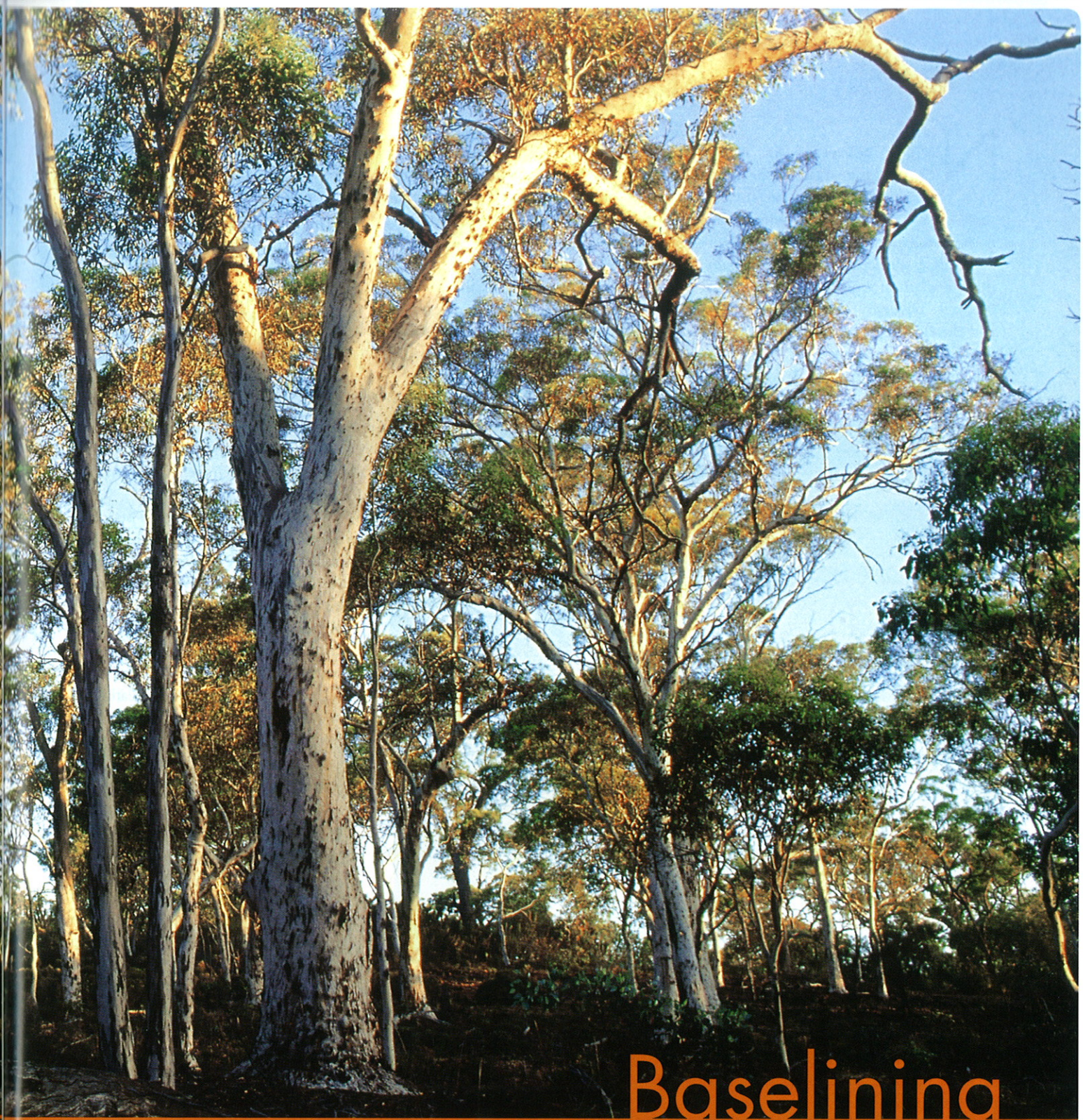
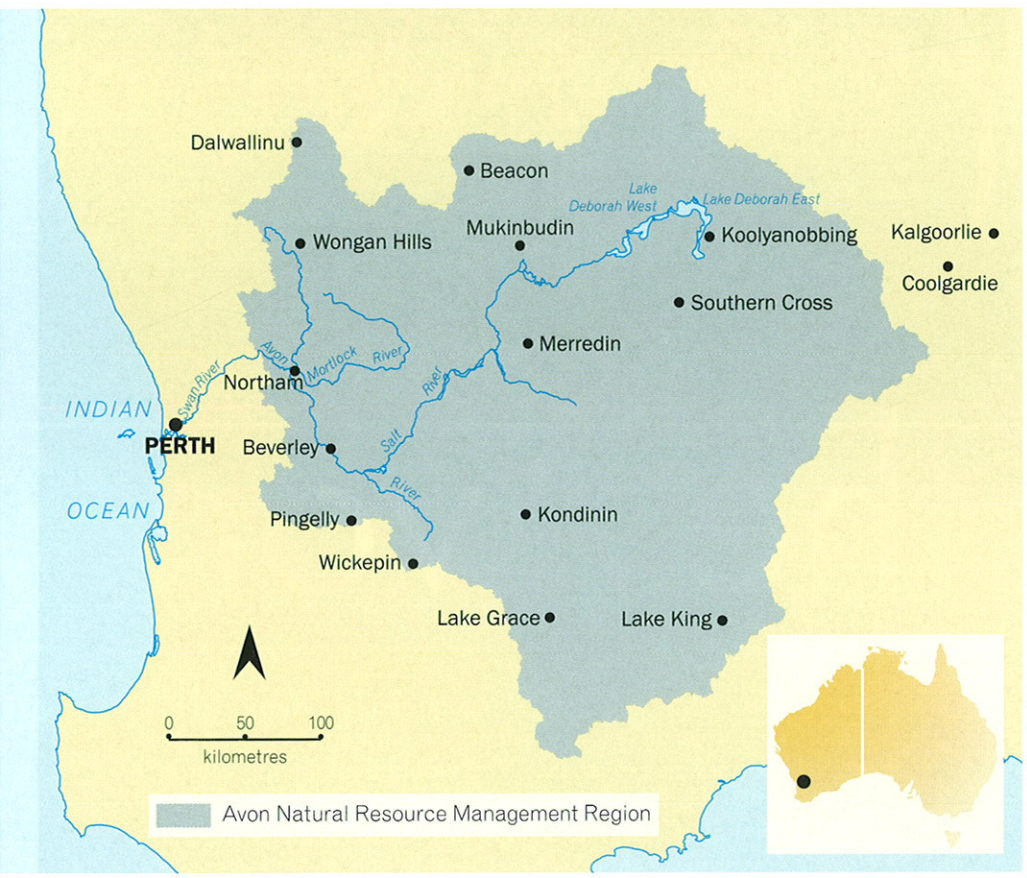


