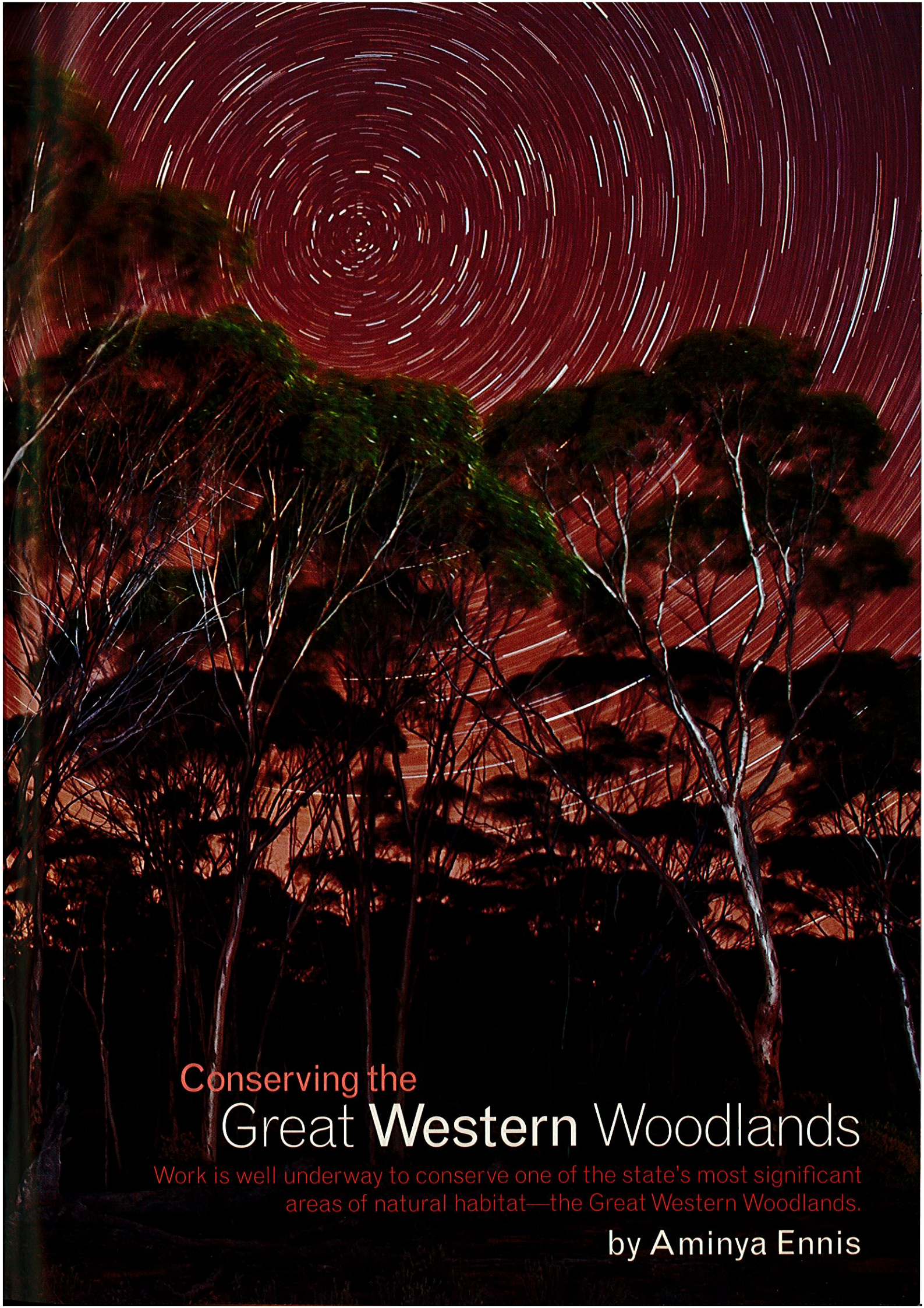

Conserving the Great **Western** Woodlands

Work is well underway to conserve one of the state's most significant areas of natural habitat—the Great Western Woodlands.

