Critical action

Eight years ago the then Department of Conservation and Land Management (CALM) set out to help save 10 plant species on the brink of extinction. Seedlings were propagated and planted in secure sites. Has this strategy worked?

by Leonie Monks

So many of Western Australia's amazing wildflowers are rare or threatened. Some 376 of the State's 11,785 recognised species are considered rare, poorly known, at risk of extinction or presumed extinct. A variety of recovery actions can be implemented to protect our threatened flora. These may involve searching for new populations, collecting and storing seeds, restoring habitat and ameliorating threatening processes (such as competition from introduced weeds; grazing by feral animals, native animals and domestic stock; *Phytophthora*-caused dieback disease; increasing soil salinity, which is often coupled with rising water tables; changes in fire regimes; and accidental destruction).

For some threatened plants, however, the risk of extinction is now so high that it is not enough to look after the existing wild populations. Increasingly, flora translocations are being considered—in conjunction with other recovery actions—to help save some of our most threatened plants. In some cases, translocations are the 'last best hope' to stop our most critically endangered plants from going extinct.

Flora translocations are the transfer of plant material from one area to another for conservation purposes. This may mean planting more plants at a site where the species already occurs (or used to occur), or at new sites with appropriate habitat. In extreme cases, some species have suffered such dramatic declines in their natural habitat that translocation is urgent, but suitable habitat cannot be found. In such cases, planting a seed orchard in a secure location is an option (see 'A safe haven for threatened plants', *LANDSCOPE*, Summer 2005–2006).

Undertaking a translocation isn't easy. It can take years of preparation and then, given the longevity of many Western Australian species, it can take many more years—or even decades—before it is known whether the plants have successfully established. So what does the process entail?

Striking new plants

First, a site needs to be found. It must have similar habitat to areas with existing populations of wild plants, but without the same kinds of threatening processes (there is no point planting at a site with threats, as the new population won't contribute to long-term conservation of the species). This means matching the soils and vegetation to the original site.

The next step is to propagate the plants. Seeds or propagation material (such as cuttings) can be collected from wild plants and grown immediately. In some cases, the seed material has already been collected and stored at low moisture content and low temperature (see 'Our Frozen Future', *LANDSCOPE*, Winter 2001) at the Department of Environment and Conservation's Threatened Flora Seed Centre. New plants are grown for the translocation by germinating seed in the Threatened Flora Seed Centre laboratory, or by striking new roots on leaf and stem material using plant hormones at the nursery. The new plants are grown in the nursery at the Botanic Gardens and Parks Authority, in conditions that ensure no weeds, pests or diseases are translocated along with the plants.

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Main Round-leaved honeysuckle (*Lambertia orbifolia*).
Photo – Andrew Davoll/Lochman Transparencies

Above Cunderdin daviesia.
Photo – Andrew Brown/DEC

Left DEC officer Renee Hartley plants Kambellup dryandra (*Dryandra ionthocarpa* subsp. *ionthocarpa*).
Photo – Leonie Monks/DEC

Planting takes place during the higher rainfall winter months, to guarantee the best start for the young plants. To learn as much as possible about the best techniques to use, and to ensure precious seed or plant material isn't wasted, all planting is done on an experimental basis. This may mean that, in some cases, only half the plants are fenced to protect them from herbivores such as rabbits and kangaroos, or only half the plants are watered over the first summer. Plants are monitored regularly for survival, growth, production of flowers and fruits and recruitment of second-generation plants to ensure we learn as much as possible about the likely success of the translocation.

How well has this strategy worked? Eight years ago the goal was to secure the long-term future of 10 critically endangered plant species using translocations (see 'Restoring diversity, restoring hope', *LANDSCOPE*, Spring 1997). Since then, CALM (which has since been incorporated into the Department of Environment and Conservation) has translocated 33 plant species, which has involved augmenting (adding plants to an existing population) six populations and starting 37 new populations in secure locations.

Some of these translocations haven't been successful. In some cases, drought has struck, kangaroos have eaten the seedlings, birds have damaged the watering systems or the seeds haven't germinated. In most cases we know what has not worked and why, and can therefore fix the problem before having another go. For example, 1500 blunt wattle (*Acacia aprica*) seeds were directly sown at a new site during the first translocation attempt. Only one of these seeds germinated—an incredible disappointment! The next year the seed was germinated in the laboratory, and grown in a nursery for six months before being planted at the site. Seven years later, 152 of the 181 seedlings planted are still alive—a survival rate of 84 per cent.

