
Remarkable
mountain
bells

Several fires burnt through ecological communities in Stirling Range National Park and there were grave concerns for a number of plant species, in particularly the mountain bells. A dedicated team of scientists and volunteers is determined to ensure that the park's unique flora, including the mountain bells, recovers and thrives following these fires.

by Leonie Monks, Andrew Crawford, Rebecca Dillon and Sarah Barrett

The Stirling Range is a unique feature in the south-west of Western Australia, a series of peaks that are in sharp contrast to the flat plains that surround them. The national park surrounding these peaks contains a staggering 1500 plant species, many restricted to a few of the mountain peaks.

On Boxing Day 2019, lightning started bushfires that burnt through large parts of the park. Following another that burnt through other areas of the park in autumn 2018 (see map on page 31). The combined impact was that more than two thirds of the park was burnt in the space of two years. Twenty-six threatened plant species and three threatened ecological communities were impacted and there were concerns that some of the unique flora of the Stirling Range may never recover. Helping species regenerate from these fires involves a focused, multi-faceted, multi-year approach (see 'Recovering from fire in a biodiversity hotspot, *LANDSCOPE*, Spring 2020).

BELL OF THE MOUNTAIN

In particular, there were grave concerns for a group of species—the mountain bells, nine species of *Darwinia* that grow in the Stirling Range National Park. The distribution of all but one is restricted to the confines of the park and several only occur on one or two of the mountain peaks.

While the impact of the recent fires was of concern for the ongoing survival of some of these species, it was the cumulative impact of previous fires that had conservation managers worried. These concerns were based on the knowledge that many species grow slowly in the montane habitat and can take many years to flower and produce enough seed to replenish the seed bank. If fires occur too frequently, the seed bank can be depleted.

Grazing of the regenerating seedlings by herbivores such as the western grey kangaroo (*Macropus fuliginosus*), rabbit (*Oryctolagus cuniculus*) and WA's iconic and much-loved quokka (*Setonix brachyurus*) can severely reduce flowering, seed production and plant survival.

Phytophthora Dieback disease caused by *Phytophthora cinnamomi* has also had a devastating impact on the flora of the park, having spread through several peaks, reducing the numbers of many species, including some Darwinias, or eliminating them from areas altogether.

Several populations of the yellow mountain bell (*Darwinia collina*) had become extinct prior to the mid-1990s

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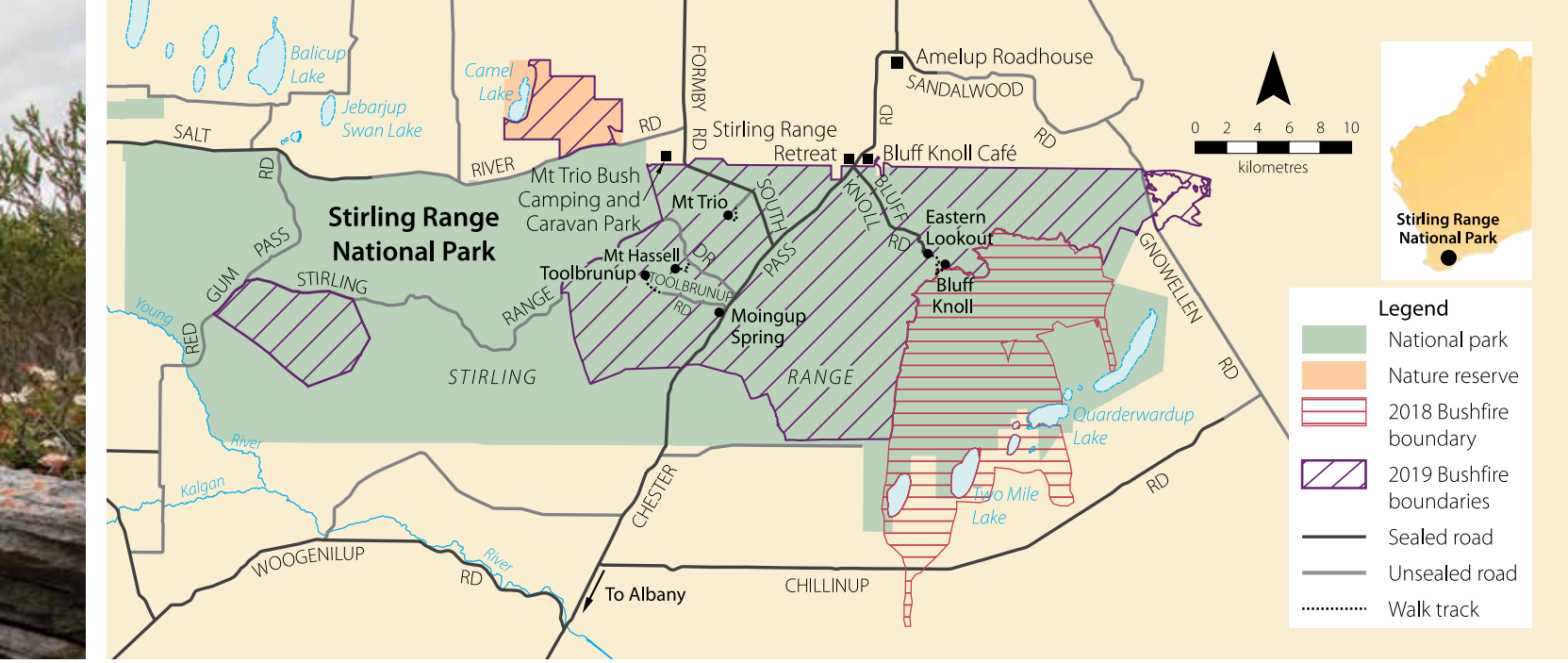
Main Yellow mountain bell (*Darwinia collina)*.
Photo – Marie Lochman