by Aminya Ennis

Covering almost 16 million hectares, the Great Western Woodlands represents the largest and most intact Mediterranean-climate woodland in the world. It is an internationally significant area of great biological richness and cultural and economic importance. In particular, the woodlands are a centre for *Eucalyptus* species diversity. Some 20 per cent of Australia's eucalypt species (more than 160 species) and more than a fifth of Australia's native plant species (more than 3,000 species) are found here. Forty-nine mammal, 138 reptile, 14 frog and 215 bird species have been found in the region, including the threatened malleefowl (*Leipoa ocellata*) and the Lake Cronin snake (*Paroplocephalus atriceps*), which is found nowhere else (see 'The Great Western Woodlands: protecting our biological richness', *LANDSCOPE,* Summer 2010–11).

Aboriginal occupation has been dated to at least 22,000 years and the region has immeasurable cultural significance, with Aboriginal people retaining strong links and responsibility for country. The area has a fascinating history, including discovery by explorers, the gold rush of the 1890s and development of the mining, pastoral and timber industries. These activities continue to play an important role for local people.

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Great Western Woodlands at night.

Left Mulga parrot (*Psephotus varius*).
Photos – Sallyanne Cousans

Below Great Western Woodlands signage showing the new visual branding for the area.
Photo – Aminya Ennis/DEC

The state government released a 10-year conservation strategy for the area—*A Biodiversity and Cultural Conservation Strategy for the Great Western Woodlands*—in November 2010. The conservation strategy was developed with the help of a stakeholder reference group and provides a framework to manage the different uses of the woodlands to ensure the long-term protection of its nature and culture.

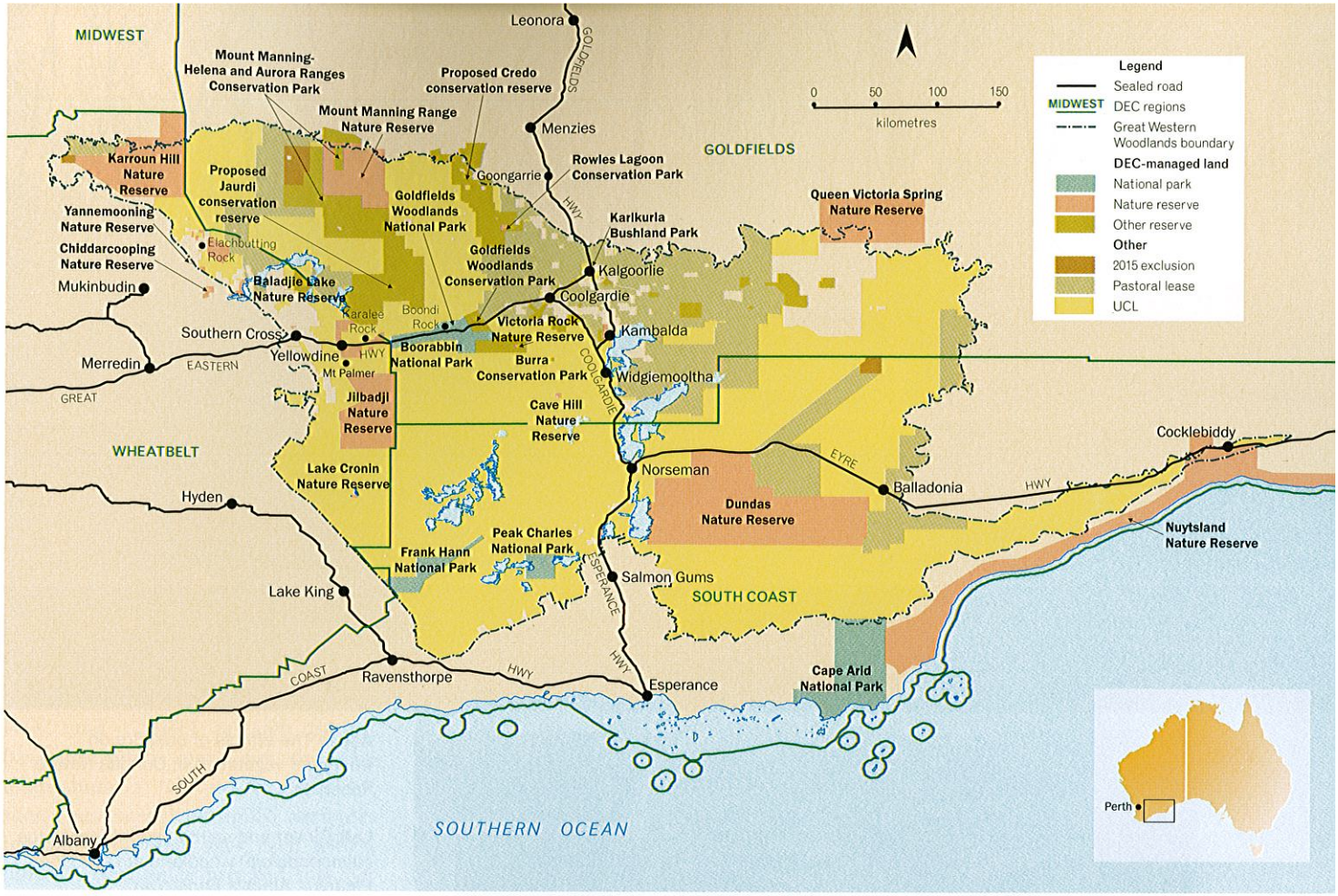
The government has allocated $3.8 million towards the highest priority on-ground works identified in the conservation strategy. The Department of Environment and Conservation (DEC) is involved in many of these projects and, with advice and input from a Great Western Woodlands Reference Group, has already set to work on bringing them to reality.

