



biodiversity

SOUTH COAST

BIODIVERSITY

NRM news

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BIODIVERSITY is the variety of all living things; the different plants, animals and micro-organisms, the genetic information they contain and the ecosystems they form. It is all the living things and the processes and interactions that connect and enable them to exist.

A new genus of spider for the Fitzgerald Biosphere Reserve

Spiders in the family Selenopidae (flatties, wall-crab spiders) are characterized by being very flat and very fast. They are non-web-building, nocturnal sit-and-wait spiders found around the world in the tropics and subtropics. They are often found under bark or rocks, or other compact spaces, and they range in size from very small (6-7mm) to rather large (18-20mm). There are around 150 species described worldwide, with the highest diversity in Africa, where there are four known genera.

Sarah Crews began studying these spiders in the Caribbean, México and Central America in 2003 at the University of California Berkeley as part of her dissertation research. This study was completed last year and comprises a taxonomic revision of all species in the northwestern hemisphere, including descriptions of nearly 20 new species, a molecular phylogeny of these species, population level comparisons of seven island and mainland species, as well as natural and life history data. In September 2008, Sarah was 'recruited' by Dr. Mark Harvey at the Western Australian Museum to begin postdoctoral research on Australian selenopid spiders. So far, we know of 25 Australian species, all undescribed at both the generic and species levels. Like several other spider species, many of these are known from only a single male or female specimen. Several of them are also only known from pitfall trap samples, thus the microhabitat which they occupy is unknown. Similar to Selenopids in other parts of the world, a few Australian species are widespread, but most have very small ranges, and are only locally abundant, therefore considered rare in general. As they are all undescribed and have only been seen alive a few times, little else is known about them.

The primary outcome of Sarah's work at the museum is to describe, name and illustrate the new Australian species, make maps of each species' known distributions and provide an identification key to all described species. Selenopids have been found in all parts of Australia, but so far, the highest diversity of species has been found in Southwestern Australia. One species is only known from a single male specimen collected in a pitfall trap by Angela Sanders in 1996 north of Roe's Rock in the Fitzgerald River National Park. This specimen is considered not only to be a new species but also a new genus for the family.

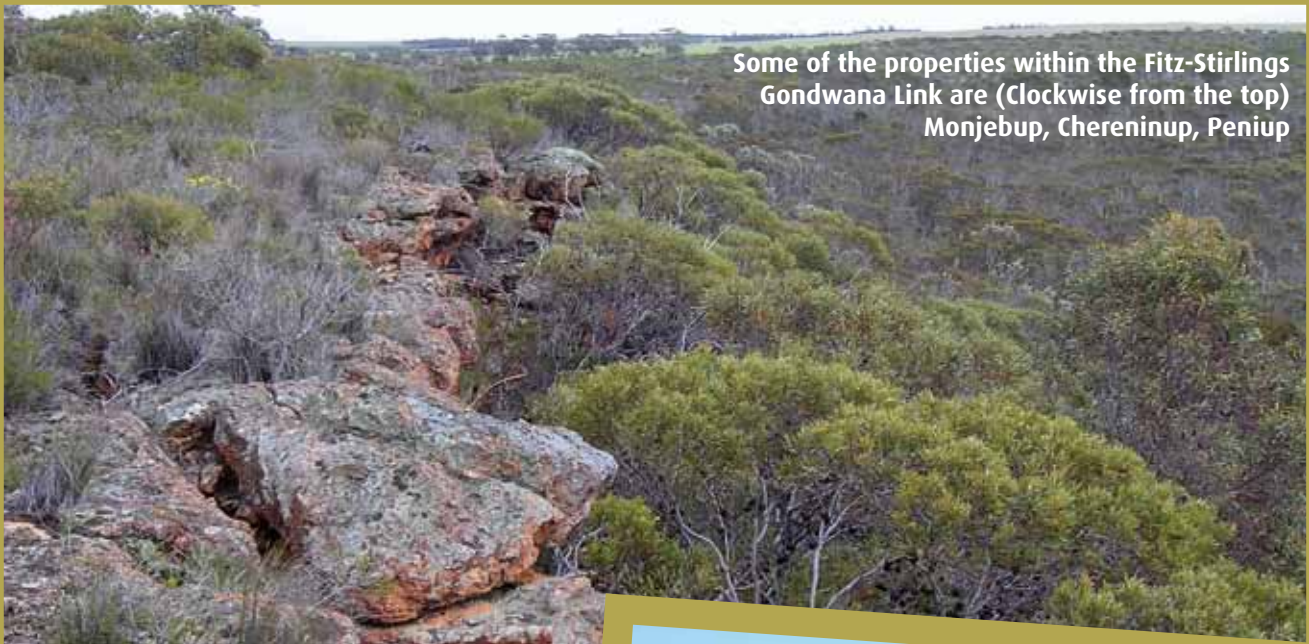
A few months ago, Natasha Moore (Biodiversity Implementation Officer, South Coast NRM Inc.), Julianne Waldock (Western Australian Museum) and Sarah went back to the original site. Unfortunately, the area had been recently burnt in a wildfire and the trio were unable to turn up anything. However, in the coming months they hope to return to find additional specimens, including a female of this elusive new Fitzgerald species.



