BRIGHTENING THE LANDSCAPE

Stirling Range wattle

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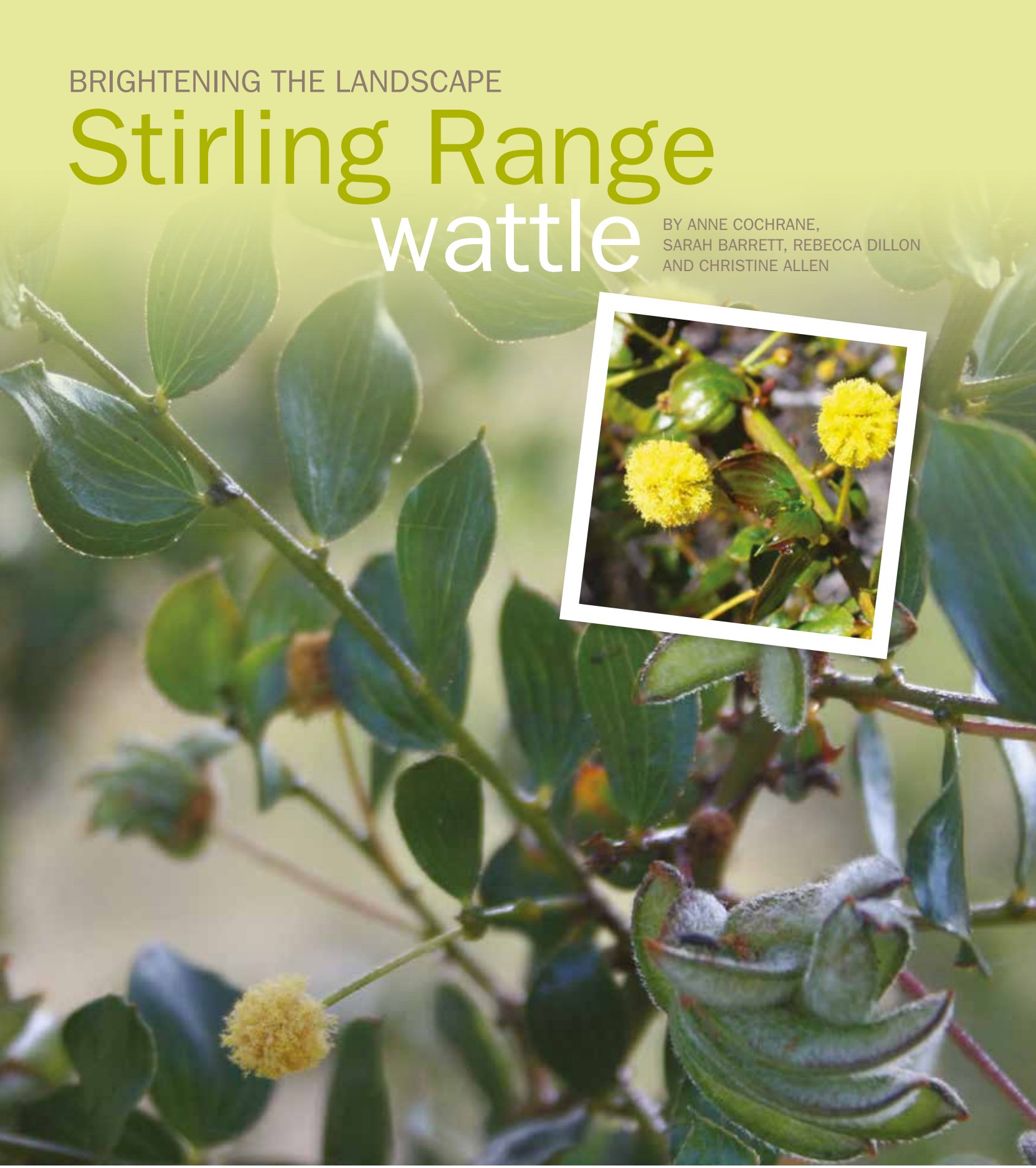

With the quintessential yellow balls of colour common to other wattle species, and taking its name from the only place in the world it's found, Stirling Range wattle is facing a brighter future thanks to conservation work.

The Stirling Range wattle (*Acacia awestoniana*) was first discovered in 1933 by the Scottish-born Australian botanist Henry Steedman, but only formally described in 1990. It is only known from two small populations located in wandoo woodland adjacent to drainage lines within Stirling Range National Park in the south-west of Western Australia. As a consequence of its limited geographic distribution and low number of plants, the species was declared as Rare Flora in 1996, and subsequently ranked as 'Vulnerable' under International Union for the Conservation of Nature (IUCN) criteria.

This tall spreading shrub is killed by fire and its survival is totally reliant on recruitment from seed. This makes it vulnerable to inappropriate fire regimes because if fires occur too often plants will be killed before they reach reproductive maturity, depleting the soil seed bank and risking localised extinction.