Creating awareness and understanding

The Great Western Woodlands is an important recreational area for residents of the region and is drawing increasing numbers of tourists (see 'Hidden gems of the Great Western Woodlands', *LANDSCOPE,* Winter 2012). One of the conservation strategy's aims is to promote the Great Western Woodlands as a tourist destination, help visitors to appreciate that they are in an internationally significant area and raise awareness of the area's high conservation values worthy of protection.

A new visual brand that includes a logo and colour theme is available free for businesses and organisations to use in marketing the Great Western Woodlands in their brochures, websites and signs. The logo is a stylised representation of the capped mallee (*Eucalyptus pileata*), a species local Aboriginal people refer to as the spear tree. It has long straight stems of strong wood, with a diameter suitable for splitting into quarters to make four spears.

DEC has installed eye-catching signage that includes the woodlands logo on the main entry routes to



Right One of the signs erected at key recreation sights with information on the area.
Photo – Aminya Ennis/DEC

the Great Western Woodlands. It has also erected information signs at key recreation sites, introducing visitors to the wonders of the woodlands and other places to explore.The department is upgrading facilities at some of these recreation sites, including Peak Charles National Park and the proposed Credo conservation reserve.

A guide to exploring the Great Western Woodlands, soon to be published by DEC, provides fascinating stories about the history of the area, its tracks and trails, and the main trees, wildflowers, mammals, reptiles and birds that visitors are likely to see. An informative brochure, available from DEC offices, shires and visitor centres throughout the Great Western Woodlands, highlights some of the fantastic places to visit, many with secluded bush camping areas, granite outcrops and historic attractions.

The Kalgoorlie-Boulder Urban Landcare Group and DEC worked together to develop curriculum resources to help primary and secondary students learn about the special nature of the Great Western Woodlands. The materials will help students learn about biological and physical threats, ecosystem sustainability and how fire and other management strategies are used to help maintain biodiversity and cultural values.

Managing fire

Fire is an important ecological process in ecosystems of the Great Western Woodlands. However, there is evidence that fire regimes in the area have changed in recent decades. Large (up to 500,000-hectare) and intense bushfires that can burn for weeks or months are occurring almost every year, and have been identified as one of the most significant threats to the woodlands' biodiversity.

The differing vegetation types found in the woodlands respond to fire in different ways. Periods between fire in some woodland communities may be longer than several centuries, while mallee and shrub communities typically have shorter periods between fires of 40 to 70 years.

