



*Cape to Cape
Catchments Group*

Cape to Cape Landcare Companion

**A practical guide to landcare and
sustainable property management for
residents of the Cape Naturaliste to
Cape Leeuwin Catchments**

Prepared by the Cape to Cape Catchments Group in partnership with





ACKNOWLEDGEMENTS

The *Cape to Cape Landcare Companion* has been compiled from a range of existing sources of information in the local area. Many local members of the community have contributed to its production and the Cape to Cape Catchments Group would like to thank them all.

Thanks are also due to members of the Cape to Cape Catchments working group for this project who provided review and project management of the production of this manual. This working group included the following people:

Kirrily White	Merryn Delaney	Margaret Moir	Rod Whittle
Genevieve Hanran-Smith	Tracey Gregory	Kay Lehman	Sasha Taylor
Paul Downes	Lorraine Firth	Shelley Ray-Brennan	
Robyn Paice	Wayne O'Sullivan	Sally Scott	

John Moore from the Department of Agriculture provided all of the specific weed control advice and photographs of weeds. This material was all taken from John's book **Southern Weeds and their Control**.

The Department of Conservation and Land Management and the Land for Wildlife Program provided information about important fauna species of the local area and the threats faced by these species.

The Dieback Working Group provided the basis for much of the material written about dieback and its management.

Margaret Moir prepared the list of native flora species suitable for revegetation in the Cape to Cape subregion.

The Water and Rivers Commission provided the catchment maps presented in the manual.

Thanks are extended to GeoCatch for their assistance and technical support.

The Natural Heritage Trust, the Shire of Augusta Margaret River and Greening Australia all contributed to the funding of this manual and provided support throughout the production process.

Cover photos by Jamie Scott, Margaret River.



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INTRODUCTION

This Landcare Companion has been prepared to provide residents within the Cape to Cape catchments and surrounds with concise, up to date information on landcare issues, environmental values and environmental best practice. The manual aims to ensure that new and existing landholders in the area are able to easily access information about environmental best practices and positive actions that can be taken.

The Cape to Cape catchments are located between Cape Naturaliste to the north and Cape Leeuwin in the south, and extend inland to include the Margaret River water catchment. The catchments are subject to intense development pressure and intensification of land use, but also contains significant environmental values, both from a community and tourism perspective and in terms of natural biodiversity.

The Cape to Cape Catchments Group is a community based catchment management group that is working with government agencies, community groups and private landholders to coordinate natural resource management activities in the local area. The group recognised that much of the up to date landcare information was not easily accessible to landholders in the area. In 2002 the group successfully applied for and received funding assistance from the Federal Government Natural Heritage Trust and the Shire of Augusta- Margaret River to bring this information together in one manual.

The Companion contains information on:

- Weed control
- Pest management
- Looking after bushland
- Managing waterways
- Suggested species for revegetation
- Important fauna
- Dams
- Fire management
- Windbreaks
- Property management and
- Many more important topics.

In some cases, the information available has been summarised and further contacts provided for those readers who wish to research a topic in more detail or who may need specialist advice about a particular problem.

It is hoped that landholders and residents will find the technical information and the contact details useful in addressing the landcare and environmental needs of their property.

Feedback on the content of this manual would be welcomed by the Cape to Cape Catchments Group; there is a feedback questionnaire at the end of the manual.



*Cape to Cape
Catchments Group*

Part A

The Environment of the Cape to Cape Subregion



ABOUT THE CAPE TO CAPE CATCHMENTS AREA

LOCATION AND LAND USE

The Cape to Cape catchments area includes all land that drains to the coast between Cape Naturaliste and Cape Leeuwin, in the southwest of Western Australia.

The area lies across parts of the Busselton and Augusta-Margaret River Shires and covers approximately 97,118 ha (Figure 1). The climate is mild Mediterranean with warm dry summers and cool wet winters. Annual rainfall decreases from about 1100mm in the west to 900mm in the east.

The Leeuwin-Naturaliste National Park spans the coast and some inland areas lie within State Forest, proposed National Parks and Conservation Reserves. A significant proportion of the catchment remains in private ownership, and land use within this area is a mosaic of dairy and beef cattle, intensive agriculture including viticulture and wine production, olive growing and oil production, and tourism. Other important industries in the local area include forestry and fishing.

HERITAGE

Aboriginal people are known to have occupied the south-west for at least 38,000 years. By the time of British colonization in 1829, the Nyoongar people were a distinct socio-cultural group. The Wardandi occupied the land between Bunbury and Cape Leeuwin.

The earliest recorded European account of the area was made in 1622, when 'Leeuwin' of the United East India Company recorded the presence of 'Leeuwin's Land.' Later explorers included Mathew Flinders who named Cape Leeuwin in 1801, and Nicholas Baudin who named Hamelin Bay, Cape Naturaliste and Geographe Bay.

The earliest recorded European settlement occurred in Augusta in the 1830's.

KEY VALUES AND THREATS

Wetlands and Waterways

The Margaret River, three creeks and eleven creek

systems drain to the coast in the Cape to Cape catchments area. All but one of these systems drains agricultural land of some kind.

Parts of these systems have been identified as being in good condition. However, a considerable proportion of the waterways in the area have become degraded through weed invasion, loss of fringing vegetation, erosion and sedimentation. A large number of on-stream dams are also impacting on the natural stream ecology.

During 2002 foreshore surveys of the Margaret River were undertaken and an action plan developed to protect and restore the river. Copies of the Margaret River Action Plan are available from the Cape to Cape Catchments Group. Contact details are available at the end of this manual.

The Margaret River supports the only known population of a unique and threatened marron species known as the 'hairy' marron (*Cherax tenuimanus*). Work is underway on a Recovery Plan for the species. The river also supports populations of rare and restricted freshwater fish and the pouched lamprey.

A number of unique wetland systems are located in the southern end of the Leeuwin-Naturaliste National Park including the Cape Leeuwin System, which is listed in the Directory of Important Wetlands in Australia.

A number of other wetland systems occur on private land, in State Forest or in other parts of the National Parks and Conservation Reserves. Given that the majority of wetlands in the area have been cleared for agriculture, any wetlands with remnant vegetation have important values. Some of the wetland systems in the Leeuwin-Naturaliste National Park and on private land support important rare flora and fauna populations such as rare snails (*Austroassiminea lethra*) and cave invertebrate fauna.

Vegetation

About 66% of the Cape to Cape catchments area is covered with native vegetation. A large proportion

of this vegetation lies within State Forest, reserve areas or the Leeuwin-Naturaliste National Park – the most visited National Park in the State. The central plain has been heavily cleared and remnants within this area tend to be small and fragmented.

There are twenty-six different vegetation communities. Jarrah-marri forest is the most widespread of these. Some of the vegetation communities in the area are significant in that only a small percentage of their coverage has been reserved for conservation.

The area contains twenty-six different species of rare plants classified as Declared Rare Flora. A significantly larger number of 'priority' species are found within the catchment. These are species that have only a few known populations, but require further survey work to determine their status.

Key processes threatening biodiversity include clearing, weed invasion, inappropriate burning regimes, dieback, grazing pressures from stock, rabbits and kangaroos, and changes to local hydrological conditions.

Fauna

The area is home to twenty-four different mammal species of which 10 are classified as a 'threatened' or 'priority' species. Loss of habitat through clearing and grazing, fragmentation of habitat, and the impact of feral animals such as foxes, cats and rabbits are key threats to these species. This manual outlines a number of ways that private landholders can help to recover the populations of these species.

The list of important fauna in the area grows considerably larger once birds, reptiles, amphibians and invertebrates are added.

Geological Formations

The Leeuwin-Naturaliste Ridge is a key geological feature of the Cape to Cape catchments area and is included in the Register of the National Estate. The ridge is 6 to 10 kilometres wide with prominent rounded hills that range between 160m and 200m in height. It is a discontinuous ridge of Tamala Limestone (younger than 1 million years) with the underlying Leeuwin Block gneiss and granite (500 - 1,000 million years) exposed in places.

The Leeuwin-Naturaliste Ridge contains hundreds of cave systems that have formed in the limestone. These caves are considered to be very significant because of the quality of the formations and the large number of cultural and fossil remains that they contain.

The cave systems in the south of the catchment support two threatened ecological communities that are being affected by changes to hydrology.

Coast

The spectacular coastline is an outstanding feature of the Cape to Cape area. Steep limestone cliffs are interspersed with sandy bays and steep sand dunes between rocky headlands.

Intertidal and near-shore marine areas support an unusually diverse fauna. In sheltered areas of the shorelines, particularly on the northern sides of headlands, granite-gneiss boulder fields and large pools provide rich habitat for a diverse range of flora and fauna.

The number of people visiting and living on the coast is growing rapidly and increasing a number of pressures. These include damage by off-road vehicles, weeds, erosion and clearing of native vegetation for development.

Source:

Australian Nature Conservation Agency (1996) *A Directory of Important Wetlands in Australia*. Australian Nature Conservation Agency, Canberra.

Hopkins, A. Morgan, R. & Shepherd, D. (2001) *Bush and Biodiversity in the South West Region*. Technical Report #4. South West Regional Strategy for Natural Resource Management. SWCC Bunbury.

Pearce, R. and Barbetti, M. (1981) 'A 30,000 Year Old Site at Upper Swan, Western Australia,' in *Archaeology in Oceania*. 16 : 173-178.

SWCC (2002) *South West Regional Strategy for Natural Resource Management*. SWCC Bunbury.

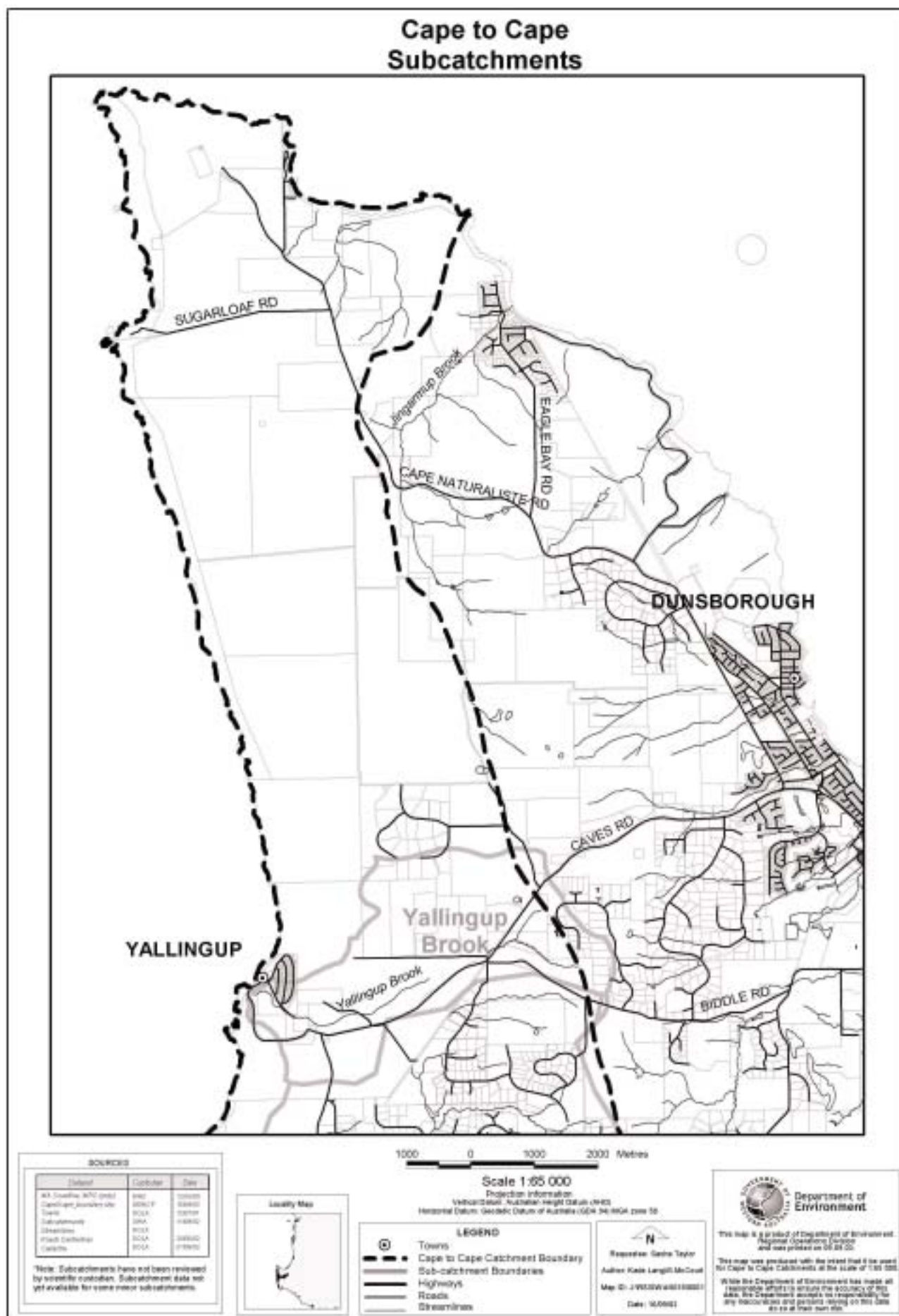


Figure 1:

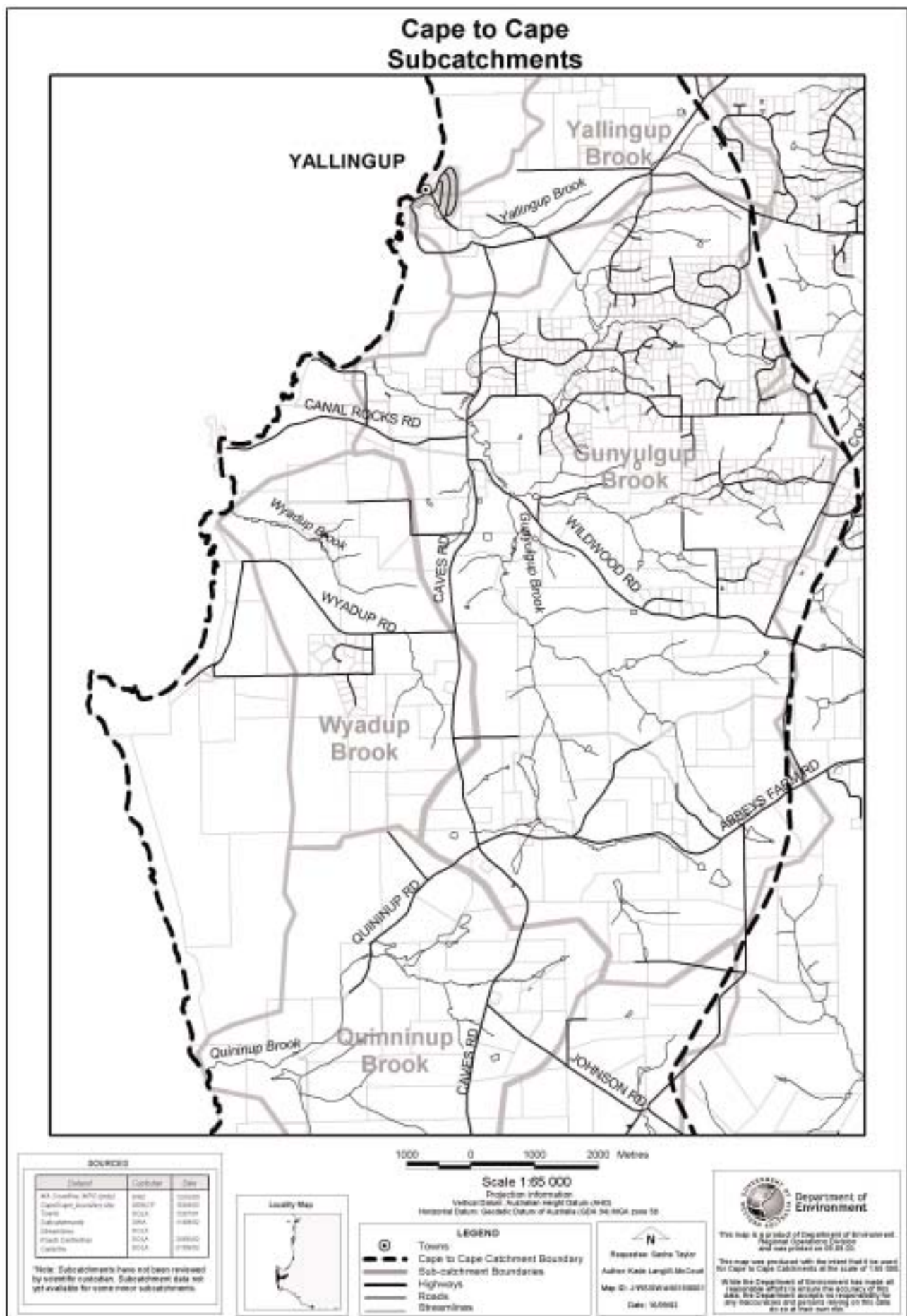


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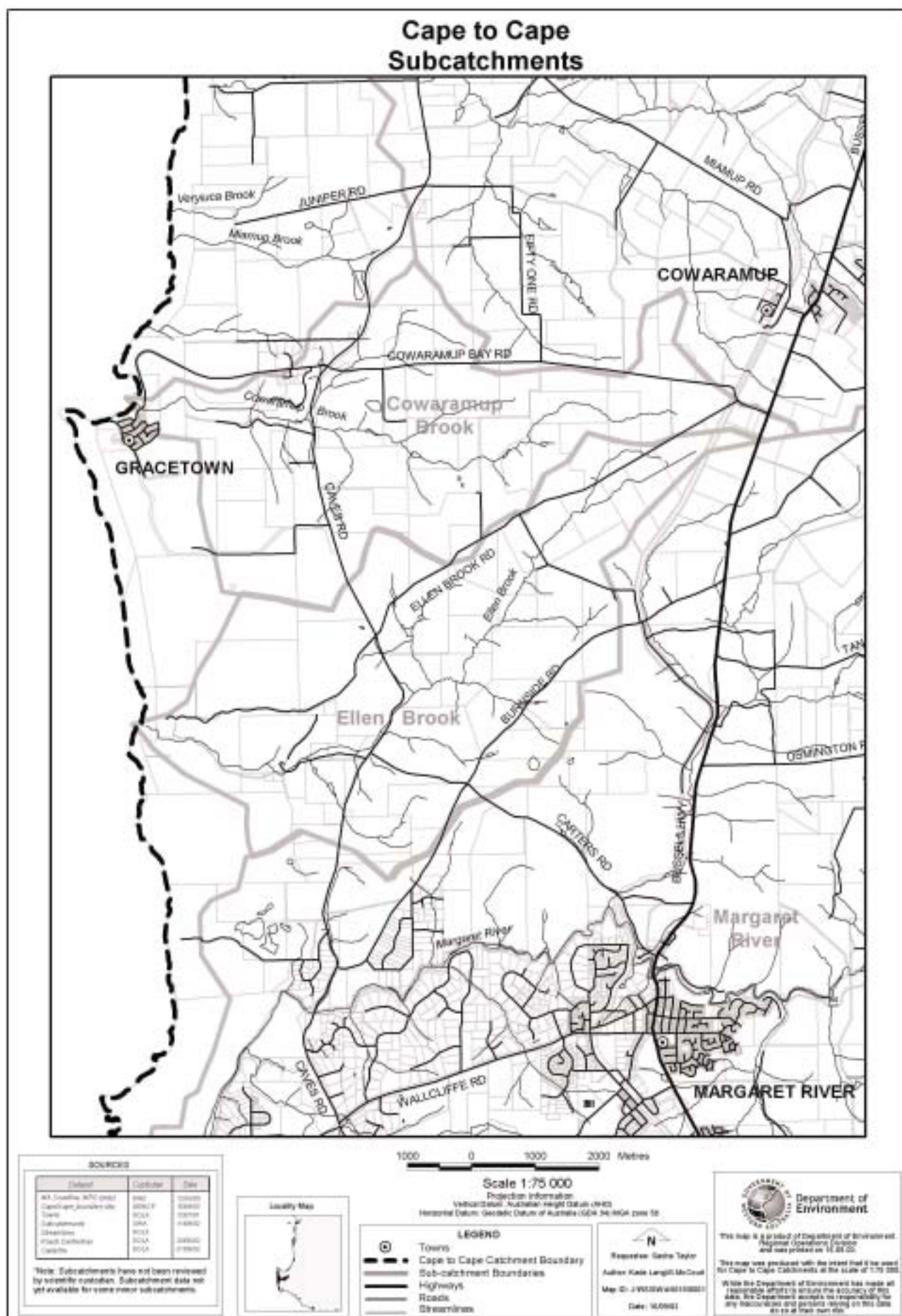


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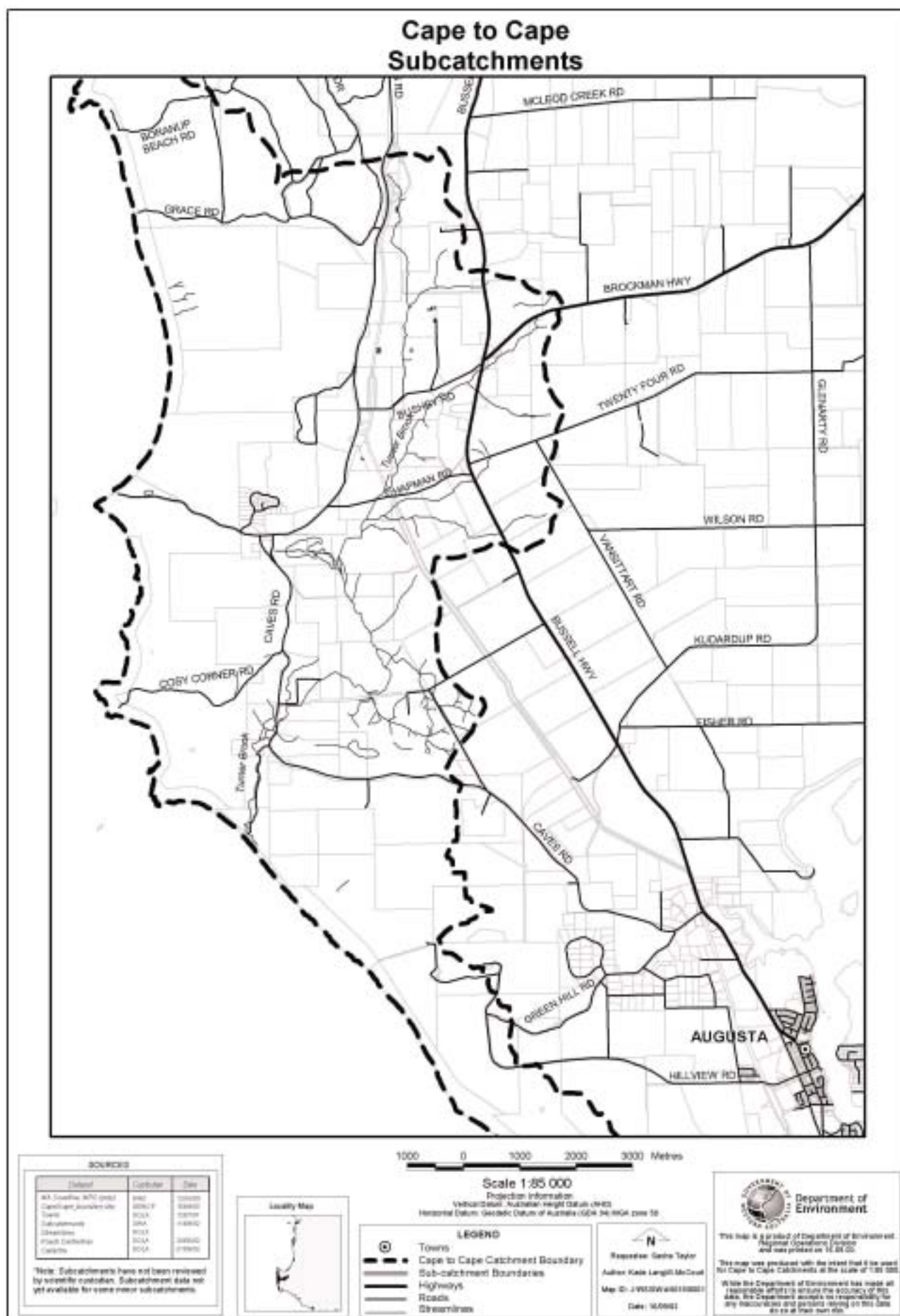
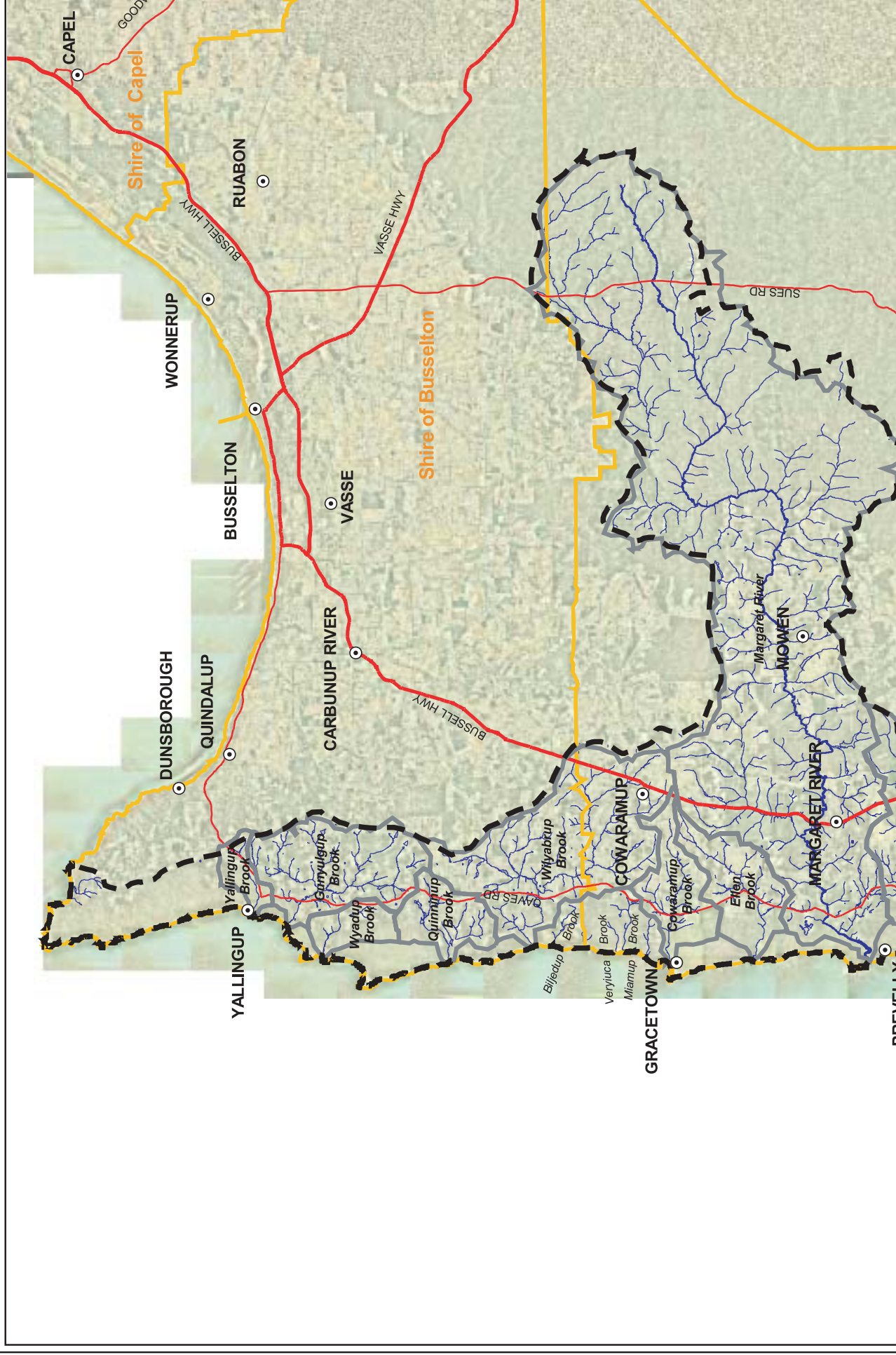