On the other hand, too long between fires may also threaten its long-term persistence. It is believed that the decline of a small roadside population to just seven plants may have been due to natural aging of the plants and the absence of fire to stimulate the germination of new ones. However, the largest known population growing along Papa Colla Creek in the park suffered a serious decline in numbers after a wildfire in 2006. While good regeneration and speedy growth had been anticipated after the fire, surveys revealed that the new recruits were being heavily grazed and that the population size was less than that recorded pre-fire. Signs of grazing had been evident early on, but it was hoped that this was only a temporary impact.

By 2008 it was clearly evident that grazing was persisting and was slowing growth, preventing flowering and causing seedling mortality. Scats indicating a range of potential animal culprits were present including western grey kangaroos (*Macropus fuliginosus*), quokkas (*Setonix brachyurus*), brushtail possums (*Trichosurus vulpecula*) and rabbits. From 2010 a range of measures were undertaken by Parks and Wildlife staff to reduce grazing impacts including tree guards, wire and plastic mesh fences, all with mixed results. By 2012 the threat category for the Stirling Range wattle had been raised to Critically Endangered due to the low numbers of mature plants and the documented decline in population size, and an interim recovery plan was written for the species.

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Main and inset Stirling Range wattle.
Photos – Anne Cochrane and Sarah Barrett/ Parks and Wildlife

Above Stirling Range wattle was first described in 1990.
Photo – Anne Cochrane/Parks and Wildlife

BOOSTING PLANT NUMBERS

Fortunately, staff from the Threatened Flora Seed Centre in Perth and Parks and Wildlife's Albany District office had been collecting seed from a wide range of plants of the Stirling Range wattle since 1994 and more than 25,000 seeds were in storage at the seed bank. This offered insurance against the loss of plants in the wild and in 2009 it was decided that more active management was needed to support the recovery of the species in the wild.

A plan to boost the small roadside population was developed and taken on by UWA PhD student Christine Allen, in association with staff from the

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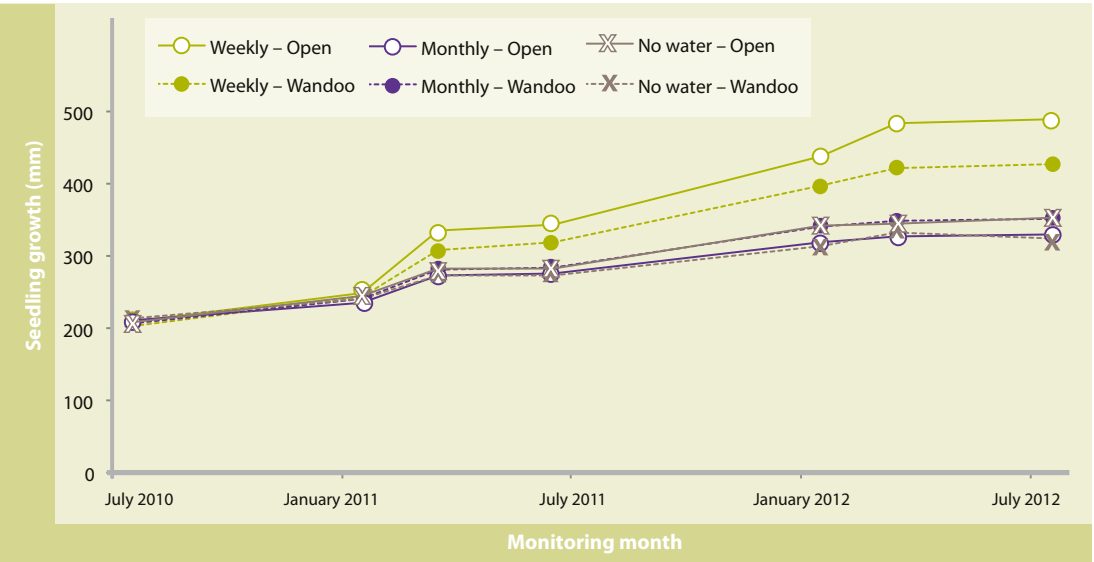
then Department of Environment and Conservation. Seeds were retrieved from storage, germinated at the Threatened Flora Seed Centre and grown at Kings Park. In autumn 2010, Christine travelled to Stirling Range National Park where she prepared two microhabitats (one in 'open ground' and the other under wandoo canopy) and developed three watering treatments (no water, weekly watering and monthly watering). Christine and a group of volunteers and department staff planted 864 seedlings into 24 fenced plots. Department staff established an additional 164 seedlings in five unfenced plots to investigate the effects of grazing on seedling establishment. During the next three years Christine took seedling measurements (including health of plants, growth, herbivory and mortality) and conducted environmental monitoring at the site, in particular measuring soil moisture at different depths. Surprisingly, watering seedlings over summer did not improve overall survival compared with the unwatered seedlings. However, the combination of microhabitat and watering affected growth, with the largest seedlings growing in weekly watered plots away from competing wandoo roots (see graph on page 14).