Round-leaved honeysuckle

Many translocations have done extremely well. They have survived, grown, flowered and then released thousands of seeds ready to start the next generation. In three cases, the second generation has already germinated—a promising sign that these new populations have the potential to be self-sustaining in the long term.

A good example is the round-leaved honeysuckle (*Lambertia orbifolia* subsp. *orbifolia*), which in 1998 was known from just two populations with a total of 169 individuals. These populations were threatened by *Phytophthora* dieback, aerial canker and accidental destruction during maintenance of their road verge habitat. Over four years, a total of 714 seedlings and cuttings were planted at a new site in a nearby nature reserve. Fifty four per cent of these plants still survive seven years later, having grown rapidly, flowered and produced viable seed. Pollinators, including the western spinebill, have been observed feeding from the flowers. Studies using molecular markers show these birds are moving pollen between many of these plants, resulting in significant cross pollination. The most positive sign of all was the discovery in 2003 that seedlings had germinated naturally at the site. The presence of seedlings is the best indication that the new population will be able to persist in the long term without management intervention.

In addition to all this positive news, the use of some simple experiments has shown us that mulching and tree guards are not needed to successfully translocate this species. This will save hundreds of dollars, which can be better spent on future translocations or other recovery actions. Another experiment has revealed that fencing plants to protect them from grazing by kangaroos is absolutely essential to ensure plants can survive, grow and reproduce.

Top Cunderdin daviesia habitat on a remnant road verge.

Above Cunderdin daviesia.
Photos – Andrew Brown/DEC

In another positive development, Department of Environment and Conservation Threatened Flora Officer Sarah Barrett discovered a new naturally occurring population of round-leaved honeysuckle and many more plants in one of the other wild populations. The land containing one of these populations was purchased by the State government and recently declared a nature reserve. Translocation, combined with a range of recovery actions, has significantly increased the chance that round-leaved honeysuckle will continue to persist in the long term.

Spiral-fruited wattle

Spiral-fruited wattle (*Acacia cochlocarpa* subsp. *cochlocarpa*) is another success story. This subspecies was known from just 115 plants growing on a narrow road verge, about 250 kilometres north of Perth, threatened by road maintenance activities, spray drift from adjacent agricultural areas and competition from weeds. Over four years, 779 seedlings were planted and 84 seeds were germinated directly in two disused gravel pits in a nature reserve (only about four kilometres up the road from the natural population) with the same soil type and similar associated plant species. To date, 557 of these plants are surviving—an almost sixfold increase in the number of plants in the wild.

Our experiments show that fencing to protect plants from grazing results in more than twice as many plants surviving as those left unprotected. This makes the cost of buying fencing a worthwhile investment. We have also found that six-month-old seedlings have a similar survival rate to seedlings grown in the nursery for 18 months, but grow at a faster rate and produce more seed per plant. Hence, it is better to plant younger seedlings, which are also less likely to be damaged when being moved to the site.