Figure 6:

Cape to Cape Catchments Area



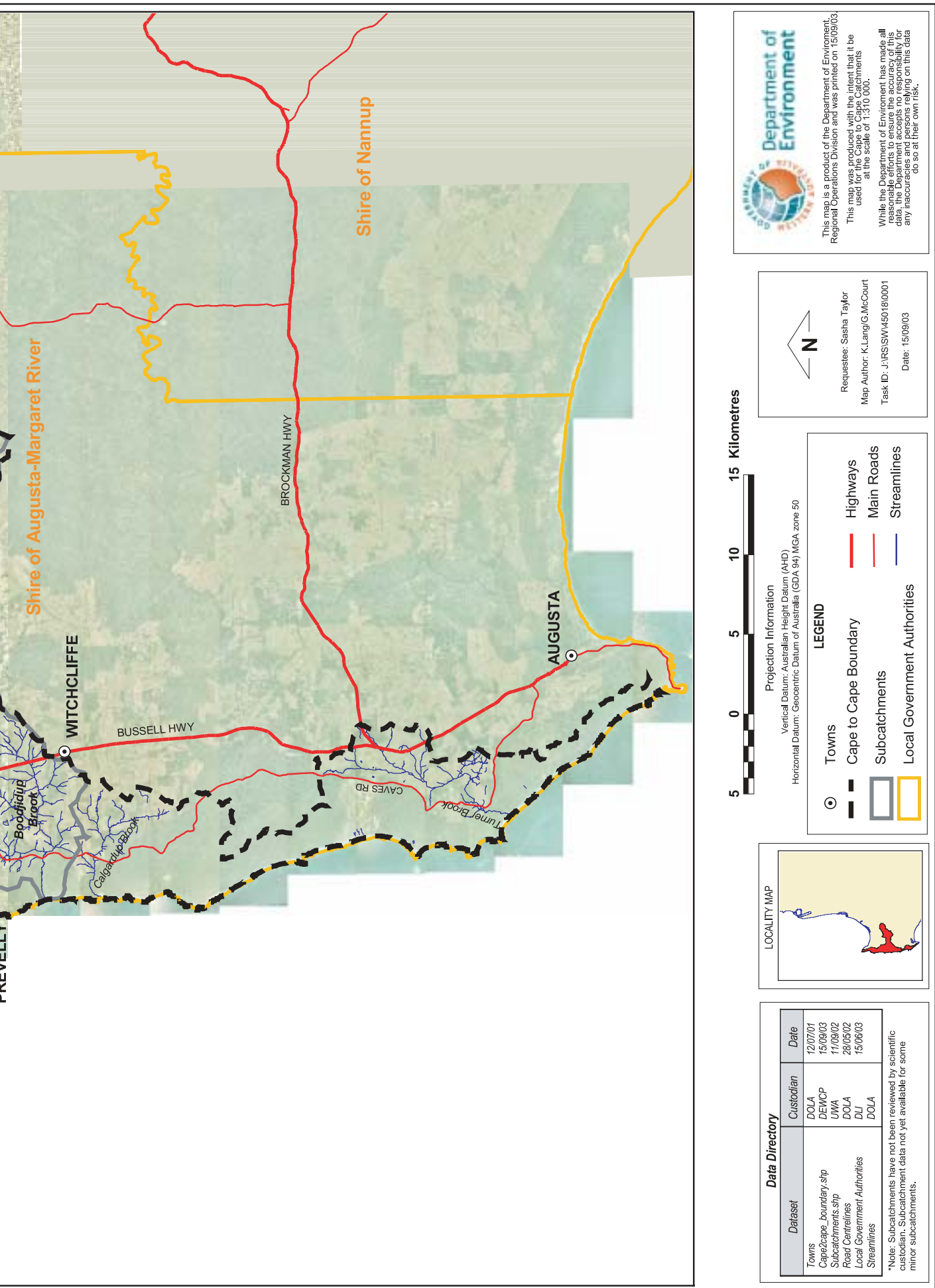


Figure 8: Cape to Cape Catchments Area

NATIVE FAUNA

In addition to important flora values, the Cape to Cape catchments area supports a diverse range of fauna species. While some species such as the western grey kangaroo are commonly found throughout the southwest region, many others are now rarely seen or are restricted in range and have been afforded special protection.

It is important to note that all native fauna are protected by State legislation (licences are issued for control of species such as kangaroos). Whether common or rare, the survival of native species is vital for the maintenance of biodiversity in the local area. While the Leeuwin-Naturaliste National Park, areas of State Forest and other reserves provide important habitat for these fauna, the effective management of remnant vegetation on private property is critical to the long-term survival of many fauna species.

This section provides a list of some fauna species that may be found in the general area. Ways to encourage fauna back to your property have been outlined. A list of other species that may be found in the general area is also included for information.

Special Fauna in the Cape to Cape Catchments Area

Marsupials

Western Ringtail Possum (Vulnerable)

Pseudocheirus occidentalis

Indigenous name: Nguara, Womp, Ngoor

The western ringtail possum was once widely distributed throughout the southwest of Western Australia, but is now restricted to isolated coastal areas between Albany and Bunbury, mainly concentrated in areas of peppermint forest (*Agonis flexuosa*).

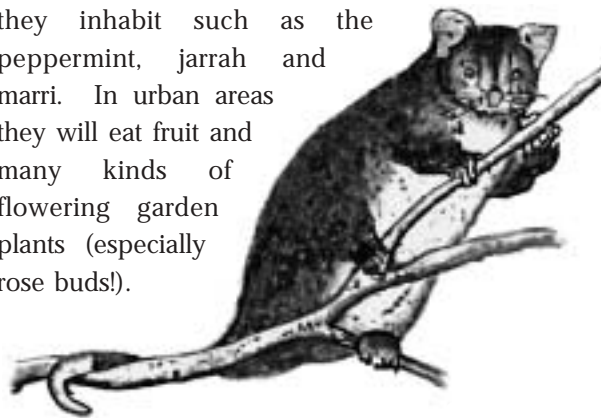
The western ringtail possum is about the size of a small cat with short fur, either brown or silver, and a paler underbelly. The tail is long and slim and white at the end.

While relatively common in some areas, such as Busselton, the possum was given the 'rare and endangered' status in 1983 and is now classified as

'Vulnerable' owing to its severely restricted range. Factors contributing to the decline of the species have been loss of habitat through land clearing and predation from foxes, and being struck by vehicles.

In the Cape to Cape catchments you may see the western ringtail possum at night within the foliage of peppermint trees. The Yallingup area is known to be important for these possums, though they are likely to occur in smaller numbers in other parts of the catchment also.

Possums diet in the wild mainly consists of the new leaves, fruit and blossoms of trees they inhabit such as the peppermint, jarrah and marri. In urban areas they will eat fruit and many kinds of flowering garden plants (especially rose buds!).



Quenda (Conservation dependent)

Isodon obesulus

Other common name: Southern Brown Bandicoot

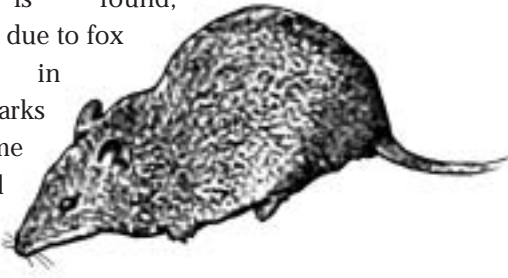
The quenda, or southern brown bandicoot, is a small marsupial about 30 cm in length (head and body only) with a long 'rat-like' tail up to about 12 cm. The body is dark greyish or yellowish brown above and creamy white below with round ears. The head and nose are fairly elongated.

Quenda are nocturnal and tend not to venture too far into open areas when feeding. They feed on earthworms and other insects in addition to fungi.

During the day quenda will sleep in a nest they build on the ground, constructed of leaves and grasses and sometimes mixed with earth.

The quenda's habitat consists of dense heath or recently burned or regenerating areas with low ground cover. Since European settlement, the spread of sheep and cattle and the reduction in the frequency of small-scale fires have resulted in a loss

of dense vegetation suitable for quenda habitat, which has led to its decline and restriction in range. In recent years populations of quenda have appeared to be on the increase where sustainable habitat is found, presumably due to fox control in National Parks and by some private land managers.



Brush-tailed Phascogale (Priority 3)

Phascogale tapoatafa

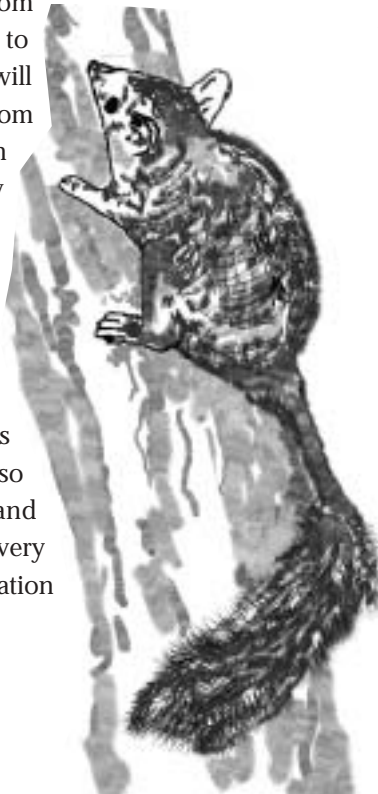
Other common name: Wambenger

The brush-tailed phascogale has grey grizzled fur on its head and back with a cream to white belly, a conspicuous black 'bottle-brush' tail with long hairs on the tail and naked areas.

It is an agile carnivorous marsupial that feeds on cockroaches, spiders, beetles and bull ants. It is also known to feed on small vertebrates such as mice.

The phascogale is mostly arboreal, i.e. it tends to remain in large trees, seldom coming to the ground to feed. The phascogale will tear strips of bark away from trees to reach hidden insects and is active only between dusk and dawn.

During the day the phascogale will sleep in a nest, usually a hollow tree limb, a rotted stump or even a disused bird's nest. Tree hollows are also used for breeding and nesting and are therefore very important for the conservation of the species.



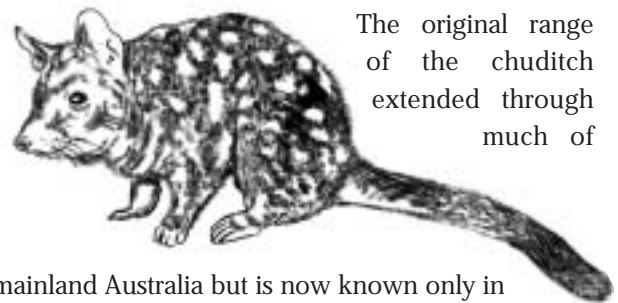
It prefers open forest with sparse ground cover, however widespread land clearing in WA has vastly reduced its natural range. Further surveys are needed to more accurately define the distribution and number of the brush-tailed phascogale in the southwest.

Chuditch (Vulnerable)

Dasyurus geoffroii

Other common names: Western Quoll, Western Native Cat

The chuditch is similar in size to a small cat, with brown fur and conspicuous white spots. Its belly is creamy white in colour and it has a large bushy tail.



The original range of the chuditch extended through much of

mainland Australia but is now known only in the southwest of WA in areas of eucalypt forest or dry woodland and mallee shrub land. Land clearing and fox predation has contributed to the decline of the species. It is currently classified as a vulnerable species with an estimated total population of less than 6000.

The chuditch is a carnivorous and nocturnal ground feeder. Its diet includes insects, freshwater crustaceans, reptiles and even mammals and birds up to the size of bandicoots and parrots.

Individuals defend a very large range with one female occupying a den within a stable core area of 55-120 hectares and male dens distributed over about 400 hectares or more.

Factors affecting the survival rate of individuals include predation by foxes and raptors; being hit by motor vehicles; illegal shooting; and injury from leg-hold traps set for foxes or rabbits or around poultry sheds.

Water Rat (Priority 4)

Hydromys chrysogaster

Other common name: Beaver Rat, Rakali

The native water rat lives around permanent fresh or brackish water bodies and the beach, forming a nest at the end of tunnels in banks, or sometimes within logs.



The water rat is about 30 cm in length (head and body only) with a thick fur-covered tail. It varies in colour from almost black to grey, with a

white to orange belly. The ears are small and the eyes and nostrils set high on the head. The hind feet have been adapted to its aquatic life, being broad and partially webbed.

The water rat is unusual in that it is not entirely nocturnal. It tends to feed around sunset but may also forage for food during the day. The water rat feeds on large aquatic insects, freshwater mussels, crustaceans, frogs, lizards, small mammals and fresh carrion.

Individuals are fairly territorial with home ranges varying from 2 to 10 hectares in some areas. Clearing of riverine vegetation and clearing, draining and filling of wetlands have all impacted on the water rat's habitat in the south west. Further surveys are required in the area to determine its overall population status. Protection and rehabilitation of vegetation fringing creeks, rivers and wetlands in the catchment will assist in the conservation of this species.

It is important to be aware that feeding native animals is detrimental to their health and wellbeing and is not recommended.

Sources:

Strahan, R. (ed); (1995) *The Mammals of Australia*. The Australian Museum Trust Reed Books, Chatswood New South Wales, Australia.

Kemp, C., and Bramwell, E. (1999) *Living with Possums* Brochure produced by Land for Wildlife and Department of Conservation and Land Management, WA

Birds

Baudin's Black Cockatoo (Schedule 1)

Calyptorhynchus baudinii

Other names: Long-billed Black Cockatoo; White-tailed Black Cockatoo

Indigenous name: Ngool yanak

A large, glossy black cockatoo about 50 to 56 cm long with white ear patches and panels in the tail. The bill of this species is greatly elongated in the upper curved tip.

Baudin's black cockatoo feeds on the seeds of large fruited gums such as the marri (*Corymbia calophylla*). It nests in the hollows of very old and tall forest trees. Pairs mate for life and lay only one egg every second year.

It occurs only in the tall marri, jarrah and karri forests of southwest WA. Populations have declined due to extensive clearing for agriculture. Mass shootings of the species also occurred between 1950 and 1983 when it was declared a pest due to damage caused to orchards.

The species is now a Schedule 1 protected species (protection afforded to those species that are rare or likely to become extinct). It prefers to nest in large hollow marri trees. Due variously to land clearing, competition for nest hollows from dramatically increasing feral honey bee populations, and probably from other bird species, suitable nest sites are becoming increasingly scarce.

Red-tailed Black Cockatoo (Priority 4)

Calyptorhynchus banksii naso

Indigenous name: Yiibi

The red-tailed black cockatoo is a large glossy black cockatoo with a bright orange-red band towards the tip of the tail.

The red-tailed black cockatoo lives in eucalypt forests and feeds on the seeds of marri, jarrah, blackbutt, karri, sheoak and snottygobble.

It was once quite common but is now rare to uncommon, and patchily distributed over a range that has become markedly reduced.

The threats to this species are similar to those impacting on Baudin's black cockatoos: destruction of forests; fires in the spring breeding season; feral honey bees; and the expansion of the Australian shelduck and Australian wood duck which take over nesting hollows.

Sources

Blyth, J. and Burbidge, A. (1999). *Threatened and Rare Birds of Western Australia*. Department of Conservation and Land Management, Como, Western Australia.

Water Corporation (2001). Cockatoo Care World Wide Web page. Website by Nature Australia Pty Ltd.

Frogs

White-bellied Frog (critically endangered)

Geocrinia alba

The white bellied frog is a tiny frog, just 2.4 cm long found only in a few sites between Margaret River and Augusta.

The underside of this frog is white to cream and the back is dark to light brown with raised dark spots in rows. The male frogs will call in spring to early summer, making a series of short clicks, about fifteen in each series.

The frogs live in peaty teatree swamps, of which there are now few remaining owing to clearing for agriculture. Protection of suitable habitat is critical to the survival of this species.

Current threats include further clearing of suitable habitat and summer and autumn fires.

Orange-bellied Frog (Vulnerable)

Geocrinia ultellina

The orange-bellied frog is currently the most restricted vertebrate known on mainland Australia. It occurs in a very small area of State Forest near Augusta and has a total range of only six square kilometres.

Like the white-bellied frog, this species is very tiny, but is unmistakable due to a bright yellowish-orange underside.

These frogs have been found calling from moist ground close to streams and well hidden by vegetation.

The call is similar to the white-bellied frog, though with only eleven clicks in each series.

A *Geocrinia* Recovery Kit has been written as a guide to the conservation of the white and orange-bellied frogs in the Margaret River area. The kit outlines identification, biology, how to conserve frogs on your property, conservation fencing agreements and recovery plan details. The local contact for queries, management issues or fencing subsidies is CALM, Busselton.

Source

Thomson-Dans, C. and Wardell-Johnson, G. (2002). *Frogs of Western Australia*. Department of Conservation and Land Management, Como, Western Australia.

Crustaceans

'Hairy Marron' or Margaret River Marron (Critically Endangered)

Cherax tenuimanus

The Margaret River marron or 'hairy marron' is a marron species unique and endemic to the Margaret River (i.e. it occurs in no other river or stream system). It differs from the other marron species, which has been introduced into the river, by the presence of setae (small hairs) on the carapace of the Margaret River species.

While the two species are known to produce hybrids, the 'hairy marron' is now officially recorded as a separate species, with a very small range of occurrence. The 'hairy marron' is most abundant in the upper reaches of the Margaret River, with this



Photo by John Bunn

section of the river being closed to recreational fishing to protect the species. A Recovery Plan is being developed by the Department of Fisheries in partnership with the Cape to Cape Catchments Group, CALM, Department of Environment and community representatives.

Fish

Pouched Lamprey

Geotria australis

The Margaret River is also home to the pouched lamprey, a primitive eel-like fish with no jaw or paired fins. Lampreys have a suctorial disk lined with teeth that they use to feed on the flesh and blood of other fish by rasping or sucking.

Lampreys are highly primitive fish; fossil evidence dates back to 280 million years ago (well before the disappearance of dinosaurs).

The pouched lamprey spends most of its adult life at sea. It re-enters permanent freshwater systems in winter and spring to migrate upstream where it spawns in the headwaters of the rivers or creeks and then dies. The resulting larval lampreys spend about four years filter feeding from burrows in the

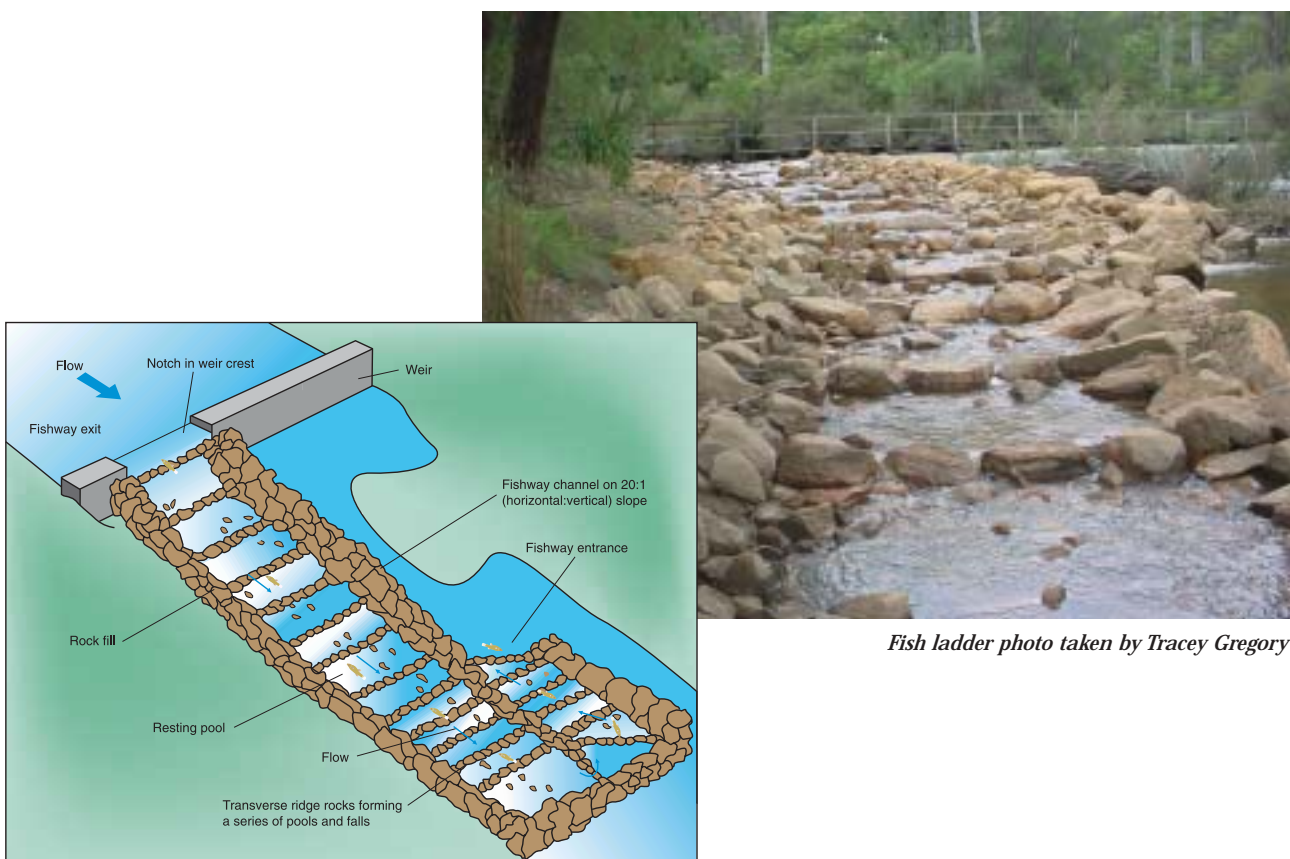
sediment before metamorphosing into their adult form and moving to the ocean.

In the Margaret River, as in many other southwest rivers today, the pouched lamprey's journey upstream is made arduous due to the presence of weirs that block the passage of these fish. Lampreys are good climbers and will leave the water to move around obstructions in wet weather. Many die in the process, however, because of injuries and exhaustion or from blood poisoning and internal bleeding.

On the Margaret River a program to make the upstream migration passage easier for lampreys and other native fish was commenced. A fishway or 'fish ladder' was constructed on the Carters Road weir to enable fish migration. Planning is currently underway to construct a second fish ladder on the middle weir. It is hoped that this program will ensure the long-term survival of the pouched lamprey in the Margaret River system.

Source

Lamprey Guides (2000) Water Note 14 Water and Rivers Commission, Perth, WA.



Fish ladder photo taken by Tracey Gregory



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Part B

Managing the Environment of the Cape to Cape Catchments



REMNANT VEGETATION IS VALUABLE

Our bush is what makes our landscape uniquely Australian; it is part of what defines our local identity. It is also beautiful to look at and provides diversity in our largely altered landscape. It is valuable for recreation and vitally important for tourism.

Remnant vegetation is important in conserving our native flora and fauna, and biodiversity. The South West of WA has one of the most diverse species of plants in the world, many of which are found nowhere else.

Native vegetation has an important role in sustainable agriculture. It can control erosion, lower water tables, protect stock from wind, and help to maintain ecological balances. It can also be a source of income through sawn timber and craft wood, fencing timber, wildflowers, seeds, honey and tourism.

