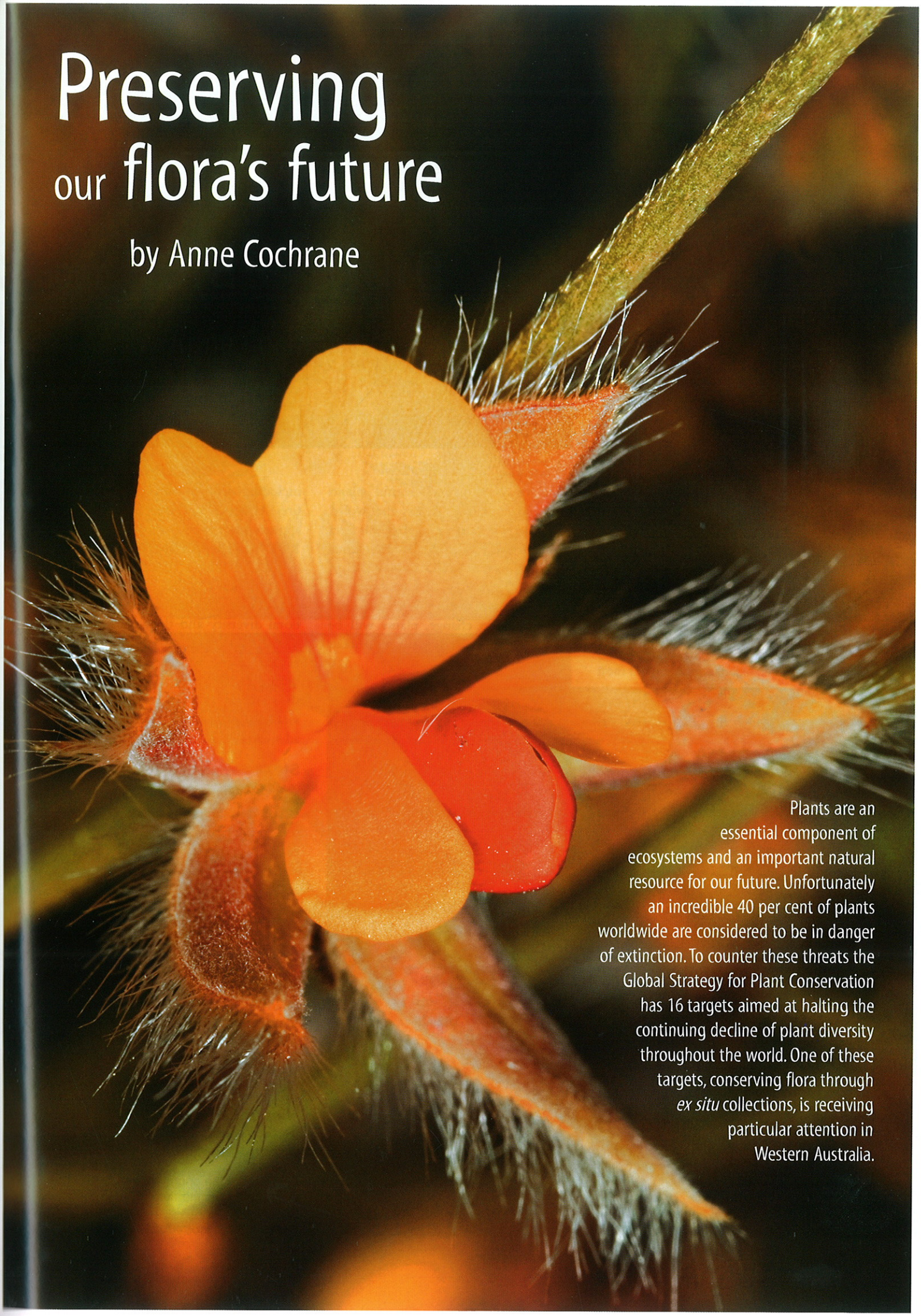
Preserving our flora's future

by Anne Cochrane



Plants are an essential component of ecosystems and an important natural resource for our future. Unfortunately an incredible 40 per cent of plants worldwide are considered to be in danger of extinction. To counter these threats the Global Strategy for Plant Conservation has 16 targets aimed at halting the continuing decline of plant diversity throughout the world. One of these targets, conserving flora through *ex situ* collections, is receiving particular attention in Western Australia.

In 2002 the Convention on Biological Diversity adopted a framework for plant conservation actions at global, national, regional and local levels—the Global Strategy for Plant Conservation (GSPC). The strategy has 16 targets that aim to promote the understanding, documentation and conservation of plant diversity and the sustainable use of plants while encouraging education, awareness and building capacity for conservation. The strategy's primary approach to plant conservation is through *in situ* (on site) measures, complemented by *ex situ* (off site) conservation. This is the first time that quantitative global plant conservation targets have been set with a deadline for their attainment. That deadline of 2010 is fast approaching.