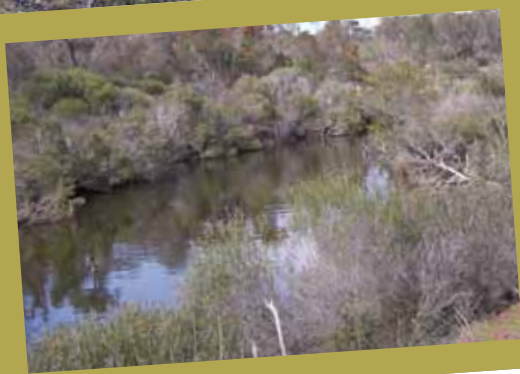
A female found hiding under schist on a scree slope, Mt Toolbrunup, Stirling Range National Park



A female guarding her eggsac on granite, Mt. Arid, Cape Arid National Park



Some of the properties within the Fitz-Stirlings
Gondwana Link are (Clockwise from the top)
Monjebup, Chereninup, Peniup



Gondwana Link and Biodiversity

Gondwana Link = reconnected country from the southwest forests to Kalgoorlie and beyond = a better chance of survival for our extraordinary biodiversity (which includes us).

That in a nutshell is the shared vision of the many bold individuals and organisations involved in the Gondwana Link project. The 1000km long pathway includes nine operational areas and in the western Fitzgerald Biosphere area the aim is to restore the connectivity between Stirling Range and Fitzgerald River National Parks. There are many ways of achieving this including land purchase and revegetation, conservation management on farms and liaison with other land managers such as the Department of Environment and Conservation and organisations such as the Fitzgerald Biosphere Group.

Restoring connectivity, or in other words reversing the negative impacts on this landscape caused through clearing of native vegetation, is a big challenge. This challenge is increased further

when we realise that the area is part of the only internationally recognised biodiversity hotspot in Australia. Thankfully the challenge is one that has been met with remarkable financial and moral support from hundreds of individuals and groups locally, nationally and internationally. Currently almost 10,000ha is being managed in a way that enhances connectivity whether through revegetation, natural regeneration of abandoned farmland or protection of existing bushland from grazing stock.

Monitoring the progress of the project is recognised as a vital component and six conservation targets have been carefully chosen as a way of checking progress. The targets are creeks, wallabies, yate woodland, mallet and moort woodlands, proteaceous rich plant communities and freshwater systems. The creeks are currently a major focus for monitoring as they are suffering from increased loads of sediment, nutrients, chemicals and salt and they contain important fauna habitat.