It is possible that the bush contains plants that could be significant for medicinal purposes. Healthy and diverse native vegetation on your block can increase the aesthetic and economic value of your property.

HOW TO LOOK AFTER YOUR BUSH

Most areas of remnant vegetation in the Cape to Cape catchments have been degraded to some degree by stock grazing, altered fire regimes, dieback, changes in water regime and invasion by exotic species.

In general the better the quality of bushland, the less management that is needed over time. If your bushland is in reasonably good condition, some small effort now may prevent a large management problem in the future.

This section provides some brief guidelines and points to consider in regard to looking after your bush. There are also some excellent books on this subject and they should be referred to for more detail. They are listed at the end of this section.

Grazing

Grazing by stock, whether cattle, sheep or deer typically causes soil damage by hard hooves and can

result in severe damage to native vegetation communities. Many understorey plants will disappear and natural regeneration will be limited as regenerating seedlings are palatable to stock. Overgrazing by kangaroos and disturbance by rabbits can also damage bush.

Stock introduce and spread weeds, ringbark trees, cause soil compaction as well as trample and destroy small plants. If remnant vegetation is to remain healthy and diverse then fencing will be needed to exclude stock.

Weeds

The invasion of bush remnants by exotic species has a major impact on the conservation value of remnant vegetation.

- Weeds compete with native vegetation, inhibiting growth and displacing species.
- They lead to diverse native plant communities being replaced by simplified ecosystems made up of a few dominant species.
- They inhibit plant regeneration through competition and alter the resources available for fauna.
- While you ignore weeds hoping they will go away they will continue to spread and many will eventually become the dominant species in your bush.

If you appreciate diversity then it is best to get stuck into weed control. Have a long-term view and make weed control another part of your life. For lots more detail on this subject turn to Part C for the section on Weeds.

Fire

The issue of fire and bush management is a complex one. Aboriginal Australians shaped areas of the bush through the use of fire over centuries. Fire is also a natural part of the Australian environment and can be used to assist regeneration. It is acknowledged that it may be necessary to burn the bush occasionally to control fire hazard.

However, inappropriate fire regimes can result in the degradation of bush areas by favouring weeds and reducing the number of native species that can continue to regenerate. Fire can kill fauna and degrade habitat for some time.

General principles for fire management to preserve bushland areas include:

- Manage the frequency of control burns (minimum 6-8 years for dry areas and 12 – 14 years for seasonally wet areas). (Burrows et al, 1995)
- For large areas control burn in patches ('mosaic burning') to retain alternative habitat for fauna.
- Always undertake active weed control following a burn to minimise the weed invasion.

Further details on the effects of frequent fires and appropriate fire management methods are provided in Part C.

Feral Animals

Exotic species of major concern in your bush are foxes, cats and rabbits.

Trapping and controlling feral animals will improve the conservation value of your bush, and productivity of your property. It is very rewarding to see a Brushed-tailed Phascogale, a Bandicoot or other native mammals in your bush and realise that you have contributed to ensuring their survival.

The numbers of native fauna have increased following CALM's 1080 baiting programs. If private landholders control feral animal numbers using 1080 and trapping then even more native fauna will be seen in our remaining bush areas. Part C contains a section dealing specifically with exotic animal pests and ways to control them.



Dieback

Dieback is caused by several types of introduced fungi, all *Phytophthora* species. These fungi kill a wide range of plant species and cause severe damage to some vegetation types.

The fungi live in the soil and plant roots and are spread by surface and ground water or the movement of infected soil or roots. The best strategy to control dieback is to prevent the spread of *Phytophthora* by people or in contaminated soil, water and/or plant material.

If you are lucky enough to have dieback free bush try your hardest to keep it that way. Equally, if you suspect that dieback may be present every effort should be made to stop it spreading.

You can also protect susceptible plants with a fungicide called Phosphite, or Phosphonate. The fungicide works by boosting the plant's natural defences. Trees can be injected and understory plants sprayed, with the treatment lasting for two to five years.

Treating plants with Phosphite, particularly in a small area, is inexpensive. The following section reproduces information from the Dieback Working Group.

References and Further Reading

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DIEBACK

(Provided by the Dieback Working Group)

Dieback has been recognised nationally as one of five key threatening processes endangering Australian plants and ecological communities.

What is dieback?

- Dieback, jarrah dieback or *Phytophthora* dieback all refer to the same thing - a plant disease caused by *Phytophthora cinnamomi*.
- *P. cinnamomi* is an introduced soil-borne pathogen that has the potential to kill about 25% of native plants in Western Australia's south- west.
- *P. cinnamomi* prefers warm, moist soil conditions.
- It is found in the 400+ mm rainfall zone, but does the most damage in the 800+ mm rainfall zone.
- It was brought to WA during settlement - probably in soil around imported plants.

Plants Under Threat

Dieback kills more than Jarrah.

- *P. cinnamomi* attacks the roots of plants and causes them to rot. This kills the plant by limiting or stopping the uptake of water or nutrients.
- Sensitive plants include *Banksia* species, grass trees, woody pear, snottygobble, zamia palms and *Hibbertia* sp.

How is Dieback Spread?

P. cinnamomi can be spread in a number of ways, including those listed below:

- Root-to-root contact
- Water flow (i.e. surface and sub-surface flows – spread tends to occur downslope from the infection point in undulating terrain)
- Animals (e.g. kangaroos)
- Recreation activities (bushwalking, 4WD, etc.)
- Vehicles
- Earthworks (road construction, firebreaks etc)
- *P. cinnamomi* infested soil and gravel
- Bush restoration activities (tree planting, weeding etc.).



Dieback-free bushland (Falls Park, Hovea).



Dieback-infected bushland (Falls Park, Hovea).

One of the major ways that dieback is spread is via the movement of soil.

How Can I Manage the Spread or Introduction of Dieback?

The approaches to managing dieback will differ according to the level of infection of dieback in your bushland.

In general principles, the management of dieback falls into two categories:

1. Phosphite treatment
2. Prevention and minimisation of disease spread

Phosphite Treatment

- Phosphite is a biodegradable fungicide that temporarily protects plants against *P.cinnamomi*.
- It works by boosting the plant's natural defences.
- The chemical is not toxic to people or animals, and has a very low pollution risk.
- Phosphite is administered by spraying and stem injecting.
- If treating small areas phosphite spraying is inexpensive.

Prevention and Minimisation of Spread

- Source dieback-free gravel, soil and plants from accredited outlets.
- Conduct earthworks during dry soil conditions.
- Control access to high priority areas.
- Clean machinery, vehicles and footwear.
- Bag weeds immediately before transporting across site.
- Control surface water flow.
- Vaccinate your native plants with phosphite.
- Stay on formed roads/tracks when driving through the bush.

Source

The Dieback Working Group, based at the Shire of Kalamunda WA, has provided all information and illustrations in this section.

Further Information and Contacts

General *Phytophthora* Dieback Information:

- Dieback Working Group - Dieback Project Officer (08) 9257 9999.
- Shire of Augusta-Margaret River Environmental Coordinator (08) 97805 255.
- Shire of Busselton Environmental Officer (08) 97810 444.
- Department of Conservation and Land Management (CALM). Busselton (08) 9752 1677
- Dieback Interpretation Services
- Department of Conservation and Land Management (CALM). Como (08) 9334 0333
- Fungus Doctors (Matt Reynolds – Perth and South West) (08) 9582 9215
- GLEVAN Dieback Consulting Services (Glenn Tuffnell – Perth and South West) (08) 9496 3336
- Simon Watkins (South West) (08) 9840 1244

Susceptible species such as banksias can be used as indicators to determine whether bushland has been infected with dieback.

LOOKING AFTER WATERWAYS AND WETLANDS

Many small landowners are fortunate enough to have creeks and tributaries running through their properties. Not only do they look great, a stream in good natural condition will also add value to your property.

In the past streams were simply seen as drainage channels that provide a means for water to flow into the sea. We now know that streams and creeks have an ecological integrity of their own and play a fundamental role in catchment systems. It is therefore necessary to look after our streams and creeks because whatever happens upstream will have a consequence downstream.



*Healthy riparian vegetation along a creek.
(Photo by Tracey Gregory).*



*Dense riparian vegetation along the Margaret River.
(Photo by Jamie Scott).*

Streams and Their Associated Vegetation

The rich soils associated with a stream valley support a diverse range of plant forms including trees, shrubs, sedges, rushes and herbs. This vegetation is known as riparian vegetation, as distinct from dryland vegetation, and acts to support the soils of the stream banks to prevent erosion and subsidence. In addition, riparian vegetation provides important habitat for native fauna and can decrease the amount of excess soil and nutrients entering the stream from the catchment area. In order to appreciate the values of riparian vegetation it is necessary to examine them in more detail.

Preventing Erosion

Well-vegetated stream banks are less likely to suffer from erosion because the roots of trees and shrubs act to stabilise and reinforce the banks of the stream. The roots also take up excess water in the soil and prevent bank collapse from saturation.

Riparian vegetation actively reduces erosion by slowing the speed of the flowing water. Without this vegetation the velocity of the stream flow would increase, causing soil to be washed from the banks, leaving them scoured and eroded.

Improving Water Quality

Riparian vegetation acts in several ways to hold sediments (soil particles) and reduce runoff into streams. Vegetation slows overland water movement causing sediments and nutrients to be deposited on land before reaching the stream. Nutrients are then absorbed by the vegetation, effectively reducing the nutrient load entering the stream.

The shade provided by riparian vegetation influences water quality in a number of ways. Firstly, the shade helps maintain low water temperatures that assist in the survival of many native plants and animals, including marron. The shade also decreases the amount of light available for nuisance plant and animal growths.

Further technical information about protecting and rehabilitating streamlines is presented in Part C.

Ecological Values

- Riparian vegetation provides an important **habitat** for many organisms. In particular, species that prefer the moist cooler areas close to stream banks depend on riparian vegetation. This includes many species of waterbirds and frogs.
- The ecological balance of the stream/river system depends on the riparian vegetation to provide leaf litter, insects and other organic matter. This is used by aquatic plants and animals as a **food source** and is an important input to the system. Also, limbs and branches of trees that fall into the stream provide habitat to many aquatic organisms.
- The riparian vegetation also provides **corridors** of remnant vegetation in which plant and animal communities are able to move along. This creates a sustainable regional network where species can move around a catchment on a large scale. These and other bushland corridors are beneficial in that they reduce isolation, improve the breeding of native species and offer routes of escape in the case of drought or fire.

The benefits of riparian vegetation cannot be overstated. It is therefore critical that riparian vegetation be preserved and managed as well as possible



An extreme case of gully erosion. Adverse effects can be minimised by replanting revegetation and minimising disturbance to the area. (Photo by Tracey Gregory).



CASE STUDY – FORREST VINEYARD

Property Manager: Albert Haak & Associates

Owner: Paul and Jean Forrest

Revegetation of a lake and watercourses on a private vineyard in the Wilyabrup Lowlands.

Forrest Vineyard is located on Johnson Road, Quinninup, in the Margaret River wine region. The property covers 34 hectares, 20 hectares of which are vines and 14 hectares are seasonal wetlands. The property is managed by Albert Haak & Associates, and owned by Paul and Jean Forrest. The property is thought to have been an old grazing paddock for dairy cattle.

Due to the high ground water level in the 14 ha of seasonal wetland area, the land wasn't suitable for viticulture and presented an excellent opportunity for re-establishing a native wetland area. Before Paul and Jean owned the property, it had been cleared for grazing and had no remaining native vegetation. A decision was made to undertake a long-term project to ecologically enhance the area by improving local biodiversity, water quality and soil stability. To put the budget and efforts to best possible use, advice was sought from Ecology Consultants, the Department of Conservation and Land Management and the Waters and River Commission who all helped to structure a plan to undertake the project.

In order to improve the local drainage, earth-moving equipment established two channels to direct backlog water into the nearby natural creek. In addition a large pond was landscaped using two existing soaks designed to discharge into the constructed creeks. The channels were designed to

simulate creeks by following natural meander ratios. Water now flows continually out of the property six months of the year and the improved drainage has enhanced the growing conditions in the vineyard. A road was built through the area to allow vehicles access during the wet season and minimise disturbance of the rehabilitation area. Permanent firebreaks have been constructed and graded so that the planting area could be easily defined. The earthworks were completed in autumn 2003 and have worked effectively.

The next phase of the project was weed control, which commenced with a fire across the 14 ha; this was effective in dealing with the thick layer of weed matter. The local volunteer fire service assisted with the fire for a small donation. Several difficult exotic weeds had established in the wet area including Kikuyu, Apple of Sodom, Sorrel, Arum Lilies and Rye grasses. When the perennial weeds re-emerged following the fire, a herbicide application of Glyphosate 'Bi-active', was applied with a boom spray. This was an ideal time to achieve a strong kill as full leaf coverage can be achieved at low chemical rates and new green tissue is ideal for chemical uptake.

The next step to revegetating the area is to establish native riparian vegetation along the banks of the waterways. This will commence in autumn of 2004. On behalf of the owners, Albert Haak & Associates applied for an Envirofund Grant from the Natural Heritage Trust to assist with the project. Regardless

of the success of the applications, some planting will take place. It is planned to introduce 9000 plants sourced from tube and cell stock. The selection will be predominantly sedges with limited trees and shrubs. Tree lines for windbreaks and water table management have already been planted around the perimeter of the property and are establishing well. Before any planting takes place another knockdown and pre-emergent herbicide will be applied to reduce weed competition, thereby maximising the strike rate of the native species.

In future years further weed control and planting will take place, working back from the waterways so that eventually the whole project area is revegetated. In order that realistic goals can be achieved care is being taken to ensure that the project is managed in stages. It's important that monitoring and maintaining of stages is factored into new budgets. Forrest Vineyard has developed the following indicators to ensure that there is satisfactory outcome:

- Successful establishment of native vegetation determined using photo-points and survival counts.
- Reduced soil erosion in watercourses and pond determined using photo-points.

- Increased numbers and diversity of birds and animals determined by counts.
- Reduction in weeds determined by photo-points and monitoring.
- Interest by local community groups and surrounding landholders determined by the number of site visits and enquiries.
- Good quality product in the vineyard area.

The vineyard was established and the primary purpose of the property is to produce wine grapes. All parties involved in viticulture on the property believe that long-term sustainable production can only be achieved by correctly managing the adjoining local wetlands. These wetlands supply irrigation water not only to the Forrest Vineyard but also neighbouring properties.

Albert Haak & Associates are presently working on a project with the owners of the adjacent vineyard, which they also manage. Once these projects link together the full ecological rewards will be realised. The property has been kindly opened by the owners to interested visitors, in an effort to encourage others to think about rehabilitation and sustainable land management practices.

CARING FOR NATIVE FAUNA

How Can You Help?

Individual landholders and even residents of urban areas can play a vital role in helping to ensure the survival of important fauna species in the Cape to Cape catchments. Some simple ways to assist with local fauna conservation are outlined below:

1. **Preserve habitat** – Where possible on private land leave remnant vegetation in-tact, fenced from stock and well managed.
2. **Undertake fox and rabbit control** where possible, and encourage your neighbours to do the same.
3. **Control domestic animals** – Leave your dog inside or restrained at night, and confined within your property during the day. Many animals prone to dog attack such as possums are active at night, and your dog is more likely to misbehave in your absence. Ensure **cats** are also kept inside at night and ideally inside or in a suitable enclosure within your property during the day. Keeping pets confined will keep them safe from attack from other animals and from motor vehicle accidents, and protect the wildlife. Sterilisation of dogs and cats is a responsible way to prevent the increase of unwanted strays.
4. **Leave fallen and dead timber** – If collecting firewood please leave some behind as it provides important habitat for many marsupial and bird species. Dead trees with hollows are also highly used habitat areas and should be retained where possible.
5. **Control weeds** – Invasive weeds displace native flora species that may provide critical habitat or food source for native fauna species. Weeds create a different type of habitat that may not be suited to some species and can lead to an increased risk or frequency of fire.
6. **Undertake strategic rehabilitation** – One of the most important threats to wildlife in the southwest of WA is loss of habitat. Landowners that choose to replace lost habitat by re-

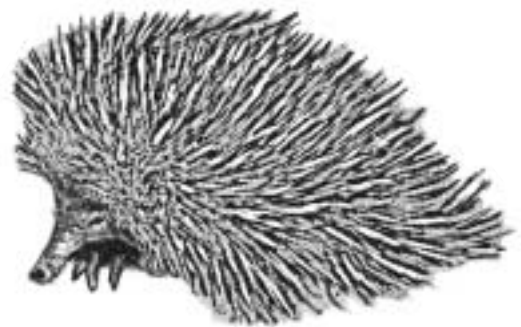
establishing native vegetation on cleared areas will be contributing to the long-term sustainability of fauna in the local area. It is worth while contacting your local landcare representative (see Catchment Contacts at the end of the manual) if you are interested in undertaking a revegetation project as funding and technical assistance may be available to you.

Land for Wildlife Program

The Department of Conservation and Land Management (DCLM) coordinates a voluntary scheme that aims to encourage and assist landholders in WA to provide habitats for wildlife on their property. The Land for Wildlife scheme can offer advice and assistance whether you manage a farm, bush block, a shire reserve or a roadside reserve. Such advice includes:

- How to integrate wildlife habitat with other uses of private land to the benefit of the landholder and wildlife, through farm and catchment planning.
- How to manage remnant bushland and the fauna occurring in the area.
- The ecological role and requirements of native flora and fauna.
- How to include wildlife aspects into revegetation schemes and landcare.
- Information about other forms of assistance incentives that are available.

Contact information for your local Land for Wildlife Officer is included at the end of this manual in the Catchment Contacts list.



RETAINING BIRD DIVERSITY

It has only recently been realised that the kinds of plants many of us are planting in our gardens or on our farms to attract birds, actually attract the bigger, more aggressive nectar-feeding species, such as Red Wattle Birds and New Holland Honeyeaters, with negative results for the smaller species such as Spinebills.

In addition, many people blame birds such as Kookaburras, Ravens [crows] or Butcher Birds for the decrease of the smaller birds, but research has shown that their impact is relatively small. A lack of a good mosaic of habitat is really the culprit.

Here are some guidelines to help you establish a garden, corridor or windbreak that will attract and sustain a diversity of bird species. Following these principles will help keep the variety of birdlife in our region for which we are so well known.

- Don't start by planting the bigger, longer flowering plants such as the hybrid Grevilleas [the so-called 'Tropical Hybrids'; Robyn Gordon, superb, sylvia, honey gem, coconut ice, and numerous others] or *Eucalyptus leucoxylon* subsp. *rosea*. Because of their long flowering period and large blooms, these will attract the bigger and more aggressive honeyeaters. Because of the constant availability of copious high-energy nectar, they are able to stop their natural dispersive habit of travelling to different food sources, and will take up permanent residence on your property. Their strongly territorial instincts will see them fighting off the other smaller nectivores.
- Instead, start your nectar section with small flowered, long-tubed plants such as kangaroo paws, *Hakea* sp., *Chorilaena* sp, small flowered *Grevillea* sp, *Adenanthos* sp, *Calothamnus* sp. See the local plant list in Appendix 1 for bird-attracting plants, of all sizes.
- The nectar reward is less in these smaller flowered plants, but worth while for smaller birds which are able to be far more opportunistic, taking small doses where they can.
- Build up on these smaller plants, trying to create all levels, from ground cover to small shrubs to a few carefully chosen trees.
- Reduce the size and amount of open spaces in your garden or planting area. Smaller birds are justly fearful of predators and will often not cross open areas. Plant clumps of smaller and preferably, some prickly, plants. Many plants are prickly, like *Hakea* sp., and *Grevillea* sp., without being thorny. Many small birds need plants under a metre in height for nesting and habitat.
- Don't forget the insect and seed eaters, such as robins, wrens and native pigeons. Plant *Melaleuca* sp, *Agonis* sp, *Taxandria* sp and *Acacia* sp. for them.
- **Please don't feed the birds. Put out water instead.** Studies have shown many negative impacts from artificial feeding of birds, from birth defects to liver damage to de-calcification of bones. If you give them the habitat they need, they will feed themselves and stay healthy into the bargain.

For further information:

Flora for Fauna

<http://www.floraforfauna.com.au/>

Birds Australia

<http://www.birdsaustralia.com.au/>

Bird Observers Club [inc. info on nest boxes]

<http://www.birdobservers.org.au/>



*Cape to Cape
Catchments Group*

Part C

Property Managment in the Cape to Cape Catchments

LANDOWNERS' RESPONSIBILITIES

All rural and semi-rural landowners have a number of landcare responsibilities, a number of which are also legal responsibilities. Whether legal requirements or not, the following issues need consideration by all rural landholders in order to collaboratively achieve quality natural resource management throughout the Cape to Cape area.

Vegetation Clearing Restrictions

The retention, protection and management of native vegetation is one of the highest priorities for landcare within the Cape to Cape catchments area. While the catchment includes a large area of State Forest and National Park, the central portion has been widely cleared with only a small amount of native vegetation remaining on private land. Clearing of native vegetation should be undertaken as a last resort only and minimised where possible.

State Regulations

In terms of State Clearing Regulations, amendments to the *Environmental Protection Act* are currently being enacted in Parliament, 2004. One of these amendments introduces a new process for applying to clear native vegetation. Under the proposed changes, all clearing of native vegetation in the State will require a permit, unless it is for an exempt purpose. These provisions will replace the Notice of Intent provisions in the Soil and Land Conservation Regulations, which will be repealed once the amendments to the *Environmental Protection Act* become law.

Local Government Controls

Even where State approval is granted, specific permission to undertake clearing is also required from the local government. Statutes and policies regarding the removal of native vegetation vary across the Cape to Cape catchments area, and depend on local government boundaries, land use zoning and sub-catchment boundaries.

In the Shire of Augusta–Margaret River all clearing is treated as 'development' and therefore a development application is required to be submitted

to the Shire prior to any clearing of native vegetation.

In the Shire of Busselton, a development application is required for some areas and land use zonings. You will need to check these requirements with the Shire as they relate to your property if you intend to undertake any clearing.

Special Restrictions in Proclaimed Water Catchment Areas

Additional responsibilities and regulations apply for landholders whose property lies within a proclaimed catchment area. In the Cape to Cape area, the Margaret River Water Catchment Area, east of the town site is the only such proclaimed water catchment area. This area was proclaimed in 1947 for the purposes of managing the catchment area of the water supply that now services the towns of Margaret River, Cowaramup, Gnarabup, and Prevelly.

Landowners in this area need to be mindful that activities they undertake on their properties have the potential to affect the quality of drinking water.

Certain activities and land uses in this area require special permission from the Department of Environment (previously the Water and Rivers Commission). In some cases specific land uses are prohibited. Refer to the current working draft *Ten Mile Brook and Margaret River Catchment Area Draft Water Source Protection Plan* (2003) Department of Environment, Water Resource Protection Series, Report No WRP Draft.

If your property lies within the Margaret River Water Catchment Area you should contact the Department of Environment before undertaking activities such as vegetation clearing, dam construction or land use change to determine appropriate approval requirements.

Control of Declared Plants

Invasive weed species can only be controlled effectively if all landholders and agencies participate. For some weed species, there are also legal obligations to undertake control.

The following chapter on Weeds lists the Declared Plants in the Cape to Cape subregion.

WEEDS

Why Control Weeds?

Many people only think of weeds as the nuisance plants that they pull out of their gardens. Weeds however are a major problem in Australia. They represent a serious threat to Australia's primary production and to our natural environment. The cost of weeds to agricultural industries alone has been estimated at over \$3.3 billion per annum and the cost to our native ecosystems is incalculable (National Weeds Strategy, 1999).

Weeds:

- Reduce farm and forest productivity;
- Displace native species;
- Reduce the capacity of remnant bushland to regenerate itself;
- Contribute significantly to land degradation;
- Replace diverse native communities with simplistic ecosystems dominated by a few species;
- Change the resources available for fauna by changing the habitat and reducing food availability; and
- Often lead to an increase in fire hazard.

In agriculture, unwanted plants in crops or pasture reduce yield and contaminate crops, poison stock, reduce stock-carrying capacity, downgrade wool and taint milk.

How Did They Get Here?

Many plants that are now weeds were introduced to Western Australia intentionally as garden plants or pasture species. *Watsonias*, *Gladioli*, *Freesias* and *Pelargoniums* (geraniums) have been used in WA gardens since the late nineteenth century.

Bridal Creeper was introduced at the turn of the century and was popular in bridal bouquets, and the spectacular flowers of arum lily have always been popular at funerals.

All of these plants are quite beautiful but unfortunately they have not stayed in gardens. They are very successful and efficient at spreading and now, along with a whole lot of other weeds, are widespread throughout the Cape to Cape catchments.

Your responsibilities

Whether you have a small block or a large farm, as a landowner, the weeds on your block are your responsibility.

Some weeds are declared under the *Agriculture and Related Resources Protection Act* (1976) and legally must be controlled by landholders. Declared weeds that are a problem in the Cape to Cape catchments include:

- Arum lily
- Blackberry
- Cape tulip
- Apple of sodom
- Paterson's curse
- Doublegee
- Narrow leaf cotton bush
- Variegated thistle
- African thistle
- Downy thorn apple

In addition the following water plants are declared:

- Water hyacinth
- Salvinia
- Parrots feather

Other pest plants currently include bridal creeper, watsonia, blue lupin, wild radish, tagasaste, geraldton carnation weed, african love grass, veldt grass, victorian teatree and pennyroyal, as well as others.

Living Near Bushland or Waterways

If you live anywhere near bushland or waterways you have an added responsibility for protecting our biodiversity from the threat of weeds.

