration strategies to increase populations of the pink-tailed worm-lizard and other rock-dependent threatened reptile species that inhabit box gum grassy woodland in New South Wales.



What we are doing

We are working collaboratively with the Central Tablelands, Local Land Services, Landcare groups and local land owners across parts of the Lachlan catchment, with most surveys and experimental trials occurring between Cowra, Young and Boorowa in southern New South Wales.

We have conducted detailed targeted field surveys using best practice and guidelines, including *Survey guidelines for Australia's threatened reptiles* on numerous grazing properties to detect new populations of the pink-tailed worm-lizard. This builds on previous reptile survey work that the research group has conducted.

We have established a surface rock addition experiment as part

of identifying new ways to restore habitat for the pink-tailed worm-lizard. This experiment is currently being carried out on 10 box gum grassy woodland sites in central and southern New South Wales, on eight privately owned farms. There are replicate sites within fenced and unfenced areas, where rock has or has not been added. The fencing is to prevent grazing from livestock and native herbivores (Figure 2).

The surface granite rocks were donated by a local quarry and added in autumn to winter of 2020. The rocks weighed an average of 9 kg and were 20 to 40 cm wide. We placed them at a density of 4 rocks per square metre, with approximately 400 rocks added per plot.

The response of the vegetation- and woodland-dependent reptiles to the grazing exclusion and rock addition was monitored in spring 2020 and will be monitored again in the spring of 2021. We are marking the reptiles individually using visual implant elastomers to evaluate small-scale movement patterns, colonisation of newly restored rock habitat and dispersal ability.

We have also collected genetic samples from the lizards captured as part of the monitoring for the rock addition experiment. Genetic analyses are currently being carried out in collaboration with researchers at the University of Canberra and Deakin University to study the patterns of genetic variability of different populations of the pink-tailed worm-lizard.

Key findings to date

The field surveys have uncovered evidence of several new populations of the pink-tailed worm-lizard across a large geographical area that includes the Cowra, Harden and Albury regions of New South Wales (Figure 3). These discoveries have filled key gaps in the distribution of the species and shown that the distribution of the species is more extensive than previously recognised. The genetic analyses of the pink-tailed worm-lizard populations are ongoing, and results will be finalised later in 2021.

We added 50 tonnes of rocks to our box gum grassy woodland plots as part of the rock addition experiment (Figure 4). Reptiles have quickly colonised some of the newly restored areas, and preliminary results suggest considerable potential for effective restoration of rocky habitats in agricultural landscapes.

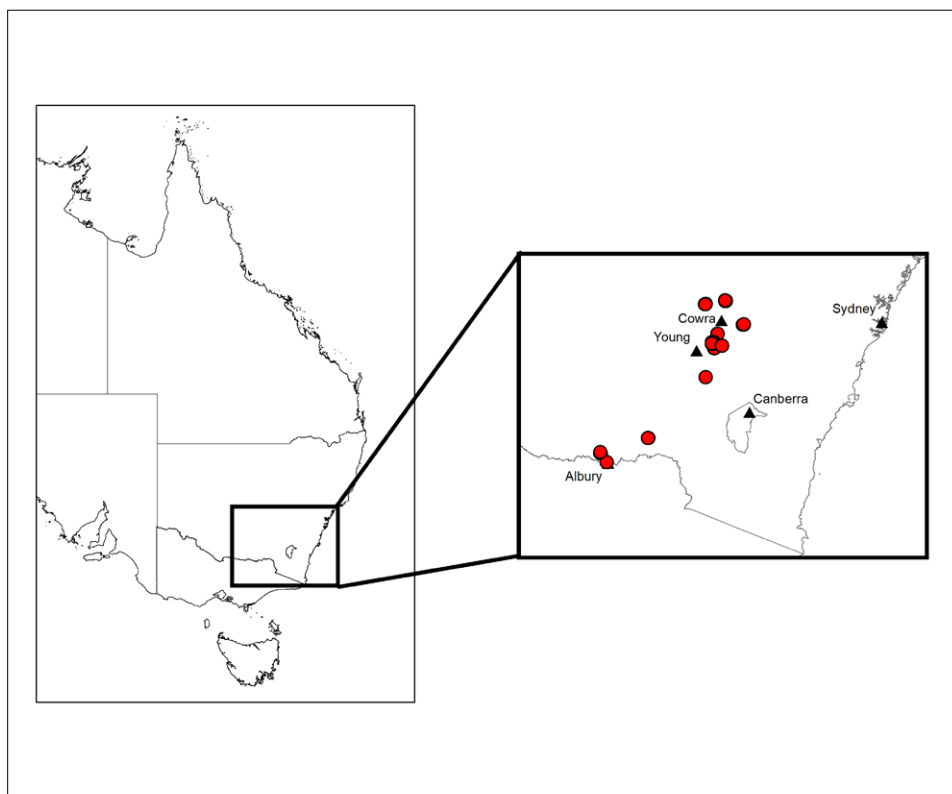


Figure 3: Known locations of pink-tailed worm-lizard in New South Wales. Image: Dan Florance