Five years on, and the translocation is hailed as a resounding success. Mortality has been minimal, and three quarters of the seedlings planted in autumn 2010 were still alive and healthy in early 2015. Most plants had flowered and produced fruits. In early summer of 2014, bags were

Above left Erecting the fence around grazed juvenile plants.

Top A juvenile plant showing signs of being grazed.
Photos – Sarah Barrett/Parks and Wildlife

Above Muslin bags were used to collect seeds from the translocation site.
Photo – Stephen van Leeuwen/Parks and Wildlife



Top and above A comparison of seedling growth between those that received weekly watering in the open (top) and those that were not watered and planted under wandoo. *Photos – Christine Allen*

Left A brushtail possum caught on camera grazing on new tips of low Stirling Range wattle plants.
Photo – Dylan Lehmann/Parks and Wildlife

placed over some of the developing fruits and more than 2500 seeds were collected from 21 of these translocated plants. Samples will be germinated in due course to determine their viability.

MYSTERY MUNCHER

Remarkably, there were minimal signs of damage from invertebrates or vertebrates to the seedlings at the translocation site, even in the unfenced plots which had been established as a control. Seedlings were unpalatable to rabbits and were unscathed, despite rabbit diggings and scats within centimetres of unfenced seedlings on several occasions.

However, this was not the case at the wild population on Papa Colla Creek that had been burned in 2006. Although plants in some sub-populations eventually escaped grazing pressure, in other sub-populations regular monitoring of tagged plants showed that grazing continued to severely damage plants and contributed to high rates of mortality, even where fenced. Remote cameras were installed in 2014 by Parks and Wildlife officer Dylan Lehmann and, surprisingly, infra-red photos revealed that the culprits responsible for the grazing damage on young seedlings that recruited after fire were brushtail possums and not kangaroos or wallabies, as previously thought. On camera, possums were seen to specifically target the growing tips of smaller plants, including those within fenced enclosures, and the limitations of fencing became obvious. However, once plants were of a certain height (0.5m), they appeared relatively safe from grazing ensuring at least some individuals managed to survive each year.

It is suspected that the differences in grazing pressure between the two populations is likely due to the Papa Colla Creek population having undergone a relatively recent fire, with large amounts of post-fire new green growth attracting herbivores to the scene. Dispersal of herbivores into this area would be facilitated by the population's location in a large tract of continuous bush in the national park. In contrast, the small

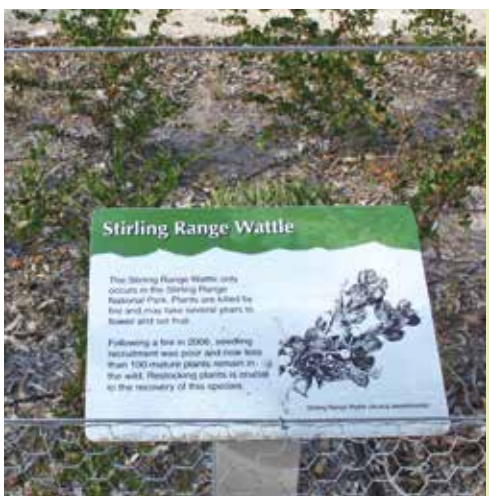
roadside population is situated within a much smaller linear remnant bordered by farmland and a main road. While rabbits thrive in this area, the possum population is likely to be much smaller, constrained by the area of habitat available and threats such as foxes and vehicle traffic.

INTERPRETING SCIENCE

As the translocation was in an area within the national park that was regularly visited by people from the nearby caravan park, a path was created and signs erected, thanks to State Natural Resource Management funds, to explain why this recovery action had been conducted and to prevent possible damage to newly planted seedlings and fencing. It also created a new visitor experience.

LOOKING FORWARD

The future of the Stirling Range wattle now looks more hopeful than it did some five years ago. However, if the translocation is to be considered a 'success' a new generation of plants must recruit and the population needs to be self-sustaining. Unfortunately, at this stage, no new seedlings have been found but this is not unexpected as fire or other disturbances may be required before the seeds will germinate. Meanwhile, plants will flower and seeds will develop, disperse and be incorporated into the soil-stored seed bank eventually enabling seedlings to recruit in the future. The site will continue to be monitored on an ongoing basis and information will be provided to visitors to the park.



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Above Gro-bags were used to protect seedlings from grazing.

Above right A demonstration plot is signed to provide visitors with insight into the project.

Right Signs provide information to help visitors understand and appreciate Stirling Range wattle and the efforts to protect it.
Photos – Sarah Barrett/Parks and Wildlife