Cutting for mining timbers in many areas, along with subsequent regeneration after bushfire, has resulted in regrowth woodlands with

Above The effects of bushfire on woodland vegetation in Dundas Nature Reserve.

Left Gimlet and salmon gum (*Eucalyptus salmonophloia*) woodland at Lake Hope. *Photos - Aminya Ennis/DEC*

more closely spaced trees and more ground litter that carries and sustains fire more easily. Without deliberate intervention in fire management in the Great Western Woodlands, it is unlikely that long periods between fires will be able to be maintained, and undesirable changes to woodland communities could result. This may already be occurring.

A fire management plan developed to provide guidance to land and fire managers under the conservation strategy outlines a two-stage approach to improve fire management in the Great Western Woodlands. The initial phase focuses on improvements to fire access tracks and the development of strategic low-fuel areas. These will enable better control over the incidence of large bushfires, particularly those with the potential to impact on mature woodlands. The ability of firefighters to safely and quickly access bushfires is critical in their control, and significant progress has been made on upgrading existing tracks to create a strategic fire access network within the woodlands. The strategic fire access network will not only provide options for firefighters to gain closer access to fires for potential direct attack but will also provide potential containment and fallback lines for bigger fires. Where tracks border or traverse particular vegetation communities, such as shrubland or mallee, they provide important access for prescribed burning operations.

Low-fuel strips—created through scrub rolling or mulching and subsequent burning—are also an important management tool to limit the potential spread of bushfires in shrubland. They also provide important low-fuel buffers for prescribed burning operations.

The second phase of the fire management plan involves the use of prescribed fire to establish and maintain a mosaic of different vegetation ages that is sensitive to the needs of the flora and fauna contained within the major vegetation types. DEC undertook aerial and ground-based mosaic burns in autumn 2012 at Forrestania, Koolyanobbing, north of Cape Arid National Park and Queen Victoria Spring Nature Reserve. These burns involve prescribed burning of patches across large areas over a number of years to create a spatial and temporal mosaic of fuel ages, which can minimise the potential size and intensity of bushfires. The burns also provide an important opportunity to improve our understanding of how biodiversity responds to fire, and of fire behaviour in shrubland and mallee vegetation communities.

Right The Holland Track is a popular four-wheel-drive track through the Great Western Woodlands.
Photo – Ann Storrie

Understanding fire

Understanding the influence of time since fire on the recovery of woodland ecosystems is important for identifying the most ecologically appropriate fire regimes to apply to these ecosystems. Because recovery of woodland ecosystems occurs over decades or centuries, measuring changes in the ecosystem through time is not practicable. Instead, a joint DEC and CSIRO research project has substituted space for time by establishing a 'chrono-sequence' of sites. These sites share similar attributes but are of different ages, each with a different time since fire, and together build a picture of ecosystem recovery within gimlet (*Eucalyptus salubris*) woodlands.

DEC has taken samples at 72 sites in the western part of the Great Western Woodlands, ranging from areas that last experienced fire two years prior to those which have not experienced fire for a long time. Estimating the time since the last fire in sites that haven't burnt for many decades is a significant challenge for researchers. In the absence of long-term historical records, fires are usually dated through the analysis of remotely sensed images. However, images cover only the past 40 to 60 years, and some fire-prone vegetation communities in the woodlands have not burnt for a significantly greater period. Therefore, studies on annual tree rings (dendro-chronology) within gimlet trees have been used to estimate the time since fire. Although limited to use on long-lived woodland tree species, this technique has considerable potential to increase our understanding of fire history in the landscape.

Another fire research project underway will provide critical information to help fire managers predict the behaviour of planned fires used for bushfire fuel reduction and ecosystem management, as well as to predict the behaviour of bushfires. The study involves collecting field data during fires, and reconstructing past fire events using remotely sensed data and weather observations. Fire behaviour will be examined in relation to vegetation, fuel and topographic factors; ignition sources; weather conditions at surface level; and upper atmospheric processes including stability and convergence.