To assist local landholders who want to contribute to the conservation effort the Gondwana Link groups have produced guidelines for land management and also information on the six targets visit www.gondwanalink.org or contact Angela Sanders 9842 0008.

King of the Beasts on the South Coast

– the Wedge tailed Eagle *Aquila audax*

The Wedge-tailed Eagle (*Aquila audax*) is Australia's largest bird of prey, fourth largest in the world and the most common of all the world's large eagles. Wedge-tails are found throughout Australia, Tasmania, and southern New Guinea in almost all habitats. The Tasmanian subspecies (*Aquila audax fleayi*) is listed as endangered by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) with fewer than 200 pairs left in the wild.

This 'bold eagle,' or so its scientific name implies ('audax' from the word 'audacious,' meaning bold), is actually very shy and wary of humans, and is usually observed soaring hundreds of metres above the earth. There are essentially 2 types of eagles: breeding birds and non-breeding birds (usually immatures and sub-adults). Both have different requirements - breeders occupy a territory and need nest sites and an abundance of prey to breed each year, and all they are concerned with is territorial defence and having enough food for them and their young. Non-breeders just need to survive, so they don't worry about nest sites, just finding food each day, whether this is live prey or carrion.

The female Wedge-tailed is much larger than the male, with a wingspan of nearly 2.5 m and an average weight of 3.5 kg. Apart from the little eagle *Hieraeetus morphnoides*, the wedge-tail is the only 'true' eagle species found in Australia. It is easily identified by its size and large diamond-shaped tail. Wedgies have different colour morphs depending on their age, immature birds are golden and progressively darken with age to become almost entirely black, apart from a golden wing-band and chestnut nape (neck) feathers.


During the breeding season, eagle pairs soar for hours together and play courtship games. The male will often perform dives known as 'pothooks,' where he plummets earthward with wings folded, before opening his wings slightly and climbing swiftly upward to reach a stall, which initiates another dive. As well as impressing his mate, these dives are also performed at the boundaries of the eagle's territory.

The size of a wedgie's territory varies according to food supply, landforms and human disturbance, but it is generally 30 - 50 km². No one really knows whether today's eagle population density is 'healthy' as there's no info on their density pre-humans. But their presence as top of the food chain is a very delicate balance, and the slightest change in habitat (and prey density) can be the difference between eagle presence and eagle absence.

The 2 main factors that affect breeding eagles are prey abundance and nest site availability. Also, they are very shy nesters, so they do best in areas where there are blocks of bush ~500m x 500m or larger, that provide a 'nest refuge area' so they can stay away from human disturbance. They can hunt over all sorts of land from woodland to open areas. In revegetation projects, anything that provides refuge habitat for small mammal species and larger birds is useful (eg eagles often hunt larger waterbirds - ducks, ibis, herons - that congregate in large numbers). Also, wedgies will use the edge of corridors to hunt along, and probably flush prey into the open when hunting in tandem.

The female usually lays two eggs on a bed of fresh green leaves and incubates (mostly by her) them for 45 days. Once hatched the chicks cannot see very well, and are brooded constantly by their parents. After about 90 days the eagle is ready to make its first flight.