Baselining the Avon

by Jeff Richardson and Joanna Moore

Straddling Australia's only globally recognised biodiversity hotspot is the Avon Natural Resource Management Region—an area of extraordinary species diversity. Who would think that this largely cleared and primarily agricultural region contains more than 25 per cent of Australia's and more than 1.5 per cent of the world's flowering plant taxa? This is only one of the reasons for the development of a project aimed at determining the natural values of the region.

Nature conservation is a challenging task, especially in a place as diverse as the south-west of Western Australia where the natural assets are diverse, poorly known and suffer numerous threats. To help fill the gaps in knowledge, the Avon Natural Diversity Alliance (ANDA) has developed a project called Avon Baselining to measure, or 'baseline', the area's natural values. Information gleaned from the wide-ranging project will be used to support many other projects aimed at conserving the natural diversity of the Avon Natural Resource Management (NRM) Region—a primarily agricultural region within the south-west of WA. In the process, Avon Baselining has revealed an extensive suite of plants and animals and highlighted areas in need of further protection and study.



Project parameters

ANDA is a partnership between government and non-government organisations that tackles nature conservation in the 13-million-hectare Avon NRM Region. The region stretches from just behind the Perth metropolitan area, through the central and southern Wheatbelt and beyond the agricultural region to about halfway between Southern Cross and Kalgoorlie—an area twice as big as Tasmania. Country towns including Wongan Hills, Mukinbudin, Northam, Merredin, Lake Grace, Kondinin and Beverley lie within the area.