Woody Weeds and Garden Weeds

There is an increasing problem in our region and indeed throughout Australia with particular plants escaping gardens and invading bushland, waterways and even open space areas. Plants such as blackwood (*Acacia melanoxylon*), sydney golden wattle (*Acacia longifolia*), sweet pittosporum (*Pittosporum undulatum*), lantana (*Lantana camara*), lavender (*Lavandula* spp), morning glory (*Ipomoea indica*) and blue periwinkle (*Vinca major*) are just a few species that are a problem in the region.

Special consideration needs to be given to the plants you use in your garden so that you are not the cause of future weed problems (Refer to the Woody Weeds list in Appendix 2 to find out what not to plant). There are lots of beautiful local native species that can be used in gardens with the added bonus that once established they require little or no fertilising or watering, as well as attracting native birds to your garden.

Never dump your garden cuttings in bushland, wetlands or creeks, as they can be the source of weed invasions.

If you have bushland on your property and you wish to restore and/or maintain it you will need to control weeds. If you ignore weeds hoping they will go away they will continue to spread and many will eventually become the dominant species in your bush.

Controlling Weeds

The war against weeds can be fought if all land-owners and agencies control problem species on their property.

The first step to managing weeds is to undertake active control. Specific advice on the control of key problem species in the cape to cape catchments is outlined in the section below.

The Shire of Augusta-Margaret River has recently formed a Weed Action Group that aims to develop and implement a weed action plan. Contact the Shire's Environmental Coordinator for details.

(NB Photos and material for the following section have been taken from Moore and Wheeler (2002) Southern Weeds and their Control. Department of Agriculture of Western Australia.)

perennial grasses



cape tulip



victorian teatree



sorrel



slender thistle



watsonia



bridal creeper



arum Lily



blackberry



doublegee



dock



capeweed





SPECIFIC WEED CONTROL ADVICE

(By John Moore – Department of Agriculture)

Blackberry

Rubus species

ROSACEAE

Description

Perennial plants with arching prickly stems (canes). The stems take root where they touch the ground, often forming dense thickets. The broad leaves are 3-15 cm long and divided into 3-5 toothed leaflets. The white or pink-tinged flowers each have 5 rounded petals 7-20 mm long and numerous stamens. The succulent and delicious fruits are an aggregation of numerous tiny fruitlets and are at first red but turn black as they mature. Native to Europe, blackberry is a declared plant and a serious weed of creek lines, spreading into forest and woodland along creek lines. It flowers in spring and summer.

Control

Mechanical control is difficult and most of the root system must be removed for effective control. Burning is not effective apart from allowing better access. It is difficult to eradicate. Three annual, summer applications of 100mL of Grazon® plus 25 mL of Pulse® in 10 L of water has provided eradication on 30% of sites when assessed 10 years later. On large infestations, 1 g metsulfuron (600g/kg) plus 25 mL Pulse® in 10 L water, applied in summer when the blackberry is actively growing, provides a cheaper option to reduce the size of the infestation before Grazon® is used. Grazon will damage most broad-leaved species but is the only chemical that has provided reliable eradication. It has little effect on grasses so the area is not left bare and this also helps reduce seedling establishment. 100 mL glyphosate in 10 L water provides reasonable control and can be used in sensitive areas. Repeat as new growth appears. Trounce® (a mixture of glyphosate and metsulfuron) plus Pulse® is also effective. Grazing with goats is reasonably effective. Replant native species after control has been achieved. Biocontrol rust fungi have established but have had little impact.

Bridal creeper

Asparagus asparagoides

ASPARAGACEAE

Description

A climber with wiry stems arising from tuberous roots, and sprawls aggressively for several metres, even climbing quite high into trees. Bridal creeper has shiny heart-shaped 'leaves' up to 7 cm long. Small white flowers occur all along the stems, each with 6 free petals about 5 mm long. Each flower has 6 stamens with orange to red anthers. The fruits are red fleshy berries up to 1 cm across. Native to southern Africa, bridal creeper is a very serious environmental weed being extremely invasive and eventually smothering native vegetation. Birds quickly spread the bright berries. It flowers in spring, dies back over summer and then shoots away in autumn. Other *Asparagus* species also have the potential to become problem weeds. Bridal creeper is not likely to be confused with native species.

Control

An effective long-term method of control is from 2 natural enemies of bridal creeper approved for release in Australia. They are the leafhopper and the rust fungus.

The leafhopper lives on the underside of bridal creeper leaves. Eggs are laid into the leaves and hatch 4-7 days later. Both adults and nymphs damage bridal creeper by sucking out the contents of the leaves, turning the leaves white.

The rust fungus appears as wart-like structures producing millions of infectious orange and brown spores. The fungus reduces the plant's ability to photosynthesize and is parasitic. It is spread by wind and can survive hot summers when the bridal creeper dies back.

For small infestations of bridal creeper it is best to spray, with the aim to eradicate. If it is a large infestation, the biological control agents are the best solution. Rust fungus and leafhopper are quite slow to spread. Hand distributing the rust and leafhopper

will help to speed up the rate of dispersal. Further information can be obtained by contacting the Cape to Cape Catchments Group.¹

¹ *Source:* Bridal Creeper Biological Control Research (brochure) available at www.ento.csiro.au/bridal_creeper/support_docs/BC_Brochure.pdf

One-leaved cape tulip

Moraea miniata

IRIDACEAE

Description

Herb with 2 or 3 sprawling leaves produced annually from a small corm. The branched flowering stem has short-lived pink to orange flowers. The flowers each have 6 petals to 2.5 cm long, 3 stamens and a 3-branched style in which each branch has 2 short lobes or 2 short crests. It reproduces by corms, cormels and bulbils, which may be found in the leaf axils and the withering flowers. Prior to flowering cape tulip can be recognised by the browning-off of the leaf tips. Cape tulips were previously assigned to the genus *Homeria*. It flowers in late winter and spring.

It is toxic to stock. Most deaths occur in animals that have recently been introduced to the plant.

Control

Control by manual removal is difficult due to many cormels formed around the basal corm and bulbils in the leaf axils and flowers. Dig plants with surrounding soil and incinerate or drench with diesel. Cultivation to 150 mm provides control if done after the old corm shrivels and is exhausted and before the new corms form. This is in June or July but may be September. Dig up plants to determine their stage. Clear trash by burning or cultivation in late summer. Hand spray until just wet in June to early September each year with one of the following mixtures: 0.2g of chlorsulfuron (750g/kg) or metsulfuron (600g/kg) or 100 mL glyphosate (450 g/L) in 10 L water plus 25 mL Pulse®. Use 50 mL amatol (250g/L) plus 50 mL atropine (500g/L) plus 50 mL 2,4-D amine (500g/L) plus 25 mL Pulse® in 10 L water for areas such as firebreaks. In sensitive areas in spring, use a blanket wiper or sponge glove using 1 L of glyphosate or 2g of

chlorsulfuron or metsulfuron in 2 L of water. Control normally takes several years and follow up is essential for good control. Cultivation to expose the corms a few weeks after spraying may improve control.

Capeweed

Arctotheca calendula

ASTERACEAE

Description

An annual daisy with a flat basal rosette of deeply lobed leaves. The leaves are 3 to 25 cm long, green on the upper surface but the lower surface has white hairs. The daisy flower heads, up to 6 cm in diameter, are held on individual stalks, with the radiating petal-like florets yellow and the tiny central florets black. Tiny woolly fruits are topped by minute scales. A common weed of pastures, crops and roadsides, but also quite common in disturbed bushland. Native to South Africa. Flowers in late winter and spring.

Control

In Clover pastures, spray-grazing with 500-1000 mL/ha of 2,4-D amine (500 g/L) in winter or spray-topping with 500 mL/ha paraquat (250g/L) at budding in spring for a number of years will lead to very low levels. In crops there are a number of post emergence options. Lontrel® and terbutryn are preferred because they have some soil residual action. In grass areas, picloram containing products provide longterm control. In bushland, 300 mL/ha Lontrel® or 5 mL plus 25 mL of wetting agent in 10 L water will provide good control and is safe on many native species.

Glyphosate (450g/L) at 500-1000 mL/ha or 10 mL in 10 L of water is also fairly selective in bushland and roadside situations if applied when young or at the budding stage. Manual removal before flowering is effective. Mowing is only effective if repeated regularly and close to the ground. Cultivation can be variable as capeweed transplants readily in wet conditions. Grazing is ineffective. Replant shrub and tall species to reduce light levels.

Arum lily

Zantedeschia aethiopica

ARACEAE 124

Description

Arum lily has a tuft of dark green, shiny, somewhat succulent leaves arising from tuberous roots. The leaf blades are heart-shaped to arrow-shaped and usually about 25 cm long on a stalk almost as long. Easily recognised by its conspicuous large white funnel-like 'flower' about 10 cm across, which has a central pencil-like column of minute male and female flowers. In fruit the tiny female flowers at the base of this column are replaced by orange-yellow berries. Native to South Africa, arum lily is a common and widespread serious weed of pasture and bushland, particularly of damp areas but also invading drier sites. The berries are spread by birds. Arum lily may be toxic to stock. Flowers mostly late winter and spring. This very distinctive plant is not likely to be confused with any native species.

Control

Mechanical removal is only effective if all the root fragments are removed. Multiple rotary hoeing over a few years provides control. Cut flowers to prevent birds spreading seed. Encourage control on a district basis to reduce re-infestation. Herbicides provide the most effective control. Use 1g chlorsulfuron (750g/kg) plus 10 mL 2,4-D amine (500g/L) plus 25 mL Pulse® per 10 L of water. Spray plants until just wet in late winter before the flowers start to wither. Repeat annually. Alternatively, use 1g metsulfuron (600g/L) plus 25 mL Pulse® per 10 L water as above. In sensitive areas a blanket wiper may be used to apply these products. Glyphosate is relatively ineffective.

Dock

Rumex species

POLYGONACEAE

Description

Erect herbs with leaves in a basal rosette and also up the stem. The small flowers are arranged in whorls

up the flower spike, greenish in colour but turning reddish when in fruit. Each flower has small floral segments, 6 stamens and 3 styles. The fruit is enclosed between 3 valves (the enlarged inner floral segments).

Curled dock (*Rumex crispus*)

A tall plant up to 1.5 m with pointed oval leaves 4-24 cm long. The leafless inflorescence has densely clustered flowers and fruits. The fruit valves are reddish brown, swollen in the centre, with the margins smooth and lacking teeth. Native to Europe and south-west Asia, a weed of creek lines, pasture and disturbed woodland. Flowers in winter, spring and early summer.

Fiddle dock (*Rumex pulcher*)

Plant to 0.5 m with rounded oblong leaves, the basal ones sometimes slightly constricted in the middle and appearing "fiddle-shaped". The leaves are 4-15 cm long. The leafy inflorescence has distant whorls of flowers and fruits. The fruit valves are brown, swollen and warty in the centre, the margin with prominent stiff teeth. Native to the Mediterranean region and south-west Asia, a common weed of creek lines, pastures and waste land. Flowers in spring and early summer.

Control

Remove isolated plants by cutting their roots at least 20 cm below ground level. Individual plants may be wiped with a mixture of 1 L glyphosate (450 g/L) in 2 L water. On small infestations 0.5 g chlorsulfuron (600 g/kg) plus 100 mL Tordon®75-D in 10 L of water in winter will control existing plants and seedlings for about a year. Some seed remains viable for 20 years. 2 L/ha glyphosate can be used selectively in some seasons when dock is green and annuals are not. Metsulfuron is also effective. Grazing and mowing usually lead to greater stands. Plant tall-growing perennial species to increase the levels of shade and help reduce reinvasion.

Doublegee, Spiny Emex

Emex australis

POLYGONACEAE

Description

Ground-hugging or sprawling herb with ovate leaves 2-7 cm long. The greenish inconspicuous flowers are in small clusters. The flowers are unisexual but both male and female flowers occur on the same plant. The male flowers have 5 or 6 tiny floral segments and 4-6 stamens. The female flowers are 6-lobed and have 3 styles. The fruit is woody with 3 rigid sharp spines. Native to South Africa, doublegee is a declared pest plant and is a widespread serious weed in agricultural areas and on waste land. Flowers in spring.

Control

Manually remove isolated plants and burn them. Spray a 10 m area around them with a mixture of 100 mL of Tordon® 75-D in 10 L of water to help control seeds germinating later in the season. Small areas should be fenced off to prevent stock, people and vehicles spreading the seed. In bushland areas, wipe actively growing plants with a mixture of 1 L glyphosate (450g/L) plus 2 L water. For small areas, apply a mixture of 0.5 g metsulfuron (600g/kg) plus 100 mL Tordon® 75-D to actively growing plants before flowering. Inspect areas 3 times a year for several years and repeat control if seedlings emerge. 50 mL glyphosate (450g/L) in 10 L water applied before flowering kills existing plants but tends to leave the area bare and often leads to greater infestations of doublegee. Young plants can be manually removed but older plants tend to break off and regrow. Doublegee produces seed very quickly so early control is essential. Larger areas in bushland can be selectively controlled with 1 g Broadstrike® plus 100 mL spray oil in 10 L water when the plants are young and repeated every 8 weeks if necessary.

PERENNIAL GRASSES

POACEAE

Description

Water Couch (*Paspalum distichum*)

Coarse grass spreading by runners. The inflorescence is of 2 or 3 slender spreading branches

each with 2 rows of small spikelets. Each spikelet is 2.5-3.5 mm long. Native to tropical and subtropical areas of the world, a weed of wetter disturbed areas, cultivation, watercourses and wet pastures. Flowers in summer. Other couch grasses include: *Cynodon dactylon*, a softer grass with narrower leaves and the inflorescence is a whorl of radiating branches with 1-3 mm long spikelets, and *Elytrigia repens*, a slightly rough grass with similar broad leaves. The inflorescence is an erect spike with larger, 8-17 mm long, alternate spikelets.

Kikuyu (*Pennisetum clandestinum*)

Coarse grass spreading by runners. The spikelets are hidden among the leaves but the stamens can be seen when flowering as long white thread-like filaments. Native to eastern Africa, a common weed of disturbed land near settlements or pasture. Flowers in summer.

Phalaris (*Phalaris aquatica*)

Tufted grass with 1 m stems carrying green cylindric flower heads 1.5-15 cm long with numerous densely packed spikelets which are each 4-7 mm long. Native to the Mediterranean, a weed of wet disturbed areas, drains and water-courses. Flowers spring and summer.

Buffalo grass (*Stenotaphrum secundatum*)

Coarse grass spreading by runners. The inflorescence a thickened axis 4-10 cm long which has small spikelets embedded along one side. Each spikelet is 4-5 mm long. Native to tropical and subtropical areas of America and Africa, a weed of watercourses, roadsides and swamps. Flowers spring and autumn.

Control

Avoid dumping garden refuse containing these grasses in areas where they may establish. Manual control is usually very difficult. 100 mL glyphosate (450g/L) plus 25 mL Pulse® in 10 L of water applied when the grass is actively growing is the most effective control. Repeat every 8 weeks or when regrowth reaches about 5 cm tall. Mowing and cultivation are usually ineffective. Burning is more variable. Selective control can usually be achieved on these species by spraying with 800 mL/ha

Verdict®520 plus 1% spray oil. Use 10 mL Verdict®520 plus 100 mL of spray oil per 10 L water for hand sprays.

Sorrel

Acetosella vulgaris

POLYGONACEAE

Description

Slender herb, often reddish tinged. The acid-tasting leaves are arrow-shaped, 2-5 cm long with a pointed tip and two basal lobes. The tiny reddish tinged flowers are arranged in whorls up the slender flower spikes, each flower with floral segments only 2 mm long. The male and female flowers are on separate plants, the male flowers with 6 stamens and the female flowers with 3 fringed style tips. The nut-like fruit is enclosed between the enlarged inner 3 floral segments. Native to Europe and Asia, sorrel has become a problem weed of pastures, roadsides and waste places. Flowers in autumn, spring and summer. Previously known as *Rumex acetosella*.

Control

Manual removal is extremely difficult and attempts often lead to greater infestations. In bushland areas, hand spray with a mix of 0.2g metsulfuron (600g/kg) plus 25 mL Pulse® in 10 L water in winter or spring. On small areas, add 0.5g Oust® for residual control of seedlings and rhizomes. This mix will kill most broad-leaved seedlings. Repeat annually if plants appear. One year after the last spray replant to tall-growing perennial species. 50 mL glyphosate (450g/L) in 10 L water applied in winter is reasonably effective but rarely provides eradication. Mowing and grazing are ineffective. Cultivation in spring/summer provides some control as it desiccates the root system. Dicamba and Tordon®242 are also used in crops.

Coast teatree (victorian teatree)

Leptospermum laevigatum

MYRTACEAE

Description

A large shrub to 5 m high with greyish green foliage. The leaves are leathery, 15-30 mm long and 4-9 mm

wide. The single white flowers have 5 small but broad petals spreading above a cup-shaped leathery base. There are numerous stamens apparently in a ring but actually in groups of 5-7, a group opposite each petal. The domed woody fruit opens by 7-10 valves to release its tiny seeds. Native to eastern Australia, it is now a serious weed of roadsides and is invading bushland around Albany and also Esperance, particularly in sandy coastal areas. Native species of *Leptospermum* differ in having 3-5-celled fruits. Possibly confused with the native silver teatree (*Leptospermum sericeum*) of granite outcrops near Esperance, but differs in flower colour, silver teatree having pink flowers. The native *Homalospermum firmum* of wet areas in the west of the region differs in its narrower leaves only 1-4 mm wide as well as its fewer-celled fruits. Seedlings of myrtle-leaved milkwort (*Polygala myrtifolia*) and coast beardheath (*Leucopogon parviflorus*) look similar.

Control

Slash, fell or bulldoze thickets, then burn when dry. Spray regrowth until just wet with a mixture of 100 mL of Grazon® plus 25 mL Pulse® in 10 L of water. Individual plants can be controlled by applying a mixture of 200 mL of Access® in 10 L of diesel to the lower 50 cm of each trunk. Overall spraying with 100 mL glyphosate (450g/L) plus 25 mL Pulse® in 10 L of water is also effective. Seedlings can be manually removed in the first year or two. Older seedlings tend to break off and regrow. Small bushes tend to regrow when cut but older bushes tend to die. Plant shrub and tree species 2 years after the last spray to increase the levels of shade. Grazing will control seedlings. Coast teatree roots produce chemicals that reduce the growth of companion plants.

Slender thistles

Carduus species

ASTERACEAE

Description

Slender thistle (*Carduus pycnocephalus*) has discontinuously winged spiny stems. The flowerheads are 10-15 mm wide and arranged in clusters of 1-3 heads. The seeds have about 20 ribs.

winged slender thistle or sheep thistle (*Carduus tenuiflorus*) has continuously winged spiny stems. The flowerheads are 8-10 mm wide and arranged in clusters of 3-10 heads. The seeds are smaller with 10-13 ribs. Both have spiny-lobed leaves with cobwebby hairs. The purple flower-heads are clustered and the bristles topping the fruits are only very minutely barbed. They originate from Europe and are common weeds of pasture, roadsides and disturbed bushland. Flowers in spring and early summer.

Control

Prevent seed set for several years. Mowing or preferably slashing before the bud stage is effective if it is repeated to control new regrowth. Seeds can develop from reserves in the stem if substantial amounts of stem remain attached to the buds. Manual removal is also effective but often unpleasant due to the spiny nature of the plant. Blanket wipers or wick applicators using 1 part glyphosate (450g/L) to 2 parts water can provide partially selective control. Overall spraying with 500 mL/ha Lontrel® provides reasonably selective control in bushland situations. Spray grazing when young with 500 mL/ha 2,4-D amine (500g/L) provides cheap control in pasture and partial control in bushland. As these thistles are annuals, control of the seed bank is the key to success. Control neighbouring infestations to reduce spread by birds. Wind rarely takes seed more than 100 metres from the parent plant. Replant to ground-covering species and avoid disturbance to reduce the bare areas present at the break of the season. Cultivation is effective. Grazing with sheep to reduce pasture then grazing with goats at flowering provides good control in 3 years.

Watsonia

IRIDACEAE

Description

Watsonias are tufted herbs with erect sword-shaped leaves to 1 m in length, which are produced annually from a corm. The flowering spike is usually

un-branched and up to 2 m high with many large trumpet-shaped flowers. Each flower has a curved tube and 6 spreading lobes 1.5-3.5 cm long, 3 stamens and a slender 6-branched style. Reproduces from a large corm and small bulbils that are mainly at the base of the leaves but occasionally also up the flower spike. Native to South Africa, now common in the south west. Watsonias are serious weeds of roadsides, watercourses and railway lines, often invading bushland. Flowers spring and early summer. Watsonias are often confused with *Chasmanthe* and *Crocosmia*. kangaroo paws may be confused with watsonias when not in flower. Kangaroo paws (*Anigozanthos species*) are darker green, fleshier, have un-ribbed leaves, with older leaves often mottled with dark markings. The dried remains of flower spikes are broad and branched in the common south west tall kangaroo paw (*Anigozanthos flavidus*).

Control

Grazing provides effective control. Cultivation to 100 mm provides good control if done after the old corm is exhausted and before the new corms form or before the flower stem emerges. A follow-up cultivation is usually needed. Mowing and slashing are usually ineffective unless repeated very regularly. Dig up isolated plants and burn the corms and bulbils. Thick infestations are difficult to control manually. 100g 2,2-DPA (740g/kg) plus 25 mL wetting agent in 10 L water is the preferred herbicide. It provides some residual control of seedlings and is more selective than 100 mL glyphosate plus 25 mL wetting agent per 10 L water. Apply from flower stem emergence to mid-flowering for the best control. For large areas use 10 kg/ha 2,2-DPA (740g/kg) plus 0.25% wetting agent. In sensitive areas use a sponge glove with 1 L of glyphosate (450g/L) plus 2 L water. Eradication from an area can usually be achieved in 2-3 years. Start control at the top of the catchment to reduce reinvasion by bulbils carried in water flows.

FERAL ANIMALS

Feral animals such as foxes and rabbits can cause significant losses to agricultural producers. Foxes and feral cats are also one of the most significant threats to native fauna species in the southwest and are considered a priority for control from a nature conservation perspective. Large populations of rabbits can have a devastating impact on native fauna and flora by degrading bushland and streamlines through overgrazing and soil disturbance.

The following advice has been drawn from the Farm Notes series distributed by the Department of Agriculture WA. For more detailed advice on the control of feral animals on your property you should contact the Department of Agriculture directly (see Catchment Contacts at the back of the manual).

Foxes

Control Tips

The available control options are often more effective when used in combination. Over and above this, the following points may assist in achieving successful control in your area:

- Foxes are often poisoned after eating rabbits killed by 1080, so it can be more effective to control rabbits first.
- If foxes are active where predation has previously occurred, they should be controlled prior to lambing or kidding.
- Farmers who time their lambing or kidding later than their neighbours may suffer losses from foxes that have already learnt to seek lambs or kids as prey.
- The most effective fox control is achieved during late winter and spring. At this time foxes are less mobile, they are rearing young and food demands are high. At other times there are more young animals to move into vacated territories.
- A district-wide campaign involving community groups can overcome the problem of reinfestation by covering a large area.

Baiting

Baiting is the most cost-effective and efficient means of reducing fox numbers, particularly over large areas.

Trained landholders can purchase bait products containing 1080 (sodium fluoroacetate) after they have obtained Baiting Approval from an authorised officer of the Department of Agriculture.

If baiting directly for foxes, baits should be laid in late winter and spring when the cubs are small. Baits should be buried or secured and all uneaten baits should be retrieved. You should advise your neighbours when you are carrying out fox control, as pets will be at risk if they eat one of the baits.

1080 is quickly broken down in the environment. Many native animals have developed a high degree of tolerance to 1080, while foxes (and domestic dogs and cats) are very sensitive to the poison.

Husbandry Methods

Holding livestock in small paddocks can help to decrease predation on newborn lambs and kids. These enclosures make it easier to monitor the flock and reduce the chances of young being left unattended. Shed lambing or kidding can be used to prevent predation of valuable animals. Some producers have successfully used trained guard dogs to protect their flocks.

It should be noted that this method really only serves to protect agricultural interests and does not result in control of the source of the problem.

Fumigation and Den Destruction

Den fumigation can be effective in reducing fox numbers. Cubs are born during August and September and fumigation must be carried out during the first 10 weeks or so that the cubs are confined to the den. The vixen is likely to be killed in the den only during the first three weeks after the birth of the cubs. For information on how to fumigate, refer to the relevant Agriculture Department Farmnote 'Fumigation for rabbit control' (Agdex 671) or contact the Department of Agriculture directly. Where the den is accessible to appropriate machinery, deep ripping can destroy it.

However, care should be taken not to cause soil erosion.

Shooting

Shooting can be effective in reducing fox numbers locally. Recommended equipment comprises a good quality spotlight (100 watts) and a small calibre (for example, 0.22 Hornet, 0.222), high velocity rifle fitted with telescopic sights.

FERAL CATS

Feral cats are becoming a problem in the southwest with domestic cats wandering or being dumped in bushland. There is clear evidence that predation by feral cats has caused the decline of native fauna. Feral cats threaten the continued survival of some native animals and have been shown to thwart re-introduction programs for endangered species such as the numbat.

Cats can carry and pass on a disease called Toxoplasmosis which can affect small mammals such as possums and quendas, and the disease can also be passed onto humans. The Shire of Busselton has adopted a local law that requires registration of cats in line with dogs and requirements for owners to keep cats confined to their property.