At the top of the food chain, wedge-tailed eagles don't have any



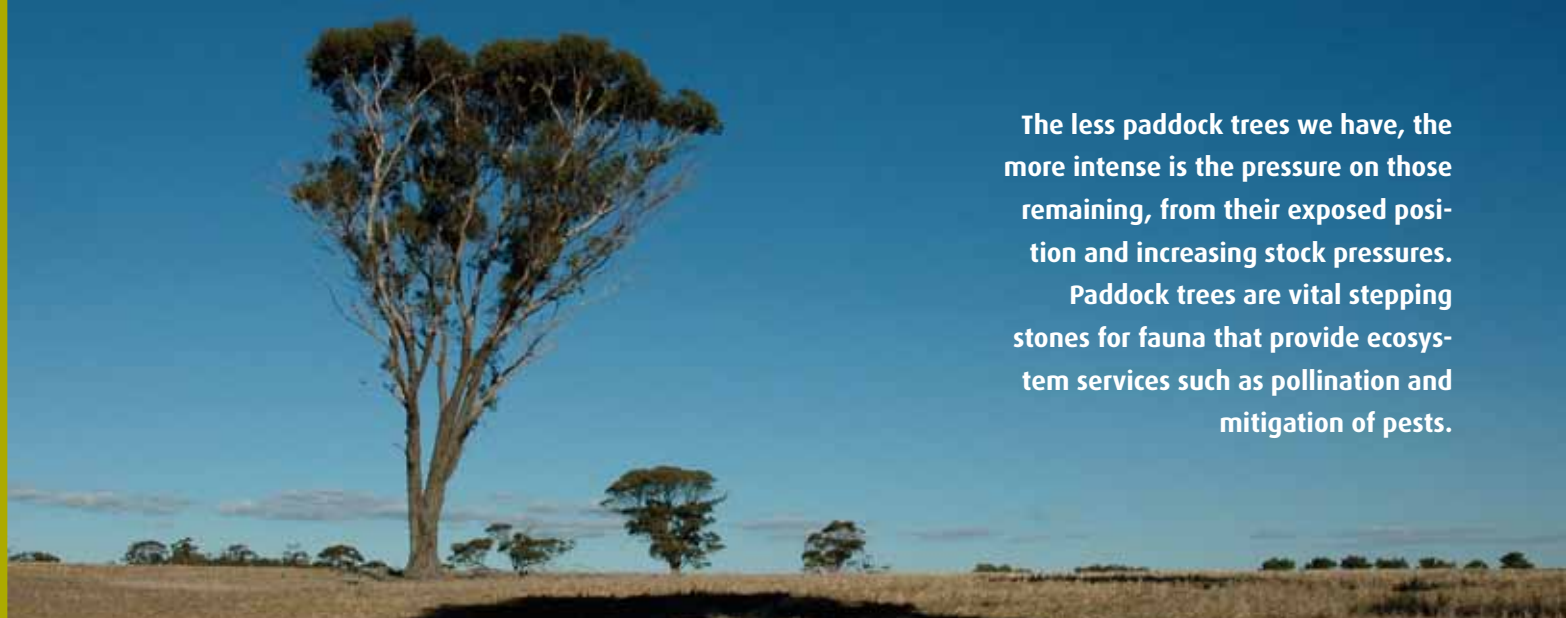
11 week old fledglings – 15m high up in a Wandoo

predators (except humans). Conversely, there is a huge variety of animals that they eat themselves. Most prey is captured on the ground in gliding attacks. Their eyesight extends into the infrared and ultraviolet bands, helping spot prey and allowing them to see rising thermals, which they can use to gain altitude while expending little energy.

Choice of prey is a matter of convenience and opportunity. Wedgies are mostly suited to hunting small to medium-sized mammals, so in general their diet includes bandicoots, bettongs, young kangaroos and wallabies and rabbits. However, they are extremely adaptable and sometimes feed on foxes, feral cats, piglets, ravens, ducks, cockatoos, parrots, pigeons, emu chicks, and reptiles including bobtail skinks and monitor lizards. They have also been known to cooperatively hunt; to cause goats to fall off steep hillsides and injure themselves; or to drive flocks of sheep or kangaroos to isolate a weaker animal. Carrion is an important part of eagle food for breeding pairs during the non-breeding season, and all year round for non-breeding sub-adults. Many of the prey items are nocturnal, which indicates that eagles are capable of hunting in semi-darkness, or working together to flush prey from its hiding place and capture it during daylight.

Wedgies have been persecuted for being sheep killers, and thousands were shot through the 1900's when bounties were offered. In most cases eagles were eating sheep that had died of other causes. Research has clarified the role that wedgies play in our local ecosystem as a top predator and reinforces that they should be respected and enjoyed as valuable assets to our unique country.