Working with Aboriginal people

Maintaining traditional ties is vitally important to the Aboriginal people of the Great Western Woodlands and they have expressed a strong desire to be involved in the ongoing management and protection of the area. A partnership between DEC and the Goldfields Land and Sea Council has employed staff within the council to help Aboriginal people become involved in the planning and management of the Great Western Woodlands. In addition to involving Aboriginal people with on-ground projects such as fire management, the partnership is progressing arrangements for the joint management of conservation reserves and development of an Aboriginal ranger training program.

Aboriginal people have used fire as a management tool for thousands of years. Throughout parts of the south-west of Western Australia, fires of differing intensities were used to create a small-patch mosaic of burnt areas to manage food resources and movement corridors. Agencies working in the area recognise a need to better understand and document traditional Aboriginal burning practices in the Great Western Woodlands.

DEC and CSIRO are collaborating to investigate the potential for combining western science-derived and Aboriginal-derived models of fire management in the Great Western Woodlands. They are holding workshops with the Ngadju traditional owners, the largest registered Native Title Claim group in the woodlands, to discuss and document their fire knowledge. The documentation of this knowledge will help land managers continue to develop fire management strategies for the woodlands.

Above Blackbutt trees (*Eucalyptus patens*).
Photo – Sallyanne Cousans

Left DEC is working to eradicate weeds such as the coral cactus.
Photo – Megan Muir/DEC

Controlling introduced species

Several species of introduced animals have become established in the Great Western Woodlands. Introduced predators are a particular problem as they prey on native wildlife, and are linked to the extinction or decline of a number of ground-dwelling small to medium-sized mammals, reptiles and birds. In addition, despite its relative intactness, the Great Western Woodlands is also subject to environmental impacts from introduced weeds.

The development of a pest animal and weed control plan for the Great Western Woodlands is well underway. The plan will identify and map priority weed and pest animal populations in the woodlands and determine the most cost-effective means of control. It will be available for public comment in early 2013.

In the meantime, on-ground weed eradication works have been undertaken in a number of areas. Initial works have focused on two invasive cactus species, the prickly pear (*Opuntia* spp.) and coral cactus or devil's rope (*Cylindropuntia* spp.). These species are highly visible, have been identified as 'weeds of national significance', and thrive in the semi-arid environment of the woodlands. They can form dense patches virtually impenetrable by native animals, harbour pest species such as rabbits and also hinder the growth and regeneration of native plants.

Increasing knowledge

The Great Western Woodlands has been chosen as the location of the first ecological 'supersite' in WA, as part of the Terrestrial Ecosystems Research Network (TERN). TERN is a federal government initiative to collect, store, manage and share scientific data about Australian ecosystems. A consortium of scientists from CSIRO, DEC and universities is establishing a suite of projects across the supersite, focusing on long-term ecological monitoring, understanding ecological processes and informing ecological management of the Great Western Woodlands. CSIRO has installed an 'OzFlux' climate station at the proposed Credo conservation reserve, which will monitor the energy, water and carbon balance of mature eucalypt woodland. A field study centre being built at Credo will offer accommodation for researchers and students.

A number of biological surveys has been undertaken in the Great Western Woodlands, including extensive research by the WA Museum and the then Department of Conservation and Land Management, now DEC, in the 1980s. Vegetation was mapped by renowned botanist Dr John Beard in

Right A tower installed at the proposed Credo conservation reserve will monitor the energy, water and carbon balance of mature eucalypt woodland.
Photo – Dr Suzanne Prober/CSIRO

Below Red-tailed black cockatoos (*Calyptorhynchus banksii*) will be among the many bird species to be recorded in a large-scale bird survey program.
Photo – Ann Storrie

the 1970s at a scale of 1:1,000,000 and his accompanying memoirs provide much useful biodiversity information. Numerous smaller vegetation surveys providing greater detail than Beard's mapping have also been conducted by agencies, tertiary institutions and mining companies.