Methods of Feral Cat Control

- Use a wire cage with bait such as sardines. Wire cage traps can be purchased through Sheffield Wire Products or contact your local Shire Ranger or CALM office.
- Shoot feral cats on sight if they are sighted on your property. The best time is dusk or dawn.
- Ensure domestic cats are sterilised and kept inside.
- Take unwanted kittens, cats and strays to a local cat adoption centre.
- Poison 1080 baits are sometimes effective.

Sources

Kemp, Cherie (2003). *Feral Cat Control*. Land for Wildlife Information Sheet.

Environment Australia (1999). *Threat Abatement Plan for Predation by Feral Cats*.

<http://ea.gov.au/biodiversity/threatened/tap/cats/3.html>

RABBITS

Each year rabbits cause an estimated \$600 million worth of damage to agriculture. They also cause serious erosion problems, prevent native vegetation from regenerating, attack domestic gardens and burrow under farm sheds and other buildings.

Landholders planning to grow broadacre, horticulture or tree crops or to preserve native vegetation need to control rabbits first.

Even landholders not growing crops are still legally obliged to control rabbits to protect their neighbours' land from the impact of rabbits. The following methods can be used for rabbit control:

- Poison baiting
- Warren fumigation
- Warren ripping
- Harbourage destruction
- Rabbit-proof fencing; and
- Shooting

The key to success is persistence and choosing the best control method for the particular situation. An approach that combines all possible options will give the best long-term result. The involvement of surrounding landholders will reduce the extent and speed of re-infestation as a large area will be controlled simultaneously.

Control Advice

The best control is achieved in late summer when rabbit numbers are decreasing and feed is limited.

Baiting

Baiting is the most cost-effective method to reduce rabbit populations, particularly over large areas, but restrictions do apply.

1080 Baits

Several types of 1080 (sodium fluoroacetate) rabbit baits are available. Trained landholders can purchase bait products after they have obtained Baiting Approval from an authorised officer of the Department of Agriculture. Once again, domestic stock and pets are very sensitive to the poison in both baits and poisoned rabbits.

Pindone Baits

Pindone is an anticoagulant with an effect similar to products used in some rat poisons. It can sometimes be used near settlements where pets might be at risk from 1080 because, unlike 1080, an antidote is available for pindone.

However, pindone poses a risk to native animals including kangaroos, birds of prey and perhaps bandicoots. The poison must not be used in the presence of these animals.

Warren Fumigation

Fumigation is the best method to use when a few rabbits live in widely scattered warrens or inaccessible areas. Fumigant tablets (commonly Phostoxin®) are placed in burrows to release poisonous phosphine gas.

Warren Ripping

Areas where warrens have been destroyed by cross-ripping the soil are much less likely to be recolonised by rabbits. A tractor-mounted ripper is used to penetrate the soil to a depth of at least 60 centimetres.

Myxomatosis and Rabbit Calicivirus Disease (RCD)

These viruses have been introduced to help reduce rabbit numbers, but may be difficult to manipulate. Following up immediately with other control methods can enhance their benefits.

Further Information

For more information on fox and rabbit control contact the nearest Department of Agriculture office, or the South Perth office on ph. 9368 3333.

See also Department of Agriculture Farmnotes:

- Fox baiting (Agdex 674).
- Red Fox (Agdex 674)
- Fumigation for rabbit control (Agdex 671)
- Guide to the safe use of 1080 poison
- Landholder use of 1080 One Shot oat rabbit bait
- Fumigation for rabbit control
- Rabbit warren and harbourage destruction.

RAINBOW LORIKEETS

'Weeds with wings'

Trichoglossus haematodus

Description and impacts

The Rainbow Lorikeet is native to the Eastern States of Australia and was introduced to WA in the early 1960s. The Rainbow Lorikeet is a small, brightly coloured parrot 26 - 30 cm in length and weighing 105 - 133 g. The birds are quite noisy, continuously screeching while in flight and when at a food source. They favour open forest woodland habitats. While previously low in numbers they are now known to be expanding in range and numbers. Rainbow Lorikeets are known to cause damage to fruit crops and may pose a potential threat as a pest species to fruit growers. From a nature conservation perspective there is concern that they may compete with the native purple-crowned lorikeet (*Glossopsitta porphyrocephala*) and out-compete timid species like the western rosella (*Platycercus icterotis*) for nest sites. There have also been some anecdotal reports of rainbow lorikeets taking over tree hollows previously used by a colony of Gould's wattle bats (*Chalinolobus gouldii*).

Management

At present there do not appear to be any effective control measures for rainbow lorikeets. Once they are established in large numbers, shooting provides only temporary relief and lorikeets are unresponsive to a variety of scaring devices.

In order to prevent new populations from establishing in the wild, any rainbow lorikeets sighted outside the metropolitan area should be destroyed or reported to the Department of Conservation and Land Management or to the Department of Agriculture.

Source

(2002) *Rainbow Lorikeet* Department of Agriculture Farmnote No. 8/2002, by David Lamont (Department of Conservation and Land Management) and Marian Massam (Department of Agriculture).

CREATING CORRIDORS

Re-creating bushland corridors to link isolated patches of bushland on your property will have major long-term benefits for biodiversity values in your local area.

While the 'islands' of vegetation that already exist provide a good robust habitat, the creation of corridors will allow for some flow of genetic material from one to another. This may happen with a bird flying along in a few minutes, or a lizard going in one end and emerging several generations later. Creating habitat along the way can help this process. Corridors do not have to be the same width or diversity as the areas of bush you are trying to link.

Principles of Corridor Creation

Planning

In planning corridors, look at aerial photos of the greater area to highlight where your bush fits in, and potential linkages. Multiple linkages are better than single linkages. Islands linked by two or more corridors are more resilient to disturbance such as fire or predators. Working with neighbours can achieve greater results and reduce costs when ordering plants or using contractors.

Species Selection

Different species cohabit in the bush by using different zones from the ground up to the canopy. If you are planting a corridor, try to mimic this in plantings by creating layers in revegetation. We commonly plant trees, but we shouldn't forget the other layers as well, the shrubs, low shrubs, native grasses, herbs and rushes.

The best seed source for a nature conservation or corridor project is that which is closest to the site being worked on. This is local provenance seed, best adapted to the conditions on site, and most appropriate for preservation of the ecosystem. At times it may be necessary to go beyond these local populations - for example they may not be producing seed, may be diseased, or the population vulnerable from over-collection in the past. Sometimes certain species are missing -they may

have been selectively cleared, like blackbutt trees along creeklines.

Long absence of fire may mean that important species like wattles and peas are not present or producing seed at the moment, although their seed may be stored in the soil. In these cases try to source healthy seed from as close to the planting site as practical.

New plantings can contain a high percentage of fast-growing high litter-producing plants such as *Acacia* sp, Sheoaks. and native peas to accelerate this process. While the Acacias and other legumes may be short lived, they fix nitrogen into the soil, help build healthy topsoil and create conditions that favour other species. A range of species is preferred, as the longer lived, slower growing plants will increase in size and take over the site as those plants that initially filled the site die out.

Plan to collect your seed well in advance. Seed is available on some plants at all times of the year, so collecting regularly throughout the year will give you a wider range of material in your planting.

Design

While there are no hard and fast rules about how wide a corridor should be, generally wider is better. As a rule of thumb, at around 40 m width more interesting things start to happen, and you have a core in the planting, as well as two edges. Likewise, when looking at planting density, within the capability of the site, denser is generally better.

Planting does not have to be even or regular, the bush seldom works that way. Think of the planting as a mosaic of different plant communities. Create thickets of shrubs as habitat for nesting birds. The prickly plants, like some of the wattles, *Hakea* sp. and peas are good for this.

Looking After the Less Conspicuous Flora and Fauna

Recognising the role played by some of the less conspicuous components in the ecosystems and creating conditions that foster them will make the system more robust. The presence of soil fauna is an indicator of soil health.

Invertebrates are critically important in the food chain and in nutrient cycling processes. They rely on a good layer of mulch and leaf litter on the surface of the soil and a reasonable cover of plants. This combination shades the surface, regulating temperature. Fire will reduce this material, so should be timed accordingly. Avoid dividing up the area with tracks or roads wherever possible. Some species (like most birds) will easily cross narrow breaks, others like the invertebrates, are more vulnerable when exposed.

Provide habitat for invertebrates, amphibians and reptiles. Avoid the temptation to 'tidy up' logs and piles of rocks; instead, install them as part of your revegetation work. They are used as breeding sites and provide cover from predators.

The role of **symbiotic fungi** in the health of vegetation has been largely overlooked in revegetation work to date. Fungi represent an enormous component of the diversity of natural systems, and as such the addition of key fungi species is an important boost to the biodiversity of plantings.

Key fungi species have the ability to improve nutrient cycling and improve organic matter development. They also improve soil structure, making the soil more able to resist erosion. Fungi are an important diversification of food supply for animals.

Their role in increasing nutrient supply to plants may increase the plants ability to flower and set seed, consequently maximising the resilience of plantings. This is also an important consideration if you are thinking of your area as a potential seed orchard.

These species appear to be slow to reinvade areas of revegetation. Attempt to retain any topsoil in areas where you are working, or consider relocating topsoil from bush areas that are being cleared nearby.

Seedlings can be inoculated with a range of species in the nursery to introduce these species across a site.

**When relocating topsoil,
it is imperative you are certain your
topsoil is free of dieback.**

Direct Seeding or Planted Seedlings?

Direct seeding will create a more natural looking planting, with species mix and density more closely resembling a piece of bush. However, there are disadvantages and even on the best site there is no guarantee of success every time.

Direct seeding will not be appropriate for every site. Sometimes a mixture of seeding and planting is appropriate. The decision needs to be made in advance of site works, as there are some differences in the way the site is prepared for example, residual chemicals cannot be used in direct seeding areas.

SITE PREPARATION FOR REVEGETATION PROJECTS

Ripping

Ripping will assist with the absorption and retention of soil moisture and create an environment where plant roots have easier access to this resource. It may also release some nutrients.

All farmland will have some degree of compaction that will need relieving for maximum performance in tree growth. Therefore, ripping is essential on all sites where vegetation is being established on farmland.

Recent research by Gavan Mullin of the Department of Conservation and Land Management, suggests that a multi-tined machine may be the best approach to this work. These machines have a bank of tines, leaving the whole area ripped, not just a single row at even spacing. They will allow more random planting patterns if planted from seedlings, and are especially suited to plantings with a high shrub component. This treatment should also provide an excellent foundation for direct seeding areas.

Sandy soils will need to be ripped to a minimum depth of 450 mm and the heavy clays to 250 mm

It is essential to investigate each site to understand the nature and depth of the hardpans in the soil profile. A prescription for the depth of ripping and the type of machine required can then be determined. A range of equipment is available for use/hire in most areas, although the multi-tine machines are not yet widely available.

Use of a single pass planting machine that rips, scalps topsoil and plants trees is common, particularly in lighter soil types. This technique has the potential to provide good cost-effective results but must be monitored to ensure that the ripper is set deep enough to break through hardpans. The hardpan depth should be checked regularly and a separate ripping operation used where needed. This will speed up the scalping/planting pass, and ensure that roots and rocks are cleared.

Maximum shatter of the ground and consequently maximum soil aeration will be achieved by ripping in summer and autumn when the subsoils are at their driest. Little is achieved by ripping clay soils when wet.

Key Points

- Depth of ripping should be determined by site inspection (backhoe, probe, shovel). Little benefit will be gained by ripping below 500 mm unless there is a rippable hardpan within reach of affordable equipment.
- All soils benefit from ripping, including deep sands.
- The main function of ripping is to relieve stock and traffic pans, which are normally ripped at 200-400mm.
- To eliminate erosion problems ripping should be on or close to the contour.
- Do not rip across waterways.
- Mound rip lines if there is a risk of waterlogging.

On the other hand...

Waterlogging and fungal infection may increase with ripping on shallow duplex soils. Where waterlogging is suspected to be a significant risk consider mounding, which will overcome these problems.

Ripping (and any ground disturbance) may change the type and/or status of weeds on the site. This will need to be monitored.

Mounding

This technique is only essential on those sites where losses are to be expected from seasonal waterlogging. Mounds may also be necessary on seepage sites to get trees established. Generally trees respond well to mounding, as there is a stockpiling of topsoil and nutrients as well as good aeration of the soil.

Mounding can be done with a grader but this is not recommended as it is difficult to control the shape, width and compaction of the mound. Avoid trailing mounds that do not have a press wheel. The function of the press wheel is critical to mound construction, providing the profile and compacting the soil.

Key Points

- Mounding reduces waterlogging stress.
- Soil must be ripped beneath mounds.
- Mounding is not a substitute for proper drainage work.
- Caution is needed to ensure that mounds do not interfere with surface water movement. This can cause erosion or increase waterlogging.
- Mounds should be constructed in the year of planting, but with sufficient time to settle and for any weeds to germinate.
- Mounds will prevent herbicides being concentrated in the ripples.
- Growth responses have been attributed to mounds on all soil types.

- Shape of mound and compaction with press wheel are important.
- Heavy soils may require cultivating first to prevent cloddy mounds.

Conversely...

Mounds will limit access across paddocks to some degree. Leave breaks through mounds at regular intervals if access is important, e.g. for stock mustering.

Light soils may cause problems with increased exposure to wind erosion and increased likelihood of drought death.

Mounding, like any ground disturbance, may change the type and/or status of weeds on the site. This will need to be monitored. Weed control may be more difficult over mounds.

Furrowing and Scalping

Furrow-lining is the opposite of mounding, where a valley is created to plant below the soil surface. Scalping is the pushing back of topsoil to remove the weed seed burden and/or a non-wetting soil. These are generally techniques used on well-drained lighter country which is often exposed and can dry out quickly in the spring.

The dish created by the scalp or furrow-line collects additional moisture in the sandy soils and provides some shelter to the young seedlings. The furrow-lining technique may be appropriate for machine planting light country where there is no risk of waterlogging.

Although initial weed control is usually good, close attention should be paid to spring weed control. The furrow can trap windblown weed seeds and create a concentrated area of dense weed growth.

Key Points

- Furrowing or scalping are used in deep and/or non-wetting sands.
- May be useful for initial weed control, but weeds may blow into the furrowed or scalped area.
- Deeper planting will provide some wind protection.
- Furrows will collect and run water, so it is essential that they be on or near to the contour.
- Ripping to the appropriate depth beneath the furrow is still essential.

Conversely...

Removal of topsoil and its nutrients may slow the initial growth of the trees. To determine if compensatory fertilising is warranted, review the paddock fertiliser history. Integrated plantings will usually benefit from any paddock top dressing.

Weed Control

Successful weed control is the single most important aspect of site preparation to ensure tree establishment and rapid early growth. Failure to achieve good weed control will severely impact on plant survival and growth.

The aim of weed control is to provide weed-free conditions adjacent to the trees for the first year and preferably longer.

The mortality of trees with inadequate weed control relates to direct competition for moisture, particularly in the first spring and summer. In severe cases trees are smothered by growth of weeds, lodging over the top of them. Any competition for resources slows the growth of the trees and this in turn makes them more susceptible to grazing damage from animals and insects.

There are various methods of controlling weeds, however the use of herbicides is the most common. Other methods include scalping, furrow-lining, cultivation, weed mats and, in conjunction with herbicides, grazing, pasture topping etc. These can be combined into an integrated system that does not rely on herbicides alone. Although herbicides remain the main element in a weed control strategy, it is becoming more common to use an integrated strategy that combines elements of two or more methods to achieve effective weed control.

Weed Control Types and Timing

Pre-season Weed Control

Reducing weed burden a year in advance can significantly reduce chemical usage in the year of planting. It is helpful for some of the problem weeds like ryegrass.

Three options are available:

- Spray topping the paddock in the previous season.
- Reducing the seed burden through grazing.
- Fallowing (care must be taken with this option as there is high potential for erosion).

Second Year Weed Control

There is evidence that weed control in the year after planting is beneficial in some instances. Initial establishment remains the most important factor in weed control. Do not rely on second year weed control to patch up a poor first year job, however. The weed control in the first year will determine survival.

Second year weed control will achieve optimum results if the treatment is applied in May or June. Treatment of pasture weeds after the end of August usually has poor results and may not be the best use of resources.

Rabbit Control

Control of rabbits is a vital pre-planting operation. It is the responsibility of the landholder to ensure the job is done thoroughly in time for planting. Allow sufficient time, as some control methods such as poisoning are much more effective if performed in the dry months.

Do not plant trees on a site that you are aware still has a rabbit problem.

There is no such thing as 'a few rabbits', nor a warren that is 'too far away to cause problems'. Rabbits seem willing to travel large distances to eat newly planted trees. Entire plantings have been lost to rabbits, making all the site preparation and expense of planting a waste. Further detail on

methods of controlling rabbits is provided in the Feral Animals section.

BUFFERS

Supportive Landuse Adjoining Bushland

Fragmented bushland is under constant pressure from invasion of weeds, insects, and drift of fertiliser and agricultural sprays from adjoining farmland. Exposure to wind and rising water tables also exert pressure on the bush. While it is not practical to try and restore mixed species plantings across all of the cleared farmland, there may be some intermediate land uses that can be concentrated around the remnant bush to relieve some of the pressure on that bush. The importance of using local provenance seed cannot be emphasised enough.

Areas adjoining bush that are suffering from rising water tables or wind or water erosion should be particularly targeted. The lower opportunity cost of this land will also make the decision easier.

Another option is to establish commercial plantings, for example for timber species, woodlots or seed production areas. The higher water use of these plants, and the maintenance of weed-free conditions under them will benefit the adjoining bush.

Local Native Plant Suppliers

Geographe Community Landcare Nursery

Contact Busselton Dunsborough Environment Centre 9754 2049

Leschenault Community Nursery

PO Box 1741
Bunbury, 9791 4670

Margaret River Tube Nursery

Blond Street
Cowaramup, 9755 5509

Margaret River Nursery and Irrigation

48 Stewart Rd
Margaret River, 9757 2691

Bandicoot Nursery

PO Box 240
Mount Barker, 9851 1802

Hamel Nursery

Burney Rd
Waroona, 9733 1421

PLANTING TECHNIQUES

Planning Planting

When assigning priorities, plant light (sandy) ground earlier in the season. These sites are going to dry out fastest when the winter rains finish.

Assess soil moisture at a depth of 5-10 cm before starting to plant. This is important on light ground, especially sands that may be non-wetting.

Monitor planting conditions and stop if there has been no rain for 3-4 days and the forecast predicts no rain for another 3-4 days. Rain a short time after planting to set the plants in is important to their survival and vigour.

Transporting Seedlings

Aim to get seedlings in the ground with the minimum disturbance possible. This means always transporting seedlings in an enclosed vehicle. Exposure on an open vehicle can damage foliage and is an additional stress for the plant at transplant.

Ensure that any multi-deck transport system has sufficient clearance to avoid tip damage to seedlings. If in doubt load from the top down to minimise damage.

Ensure that seedlings are well watered before transporting.

Storing Seedlings

Always endeavour to transport seedlings direct from the nursery to the planting site at time of planting. If intermediate storage is unavoidable ensure seedlings are:

- Out of the wind
- Near a watering point
- Safe from stock and (other) vermin
- Somewhere easily accessible and conspicuous, where they can be easily monitored.

Seedlings in field storage will need watering at least twice a day. They will require checking even if it has been raining, especially if the rain has been accompanied by wind.

Seedlings being carried over until the next day should be left in a sheltered position and well watered. Endeavour to plant all seedlings that have been broken out before finishing for the day. Any seedlings broken out but not used should be re-potted for overnight storage if in good condition or discarded if damaged.

Planting Standards

Ensure that all planters, farmers and experienced contractors alike, have been briefed on planting standards before commencing work.

It is essential that all seedlings be well watered before being planted.

No physical damage to seedlings at breaking out or planting should occur.

Excessive root growth must be removed from seedlings. While every attempt is made to eliminate this problem at nursery stage some problems seem inevitable. Root-bound seedlings will die or suffer reduced growth if left untreated. 'Root trainer pots' should be specified in the nursery contract if ordering in advance. Give preference to nurseries using root trainer pots when buying seedlings.

Ensure that seedlings are not broken out more than an hour in advance of planting, less in windy conditions. Seedlings broken out should be covered with wet hessian to prevent drying out.

Seedlings should be planted with the top of the root ball 3 cm below ground level. In sandy soils, where there is little risk of collar rot it may be advantageous to plant deeper than this. It is critical to ensure that the soil bolus (the root ball) is covered with soil. The potting mix from the nursery is quite open and will dry out rapidly if not covered.

Seedlings must be well heeled in. They should be planted firmly enough that they cannot be lifted out by the foliage. Ensure that hand planters are stepping down on the ground, rather than kicking it, as this does not do a good job of evenly pressing the soil around the seedling. In machine planting, especially in heavier soils, ensure that the press wheels are filling the spaces in front of and behind the seedling as well as the sides. It is essential that there are no air pockets around the seedlings.

Ensure that trees are close to vertical (within 20 degrees) when planted.

Ensure that all planters are aware of spacing requirements and ask them to check their spacing regularly. Spacing may vary with species, so seedlings should be sorted such that planters understand the requirements of each species or group of species. Planting machines should be fitted with trailing chains to ensure spacing is constant.

Hand or Machine Planting

In most cases the farmer will make this decision. They will be planting with their own machine or their own hand planting tools. If they are relying on contract planters, the contractor will often have a preference, or the site will dictate what is appropriate.

Mounded sites will have to be hand planted. Hand planting is also preferable on small sites, excessively

wet sites, stony sites or sites with difficult access. Plantings with a large number of species are generally easier to plant with successive waves of hand planting.

When planting open riplines it is important to plant off to the side of the rip. Further collapse of the rip line can lead to roots being exposed. There is also a risk of simazine toxicity from soil collapsing into the rip. Performance of the trees will not be impaired by planting 15 cm to the side as the shatter from the ripping and moisture retention advantages will still apply to this zone.

Planting machines are advantageous in the lighter soils where the scalping action can be used to push aside non-wetting soils and enable seedlings to be planted deep. The furrow created will also assist in moisture collection, but it can also trap wind-blown weed seeds, creating a concentrated area of dense weed growth.

CASE STUDY – OLIVE HILL FARM

Owner: Margaret and Peter Moir

Small mixed enterprise farm, incorporating agroforestry, grazing, olive production, tourism and conservation.

Olive Hill Farm is some 60 ha, an original group settlement property on the Margaret River. It has been variously a dairy, sheep farm and runoff block. The major bush clearing took place in the seventies, when the property, including creeklines, was 98% cleared.

The Moirs moved to the property 10 years ago, and have lived permanently in Margaret River since that time. The farm was in rough condition, pastures were weedy, especially with dock and sorrel, fencing was poor to non-existent, with the whole farm virtually one paddock without internal fencing or access laneways. There were only two off-stream watering points, small sheep troughs, the Margaret River and remnant vegetation unfenced and degraded. The riverfront had little vegetation other than some fine Blackbutt, Marri and Bullich, and was suffering severe bank erosion. There were masses of rabbits, the riverfront especially was heaving with them, and mounded with warrens.

There was little shelter, all bush had been cleared other than a remnant patch of 1.5 ha, which had only trees remaining. Unfortunately, this left the property very exposed to the relentless southerlies and south-easterlies of summer, and the north-westerlies of winter storms. Additionally, in this particularly high rainfall location [average 1400 mm] winter waterlogging was a serious

management problem, which was due in large part to the over clearing.

The Moirs have a small, diversified farming operation, with a Murray Grey cattle herd breeding baby beef, and an olive grove of 1600 trees producing extra-virgin olive oil. Their most recent enterprise is an original and popular farmstay, with tourist accommodation in the picturesque renovated 1922 group settlement home on the property.

Before Peter and Margaret bought their cattle, they had to prioritise the many tasks needing attention. Margaret relates that she will always remember a local stud breeder/vet, saying to them, the four most important things for successful cattle breeding are [1] fences, [2] fences, [3] fences, and [4] fences! So Peter fenced and fenced and fenced and fenced!

Their first priority was the external fences, and then the internal fencing, creating smaller paddocks, laneways and fencing off the river and remnant vegetation. Initially, Peter fenced off quite a distance from the river but found they were unable to manage the weeds.

They obtained a fencing grant from the Water Corporation and fenced closer to the river. This was done so the fence was still quite a way back from the high water mark. The river paddock is used for hay cutting, and only grazed a couple of times each year. Stock have never been let into the fenced off river sections, but due to rampant kikuyu they crash graze in the fenced-off remnant winter creek paddock several times a year. If it were in better

condition, the Moirs feel they wouldn't need to do this, but they say they have certainly learned how very hard it is to rehabilitate the wet areas.

Cattle troughs have been placed in all paddocks that are gravity fed from the header tank. This benefits not just the environment but the stock as well, eliminating the risk of stock drowning in the river or wandering onto neighbouring properties when water levels are low, and reducing parasite transmission.

Soil testing has consistently been done, in line with best management practice. This is to ensure that fertiliser is applied in the most cost-efficient and environmentally sound way. The first test showed very high phosphorous and nitrogen, satisfactory potassium, and fearsomely high acidity, 4.2 on average. Liming had to be the first priority. They have limed several times, and been very sparing with the NPK. Nitrogen fertiliser has not been used because it would increase the soil acidity further, and suppress the clover which has become abundant. They have still been able to cut a good hay crop as well as feed the cattle; the phosphorous retained in the soil has become available to the pastures. The weed burden has decreased each year. Many weeds thrive where there is an excess of nutrients.

Revegetation has been a priority in improving the farm. Peter and Margaret say that windbreaks and corridors make a huge difference to productivity, aesthetics, and living conditions. They help stop wind blowing weeds onto the property, they improve conditions for humans and beasts, they reduce waterlogging, and they can even reduce wind-blown fire which sweeps across grass, especially uphill.