If you find an injured wedge-tailed eagle, approach it with GREAT CAUTION! They can put a talon through your arm, and are likely to be highly stressed, so never underestimate their capabilities! The best thing to do is get a blanket or sheet and cover the eagle, then get hold of its legs and tie them together with soft cloth or rope. Keeping their eyes covered is the most important thing to minimise stress, and obviously stopping them moving, especially if their wing is injured. Then ring the nearest Department of Environment and Conservation office or local wildlife carer. If you find a young eagle that has been pushed from a nest then LEAVE it where it is and let nature take its course. Sibicide is common and if a bird's destiny is to fly, then it will survive.



The less paddock trees we have, the more intense is the pressure on those remaining, from their exposed position and increasing stock pressures.

Paddock trees are vital stepping stones for fauna that provide ecosystem services such as pollination and mitigation of pests.

Paddock tree budgeting

Agriculture, like any other business is plagued by the truth that we must make a profit to be sustainable, so the economic bottom line is very important. It is also true that the absolute bottom line of agriculture is ecological. This article explores ecological realities of the benefits of paddock trees that impact on the financial bottom line.

Given the increasing uncertainty of climate change and increasing energy costs, it is very timely to have a good hard look at how we can maximise the resilience of our farming systems by using ecological budgeting side-by-side with our financial budgeting. This brings up an important question - how do you value ecological services provided by scattered paddock trees? To do this, we need to look at the broader farm ecosystem to see the less direct benefits, as well as the direct more easily measurable benefits.

From a biodiversity perspective, the threshold of 30% cover of pre-clearing extent of native vegetation type has been recognised as the point below which species loss appears to accelerate exponentially at an ecosystem level, and at a level of 10% of the original extent is a level representing "endangered" (taking no account of other land degradation issues). It is also recognised that biodiversity leads to environmental stability, stability leads to resilience, and that resilience is vital to agricultural sustainability. The latest figures on remnant vegetation extent remaining on private land in Land Conservation Districts in the South Coast Region from DAFWA show that Denmark, Kent River and Walpole are the only districts showing more than the 30% threshold of native vegetation required on private land to maintain species diversity which in turn maintain ecosystem services. Many remnants are isolated and too small to be genetically viable. In these highly fragmented landscapes, paddock trees have a vital role to play as stepping stones for the movement of pollinators to maintain the viability of the fragmented remnants. Old trees are especially important because they provide by far the most habitat niches for invertebrates and vertebrates, including hollows for nesting and roosting.

So back to the paddock tree budget - on the negative side of the balance sheet, we have:

- competition with pasture/crop layer for water, light and nutrients
- inconvenience and cost of having to drive around them at cropping time and cleaning up sticks/limbs

On the positive side of the balance sheet:

- Research has shown that:
 - In open paddocks, strong wind and rain can double the energy requirement for the maintenance of cattle and sheep in hot and

cold conditions. Trees can provide protection from extreme cold, greatly increasing survival of young animals and newly shorn sheep exposed to these conditions.

- In the cropping and higher rainfall grazing areas, the systematic planting of 10% of the land in a net of shelterbelts/timberbelts/clusters could achieve a 50% windspeed reduction, and naturally occurring woodlands with mature, scattered trees, can be just as effective.

- Firewood and farm construction timbers
- Play a vital role as stepping stones to maintain ecosystem services as described above (especially when >30% native vegetation cover is present on property).

The big problem is that the less paddock trees we have, the more intense is the pressure from stock, pests and exposure to the elements on those remaining. As the paddock trees disappear, the small fragmented remnants become more isolated and vulnerable, the stepping stones that maintain wildlife linkages become less efficient, and the downward spiral of decline is sped up. The end result of this is the need for increased cost inputs from the farmer to replace the ecosystem services provided by nature for free.