The Avon NRM region straddles what is known as the South West Botanical Province of Western Australia, one of the world's biodiversity hotspots. This hotspot title recognises the region's high diversity of species—the Avon is home to more than 5,000 different types of plants, of which more than 400 are confined to the Wheatbelt—and the high level of threat to this biodiversity. Threats include vegetation clearing, pest animals, salinity and climate change. The south-west of WA is ranked as one of the six world biodiversity hotspots most vulnerable to climate change.

Vegetation clearing in the area has occurred from the beginning of European settlement in WA. Within the agricultural area, which makes up most of the region, 16 per cent of the vegetation is left, or about 1.3 million hectares. Agriculture has led to patchy remnants of native vegetation—about 110,000 patches across eight million hectares of agricultural land.

Previous page
Main Wandoo woodland in the southern Wheatbelt.
Photo – Marie Lochman
Insets from left Carnaby's black-cockatoo.
Photo – Babs and Bert Wells/DEC
Grevillea scapigera.
Bindoon starbush (*Asterolasia nivea*).
Photos – Andrew Brown/DEC
Western spiny-tailed skink near Koorda.
Photo – Rowan Inglis/DEC

Above Salinity-affected land.
Photo – Jiri Lochman

Above Biodiversity of flora in the Wheatbelt region.
Photo – Marie Lochman

Right Wongan Gully wattle (*Acacia pharangites*).
Photo – Luke Sweedman

ANDA is supported by the Avon Catchment Council (funded through the State and Commonwealth governments' Natural Heritage Trust and National Action Plan for Salinity and Water Quality) and includes a range of government and non-government organisations which have come together to conserve the natural values of the region. Greening Australia WA, WWF-Australia and the Western Australian Government departments of Environment and Conservation (DEC) and Water are members of ANDA. Run by DEC, the Avon Baselining project was conceived by ANDA with the intent of informing the alliance's five other conservation projects about the natural attributes of the area.

Where do we start?

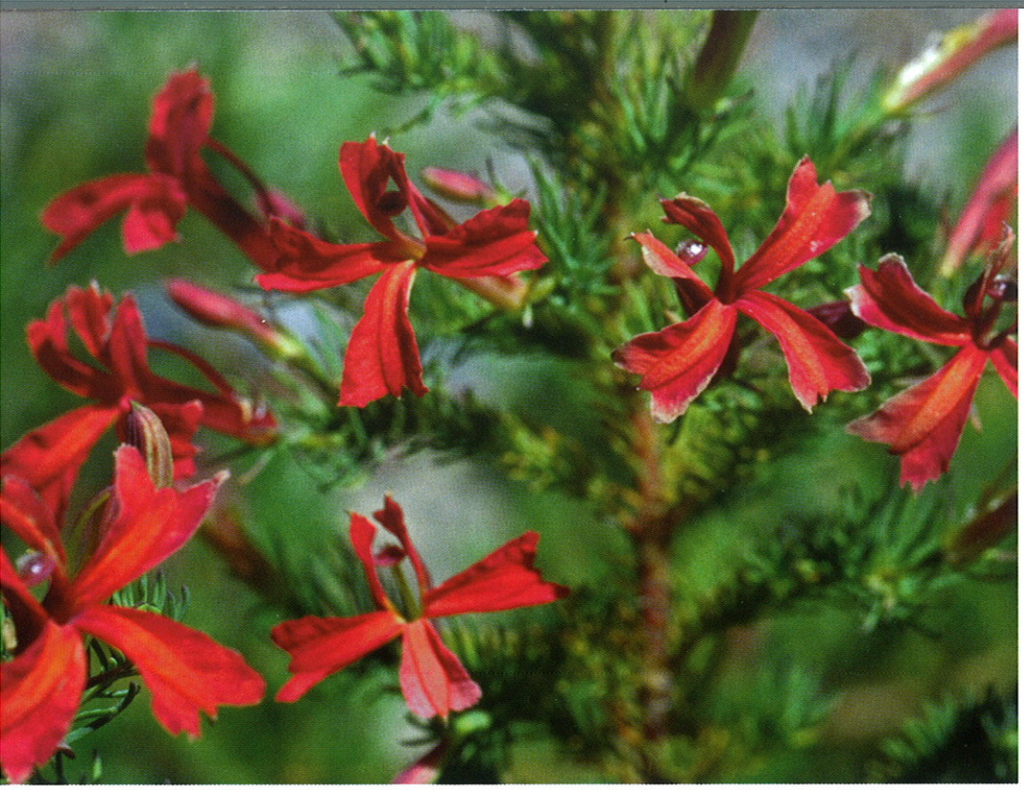
Collating data across an area as large as the Avon NRM region was a significant task. It involved gathering existing data from a range of sources in each of three broad areas: natural assets, threats to these assets and current or historic conservation programs. Some of these datasets are huge.