They also bring in birds, insects and other animals that are a tremendous help in controlling pests. Some 25,000 trees and shrubs, including a 5 hectare amenity planting of different Eucalyptus sp. for timber and firewood, have been planted. This is along the west boundary, and serves a dual purpose as an excellent windbreak.

The Moirs are also aware that if you want to keep the birds and other animals on the property you need to control vermin, which they have done with a zero rabbit tolerance policy, cat trapping and fox baiting. The difference has been amazing. Peter shoots rabbits, foxes and cats, 1080 baits are used, and warrens are gassed when necessary. This has [almost] eliminated rabbits, and controlled feral predators enough to see a big resurgence in the native fauna, such as quendas.

The Moirs feel a significant, but frequently overlooked aspect of vermin management is rat/mice control. Most people simply use a standard rodenticide, which causes secondary poisoning of any animal that consumes the dead or dying rodent. This is a big but overlooked cause of many deaths of owls and other raptors, reptiles, and any carnivorous marsupial. The Moirs only use traps and the 'fauna friendly' bait that was developed for use in Queensland cane fields.

The benefits from this type of 'integrated pest management' have been shown to be many. Native wasps have got to work parasitising caterpillars and grasshoppers, spiders are their best friends in an olive grove, tackling weevils and beetles. Lizards consume snails and pests. The quendas have worked through the black beetles and weevils, and the Moirs have never had to use sprays for these

pests. The many birds keep on top of many other insects, and even the ants have had a part to play. The limesand brought in millions of small white pointed shell snails [a South African pest], and black ants have gradually eliminated them. The olive grove is now littered with thousands of tiny empty snail shells.

The cattle follow a strip or rotational grazing system, being held over in autumn in a "sacrifice paddock" and fed on hay for a few weeks in autumn until the break is established. Once the pasture is growing strongly, they are moved through small paddocks on a rotating system, giving a paddock enough time to regenerate strongly before grazing again. This has been an enormous benefit for weed control, being especially effective on dock and capeweed.

Grasshoppers were a significant pest as in most areas of the region and guinea fowl are effective predators for these. There have been some losses of the guinea fowl to raptors, but few to foxes, as the baiting programs have controlled fox predation.

The couple emphasise some issues that have arisen for them:

- In following recommendations from some heavily promoted sources, some 500 deciduous trees have been planted, including many poplars. While Margaret and Peter still think deciduous trees have a role to play in fire control, and especially around homesteads for winter sunlight, they are now faced with removing most of the now huge Cottonwood Poplars, which are suckering, dropping masses of seed, and becoming real pests.

It is a popular myth that poplars and willows are good trees for paddocks, as they soak up boggy

areas and provide feed. Unfortunately, the Moirs have found that stock don't like poplars, that the deciduous trees don't soak up the water in the winter when you need them to, (because they are dormant) and similarly are useless as windbreaks for the same reason. They also have the potential to be genuine weed problems around waterways. Margaret has learned to be very careful about choice of species for weed reasons, and prefers to use local plants.

Margaret believes the local Blackbutt or Yarri, (*Eucalyptus patens*) will be a much better choice than any Poplar or Willow, and now uses it extensively in windbreaks. *Acacia saligna* is immensely palatable to stock, and makes a good choice, especially the suckering type. Unfortunately, much bad advice is still being given with respect to choice of windbreak species, with many weeds still being promoted and sold, such as *Acacia longifolia*, tagasaste and Cootamundra Wattle.

- Peter recommends allowing plenty of room around corridors/windbreaks, including adequate turning space, so that the tractor can access for slashing for the first few years. Electric fences and vegetation don't mix so keep away from fence lines.
- They would still like to plant more windbreaks/corridors as time and finances permit. With their increased knowledge and experience, they are better equipped to choose and mix appropriate species, and are better at regulating how much they can take on in any year. There is also much easier access to desirable local species these days, and advice is more easily obtained.

- Olive Hill Farm is a Land for Wildlife property which entails responsibility for continuing feral animal control, and riverfront rehabilitation. In the first few years, Margaret and Peter replanted extensively in the degraded riverfront sections; some 3000 local species were planted after weed control. Peter has always slashed for fire control in weedy areas, which are gradually receding. There has been dramatic recovery and regeneration, some taking place quickly, and some very slowly.

In the last two years, prolific re-seeding and natural regeneration is taking place, and the riverfront is a refuge for river rats, quenda, fire-tailed finches and similar fauna dependent on dense habitat. The aquatic fauna is healthy, and mussels, long-necked turtles, and macro-invertebrates prolific. Unfortunately, there appear to be no hairy marron, only the introduced species.

Margaret and Peter may be contacted at olivehill@wn.com.au

REVEGETATING WITH RUSHES AND SEDGES

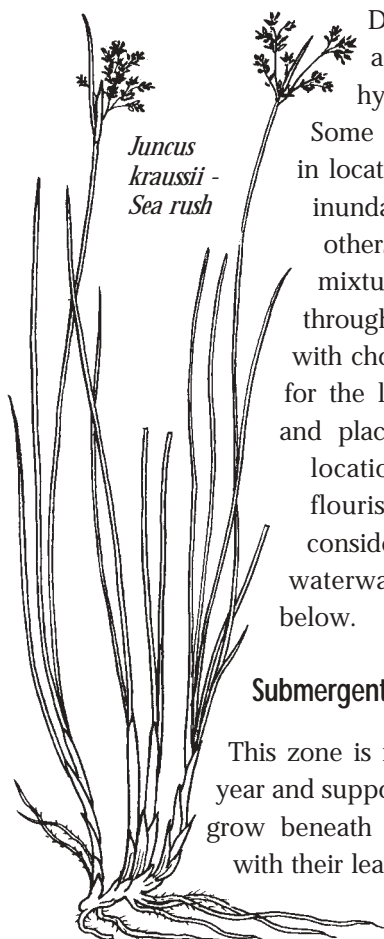
Benefits

When undertaking a replanting project along a streamline or around a dam or wetland you will invariably need to include rushes and sedges in your species list if you wish to re-create, restore or imitate a natural system.

Incorporating rushes and sedges into your revegetation project will have the benefits of:

- Providing food and habitat for a wide range of aquatic species;
- Assisting with aeration of the sediments;
- Filtering and binding pollutants, especially nutrients;
- Assisting with weed suppression by out-competing them;
- Helping to stabilise banks of watercourses;
- Providing nesting habitat for waterbirds.

Plant Placement



Juncus kraussii -
Sea rush

Different species of rushes and sedges have varying hydrological requirements. Some species will tend to grow in locations where their roots are inundated all year round, while others prefer drier country or a mixture of both conditions throughout the year. To assist with choosing appropriate species for the location you are planting, and placing individual species in locations where they will flourish it is important to consider the various wetland or waterway zones as outlined below.

Submergent Zone

This zone is inundated for most of the year and supports submergent plants that grow beneath the surface of the water with their leaves floating on the surface

or their flower spikes extending above the surface of the water.

Emergent Zone

This zone ranges from 1m deep in winter to damp in the driest parts of summer. This is the most important area for erosion control, most erosion tends to occur here. The emergent zone supports plants that have their roots submerged below the water for part or all of the year, but have their leaves and stems extending above the water surface.

Damp Zone

The damp zone is permanently damp for most of the year without having standing water, except for flood events. In many natural systems this zone can be quite wide and encompass much of the floodplain. Revegetation of this area with rushes and sedges will help to prevent erosion during flood events and will also provide important habitat for fauna, especially birds.



Bog rush

Ephemeral Zone

The ephemeral zone is dry for most of the year and only becomes wet in a flood event. This is essentially the interface between the riparian zone and the bushland zone.

Selection Guide

Choosing local natives for the right location

If undertaking a revegetation project in a riparian area try to familiarise yourself with the above zones and identify their rough location at your revegetation site. Table 1 in Water Note 20 (attached CD) lists common wetland species and describes the appropriate planting zones. Locally native rushes and sedges are provided in flora species list in Appendix 1. If you are planting species not included on this list, have a look at where they are growing naturally, or ask your plant supplier to provide details of their hydrological requirements.

Weedy rushes and sedges

Some species of rushes and sedges are weeds and can tend to dominate a revegetation site if they are planted. They can also spread to other areas and start competing with native species. The following species in particular should be avoided in any planting program in the Cape to Cape area and South West of WA, they are weeds!

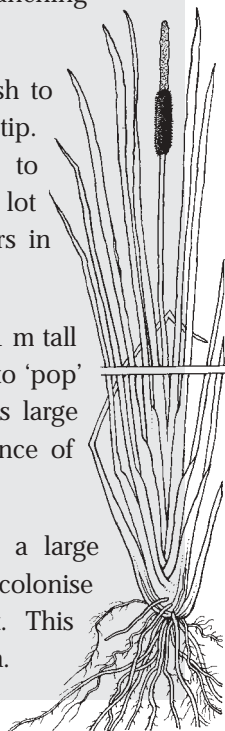
WEEDY REEDS!

Juncus articulatus – a soft and low growing rush with hollow and articulated branching stems, found in the damp zone.

Juncus acutus – spiny rush. A tall rush to 1.5 m with stiff leaves with a sharp tip. The seed heads have large red to brown capsules and in shape look a lot like a sea urchin. This rush occurs in either brackish or fresh conditions.

Juncus microcephalus – a large rush to 1 m tall with articulated stems that are easy to 'pop' with the fingers. The seed head is large and loose and contains an abundance of viable seeds.

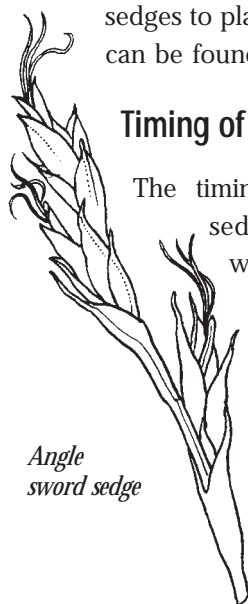
Typha orientalis – bulrush. This is a large robust rush that will vigorously colonise disturbed wetlands in the southwest. This species is native to Eastern Australia.



A suitable list of rushes and sedges to plant along waterways can be found in the section on dams.

Timing of Planting

The timing of planting for rushes and sedges will depend greatly on where they are to be planted. For the emergent zone in particular it is recommended that planting of rushes and sedges take place in spring. This allows the roots of the plant to become established before the eroding forces of winter flow can affect the plant. It is also believed to



Angle sword sedge

encourage root growth as the roots tend to follow the declining water levels. Species to be planted in drier areas could be successfully planted in winter, though this does risk some plant losses if a flood event occurs. You should be aware that spring planting often requires follow-up watering to ensure plant survival.

Sources

'Using Rushes and Sedges in Revegetation of Wetland Areas of the South West of WA' by Linda Taman. Speaker notes for the River Restoration Workshop Series coordinated by the Water and Rivers Commission.

The above paper is available at the Water and Rivers Commission Website at:

www.wrc.wa.gov.au/publications/riverrestorations

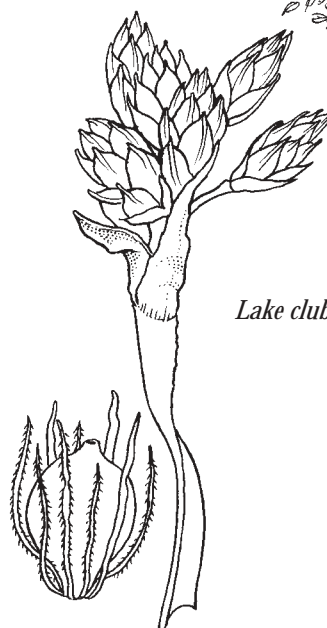
Scott, J. & Negus, P. (2002). *Field Guide to the Wildflowers of Australia's South West*, Augusta-Margaret River Region. Cape to Cape Publishing.

All pictures reprinted from: *Water and Rivers Commission (1997) Native Vegetation of Freshwater Rivers and Creeks in South Western Australia, Perth*

Native cumbungi



Lake club rush



CASE STUDY – MERRIBROOK

Owner: Richard and Lorraine Firth

CASE STUDY

Original grazing land, now tourism and recreation enterprise.

The Firths purchased their Cowaramup property in 1984. Merribrook is 160 acres located on Armstrong Rd, and was part of a large holding of the Patton family. Lorraine recalls John Patton saying that their square block with abundant water, virgin bush and magnificent granite outcrops would have been gazetted for a homestead block.

Over the last 20 years that the Firth family have been custodians of Merribrook, the property's use and visual appearance has changed remarkably. Previously grazed by sheep and cattle, Lorraine adds, 'we decided to graze sheep and people!'

Merribrook was one of the first chalet developments approved in the Shire of Augusta-Margaret River. From the beginning, landcare was an important part of this innovative accommodation, adventure training and recreation business.

All development has taken place in old pastures. Building sites were chosen for their protection from the prevailing winds and proximity to water. At all times the 80 acres of ungrazed bush has been conserved and is now part of Land for Wildlife.

The Firth's philosophy has evolved from a deep love of nature, permaculture and agroforestry models with a healthy appreciation for best practice in landcare. Lorraine believes their property was in good condition when they purchased it. She recalls 'the previous owners had fenced the beautiful 80

acres of bush and I believe it has never been grazed by stock. Only the lower section was lightly logged.'

When asked about how they have enhanced the sustainability of their farm, Richard remembers vividly the hours and hours of tree planting for windbreaks. 'The kids were very little and we'd all plant trees and place treeguards for hours. We developed an excellent small and medium size tree guard that we recycle and still use 18 years later. We had to have a good guarding system as we've always had large numbers of kangaroos. The rabbit population has decreased due to poisoning and shooting.'

Lorraine feels that some of the tree species they planted in the windbreaks have not been effective. She strongly urges people embarking on windbreak planting to seek local advice and get ideas from other established windbreaks in the district.

The thousands of trees planted at Merribrook range from carobs, paulownias, cork, oaks, olives to bottlebrushes, *eucalyptus* and more recently *melaleucas* around the dams.

Lorraine believes the diversity of planting at Merribrook adds greatly to the property's sustainability. 'People adore our native bush and appreciate the exotic areas – it's like a botanical garden on a large scale.' She is quick to add that with current knowledge of stream revegetation and weed control, she would now make different choices about certain trees. 'The pittosporum have just recently been pulled out around the Merribrook

Lodge. These are fantastic trees, but rapidly spread along waterways. Garden escapees can become a problem. We also took out our Bleeding heart trees – it breaks your heart – lovely trees but in the wrong environment.’

The Firths use organic fertiliser where possible and as their sheep numbers decrease each year with more land under trees, they have no longer spread fertiliser on their paddocks.

Richard believes ‘Our primary aim at Merribrook is to preserve the land in a healthy, happy state so many, many people can enjoy its beauty and the abundant wildlife that follows healthy land. Our bird population is quite amazing and the frogs are deafening’.

Thousands of adults and school children have visited Merribrook over the past 18 years. Their impact on the environment has been minimal. ‘I guess the pastures just went from grazing stock in some areas, to grazing people!’ Lorraine suggests.

When asked what the Firths would still like to do at Merribrook, Richard and Lorraine said the landcare list was endless. They are currently maintaining and

expanding the narrow walk trails through the bush areas. They have a 5 year plan to continue revegetating their dam areas. Their creek lines are in good condition. They want to continue encouraging the bush slowly back into the pastures by using only local plant species. Each year all the creek lines are walked and major weeds pulled out. Lorraine is currently working on an interpretive walk around Merribrook, which will celebrate the biodiversity of this land.

Places like Merribrook contribute to the conservation and sustainability of our district in many ways. Merribrook supports the school-based program Ribbons of Blue by having school children from Cowaramup Primary School enjoy excursions there. As a member of Land for Wildlife, information and advice received is passed on to guests. Lorraine Firth is a member of the Cape to Cape Catchments Group which helps her implement a wide range of the latest environmental practices.

Lorraine remarks that Merribrook is certainly not your typical farm, but when we are talking Margaret River, what is a typical farm these days?

PROPERTY PLANNING

The basis of property planning is that different areas of land have different characteristics and therefore should be managed to suit their capabilities. For example, an area of sandy, windblown soil will be managed to reduce erosion and an area of clay managed to reduce waterlogging.

Where to Begin

Your property management will depend on the natural and physical features of your land. Firstly, a map or aerial photo and an overlay of your property will be needed. Aerial photographs are available from the Department of Land Administration (DOLA). It can even be a simple sketch.

Important considerations to include on the plan -

- Slope
- Aspect
- Soil type
- Prevailing wind direction
- Existing waterways and wetlands
- Remnant vegetation
- Fence lines
- Buildings, roads etc.

Plus any degradation issues such as waterlogging, salty areas and erosion should be drawn onto the map. [An example of a property plan is illustrated in figure 9]

Handy Hints

1. **Riparian vegetation** helps stabilise waterways, protect water quality and reduce erosion. It also aids in stripping nutrients, therefore reducing the nutrient export into creeklines and dams. Fringing vegetation also shades the water keeping temperature low and minimising the risk of nuisance algal growth. Vegetation along creeks may act as a windbreak.

2. **Fencing of creeklines** protects the existing riparian vegetation. Native riparian vegetation has many values including erosion control, dissipating flows, sediment and nutrient retention and ecological values.
3. **Stock crossings**- if stock need to cross a creekline consider a rock crossing. Rock will stabilise the banks and bed of the creek. A rock crossing is generally cheaper to construct than a bridge. Refer to Water Notes 6 on the disc included in the manual
4. **Ploughing and farming** should run along contours rather than across. Remember water follows the natural contour or slope of the ground, therefore farming along contours will minimise the risk of water erosion.
5. **Remnant vegetation** will benefit from excluding stock, encouraging natural regeneration of native vegetation. Remnant vegetation can reduce the quantity of water entering the water-table, which minimises waterlogging issues downslope and lowers the risk of salinity problems. As well as improving the aesthetics of your property it can provide a refuge for native fauna. Remnant vegetation provides valuable shelter for stock in all seasons and can act as a windbreak for crops. If finances permit, increase the size of your remnant. Planting lower storey species will improve the diversity and health of your bush.
6. **Locate dams off-stream** wherever possible to minimise hydrological impacts on waterways. Revegetating your dam will reduce evaporation and water loss. The cumulative impact of the high number of on-stream dams in the area is of concern.

Consideration will need to be given to soil type when choosing plant species.
Remember to choose local species!
(See list of suitable species in Appendix 1).

7. **Stock watering points and troughs** should be strategically located to keep stock out of waterways, minimise trampling and stock concentrating in the same areas. Troughs and tanks that intercept rainfall are extremely effective. Farmers report productivity gains from NOT watering stock in waterways.
8. **Stock access ways and roads** should be located along fence lines where possible as this area is already disturbed. Construct laneways to guide stock along access roads, rather than through valuable pasture and remnant stands. Monitor laneways for erosion and vegetate downslope of the laneway if erosion occurs.
9. **Waterlogging and seepage** can be reduced with the strategic positioning of diversion or contour banks. Placing banks along the contour in waterlogged areas can guide excess water away from problem areas and towards dams. This water can then be used elsewhere and not wasted.
10. **Alternating pastures** with different land uses is another useful farm management tool. Paddocks compacted from years of grazing can be ripped and replanted with suitable fodder or crop plants. Certain crops fix nitrogen back into the soil; soil structure can be improved from root growth and the addition of organic matter into the soil.
11. **Agroforestry** as an alternative source of income is an option for farmers in the southwest. Our high rainfall zone means that agroforestry can be a viable option. Windbreaks to combat wind erosion can double as a timber source. Introduce perennial species to co-exist with current grazing or cropping

activities. In rainfall zones of 600-1100 mm, dense plantations are more effective in drawing down the water table. Plantations can be widely spaced with pasture in an alley system for cropping between rows. Stagger tree plantings so a range of heights can be achieved so when mature trees are ready for harvest, there is still some cover from wind available.

Long-Term Benefits of Farm Planning –

- The longterm benefits from implementing sustainable farming will mean economic gains in the future.
- Some shires provide rates rebates and incentives for landholders who retain and preserve significant stands of remnant vegetation. Check with your local shire. The Shire of Busselton provides rate relief through its Biodiversity Incentive Scheme. The Shire of Augusta-Margaret River is in the process of developing a similar Scheme. Your local Land for Wildlife Officer, the Department of Agriculture or local Landcare Group may be able to provide assistance in the form of advice on land management
- The aesthetic value of your land and the productivity of stock and crops will increase with time.
- An alternate income source could be provided from agroforestry; in our high rainfall zone, this is a viable alternative.
- The overall health of the catchment can improve if many landholders become involved. Remember, effectiveness can be greatly enhanced with more cooperation and participants involved!

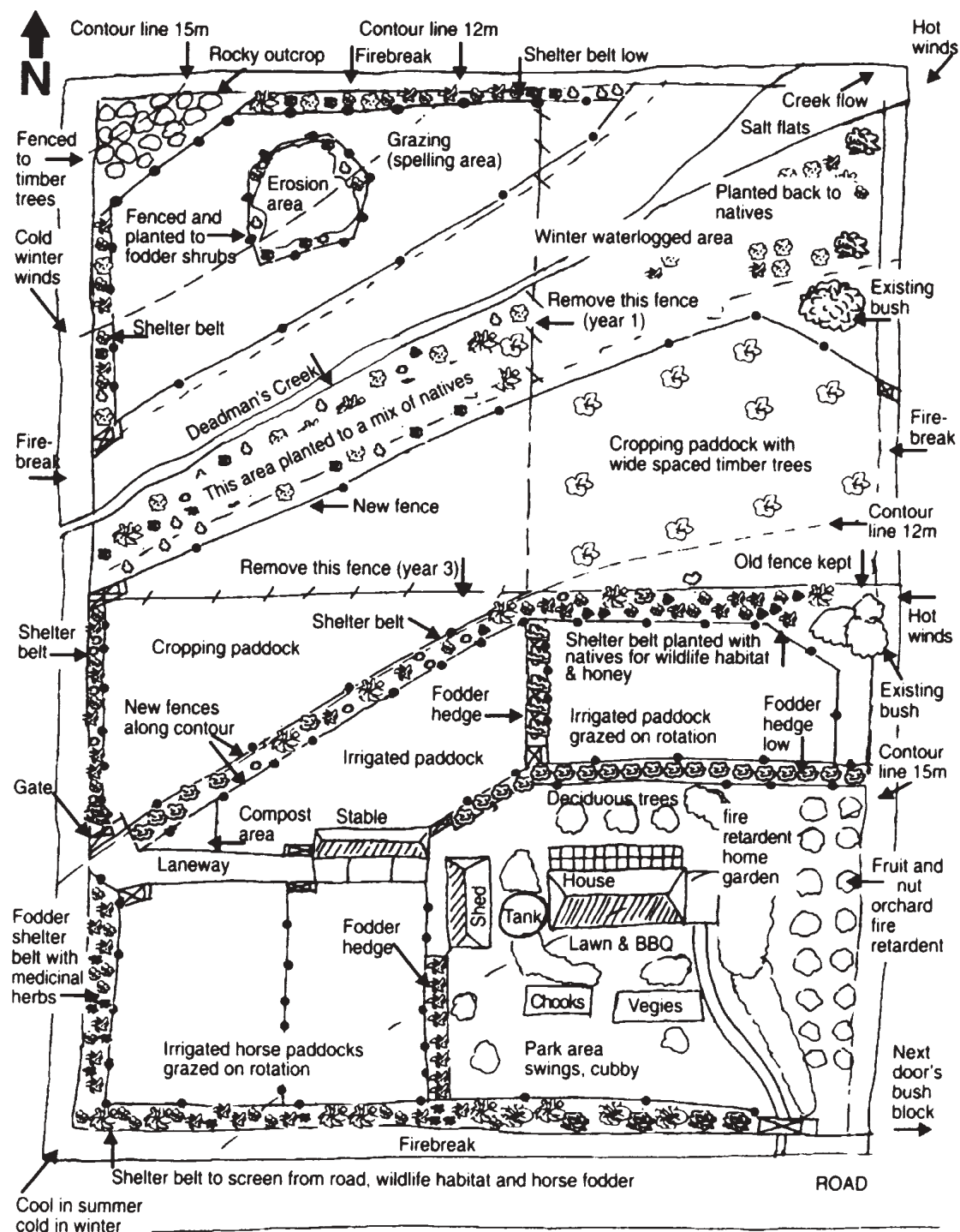


Figure 9: A Theoretical Farm Plan. Such a diagram can be designed by placing a clear overlay over a map or aerial photo. Fencelines, buildings, existing vegetation, slope, creeklines etc. can be marked in and a plan for the farm based on function and future sustainability can be drawn up.

Department of Agriculture, (1999) *The Land is in Your Hands. A Practical Guide for Owners of Small Rural Landholders in WA.* Department of Agriculture. Miscellaneous Publication.

WINDBREAKS

In the southwest we are exposed to strong prevailing winds throughout the year. Land use activities such as grazing can accelerate wind erosion, which can decrease the productivity and value of your land. Exposure to strong winds increases stress on stock, vines, olives and other crops. The most common windbreak is a vegetation barrier.

Trees and shrubs offer the greatest protection by slowing the wind speed. Tree windbreaks reduce the speed of some of the wind as it passes through, while the remainder of the wind rushes over the top.

Benefits

- Increasing crop and pasture growth by reducing soil moisture evaporation and improving germination;
- More efficient crop water use;
- Reduces groundwater recharge;
- Minimises structural damage to crop plants; protects crops from wind erosion, increasing crop yields and plant quality;
- Prevents loss of topsoil and nutrients;
- Stock productivity is enhanced through reduced chill factor (particularly important for newborn animals and off-shear sheep) by providing shelter from extreme weather conditions;
- Alternative source of secondary products such as timber (logs, firewood, posts and poles), flowers, honey and food;

- Nature conservation benefits through re-establishing local provenance plants and providing additional fauna habitat or corridors;
- Visually enhances your land and improve land values.