In the mid-USA, the biggest cost for alfalfa growers is the provision of beehives for pollination of their crops because the 'free' pollination service that used to be provided by the ecosystems around the fields has declined as a result of loss of natural areas and the loss of insect diversity through pesticide use. It is often not until we lose the services that we take for granted that we realise how valuable they are.



A Brush tailed possum struggling to find a suitable refuge.

The author is grateful to Damian Shepherd, DAFWA, for providing remnant vegetation data that was required for this article.

For more information and details of literature used to create this article, please contact Wendy Bradshaw on 0898253092 or email wendyb@southcoastnrm.com.au.

Indigenous knowledge today and its potential to revitalise land management practises on the South Coast.

Concern about the loss of indigenous languages and knowledge is confronting minority communities in all corners of the globe and continues to receive growing international publicity. The restoration of paths of transmission of indigenous knowledge is seen as the essential key to reversing this loss.

However the repair of these pathways involves all generations and it is at this point that the task becomes complex and challenging. The main stumbling block for most indigenous groups involves issues of poor numeracy and literacy. These problems must be dealt with in conjunction with knowledge and language restoration programs, as the programs themselves are intrinsically linked. For example the simple act of visiting ancestral lands and reconnecting with traditional spaces and activities can trigger turning points in individuals' lives, and help show the pathway to a purposeful future.

In some parts of the world, efforts have begun to turn to the need to build capacity in communities and to empower community members to work on the documentation and maintenance of their knowledge and language. This has seen the establishment of many educational and training programmes, and the growth of indigenous language centres, particularly in Australia and North America. In Australia there are at present 39 formal language centres, one of the largest being the Wangka Maya Language Centre in the Pilbara. These language centres work under the direction of elders to record expertise, knowledge in a sensitive and appropriate manner. They foster languages, culture and history to ensure the young people remain strong and focused on their role in today's society.

The context of the delivery of these programs is critically important. Delivery of a program in the right location can revitalise the language and traditional knowledge in a profoundly meaningful and memorable way. The process of bringing the grandchild and grandparent generations, teachers and students together in a caring learning environment helps to restore respect for the knowledge of elders regardless of cultural background. And it is from this perspective that we strongly believe that language revitalisation and the handing on of traditional knowledge are an important part of the healing process both within the Noongar community and also with the Wadjula (European)

community on the south coast. This process enables us to all move forward, together, united and secure in the knowledge that we have the wisdom of all our elders to support us as we face the challenges ahead.

This model helps explain why the biannual Schools Biodiversity Education week at Nowanup, a Greening Australia WA property near Boxwood Hill, has proven so efficient at delivering both cultural and biodiversity programs to students, their teachers and parents. This program delivers an expansive range of activities from fauna studies, bush skills, storytelling and bush cooking but the physical location of the program also plays a critical role. It is a landscape seemingly purpose made for learning (fondly referred to as our Bush University) and nurturing those in need. There is no doubt that the knowledge gained by the students (approximately 300 students from Kindy through to yr 12) over the last 4 years has helped change attitudes towards local environmental issues as well as improve cross cultural relationships. Letters of appreciation and artwork from individuals, school principals and the students reveal some startling admissions and all agree that the veils have been removed from their eyes in so many ways and on many different levels. Responses by the presenters themselves also reflect these sentiments, those who at first doubted the value of the program now "get it" and have stoically supported us ever since. A visiting elder recently commented on the program at Nowanup as being "the most exciting and refreshing cultural program I have ever experienced".

Despite the immediate impact, the full potential of this program at Nowanup is yet to be realised. It won't be seen until these students use this knowledge as a platform towards becoming tomorrow's leaders and land managers. The future holds many exciting prospects, especially with so many passionate and informed local Noongar and Wadjula children waiting in the wings.