Top *Darwinia squarrosa* habitat.
Photo – Andrew Crawford/DBCA

Above left Planting *Darwinia collina*.
Photo – Leonie Monks/DBCA

Above right Wedge Hill after the 2019 bushfire.
Photo – Rebecca Dillon/DBCA



"In particular, there were grave concerns for a group of species—the mountain bells, nine species of *Darwinia* that grow in the Stirling Range National Park."

for reasons that are not fully understood. This does not appear to be because of any of the aforementioned threats in isolation. However, the drying climate appears to be a contributing factor with several populations now contracting to wetter, south-facing habitat.

FIGHTING BACK

Over the past few decades there has been a concerted effort to ensure the mountain bells do not become extinct. The Department of Biodiversity, Conservation and Attractions (DBCA) has used the fungicide phosphite to mitigate the impact of *Phytophthora* dieback and enhance plant survival.

Some areas containing threatened mountain bell populations have been fenced to protect them from herbivores, allowing the plants the chance to grow and flower. Ongoing monitoring is providing the datas needed to understand how the number of plants and the health of the plants are changing over time and to quantify the impact of management actions.

In addition to this on-site management, DBCA's Western Australian Seed Centre (WASC) has been collecting seed of the mountain bells since the mid-1990s and storing the seed in the vault at Kensington under conditions aimed to keep the seed alive long-term.

AFTER THE FIRE

After the 2018 and 2019 bushfires, the conservation effort had to be stepped up to ensure affected species persist. DBCA received funding through the Australian Government's Bushfire Wildlife and Habitat Recovery program to implement recovery actions for threatened plant species in the Stirling Range National Park including the mountain bells.

Above Map showing bushfires in Stirling Range National Park.

Right Helicopter dropping off fencing material in the Stirling Range.
Photo – Andrew Crawford/DBCA

Top left Monitoring quadrats for Stirling Range flora, including yellow mountain bell (*Darwinia collina)*.
Photo – Damien Rathbone

Top right Planted *Darwinia collina*.
Photo – Leonie Monks/DBCA

Above left Gillam's bell (*Darwinia oxylepis)*.
Photo – Andrew Crawford/DBCA

Above right Planting *Darwinia collina* at one of the new translocation sites.
Photo – Leonie Monks/DBCA

The first step to recovery was to undertake detailed post-fire surveys of all populations to understand their response to the fires and allow managers to prioritise recovery actions. These surveys are logistically challenging. The teams had to hike into remote locations, scale the mountain habitats or, where necessary, use helicopter access to quantify plant numbers. Repeat visits are needed to see how plants are surviving and growing over time.

The survey teams were often accompanied by WASC staff to undertake further seed collections. Seed has been collected from all species of mountain bells across their range and stored in the secure vault at the WASC. Aerial phosphite spraying was undertaken over 40 hectares to protect the regenerating habitat and delicate seedlings.

While the helicopter was dropping off the survey teams, building material for fences was also delivered. Patches of

regenerating seedlings have been fenced to protect them from grazing. Repeat survey visits will help assess the benefit of the fences to the mountain bells.

REMARKABLY RESILIENT

Despite some dire predictions of large-scale loss of plant species in the Stirling Range National Park, the mountain bells are proving remarkably resilient. Recent monitoring has recorded good germination and, while grazing impacts are apparent, plants in areas that were fenced have shown better growth. However, germination has been sparser in the small areas that burnt in both 2018 and 2019.

While some mountain bell species are recovering well after the bushfires, others need a helping hand. In early 2020, DBCA staff began planning a large-scale translocation project for species affected by the bushfires including the yellow mountain bell and the pink mountain bell (*Darwinia squarrosa*).

The presence of *Phytophthora* dieback throughout much of the range of these species meant some lateral thinking was required to find suitable translocation sites. A decision was made to locate the translocation sites outside of Stirling Range National Park and focus on maximising seed production so seeds could be collected and used in recovery efforts within the natural habitat in the future.

Seed that had been safely stored at the WASC for up to 25 years was germinated to produce seedlings for planting at the two new, carefully selected *Phytophthora* dieback-free translocation sites. After the sites were fenced, and watering systems installed, seedlings were planted into their new homes in winter 2021.

DBCA staff will continue to monitor the translocation sites and when the plants start to produce seed WASC staff will be there to start collecting and banking the seed ready to use and ensure these species are not lost from the Stirling Range.

Top left Cleaning boots to prevent the spread of Phythophthora dieback.
Photo– Leonie Monks/DBCA

Above left Gillam's bell (*Darwinia oxylepis)*.

Above right Wittwer's pink mountain bell (*Darwinia wittwerorum*).
Photos – Andrew Crawford/DBCA

Below *Darwinia collina* seedling.
Photo – DBCA

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