How Do Windbreaks Work?

A windbreak's effectiveness depends on factors such as height, orientation to the wind, position in the landscape, and uniformity (absence of gaps in the foliage).

Trees make excellent windbreaks because they grow tall, and are cheaper and more durable than most other alternatives.

Windbreak Design

Consideration should be given to existing boundary fence lines, roads and soil types, which will influence the species chosen. The cost of establishing a windbreak can be high, so priority should be given to those areas most prone to wind erosion, areas of crop damage from wind spray and existing infrastructure that is at risk from spray or drift.

Windbreak Height

Generally, the taller the tree, the more effective the windbreak and the further windbreaks can be spaced apart. Having different layers of foliage by incorporating shrubs can improve the efficiency of your barrier.

- Windbreaks can protect land for a distance equal to 20 times the height ($H = \text{height}$) of the windbreak downwind. (see figure 10).

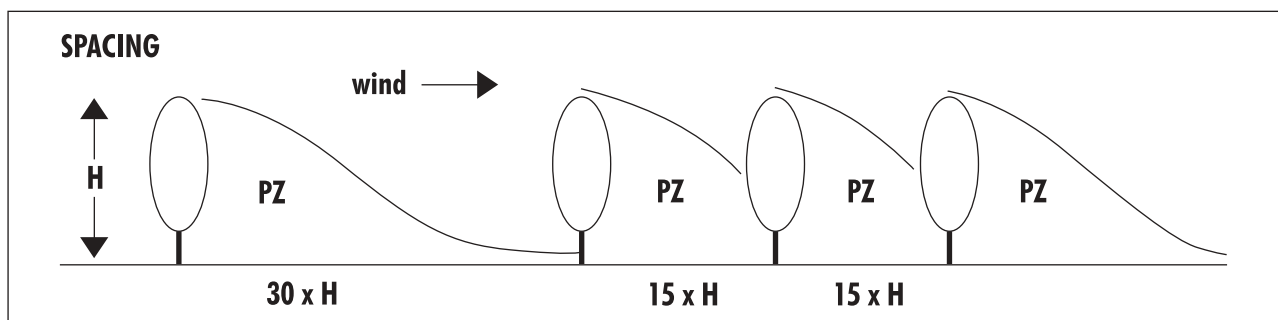


Figure 10: Diagram shows the ideal spacing of windbreak rows, being 15 times the windbreak height; width of more than 30 times the height of the windbreak are ineffective. (Illustrated by Wayne O'Sullivan).

- Upwind, land is protected up to 4 times the windbreak height.
- The area of greatest protection is between 2 and 10 tree heights downwind.
- Windbreaks have little or no effect beyond 30 tree heights.
- In most areas, windbreaks spaced at 25 to 30 tree heights give adequate protection. However, on soils prone to wind erosion, or in hilly areas with complicated wind patterns, closer spacings will be more effective.

Windbreak Orientation

Winter in the south of Western Australia brings strong winds from the northwest, west and southwest. North-westerlies can be destructive but south-westerlies are colder and more dangerous for stock. Windbreaks are most effective when oriented at right angles to approaching winds.

In summer, hot dry winds blow from the east. Commonly, to protect crops, windbreaks should be oriented north-south, to minimise crop and pasture shading; or northeast to southwest. To protect livestock from cold winter winds, windbreaks are often aligned north-west to south-east. If stock shelter is the main aim, wide shelterbelts or dense blocks of trees are more effective than narrow windbreaks.

Barriers become progressively less effective as the wind angle decreases. Landholders will know from experience which winds are most damaging on their property and can align their windbreaks accordingly.

Where wind directions are highly variable, a grid pattern of windbreaks will give the best protection.

Windbreak Density

- Short windbreaks are less effective than long windbreak. Try to aim for a minimum length of 20 times the windbreak height.
- Most windbreaks with shelter as their main purpose have at least three rows of trees and shrubs.
- A single row of trees can make a reasonable windbreak if the trees grow uniformly and retain their lower branches and foliage.
- Choose a plant spacing that will give a continuous screen of foliage without gaps when the trees and shrubs mature.
- All windbreaks need to have stock excluded, at least while they are establishing. Unless shelter is needed for stock, it may be best to fence them out permanently.

Windbreak Permeability

The aim is to allow 30-50% of the prevailing wind to pass through the windbreak. A dense windbreak will provide excellent shelter close up, but may increase wind velocity and turbulence further downwind. (See figure 11).

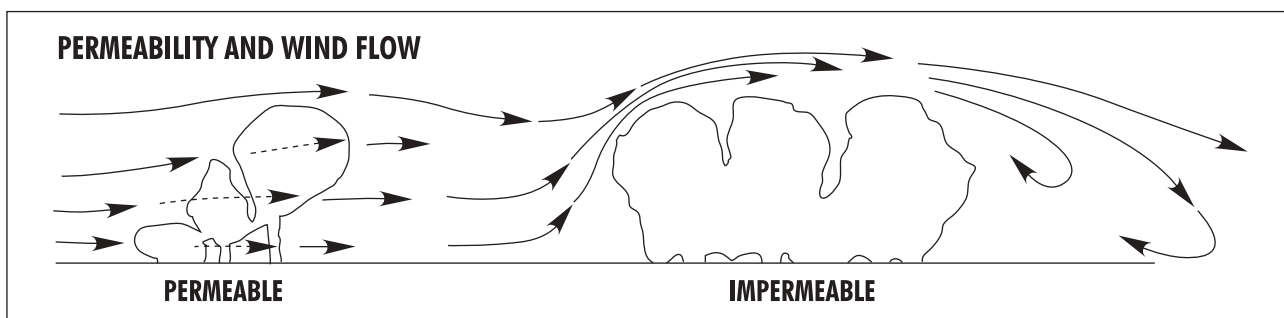


Figure 11: Diagram showing the different effects of wind flow over permeable and impermeable barriers. (Illustrated by Wayne O'Sullivan).

If access tracks are needed through wide windbreaks, place them diagonally through the trees, or in areas where wind speed is lowest, or erosion is least likely. For access tracks passing through a series of parallel windbreaks, stagger the gaps to avoid making continuous passages for wind.

Which Species?

Many species are suitable for use in windbreaks and combinations of species can be used. Choose species for their suitability to the climate and soil type, and the windbreak's purpose. The Cape to Cape Catchments Group recommend the use of locally native species. Local species recommended for use in windbreaks are listed below.

Once established, windbreaks require little maintenance other than weed control and fence maintenance. If possible, establish a network of windbreaks, with the ends of each windbreak joining or butting into other windbreaks, or abutting other tall objects such as buildings, bush and hills.

Overall, well-planned and well-managed windbreaks are likely to have a positive influence on crops and pastures throughout the high rainfall zone in south Western Australia.



A typical windbreak: Effectiveness can be improved by including understorey species in windbreak design. (Photo by Tracey Gregory).

Recommended Local Species for Use in Windbreaks

TREES

Allocasuarina fraseriana – sheoak
Agonis flexuosa – peppermint
 [NB subsp. *flexuosa* coastal]
Eucalyptus calcicola – hamelin bay mallee
Eucalyptus cornuta – yate
Eucalyptus diversicolor – karri
Eucalyptus megacarpa – bullich
Eucalyptus patens – blackbutt
Hakea oleifolia – frog hakea
Melaleuca cuticularis – saltwater paperbark
Melaleuca lanceolata – rotnest teatree
Melaleuca preissiana – paperbark
Melaleuca raphiophylla – paperbark

SHRUBS

Acacia cochlearis – rigid wattle
Acacia cyclops – coastal wattle
Acacia littorea – shark's tooth wattle
Acacia saligna – golden wreath wattle, orange wattle
Actinostrobus acuminatus – dwarf cypress
Allocasuarina humilis – dwarf sheoak
Calothamnus sanguineus – silky leaved blood flower
Dodonaea viscosa – hop bush
Hakea lasiantha – woolly flowered hakea
Hakea lissocarpha – honey bush
Hakea trifurcata – two-leaf hakea
Kunzea glabrescens – spearwood
Melaleuca densa
Melaleuca huegelii – chenille honey myrtle
Melaleuca huegelii subsp. *huegelii* – chenille honey myrtle
Melaleuca incana – grey honey myrtle
Melaleuca incana subsp. *incana* – grey honey myrtle
Melaleuca lateritia – robin redbreast bush
Melaleuca systema [previously, *acerosa*]
Melaleuca viminea – mohan
Olearia axillaris – coastal daisy

Reference

McTainish, G.H. and Boughton, W.C. (1993) *Land Degradation Processes in Australia*. Longman Cheshire, Melbourne.

Some information and input from Wayne O'Sullivan.

Department of Agriculture's Farm Note No. 72/2002

For further Information on windbreak tree species see Department of Agriculture TreeNote 23 *Timber Production from Windbreaks*.

NUTRIENT MANAGEMENT

We all live in a water catchment. What we put on our land can be transported by surface or ground water to somewhere kilometres away. There it may contribute to the pollution of wetlands, rivers, creeks or the ocean.

Excess nutrients can lead to algal blooms, oxygen depletion and fish deaths. Algal blooms also result in bad odour and upset fragile biological balances. Furthermore, high levels of nutrients and silt entering small coastal embayments such as Cowaramup Bay through the drainage systems may affect the seagrass that grows there.

There are a number of things you can do to ensure that you are not contributing to water quality problems elsewhere. They include:

Use fertilisers with care.

Testing your soil will help you determine what nutrients your soil actually needs. This can save you money as well as minimise the potential export of nutrients from your property.

Use a slow release fertiliser source if possible.

Try to apply nitrogen fertilizers to actively growing crops.

It makes sense for the environment and the economics of a farm business to minimise the losses and maximise the effectiveness of these fertilisers. The sandier the soil, the lower the nitrogen rate applied in one application.

Apply fertiliser at the right time.

Do not apply fertiliser just prior to heavy rain as a lot may be washed away. If applying on to pasture, do so 3-4 weeks after germination when the plant's root systems have already developed. This will increase the chance of the nutrients being used by the plants before they leach through the soil. Contact Agriculture WA for more details.

**Take care applying fertiliser in winter and times of high rainfall.
Fertiliser should not be applied near dams or watercourses.**

Minimise paddock erosion because nutrients also leave your land attached to soil particles. Don't overstock paddocks so they become bare. Use electric fencing to rotate the grazing pressure around your paddocks.

Revegetate your creekline and wetland areas with a variety of local species, and fence out stock. Vegetation helps to minimise erosion and filter out nutrients and sediments. Native plants also provide habitat for fauna and make a creek line or wetland an attractive area for recreation.

Replace deciduous trees near wetlands and waterways with native species. Many wetlands and waterways on farms have been planted with European species of deciduous trees such as willows, poplars and plane trees. While previously popular as landscaping features these trees have the potential to cause nutrient problems in waterways when they drop their leaves annually. Deciduous species lose their leaves all at once and the leaves are comprised of material that breaks down quickly. Leaves of this kind that fall or blow into the water add to the nutrient levels of streams that have evolved with naturally low levels of nutrients. The leaves of native species such as peppermint trees break down very slowly, thereby avoiding large sudden loads of nutrients. They also contain special tannins that are natural and important component of south west streams.

Plant local native plants in your garden. They will need little or no fertiliser or water once established. They will also have other benefits such as attracting wildlife to gardens and providing habitat, helping the movement of pollinators between bush remnants and helping to conserve Western Australian plants and animals.

Use an alternative waste disposal system to septic tanks. Dry composting toilets do not pollute and save approximately 45,000 litres of water per person per year. There are a number of alternatives available.

If you have a septic tank/leach drain system change over between leach drains regularly.

Switch to household detergents without phosphates, or use soap.

Avoid using abrasive or chemical cleaner, ammonia or bleach in sinks or toilets. Try environmentally friendly products that reduce pollution.

Minimise your use of pesticides and herbicides as these chemicals can upset fragile ecological balances.

Don't wash pollutants down drains. Wash your car on the lawn and use a broom, NOT a hose to clean the driveway.

Dairy Effluent Management

Most dairy farmers have accepted that management of farm dairy effluent needs to be improved. On many farms, effluent is disposed of rather than managed. The effluent which collects around dairies and their associated feeding facilities should be regarded as a resource to be retained and used on the farm, rather than a waste product for disposal.



Farmers have a responsibility to ensure their activities do not adversely affect the environment beyond their farm. Intensive animal industries can pose particular problems due to animals producing a concentration of effluent. This needs careful management if it is not to pollute surface or ground water. This is importantly so near sources of drinking water. Poor management of effluent can also pollute farm water supplies.

Increasingly, good effluent management is an integral part of quality assurance. Managing effluent takes time and money to plan, install and manage. But the costs can be offset by the short-term return from better use of effluent on the farm and the long-term return from a more sustainable dairy business. Expenditure on facilities to retain and treat dairy effluent is **fully deductible** for taxation purposes under Section 75D of the *Income Assessment Act*.

Dairycatch is an industry led project to work with farmers to develop and agree on 'best management practices.' Dairy farmers who become involved in the project will be eligible for assistance to develop and implement an individual effluent management system to suit their farm. All dairy farmers in WA are eligible to participate in the project. You can register your interest with Geocatch on 9754 4331.

Projects like Dairycatch increase catchment health and farm productivity through a sustainable dairy industry.

Source:

Department of Agriculture Bulletin 4336: Dairy Farm Effluent Management.



CASE STUDY – ABLETT DAIRY

Owner: Shane and Leanne Ablett

Dairy and beef production.

The property has been farmed by the Ablett family since 1939, and Shane and Leanne took over management of the farm in 1997. The farm operates a dairy milking up to 130 cows, with a small sideline in Murray Grey first cross beef. The Abletts manage a total of 650 acres: 450 acres in Cowaramup and 200 acres in Treeton. About one-third of this total area is under bush, including significant areas of very high quality vegetation. Most of the bush was fenced many years ago to exclude cattle. The creek running through the Cowaramup property feeds the Bramley Brook, flowing into the Margaret River. Sections of the creek have also been fenced for many years.

The family has always had in place a rigorous pest management program, including the eradication of rabbits, foxes and feral cats through baiting, trapping and shooting. Weed control has also been diligent, both manually (hand picking) and with the safe use of appropriate herbicides.

Since 1997, the major changes in land management that have occurred have included:

- Annual soil testing to ensure economical and environmentally sound use of fertilisers;
- Fencing to reduce paddock size to facilitate intensive grazing practices;
- Installation of a network of cattle-troughs to eliminate the need for cattle to access water from soaks or the creek;
- Improvements to dairy effluent management, including installation of a settling pond designed to greatly reduce runoff.

Recently the farm received funding from the Cape to Cape Catchments Group to assist with the fencing of an additional 1.4 km of the creek on both sides to exclude stock.

The Abletts have received environmental advice from a consultant on further upgrading of their dairy effluent management infrastructure. Funding is now available through the Dairycatch program to produce effluent management plans. Funding is also available for implementation. Contact Geocatch at Busselton for details on 9754 4331.

FIRE MANAGEMENT

Fire hazard reduction is essential to protect life and property. As a landowner you have a responsibility to manage your property to reduce the risk of a bush fire. This includes establishing and maintaining firebreaks around your property. In some areas boundary firebreaks are required while in others, strategic firebreaks are specified in certain locations. You should check with the Shires of Augusta-Margaret River or Busselton to determine the type of firebreak that applies to your property.

Firebreaks

A firebreak is an area of land that will not carry a fire. Fire-fighters also use firebreaks to gain access to fight fires. Each year a Bush Fire Order is issued with your rates notice from the Shire Council. This order sets out your obligations regarding fire management on your property and the dates by when those obligations must be carried out.

- It is important to maintain your firebreaks throughout the fire season.
- Clear firebreaks of all organic material, dead or alive. This may be achieved with herbicides or by slashing and raking.
- Slashing or raking to clear your firebreak may need to be repeated during the fire season.

Prescribed Burning

Many people like to use prescribed burning for areas of remnant bushland in order to reduce the litter and ground cover present on the property. These controlled burns are undertaken to reduce the intensity of a potential bush fire and to assist regeneration of native vegetation.

It is also important to remember that frequent fires can -

- Favour the replacement of native vegetation by weeds, which often leads to an increase in the fire hazard;
- Lead to a loss of native plant diversity by inhibiting regeneration of some species;

- Can result in a decrease in fauna numbers with food resources and suitable habitat unavailable after fire.

A careful balance is therefore required.

Recommendations from the Department of Conservation and Land Management indicate that for conservation purposes, jarrah forest should not be burnt at frequencies less than 6-8 year intervals and seasonally wet sites should not be burnt at intervals of less than 12-14 years (Burrows, Ward & Robinson, 1995). Many would consider these intervals to be the absolute minimum and would recommend at least twice this.

If you are concerned about maintaining the conservation value of your bush it is best to be cautious and to minimise the frequency of fires.

It is also a good idea not to burn your patch of remnant vegetation all in one go. It is better to burn small patches at a time or to make a heap of branches and brush and burn that. Don't include hollow logs in your heap though as they are potential homes for fauna.

After a fire it will be necessary to put quite a bit of effort into controlling weeds in the area or you may end up with a bigger weed problem than before the fire.

Alternative Fuel Control Methods

Methods other than controlled burning can be used to reduce the fire hazard. For example:

- Removing flammable debris (i.e. leaf litter, twigs and branches can be piled up and burnt),
- Reducing the density of fuel by mowing or slashing,
- Removing grass fuel by herbicides, or
- Keeping fuel very low around the edge of the bush by cool burns.

Managing Risk

The Fire and Emergency Services Association (FESA) have produced a booklet entitled *The Homeowners Bush Fire Survival Manual*, which outlines measures you should take around your home to reduce the risk of bush fire. The booklet also includes advice about what to do in event of a fire. The booklet is available free of charge and can be collected from local government officers or requested directly from FESA (see Catchment Contacts at the end of this manual).

DAMS

Minimising Impact

Availability of water is often the primary concern of landholders when purchasing a new property or changing land use on their property. Bore water is scarce in many parts of the Cape to Cape catchments so in many cases it is necessary to construct a dam to provide adequate water resources for agricultural purposes.

If inappropriately located or designed, dams can adversely affect the ecology of rivers and streams by **obstructing environmental flows; requiring extensive clearing of riparian vegetation; creating barriers to migration of native freshwater fish and lampreys; or causing sedimentation of streams at eroding outlet points**. In most cases such impacts can be avoided by careful design and location.

In order to minimise adverse impacts, dams should be located **off-stream** wherever possible. Locating dams off-stream usually avoids the need to clear riparian vegetation, minimises disturbance to the stream bed and banks, and also avoids the creation of a dam wall within the stream, which would block native fish movement upstream. A pump can be used in many cases to fill the dam with winter flow for storage and use during the summer season.

If construction of an on-stream dam is unavoidable, you will need to ensure that the dam is fitted with a summer flow bypass pipe. This is a pipe valve that is installed within the dam wall to enable water flow

leaving the dam to be controlled. The valve on these bypass pipes should be left open during low flow periods to ensure that sufficient environmental flows are maintained within the creek systems. It contravenes the rights in the *Water and Irrigation Act* to sensibly diminish the flow of water in a creek.

When designing a dam you should also consider appropriate size. Oversized dams hold up large volumes of spring to autumn flow and result in large water losses due to evaporation during summer. Large numbers of oversized dams at the headwaters of streams delay the commencement of stream flow and result in downstream landholders and aquatic fauna having to wait longer for water to reach them. This can have adverse impacts on aquatic breeding cycles and can also alter the riparian vegetation structure over time.

While some allowance will need to be made for evaporation, dams should be sized according to the per hectare water requirements of the particular agricultural use that the water is needed for. The Department of Agriculture can provide advice about the various water requirements for different land uses and crops.

In summary the following points should be used as a reference when designing dams to minimise their environmental impact:

- Locate dams off-stream wherever possible.
- Use pumps to fill off-stream dams during winter for summer storage and use.
- For on-stream dams install a summer bypass flow pipe and leave the valve open during low flow periods.
- Size dams appropriately according to the proposed agricultural uses and area of land under production.
- Minimise loss of riparian vegetation and replant dam banks and streamlines where possible with local native species. Seek advice regarding species selection.
- Seek professional advice about the need to line your dam to prevent leakage of water.

Approval Requirements for Dams

Both the Augusta-Margaret River and Busselton Shire Councils have legal requirements for landholders to submit development applications for dam proposals. In some parts of the Margaret River catchment, approvals are also required from the Water and Rivers Commission as the upper reaches are part of a proclaimed water catchment.

If planning to build a dam you will need to ensure that you receive the appropriate approvals from the relevant local and State government authorities prior to construction commencing. It is a good idea to submit plans well in advance of your planned construction date, as approval processes sometimes take a number of weeks or longer.

Both Councils have adopted Dams Policies, which clarify the requirements of landholders to submit development applications for dams, and outline guidelines and minimum design specifications for dam construction. Both Councils may also specify a requirement for rehabilitation of the stream area and replanting the banks of the dam where possible to re-create or restore stream habitat and function.

Revegetating Dams

The habitat value of dams can be substantially improved by replanting the banks with native vegetation. There are many benefits associated with revegetating dams. For example;

- Establishment of native vegetation around dams provides shade, which reduces water loss from evaporation.
- Reducing water temperature also provides a better habitat for native macro-invertebrates, including marron.
- Native vegetation around dams provides a food source and shelter for a range of fauna species such as water-birds that may use dams as a summer refuge.
- The vegetation will help to trap nutrients and sediment from runoff and drainage.
- Dams that have been revegetated are less likely to erode and less likely to suffer from algal blooms.

- Revegetation of dams also enhances their aesthetic value within the landscape.

It is, however, very important to consider where and what you plant around dams. Planting of deep-rooted species should be avoided around load bearing walls as the roots can create cracks and result in leaks or even slumping. Rushes and sedges can be used safely in these areas to provide habitat for small aquatic species such as frogs and nesting habitat for birds.

On stable or non-load bearing walls you can plant deeper-rooted species. A mixture of species is recommended by CALM's Land for Wildlife program for revegetating dams.

A list of suitable local plant species for dam revegetation is located at the end of this section.

Designing Dams to Provide Habitat

If you would like your dam to perform a dual role by providing habitat for aquatic species as well a water supply, there are a number of simple design features that can be incorporated into the dam. The following tips come from a paper by Jeanette Della-Bona published in the Shire of Serpentine-Jarrahdale's Small Block Manual. They are equally relevant for the Cape to Cape catchments.

Construction Considerations

- Ensure that the side slope of the basin is less than one in eight to provide a natural slope for planting.
- For diversity of habitat, try to shape the edges of the dam as irregularly as possible.
- Provide a range of water depths in the basin, for a variety of feeding habitats.
- Link shallow mud flats to an island rather than the shore to provide secure habitats for wading birds.
- Islands can be constructed from heaped earth during dam construction or using rocks or logs after it is constructed.
- Provide a level bench around the basin at winter high water level, or a series of level benches below this water height. This provides a variety

of water depths at different times of the year to suit a mix of species. Generally rushes and sedges grow between the winter high water level and summer low water levels. The benches provide more room for planting in this area.

- If possible include shallow areas around the basin they help to remove nutrients when they are successively inundated and dried out.

Revegetation and habitat construction considerations

- If you have a seasonally inundated dam be sure to select species for revegetation that will tolerate dry periods.
- Local native species should be used wherever possible as these will provide an appropriate food source for native aquatic fauna and will not become invasive weeds.
- To encourage frogs, reptiles and waterbirds:
 - Stack rocks underwater to provide habitat for macro-invertebrates and small fish.
 - Leave rocks or logs protruding from the water and at the edge of the dam at varying heights for waterbirds to roost on.
 - Rocks and logs placed at the margin of shallow areas provide a wonderful frog habitat.

Introducing Marron and Fish

- Only introduce local native species to the dam and seek advice first from the Fisheries Department. Don't try to introduce both marron and fish to an enclosed dam; you could stock one or the other but not both.
- The Margaret River has a special native species of marron ('Hairy' Marron) that occurs in no other river system and is being threatened by introductions of the 'smooth' marron species. Please seek advice from the Fisheries Department before introducing marron to dams near the Margaret River.
- Yabbies are not local species and should not be introduced to dams in this area as they will move to natural wetlands and streams and displace native marron from their habitat.