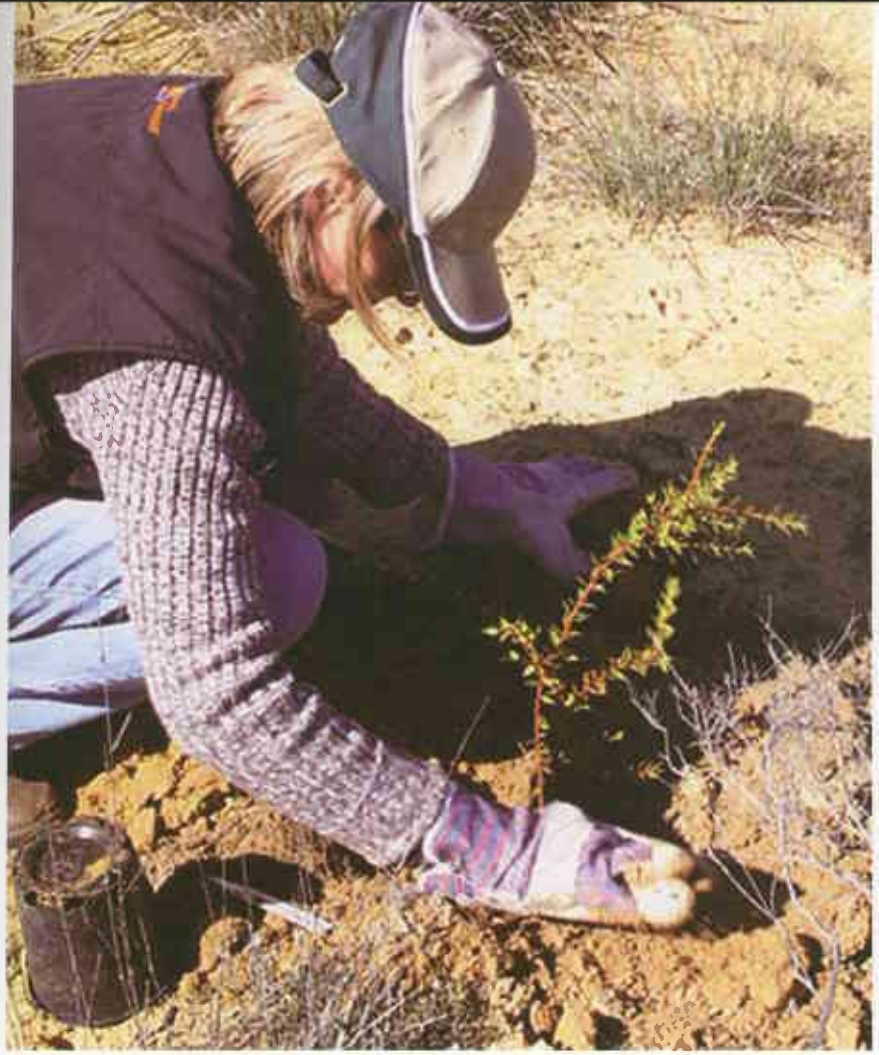
Watering the seedlings over the first summer was shown to result in greater growth, although it didn't increase survival. Greater growth means more seed can potentially be produced, thus improving the chance of a second generation.

Top left A volunteer mulches plants at a spiral-fruited wattle site.
Photo – Leonie Monks/DEC

Above left Spiral-fruited wattle habitat.
Photo – Gillian Stack/DEC

Above Spiral-fruited wattle flowers.
Photo – Bruce Maslin/DEC

Left Volunteers monitoring Three Springs daviesia (*Daviesia bursariodes*).
Photo – Leonie Monks/DEC



Top Tangled wattle.
Photo – Andrew Brown/DEC

Above Tangled wattle flowers.
Photo – Bruce Maslin/DEC

Above left Amanda Godfrey, then the Landcare officer for Cunderdin, planting Cunderdin daviesia.
Photo – Leonie Monks/DEC

Below Flowers of the Cunderdin daviesia.
Photo – Andrew Brown/DEC

Productive partnerships

Some translocation projects have allowed good partnerships to be forged between the Department of Environment and Conservation and community groups. The Cunderdin daviesia (*Daviesia cunderdin*) and tangled wattle (*Acacia volubilis*), for example, are both critically endangered and occur in small numbers near the Wheatbelt town of Cunderdin (about 150 kilometres east of Perth). Cunderdin daviesia is known from a single population of about 12 plants on a narrow road verge. Tangled wattle grows at the same location, but is also known from 10 other populations with a total of 89 known plants. In 2002, the Landcare Officers in Cunderdin, Amanda Godfrey and Faye Christison, became concerned about the Cunderdin daviesia and wanted to do something to help. As a result, a joint project was set up between the Cunderdin Landcare Group and the former agency CALM to look after Cunderdin daviesia and tangled wattle. The Cunderdin Landcare Group obtained a grant from the Threatened Species Network to help fund some of this work.

The Christisons owned a piece of remnant vegetation containing one of the natural tangled wattle populations, so the plan was to translocate seedlings and cuttings of the two species there. In July 2004, 102 cuttings of Cunderdin daviesia, and 75 seedlings and cuttings of tangled wattle, were planted at the site. Because the first summer was long and dry, only 13 tangled wattles and 18 Cunderdin daviesias survived, but this was still a significant increase (in terms of percentages of the overall numbers of each species) in numbers of plants occurring in the wild. We have learnt more about how to carry out the next translocation and a productive partnership has developed between DEC and the Cunderdin Landcare Group.

Translocation is very labour and resource intensive, so it is very important to find out which techniques deliver the best outcomes. In the last eight years we have learnt a lot about how to achieve translocation success. For some projects, like the round-leaved honeysuckle, we are quietly confident that a new, viable population has been established. For other species, like the spiral-fruited wattle, the signs are encouraging, but it is still too early to say whether we have been successful.

Overall, we know that translocations, monitored over the long term, and undertaken in conjunction with other recovery actions, are a powerful tool to aid in the fight to save our most critically endangered plants.

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