For more information please contact:

Anne Sparrow, Project Officer, Fitzgerald Biosphere Group ph 98351127 anne@fbg.org.au

Natasha Moore, Biodiversity Implementation Officer - Fitzgerald Biosphere Reserve, South Coast NRM Inc ph 90414862

Eugene Eades, Indigenous Project Officer, Greening Australia, WA mob 0429087270

Lower Primary students from
Jerramungup District High School –
our future is in their hands.



“the most exciting
and refreshing cultural
program I have ever
experienced”





(left) – The Ravensthorpe Range has a large range of discreet vegetation communities that occur across the landscape
 (Right) – An open mallee community dominated by *Eucalyptus pleurocarpa*

Vegetation Map of the Ravensthorpe Range

Local botanists have recently completed detailed vegetation mapping of the Ravensthorpe Range.

The Range is a hotspot for species diversity and endemism of flora within the internationally recognized 'Southwest Australia' biodiversity hotspot. Over 1300 flora taxa occur in the Ravensthorpe Range system, of which 52 are endemic or near endemic.

The vegetation communities of 10 200 ha of the Ravensthorpe Range, from Mt Short to Kundip, were mapped at a scale of 1:10 000 by botanists Gillian Craig, Libby Sandiford, Ellen Hickman, Nathan McQuoid and Anne Rick. This vegetation mapping was part of the Biodiversity Inventory Program, a joint project between the South Coast NRM and the Department of Environment and Conservation.

Overall 70 distinct vegetation units were identified, many of which were closely associated with the underlying soil type, geology and terrain. The vegetation was in general in excellent condition with minimal invasion by weeds.

A combination of desktop aerial photography interpretation and ground-truthing was used to map these vegetation communities. This methodology is also currently being used for vegetation mapping of the Albany region.

Ultimately, it is planned to map the vegetation of the whole of the Ravensthorpe Range at this detailed scale. This will provide context for land-use and conservation planning for determining the relative occurrence, extent and representation of the vegetation communities in the region.

For more information on the vegetation mapping of the Ravensthorpe Range or the Biodiversity Inventory Program contact the South Coast NRM Inc. Biodiversity Theme Facilitator.

DID YOU KNOW:

THE WESTERN AUSTRALIAN ENVIRONMENTAL PROTECTION AUTHORITY states that: below the threshold of 30% cover of the pre-clearing extent of native vegetation type, species loss appears to accelerate exponentially at an ecosystem level, and at a level of 10% of the original extent is regarded as being a level representing "endangered".

IT IS ALSO WELL DOCUMENTED that high biodiversity leads to environmental stability, stability leads to resilience, and that resilience is vital to agricultural sustainability.

AS A GENERAL RULE OF THUMB, transpiration accounts for some 40% of a region's rainfall. Large scale clearing of vegetation for agriculture in many parts of Australia is associated with a significant decrease in recorded rainfall (Victorian Mallee, South Gippsland, WA Wheat Belt).

A STUDY OF PROPERTIES ON THE NORTH-WEST SLOPES OF NSW examining the effect of tree retention on the economic value of pasture outputs in grassy woodlands, showed a maximum \$ return when properties had 34% of their area covered by woodland vegetation and that productivity was reduced at values both above and below 34%.

The South Coast NRM Inc. Biodiversity Team:

- Regional Facilitator - Deon Utber ph: 98424546 email: deon.utber@dec.wa.gov.au
- Implementation Officers
 - West – Wendy Bradshaw ph: 98253092 email: wendyb@southcoastnrm.com.au
 - Central – Natasha Moore ph: 90414862 email: natasham4@bigpond.com
 - East – Robyn Cail ph: 9071 7685 mob: 0428 71 7685 email: robync@southcoastnrm.com.au

For all general enquires please contact South Coast NRM Inc. ph: 9845 8537 email: info@southcoastnrm.com.au



connecting the south coast

South Coast Natural Resource Management Inc
 39 Mercer Road, Albany WA 6330
 phone: 08 9845 8537
 fax: 08 9845 8538