For example, there are more than 80,000 plant specimens, known as vouchers, from the region in the Western Australian Herbarium, some 110,000 bird records from Birds Australia's Bird Atlas and more than 26,000 animal vouchers from the Western Australian Museum. DEC's Threatened Flora Database was also a useful source of information, providing 13,000 records about declared rare flora. Frequently, taxonomy was a major issue—for instance the bird names used by Birds Australia differ from those used at the Western Australian Museum.

Fascinating flora

It is astounding to think that 25 per cent of Australia's flowering plants can be found in the Avon NRM region. The region also has a high number of WA's threatened and priority flora populations and perhaps this is to be expected, given the amount of vegetation that has been cleared during decades of farming in the agricultural region. For example, 34 per cent of WA's 137 critically endangered plant taxa are found in the Avon NRM region.

The process of examining plant specimens at the Western Australian Herbarium showed that there are large areas in the Avon NRM region from which few or no specimens have been gathered. In a region with such high plant species diversity, dozens of rare plants and many endemic ones, this is a cause for concern. Also, there are many taxa that have been recorded infrequently and, due to the imprecise records for the vouchers, it is hard to know exactly where they were collected.



The Avon is also home to one of the world's rarest plants: Bancroft's symonanthus (*Symonanthus bancroftii*). Previously thought extinct, this species was rediscovered in 1998 with the recording of a single plant within the region. This single plant has now been cloned and two new populations established from these clones. No other known populations exist for the species.

Fauna under threat

Across the region there are nearly 1,200 known fauna species, including 165 species of bird, 121 reptiles, 56 mammals, 22 amphibians, 19 fish and more than 800 species of invertebrates. The fauna currently found in the Avon are a subset of what was there historically: the endangered dibbler (*Paratechinus apicalis*) was recorded in the region in 1843 near New Norcia; the western ringtail possum (*Pseudocheirus occidentalis*) was last recorded in the area in the 1970s from Tutanning Nature Reserve; and the endangered western barred bandicoot (*Perameles bougainville bougainville*) also has just one record from the region, in 1906.

These species are now considered locally extinct and this contraction from the region is consistent across the south-west: the dibbler is now only found on off-shore islands and the south coast; there have been no confirmed sightings of the western ringtail possum in the Wheatbelt since the 1970s; and the only natural populations of the western barred bandicoot are on two islands off the mid-west coast.

However, many other threatened fauna can still be found in the region. For example, the red-tailed phascogale (*Phascogale calura*) is still known in

Top left Scarlet lechenaultia (*Lechenaultia laricina*).
Photo – Andrew Brown/DEC

Centre left Botanic Gardens and Parks Authority's Bob Dixon with Bancroft's symonanthus (*Symonanthus bancroftii*).
Photo – Marie Short/DEC

Left DEC conservation officer Rowan Inglis releasing a rock wallaby at Mount Caroline Nature Reserve.
Photo – Nicole Willers/DEC

Right The southern dibbler is now extinct in the Avon NRM region.
Photo – Jiri Lochman

suitable habitat and so are black-flanked rock-wallabies (*Petrogale lateralis lateralis*) and numbats (*Myrmecobius fasciatus*). Declines of fauna, though, are continuing. Of the 165 species of birds in the region many, such as the sedentary woodland birds, are in decline.

The challenge is to identify the taxa in decline, determine ways to halt the decline and ensure that this is incorporated into the ANDA projects. So far, the Avon Baselining project has identified the declining species, their locations, the processes which threaten their survival and what actions are required to ameliorate this decline.

Conservation threats and programs

The conservation of plants and animals in the Avon NRM region is complicated by the patchy structure of its remaining vegetation and the small size of these remnants. Of the 110,000 patches of vegetation in the agricultural area, nearly 70,000 are less than one hectare in size and only about 1,000 are more than 100 hectares. This fragmentation results in the modification of ecological processes and species activities and is a severe threat to biodiversity in the region.