Meeting targets in Western Australia

Western Australia is blessed with a highly diverse flora which displays high levels of endemism, meaning that many of these plants are found nowhere else in the world. This vast array of stunningly beautiful plants draws visitors from across the world, particularly during spring. But this flora is threatened by current environmental problems such as habitat fragmentation, changed hydrology and invasion by exotic pests and diseases. With projected future climate change, plants will be facing a whole new series of threats including drought and more frequent fires. Although not precisely known, it appears that there may be more than 13,000 plant species and subspecies in WA, of which about 20 per cent are considered to be of conservation significance. This combination of high floral diversity and threat has resulted in the south-west of WA being listed as one of the world's 34 biodiversity hotspots—the only such hotspot in the country. For these reasons it is vital that plant conservation targets are adequately addressed.

Storing seeds for the future

One of the vitally important goals as stated in target eight of the GSPC is the conservation of "... 60 per cent of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programs".

Previous page
Main The rare *Jacksonia pungens*. The Threatened Flora Seed Centre holds many thousands of seeds of this species in secure long-term storage as an insurance against loss in the wild.
Photo – Andrew Crawford/DEC

Above Goldfields woodlands.
Photo – Anne Cochrane/DEC

Left Fruit of the priority-listed *Daviesia chapmanii* from the flora-rich northern sandplains.
Photo – Andrew Crawford/DEC

Above Colourful flowers of the conservation-listed *Verticordia rutilastra* from the northern sandplains.

Left The little known and geographically restricted *Stylidium pendens*.
Photos – Andrew Crawford/DEC

Within WA this goal is being addressed by the Department of Environment and Conservation's (DEC's) Threatened Flora Seed Centre, which was established in 1992 as part of a risk-management strategy for the State's threatened plant species. The seed bank is responsible for collecting and storing seeds from the State's conservation-listed flora and flora associated with threatened ecological communities and biodiversity hotspots. During its 15 years of operation, the seed bank has provided protective custody, through *ex situ* seed conservation, for hundreds of threatened flora facing extinction. Seeds are held in the seed bank from some populations of species that no longer exist in the wild. Not only is seed conservation providing 'insurance' for threatened species diversity, it is also providing material for research and recovery. Seeds and seedlings have been provided for a number of different research studies ranging from assessing temperature limits for recruitment in restricted endemic plant species in the Stirling Range to provision of material for *Phytophthora* dieback susceptibility trials. However, the ultimate purpose of the seed bank is to provide genetic material for the recovery of threatened species.

In 2001 the Threatened Flora Seed Centre joined a global seed conservation partnership initiated by the Royal Botanic Gardens, Kew, in the United Kingdom that includes more than 50 partner countries around the world (see 'Our frozen future', *LANDSCOPE*, Winter 2001). This 10-year partnership—the Millennium Seed Bank Project—has enabled WA to increase its capacity to deliver seed conservation goals for its unique flora.

Currently the DEC seed bank has 30 per cent of the 2,618 Declared Rare and Priority Flora of WA in storage. This includes 70 per cent of the 372 extant taxa listed as being Threatened (Declared Rare Flora) under the International Union for

Global Strategy for Plant Conservation targets

1. Creating widely accessible working lists of known plant species.
2. Assessing the conservation status of known plant species.
3. Developing models with protocols for plant conservation and sustainable use, based on research and practical experience.
4. Effectively conserving at least 10 per cent of each of the world's ecological regions.
5. Assuring protection of 50 per cent of the most important areas for plant diversity.
6. Ensuring that management is consistent with the conservation of plant diversity in at least 30 per cent of production lands.
7. Conserving threatened plant species through conservation reserves.
8. Storing 60 per cent of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programs.
9. Conserving 70 per cent of the genetic diversity of crops and other major socioeconomically valuable plant species and maintaining associated Indigenous and local knowledge.
10. Establishing management plans for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems.
11. Ensuring no species of wild flora is endangered by international trade.
12. Ensuring 30 per cent of plant-based products are derived from sustainably managed sources.
13. Halting the decline of environmental resources, including Indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care.
14. Conducting community education programs on flora.
15. Ensuring skilled staff and facilities are available to achieve global plant conservation targets.
16. Forming local, regional, national and international partnerships.

Above Robin Probert from the Royal Botanic Gardens Millennium Seed Bank Project collecting seeds of the priority-listed *Banksia tricuspis* in Mount Lesueur National Park.
Photo – Andrew Crawford

the Conservation of Nature criteria. More than 1,000 collections represent these 259 Threatened taxa. Seeds have been collected and conserved from multiple populations to ensure a broad range of genetic variation has been captured. More than half of all the collections have been made since the start of DEC's partnership with the Millennium Seed Bank Project, the remainder having been collected with funding from State and Federal sources (e.g. Commonwealth Government Natural Heritage Trust funding through the South Coast Natural Resource Management).