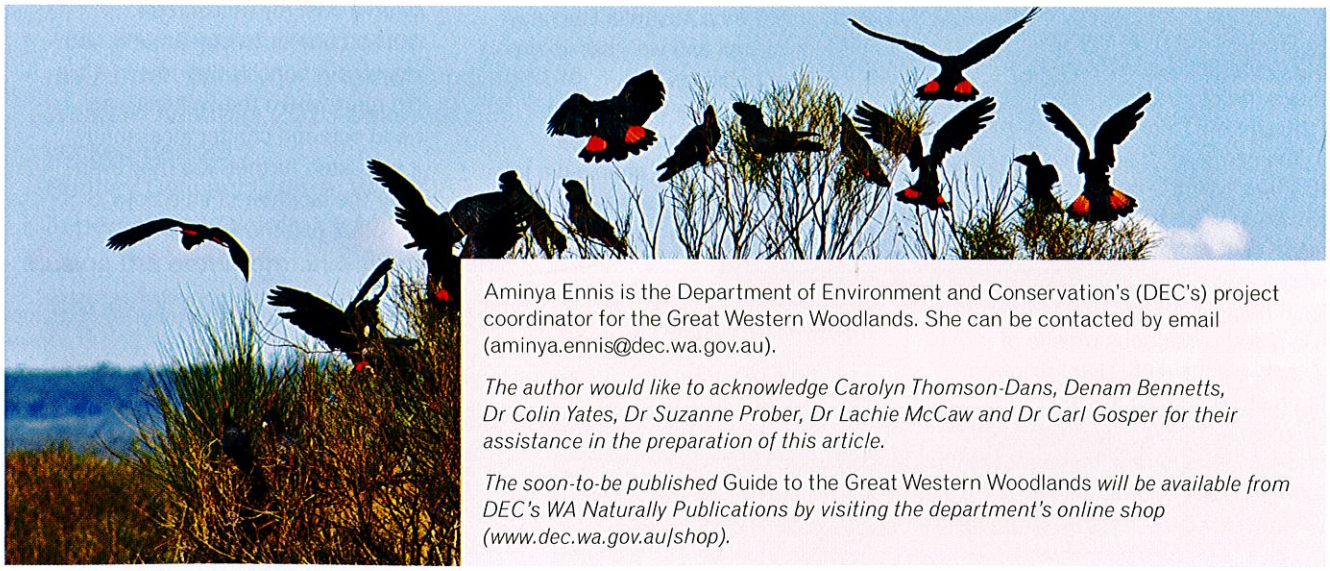
In partnership with South Coast Natural Resource Management, DEC is collating vegetation information and data from these surveys. Many of these studies would have been undertaken using differing procedures and the next step will be to standardise the collated vegetation data. The outcome will be a reconciled vegetation map of the Great Western Woodlands that also identifies gaps in the available mapped coverage.

Under the state government's 2011 Environmental Community Grants, Birdlife Australia undertook a pilot study for a project studying bird communities of the Great Western Woodlands. Existing bird survey records within the woodlands were collated and a central database established. A stakeholder support network was developed for the project through awareness-raising workshops. Birdlife Australia, in partnership with The Nature Conservancy, has now commenced a wider project in the woodlands—a large-scale bird survey research program. The program, which is seeking volunteers, will include long-term bird monitoring to detect population change and will eventually assess the population status of various species.

Sharing information

Existing biodiversity information for the Great Western Woodlands is now accessible through a specific theme and interactive maps in NatureMap, a free online public web portal (www.naturemap.dec.wa.gov.au). NatureMap enables researchers, conservation planners, community groups, industry, consultants and the public to produce maps, lists of species, reports and information on WA's biodiversity. Additional information from research projects being undertaken in the Great Western Woodlands will be added as it becomes available.

The wealth of projects occurring in the Great Western Woodlands is moving the area towards the realisation of the conservation strategy's overall vision—to protect this large parcel of the state's heartland through collaborative and integrated management based on sound information, while sustaining a flow of economic and social benefits.



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The soon-to-be published Guide to the Great Western Woodlands *will be available from DEC's WA Naturally Publications by visiting the department's online shop (www.dec.wa.gov.au/shop).*

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