Furthermore, salinity is causing habitat loss, effectively 'clearing' more land of native vegetation. And the situation is probably worse than it currently appears because there is a delay between habitat loss and loss of species. This is called 'extinction debt' and it may be centuries before it is fully realised. Ubiquitous foxes and cats pose another threat, as do *Phytophthora* dieback and climate change, which is expected to substantially reduce the rainfall in the region, having unknown impacts.

Reflecting the substantial biodiversity of the region, there are numerous biodiversity conservation programs in place. Many of the larger nature reserves in the region are part of DEC's *Western Shield* fox baiting and fauna recovery program. Every DEC district in the region has a flora conservation program and staff dedicated to conservation and recovery of threatened flora. DEC's *Land for Wildlife* program works with local landholders to help them manage their bushland to preserve habitat.

The Avon Catchment Council, through ANDA, has provided an opportunity to augment these programs. *Back from the Edge* is an ANDA project aimed at recovering threatened fauna and flora across the region. The Healthy Ecosystems project, which is managed by WWF-Australia, works with landholders to protect priority ecosystems. The Ecoscapes project, managed by Greening Australia, WWF-Australia, the Department of Water and DEC, is working to recover biodiversity at a landscape scale. The Avon Baselining project provides information on the current state of biodiversity in the region, to help each of these projects proceed.

Prioritisation is the key

The first phase of the Baselining project was to collate all the regional biodiversity data into standardised formats. This allowed for the second phase of the project—analysing these data to inform or prioritise the other projects within ANDA. For example, the rare flora monitoring data were analysed, aimed at informing the *Back from the Edge* project about the salinity risk, other risks and the monitoring history of each population of rare flora.

Above Red-tailed phascogale.
Photo – Jiri Lochman

Left Landholders and WWF-Australia officers discuss a voluntary covenant near Trayning in the Wheatbelt.
Photo – Mike Griffiths

Below Colourful snakebush (*Hemiandra rutilans*).
Photo – Andrew Brown/DEC

Baselining also identified the priority ecosystems for the Healthy Ecosystems project.

The third phase of the biodiversity Avon Baselining project was to identify gaps in present knowledge and programs and prioritise them. One of the first gaps identified was the lack of fine-scale vegetation mapping in a format that could be used by ANDA projects. Baselining has now synthesised all existing fine-scale vegetation mapping across the region into a searchable geographic information systems database. This constitutes an area of about 185,000 hectares, or more than eight per cent, of the remnant vegetation in the region's agricultural area.

Another important gap the Avon Baselining project identified was the need to develop a strategic conservation plan for the region. This challenge is now being tackled by Professor Bob Pressey from James Cook University for the Avon's vegetation, ecological communities and species. The plan will create an analysis of return on investment in conserving the rare, priority and of-concern fauna and flora species that have been identified through the analysis stages of the Avon Baselining project. The plan will help determine how best to deal with conserving these valuable assets in a region of such complexity.

Baselining is currently developing a framework for vegetation management and restoration, which defines management objectives. The framework is based on the Avon Baselining project's vegetation mapping component, some work delivered through the Healthy Ecosystems project and a co-managed project between WWF-Australia and the Avon Baselining project. The project, called the 'After the Fence', is being delivered by Murdoch University and CSIRO and asks the fundamental question: "Is fencing remnant vegetation useful?" The project specifically examines what happens when fences are put around patches of York gum, a common Avon community.

Where to now?

The Avon NRM region is an area of high biodiversity conservation significance that is under high threat. In researching biodiversity assets, threats and existing biodiversity-related programs across the region, the Avon Baselining project collated and interpreted data which will enable the all-important prioritisation of conservation actions. The partnering five projects in ANDA are already achieving great results, working at the species, biological community, ecosystem and landscape levels of biodiversity. In addition to the programs which are already under way, it is hoped the knowledge gained will help with prioritising more on-ground work as well as landscape-scale biodiversity planning for the future.

Jeff Richardson is the coordinating ecologist with the Avon Baselining project team and is based DEC's Science Division at Kensington. He can be contacted on (08) 9334 0548 or by email (jeff.richardson@dec.wa.gov.au)

Joanna Moore is a DEC communications officer.

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Editors Samille Mitchell, Rhianna King, Carolyn Thomson-Dans.

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Marketing Cathy Birch
Phone (08) 9334 0296 *Fax* (08) 9334 0432.

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