Implications and future directions

This project has been slowed by COVID 19 restrictions on field surveys and access to areas where the pink-tailed worm-lizard may occur. However, preliminary findings are very encouraging, as the species appears more widely distributed than previously recognised. Populations may therefore be more secure than previously thought. In addition, positive responses to rock restoration efforts suggest that restoration efforts using additions

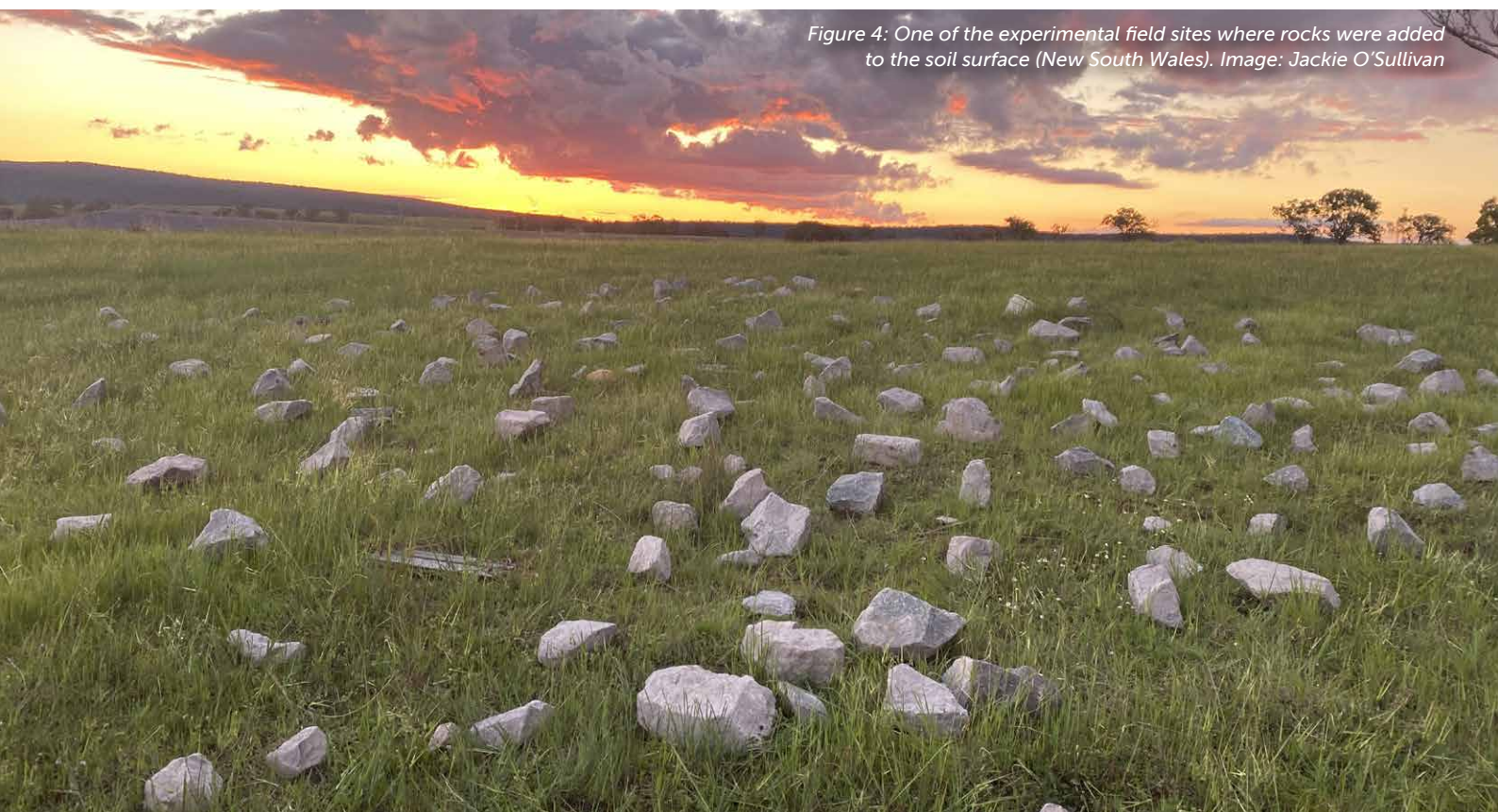
of rocks such as those sourced from active quarries may be a viable option for habitat restoration.

A key outcome of the work will be to use the new findings from the project to help develop protocols for rock restoration and grazing management programs to better conserve threatened rock-dependent reptiles in temperate woodland landscapes. These protocols will be formulated once more key results from this project have been compiled and

the basis for evidence-based interventions becomes clearer.

This project aims to provide a new outlook on what constitutes sustainable farming practices and effective restoration in agricultural landscapes. On a larger scale, the project has a broad application to inform government regulations on surface rock removal and management, national offset strategies for loss of rock habitat, and future ecological restoration programs.

Figure 4: One of the experimental field sites where rocks were added to the soil surface (New South Wales). Image: Jackie O'Sullivan



Further Information

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