Plant reintroduction

The collections support an active species recovery program, an important component of which is reintroduction of threatened species back into the wild (see 'Restoring diversity, restoring hope', *LANDSCOPE*, Spring 1999). Although one of the major challenges associated with target eight of the GSPC is considered to be species reintroduction, DEC has implemented reintroductions for 48 of the State's Threatened plants, 33 of which have used seed from the seed conservation program. DEC's responsibility for all aspects of flora conservation includes an active and integrated strategy combining both *in situ* and *ex situ* conservation programs. The flora reintroductions have had a major impact on the threatened wild populations, sometimes doubling or trebling plant numbers as a result. For example, the numbers of plants of the spiral-fruited wattle (*Acacia cochlocarpa* subspecies *cochlocarpa*), rose from 132 plants in the wild in 1998 to 540 (plus the original 132) plants after one single reintroduction in 2006. These increases in plant numbers help to ensure that Threatened species known from single small populations are less vulnerable to extinction. Many of the reintroductions are still only a few years old and their success is not guaranteed until the new reintroduced populations become self sustaining, meaning the new plants survive, flower and reproduce successfully, adding progeny to the population. All the reintroductions are routinely monitored and documented and provide valuable information on plant performance. This information helps DEC staff in the development of management strategies for wild populations and enhances our understanding of rare plants and their ecological interactions. These data also help determine the amounts of seeds required for future reintroduction programs. This is a very important feedback mechanism for the seed conservation program. If only 10 per cent of the seeds germinated in the laboratory actually grow and survive to maturity in the new populations, then we know how many seeds we require for the next reintroduction to attain a certain number of reproducing plants in the ground.

Above Flora diversity in the Stirling Range requires protection from threats such as *Phytophthora* dieback.
Photo – Rob Olver

Below right Laboratory of the Threatened Flora Seed Centre in Perth.
Photo – DEC

Achieving target eight of the GSPC before the 2010 deadline clearly demonstrates the progress that DEC's seed conservation program has made towards implementing the global biodiversity targets for flora. We are lucky to be part of a global network of seed banking facilities supported both financially and technologically by the Millennium Seed Bank. We are also privileged to be able to draw on expertise from around Australia and the world, knowing that we are not alone in our endeavours to conserve our portion of the world's flora. We are also very fortunate to have much of the infrastructure and skills required to undertake the enormous task of conserving our most endangered plants species as seeds. It has been a major achievement to reach this goal but many of the existing conservation collections are still not adequately representative of the genetic diversity of the species. In many cases the collections only contain small amounts of seeds and are not big enough to meet the demands for recovery. To obtain enough seeds to meet conservation goals without impacting on wild populations is an on-going challenge. For seed conservation to be truly effective, it is necessary to be able to collect seeds before population size and genetic diversity decline. Therefore early identification of threatened species status is essential.

Flora for the future

Seed conservation is only one means to help maintain biodiversity and ensure that our unique flora is not lost to future generations. *Ex situ* collections are reserve collections that can be drawn on when required and it is important that seed stocks are readily available in case of drastic environmental change, such as may be expected with future climate change. In the short term, DEC's seed conservation program aims to address as a priority the collection and conservation of critically threatened plant species, with a goal of 90 per cent in seed banks by 2010. Over the next 10 years it will be concentrating on saving more plant resources for the future and directing its efforts towards sampling throughout a species range. It will also work to ensure the collection and conservation of enough genetically representative material to support efforts to recover species to a point where they are no longer considered threatened.

Anne Cochrane is a Senior Research Scientist working with DEC in Albany. She manages the Threatened Flora Seed Centre, DEC's seed conservation facility for rare, threatened and poorly known plant species. She can be contacted on (08) 9842 4500 or by email (anne.cochrane@dec.wa.gov.au).

Volume 23 Number 3 Autumn 2008

contents

Regulars

Publishing credits
Executive editor Kaye Verboon.
Editors Samille Mitchell, Rhianna King, Carolyn Thomson-Dans.
Scientific/technical advice Kevin Kenneally, Chris Simpson, Keith Morris.
Design and production Natalie Jolakoski, Tiffany Taylor, Gooitzen van der Meer.
Illustration Gooitzen van der Meer.
Cartography Promaco Geodraft.
Marketing Estelle de San Miguel
Phone (08) 9334 0296 *Fax* (08) 9334 0432.
Subscription enquiries
Phone (08) 9334 0481 or (08) 9334 0437.
Prepress and printing Lamb Print, Western Australia.
© ISSN 0815-4465

Please do not send unsolicited material, but feel free to contact the editors.

Visit NatureBase at www.naturebase.net

Published by the Department of Environment and Conservation, 17 Dick Perry Avenue, Kensington, Western Australia.

Department of Environment and Conservation
Our environment, our future