REMEMBER – CONTACT YOUR LOCAL SHIRE OFFICE BEFORE CONSTRUCTING A NEW DAM, AS IT WILL REQUIRE DEVELOPMENT APPROVAL

RECOMMENDED LOCAL FLORA FOR DAM OR STREAM REVEGETATION

TREES

- *Agonis flexuosa* – WA peppermint
- *Banksia littoralis* – swamp banksias
- *Callistachys lanceolata* – native willow
- *Corymbia callophylla* – marri
- *Eucalyptus cornuta* -Yate
- *Eucalyptus megacarpa* – bullich
- *Eucalyptus patens* – blackbutt
- *Eucalyptus rudis* – flooded gum
- *Hakea lasianthiodes*
- *Melaleuca cuticularis*
- *Melaleuca lanceolata*
- *Melaleuca preissiana* – modong
- *Melaleuca raphiophylla* – swamp paperbark
- *Taxandria juniperina* – wattie

SHRUBS

- *Acacia alata* – winged wattle
- *Acacia browniana* – Brown's wattle
- *Acacia divergens*
- *Acacia extensa* – wiry wattle
- *Acacia mooreana*
- *Acacia myrtifolia*
- *Acacia pentadenia* – Karri wattle
- *Acacia pulchella* – prickly moses
- *Acacia rostellifera* – summer-scented wattle
- *Acacia saligna* – orange wattle
- *Acacia stenoptera* – narrow-winged wattle
- *Acacia uliginosa*
- *Adenathos obovatus* – basket flower
- *Anigozanthos flavidus* – tall kangaroo paw

- *Anigozanthus viridis* – green kangaroo paw
- *Astartea fascicularis* – astartea
- *Astartea scoparia*
- *Beaufortia sparsa* – swamp bottlebrush
- *Brachysema praemorsum*
- *Calothamnus lateral*
- *Gompholobium capitatum* – yellow pea
- *Grevillea brachystylis* – short-styled grevillea
- *Grevillea diversifolia* – variable-leaved grevillea
- *Grevillea trifida*
- *Hakea linearis*
- *Hakea varia* – variable-leaved hakea
- *Hypocalymna cordifolium*
- *Hypocalymna angustifolium* – white myrtle
- *Kunzea recurva*
- *Melaleuca densa*
- *Melaleuca incana* – grey honey myrtle
- *Melaleuca lateritia* – robin redbreast bush
- *Melaleuca pauciflora*
- *Melaleuca thymoides*
- *Melaleuca viminea* – mohan
- *Oxylobium lineare* – narrow-leaved oxylobium
- *Pattersonia occidentalis* – purple flag
- *Paraserianthes lophantha* var. *lophantha* – Cape Leeuwin wattle
- *Samolus repens* – creeping brookweed
- *Taxandria linearifolia* – swamp peppermint (was *Agonis linearifolia*)
- *Taxandria parviceps* – fine teatree (was *Agonis parviceps*)
- *Trymallium floribundum* – Karri hazel
- *Viminaria juncea* – swishbush

SEDGES

- *Baumea acuta* – pale twig rush
- *Baumea arthropphylla* – sparse twig rush
- *Baumea articulata* – jointed twig rush
- *Baumea juncea* – bare twig rush
- *Baumea riparia* – river twig rush
- *Baumea vaginalis* – sheath twig rush
- *Bolboschoenus caldwellii* – marsh club rush
- *Carex appressa* – tall sedge
- *Cyathochaeta avenacea*
- *Eleocharis acuta* – common spike rush
- *Ficinia nodosa* – knotted club rush
- *Hemarthria uncinata*
- *Hypolaena pubescens*
- *Lepidosperma effusum* – spreading sword sedge
- *Lepidosperma gladiatum* – coastal sword sedge
- *Lepidosperma tetraquetrum* – angle sword sedge
- *Lyginia imberbis*
- *Schoenoplectus pungens*
- *Schoenus grandiflorus* – large-flowered bog rush
- *Tetraria octandra* – eight-anthered sedge

RUSHES

- *Juncus kraussi* – sea rush
- *Juncus pallidus* – pale rush
- *Juncus pauciflorus*
- *Juncus subsecundus* – finger rush
- *Leptocarpus diffusus*
- *Leptocarpus laxus*
- *Leptocarpus tenax*
- *Meeboldina coangustata*
- *Meeboldina tephrrina*
- *Meeboldina scariosa*
- *Mesomelaena tetragona* – semaphore sedge
- *Melanostachya ustulata*

Issue	Contacts	Phone	Fax	Postal
<ul style="list-style-type: none"> • Land care advice • Information about grant assistance for fencing and rehabilitation • Technical assistance for environmental restoration activities • Ideas for new land care projects 	Cape to Cape Catchments Group – Coordinator	9780 5231	9780 5285	PO Box 61 Margaret River WA 6285
	Augusta-Margaret River Shire Landcare Officer	9780 5252	9780 5285	PO Box 61 Margaret River WA 6285
	Lower Blackwood LCDC Landcare Coordinator	9758 4021	9758 4021	C/O Karridale PO Karridale WA 6288
	Ribbons of Blue	9754 4331	9754 4335	PO Box 269 Busselton WA 6280
	Geocatch	9754 4331	9754 4335	PO Box 269 Busselton WA 6280
<ul style="list-style-type: none"> • Land Care District Committees (LCDC's) 	Yallingup LCDC	9755 2029		Yallingup Post Office Yallingup WA 6282F
	Lower Blackwood LCDC	9758 4021	9758 4021	C/O Karridale PO Karridale WA 6288
<ul style="list-style-type: none"> • Local Government planning controls regarding vegetation and streamlines • Formation of 'Friends of Reserve Groups' • Management of Shire Reserves • Rates rebates and local government incentives to manage bushland 	Shire of Augusta - Margaret River Environmental Coordinator	9780 5204	9780 5285	PO Box 61 Margaret River WA 6285
	Shire of Busselton Environmental Officer	9781 0464	9752 4958	Locked Bag 1 Busselton WA 6280
<ul style="list-style-type: none"> • Nature Conservation • Declared Rare Flora and Fauna • Native flora and fauna management • National Parks 	Dept of Conservation and Land Management (CALM)	9752 1677	9752 1432	14 Queen Street Busselton WA 6280
<ul style="list-style-type: none"> • Technical support for bushland management on private land 	CALM Land for Wildlife Officer	9752 1677	9752 1432	14 Queen Street Busselton WA 6280
<ul style="list-style-type: none"> • Waterways management 	Geocatch Busselton (Department of Environment)	9754 4331	9754 4335	PO Box 269 Busselton WA 6280

Issue	Contacts	Phone	Fax	Postal
<ul style="list-style-type: none"> Water allocation advice (for dams and groundwater) 	Department of Environment (previously Water and Rivers Commission) – Bunbury	9726 4111	9726 4100	PO Box 261 Bunbury WA 6231
<ul style="list-style-type: none"> Local native plant suppliers 	Geographe Community Landcare Nursery Leschenault Community Nursery Margaret River Tube Nursery Margaret River Nursery & Irrigation Bandicoot Nursery Hamel Nursery South West Native Seed Supply Kimseed Pty Ltd Nindethana Seed Service P/L	9754 2049 9791 4670 9755 5509 9757 2691 9851 1802 9733 1241 9731 1806 9446 4377 9844 3533	 9755 5954 9757 3193 9851 2802 9733 1417 9731 1114 9446 3444 9844 3573	Contact Busselton Dunsborough Environment Centre PO Box 1741 Bunbury WA 6230 Blond Street Cowaramup, WA 6284 48 Stewart Rd Margaret River WA 6285 PO Box 240 Mount Barker WA 6324 Burney Road Waroon WA 6214 PO Box 17 Donnybrook WA 6239 42 Sarich Court Osborne Park WA 6017 PO Box 2121 Albany WA 6331
<ul style="list-style-type: none"> Aboriginal culture and heritage 	Wardan Aboriginal Cultural Centre Department for Indigenous Affairs	9756 6566 9235 8000	 9235 8088	PO Box 30 Yallingup WA 6282 Level 1 197 St Georges Tce Perth WA 6000
<ul style="list-style-type: none"> State Forest 	Forest Products Commission	9475 8888	9475 8899	Locked Bag 888 Perth Business Centre Perth WA 6849
<ul style="list-style-type: none"> Fire safety 	Fire and Emergency Services Association (FESA) Fire Management Officer – (Augusta-Margaret River and Busselton Shires)	9323 9300 9780 5254	9323 9384 9757 2512	PO Box P1174 Perth WA 6844 PO Box 61 Margaret River WA 6285



*Cape to Cape
Catchments Group*

Appendix 1

Local Flora Species for the Cape to Cape Region



PRIORITY TAXA:

Conservation Codes

R: Declared Rare Flora - Extant Taxa

(= Threatened Flora = Endangered + Vulnerable)

Taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

X: Declared Rare Flora - Presumed Extinct Taxa

Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

P1: Priority One - Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

P2: Priority Two - Poorly Known Taxa

Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

P3: Priority Three - Poorly Known Taxa

Taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.

P4: Priority Four - Rare Taxa

Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.

Tree Key:

D = extra drought tolerant
Hv = important habitat values
W = tolerates wet
F = extra fast
P = phytophthora resistant

Notes

O = ornamental
A = adaptable and hardy
WB = windbreak, wind tolerant
Sh = needs shelter and/or shade
Yall = Yallingup area.

Tree sizes:

Sml = 8m or less
Med = 8-15m
Tall = 15m+

General sizes:

Sml = 1m or less
Med = 1-2m
Tall = 2m plus

1 = may help to prevent *phytophthora*. In any event, it is best practice to plant a suite of leguminous plants in any planting program. Leguminous species are denoted with an

* before the first plant in a genus.

• denotes plants readily available from nurseries.

Authors note

Every attempt has been made to include all native species within the Cape to Cape Catchments, with the exception of Orchidaceae, Stylidaceae, Utriculariaceae, Droseraceae and annual plants, as it was felt these would not be within the scope of most vegetation projects. There are approximately 60 species of Orchidaceae, 20 Droseraceae, 48 Stylidaceae and Utriculariaceae, and numerous annuals. There are also a saddening number of introduced weed and feral species.

I have attempted to include information on as many species as possible. Where no information occurs on a given species, it is because it has defied my attempts to source reliable data.

Many species included are poorly known, and many have so far not been easy to propagate. They have been included in the belief that as their values are appreciated, knowledge will correspondingly increase. At the same time, it is often not realized how easy and adaptable many of our species are. I hope that this work will inspire more appreciation of the diversity, value and beauty of our local plants, highlight how adaptable many are, and encourage more use of them on our farms, public places, and gardens.

Margaret Moir,
June 2003.

References

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- A Guide to Emergent Wetland Plants of South Western Australia*, Jane M. Chambers, Nicola L. Fletcher and Arthur J. McComb.
- Bottlebrushes, Paperbarks and Teatrees*, John W. Wrigley and Murray Fagg
- CALM Herbarium Florabase*.
- Encyclopaedia of Australian Plants*, W.Rodger Elliott and David L Jones. All volumes.
- Field Guide to the Wildflowers of Australia's South West Augusta-Margaret River Region*, Jane Scott and Patricia Negus.
- Flora of the South West: Bunbury. Augusta. Denmark, Vols. 1 and 2*, Wheeler, J., Marchant, N. and Lewington, M.
- Hakeas of Western Australia, Botanical Districts of Irwin and Darling*, Jennifer Young.
- The Grevillea Book Vol 2-3*, Peter Olde and Keith Marriott.
- Western Australian Flora, A descriptive Catalogue*, Paczkowska, G. and Chapman, A.R.

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Billardiera floribunda</i>	white-flowered billardiera	Med-tall OA	White Nov-Feb		Gravel, sand.	Seed, cutting		X	X		
<i>Billardiera laxiflora</i>		Sml OA	White, Feb-Jun		Gravel.	Seed, cutting		X	X		
<i>Billardiera varifolia</i>		Tall OA	Blue, purple Dec-May		Sand, loam, gravel, clay.	Seed, cutting		X	X		
<i>Cassytha flava</i>	dodder laurel	Tall, parasitic	Yellow, Jan-Dec	X	Gravel, limestone, winter wet.	Seed					
<i>Cassytha glabella</i>	tangled dodder laurel	As above	White, yellow, Jan-Dec		Grows on <i>Astartea</i> , <i>Melaleuca</i> , <i>Casuarina</i> .	Seed					
<i>Cassytha racemosa</i>	dodder laurel	As above	White, green, yellow, Jan-Dec		Grows on <i>Eucalyptus</i> , <i>Daviesia</i> , <i>Triodia</i> .	Seed					
<i>Cheiranthra preissiana</i>		Med OA	Blue, Sep-Jan	X	Loam, gravel, laterite, granite, swamps.	Seed, cutting			X		
<i>Chorizema diversifolium</i>		Sml O	Pink, orange, red, Aug-Dec		Sand, sandy loam, gravel.	Seed	X		X		
<i>Clenatis pubescens</i> •	common clematis	Sml-Med OA	White, cream, Mar-May		Sand, loam.	Fresh seed, cutting			X		
<i>Comesperma ciliatum</i>		Sml-Med OA	Blue, Sep-Dec	X	Laterite, sand, granite, creeks.	Seed, cutting			X		
<i>Hardenbergia comptoniana</i> •	native wisteria	Tall OA, vig	Blue, purple, white, Jul-Oct		Various, inc. sand dunes.	Seed			X		
<i>Hybanthus volubilis</i>		P2 sml-tall O Local endemic	Blue, purple, white, Sep-Dec		Clay, sandy clay, river banks.	Seed, cutting	X		X		
<i>Kennedia coccinea</i> •	coral vine	Med OA	Orange, pink, red, purple, Aug-Nov		Various.	Seed			X		
<i>Kennedia macrophylla</i> •	Augusta kennedia	R Tall OA, vig	Red, Sep-Oct		Loam, sand, granitic soils [Leeuwin].	Seed	X		X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Progp'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Marianthus candidus</i>	white marianthus	Tall OA	White, cream, Oct-Dec		Sandy.	Seed, cutting		X	X		
<i>Marianthus drummondianus</i>		Sml OA	White, blue, purple, Mar-Dec		Dry gravelly, clayey loam, laterite, granite, haematite.	Seed, cutting		X	X		
<i>Marianthus tenuis</i>		Sml OA	Blue, Mar-Jun		Lateritic sand.	Seed, cutting		X	X		
<i>Muehlenbeckia adpressa</i>	climbing lignum	Med	Green, yellow, Sep-Dec		Sand.	Seed, cutting					
<i>Opercularia volubilis</i>	twining stinkweed	Sml	Green, white, Jun-Dec		Sand, sandy loam, loam.						
<i>Sollya fusiformis</i> • [<i>S. heterophylla</i>]	australian bluebell	Med OAW/b	Blue, Jan-Dec		Most.	Seed, cutting			X		
<i>Tetradlea hirsuta</i>	black eyed susan	Sml O	Pink, purple, blue, Jul-Dec		Gravelly.	Cutting			X		
<i>Thysanotus manglianus</i>	fringed lily	Sml O	Purple, Aug-Nov		Red sand, loam, clay, laterite.	Cutting			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Actinotus glomeratus</i>			White, green Jul-Nov	X	Sand, gravel.	Seed, cutting				X	X
<i>Actinotus "Walpole"</i>		Prostrate	White	X	Sand, clay.	Seed, cutting				X	X
<i>Adiantum aethiopicum</i> •	maidenhair fern	Sml OSh		X	Sand, clay, loam, gravel.	Spores Suckers				X	
<i>Ampera ericoides</i>			White, yellow green, Sep-Jan		Sand, dunes, rocks.						
<i>Anogramma leptophylla</i>	annual fern	Streams OSh		X	Any.					X	
<i>Asplenium trichomanes</i>	maidenhair spleenwort	Shade Sh		X	Any.					X	
<i>Atriplex hypoleuca</i> •		Saline tolerant	Red, brown, Dec-Apr	X	Saline mud, sand, inlets, estuaries, tidal.						X
<i>Carpobrotus virens</i> •	coastal pigface	Prostrate Bush tucker	Purple, pink, white, Jun		Sand, coastal, dunes.	Cuttings, seed	X		X		X
<i>Centella asiatica</i>		Spreading	Pink, purple, red, white, Aug-Apr	X	Any, winter-wet.	Cuttings, div. seed				X	
<i>Chamaecilla corymbosa</i>	blue squill	O	Blue, Jul-Dec		Any.	Seed			X		X
<i>Cheilanthes austrotenuifolia</i>		Fern Sml Sh			Sand, clay, loam.					X	
<i>Cheilanthes sieberi</i> subsp <i>sieberi</i>		Fern Sml Sh		X	Sandy, clayey loams, gravel, laterite, granite waterfalls, streams.					X	
<i>Dichondra repens</i>	kidney weed	Sml, creeping	White, green, yellow, Sep-Oct		Sand.	Seed				X	
<i>Dryandra bipinnatifida</i> subsp <i>bipinnatifida</i>		Prostrate O	Oct-Nov		Gravel [yall].	Seed		X			X
<i>Dryandra lindleyana</i> subsp <i>sylvestris</i>		O	Yellow, cream, brown, Sep-Oct		Gravel.	Seed		X			X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Prop'g'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Dryandra mimica</i>	summer honeypot	R O	Yellow, brown, Dec-Feb		Sand, sandy loam.	Seed		X			X
<i>Galium migrans</i>		P3 prostrate	Green, white, Sep-Dec		Sandy soils over limestone, granite.	Seed, div.					
<i>Geranium retrorsum</i>		Sml O	Pink, Aug-Dec		Any.	Seed, cutting			X		
<i>Geranium solanderi</i>		Sml, vig. OA	Pink, blue, Aug-Dec		Sand, clay, granite rocks, coastal limestone.	Seed, cutting			X		
<i>Gratiola pubescens</i>	australl brooklime	Sml O	White, pink, purple, Jun/Oct-Jan	X	Sand, peat, clay, winter-wet, swamps, streams.	Cutting, div.			X	X	
<i>Grevillea brachystylis</i> subsp <i>brachystylis</i>		P3 Sml, wide OA	Red, Aug-Nov	X	Sand, sandy clay, swampy.	Seed, cutting		X	X	X	X
<i>Grevillea quercifolia</i> [see shrubs]											
<i>Haloragis digyna</i>		Sml	Green, yellow, red, Oct-Jan		Sandy soils over limestone, coastal.	Seed, cutting					
<i>Hemianandra pungens</i>	snakebush	Sml, wide OA	White, blue, purple, pink, Jan-Dec		Sand, clay and loam, gravel, laterite, granite.	Fresh seed, cutting			X		
<i>Hibbertia acerosa</i>	needle leaved guinea flower	Sml O	Yellow, Jul-Feb		Sandy or gravel soils, laterite, granite.	Cutting			X		
<i>Hibbertia grossulariifolia</i>		Sml, wide OASH	Yellow, Aug-Dec		Black sand, calcareous sand, loam, granite.	Cutting			X		
<i>Hypocalymma cordifolium</i> subsp <i>Minus</i> [see shrubs] •											
<i>Leucopogon hirsutus</i> [see shrubs]											

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Lindsea linearis</i>		Sml fern Sh		X	Sand, sandy loam, clay.					X	
<i>Pelargonium littorale</i> [see shrubs]					Sand.	Seed, cutting			X		
<i>Pentapeltis silvatica</i>	southern pentapeltis	Prostrate	White, pink, Dec-Apr		Gravel.						
<i>Persicaria prostrata</i>		Sml	Green, Feb-Jun/ Oct-Nov	X	Sand, clay sand, winter-wet.					X	X
<i>Pteris vittata</i>	chinese brake	Med-fern Sh		X	Sand, stream-sides.		X	X			
<i>Ranunculus colonorum</i>	common buttercup	Sml	Yellow, Sep-Dec	X	Sandy, often clayey.				X	X	X
<i>Samolus junceus</i>		Sml O	White, pink, Sep-Apr	X	Sandy, peaty & clayey wet.	Div. seed			X	X	X
<i>Samolus repens</i>	creeping brookweed	Sml O	White, pink, Jul-Jan	X	Sand, clay, sandstone, swamps.	Div. seed			X	X	X
<i>Sarcocornia blackiana</i>				X	Sand, silt, swampy.						
<i>Scaevola striata</i>	royal Robe	Sml OA	Blue, purple, Aug-Dec	X	Sand.	Cutting			X	X	
<i>Veronica plebeia</i>	creeping speedwell	Sml	Blue, Mar-Dec		Sand or loam.						

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
*Acacia ¹ alata var alata	winged wattle	Sml-med Sh	White, cream, yellow, pink, Apr-Dec	X	Various.		X		X		browse
Acacia ¹ alata var alata •	winged wattle	Med. May help prevent dieback Sh	Cream, yellow, July Oct	X	Sand, loam, gravel, clay.	Seed, easy	X		X		Browse
Acacia browniana var browniana		Med. May help prevent dieback.	Cream, yellow, Jul-Oct	X	Sand, gravel.	Seed	X		X		Browse
A. browniana var obscura		Sml-med	Cream, yellow, Sep-Nov	X	Sand, loam, gravel.	Seed	X		X		Browse
Acacia cochlearis •	rigid wattle	Sml-tall WB	Yellow, Jul-Oct		Sand, coastal.	Seed	X		X		Browse
Acacia cyclops	coastal wattle	Med-tall WB	Yellow, Sep-May		Sand, coastal.	Seed	X		X		Browse
Acacia divergens		Sml-med, prickly	Yellow, cream, Aug-Nov	X	Various.	Seed	X		X		
¹ Acacia extensa •	wiry wattle	Sml-med OA	Yellow, Aug-Oct	X	Sand, gravel.	Seed	X		X		Browse
Acacia flagelliformis		P4, rush-like, sml, O	Yellow, May-Sep	X	Sand.	Seed	X		X		Browse
Acacia gilbertii		Med.	White, Oct-Feb		Gravel.	Seed	X		X		Browse
Acacia hastulata		Med. prickly	Cream, yellow	X	Swampy.	Seed	X		X		
Acacia huegelii		Sml prickly	White, cream, Oct-Feb		Sand.	Seed	X		X		
Acacia inops		Sml, prickly	White, cream, Sep-Nov	X	Sand, clay swampy.	Seed	X		X		
Acacia ¹ latericola		Med, O May-Oct	Yellow, cream, May-Oct		Gravel.	Seed	X		X		Browse
Acacia littorea		Med prickly WB	Yellow, Aug-Nov		Sand, coastal.	Seed	X		X		
Acacia mooreana		Sml prickly	Yellow, cream, May-Sep	X	Sand, gravel.	Seed	X		X		
Acacia myrtifolia •		Med-tall	cream, yellow, May-Jan		Sand, gravel	Seed	X		X		Browse

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Acacia nervosa</i>	rib wattle	Sml	Yellow, Jun-Oct		Gravel.	Seed	X		X		
<i>Acacia obovata</i>		Sml	Yellow, cream, white		Gravel.	Seed	X		X		
<i>Acacia pentadenia</i>	karri wattle	Med-Aromatic foliage [may be unpleasant]	Cream	X	Loam, clay.	seed	X		X		
<i>Acacia pulchella</i> ¹	prickly moses	Med Prickly, may confer dieback resistance	Yellow, May-Dec	X	Sand, clay, loam.	Seed	X		X		
<i>Acacia pulchella</i> var <i>glaberrima</i> ¹	prickly moses	Med	Yellow, May-Oct	X	Sand, clay, loam.	Seed	X		X		
<i>Acacia pulchella</i> ¹ var <i>goadbyi</i> ¹	prickly moses	Sml	Yellow, Jul-Oct	X	Sand, gravel.	Seed	X		X		
<i>Acacia pulchella</i> ¹ var <i>pulchella</i>	prickly moses	sml	Yellow, Jul-Dec		Gravel.	Seed	X		X		
<i>Acacia saligna</i> ¹	golden wreath wattle	Tall OAWB	Yellow, Jul-Nov	X	Most.	Seed	X		X		Browse
<i>Acacia scalpelliformis</i>		Med	Yellow, Sep	X	Wet.	Seed	X		X		
<i>Acacia semitrullata</i>		Sml	White, cream	X	Sand, clay.	Seed	X		X		
<i>Acacia</i> ¹ <i>stenoptera</i>		Sml, prickly	Cream, yellow, Mar-Dec		Sand, gravel.	Seed	X		X		
<i>Acacia subracemosa</i>		Tall	Cream, white, yellow		Sand.	Seed	X		X		
<i>Acacia tayloriana</i>		Prostrate O	Cream, white, Jan	X	Sand, gravel, clay, loam.	Seed	X		X		
<i>Acacia tetragonocarpa</i>		Med rush-like O	Yellow, Mar-Jun	X	Sand, loam, gravel.	Seed	X		X		
<i>Acacia uliginosa</i>		Sml	Yellow, cream, Aug-Oct	X	Sand, gravel, clay.	Seed	X		X		
<i>Acacia urophylla</i>		Tall	Cream, white, May-Oct	X	Gravel, loam.	Seed	X		X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Acacia varia</i>		Med	Yellow, cream, white, May-Oct		Any.	Seed	X		X		
<i>Acacia varia</i> var <i>varia</i>		Sml, suckering	Cream, white, yellow, Jul-Oct		Sandy loam, clay.	Seed	X		X		
<i>Acrotriche</i> <i>Cordata</i>	coast ground berry	Sml	Green, white Jul-Dec		Sand, dunes.	Cuttings					
<i>Actinodium</i> <i>cunninghamia</i>	albany daisy	Sml O	White, pink Aug-Nov	X	Sand, clay.	Cutting, seed			X		
<i>Actinostrobilus</i> <i>acuminatus</i>	dwarf cypress	Sml OWB			Sand.	Seed	X		X		
<i>Actinotus</i> <i>glomeratus</i>		Sml	White, green, Jul-Nov	X	Sand, gravel.	Seed, cutting					
<i>Actinotus laxus</i>		Sml	White, cream Dec-Mar	X	Sand, peat, clay.	Seed, cutting					
<i>Actinotus</i> <i>omnifertilis</i>		Sml	White	X	Sand.	Seed, cutting					
<i>Actites</i> <i>megalocarpa</i>	dune thistle	Sml	Yellow, Sep-Jun	X	Sand, dunes.						
<i>Adenanthos</i> <i>barbiger</i>		Sml OA	Red, Feb-Dec		Any.	Cutting		X	X		X
<i>barbiger</i> subsp <i>intermedius</i>		Sml OA	Red, Feb-Dec		Any.	Cutting		X	X		X
<i>Adenanthos</i> <i>meisneri</i> •		Med OA	Red, pink, purple, cream, Jul-Apr		Sand, gravel.	Cutting		X	X		X
<i>Adenanthos</i> <i>obovatus</i> •	basket flower	Med OA	Red, orange, May-Dec	X	Sand, gravel, loam, dunes, swamps.	Cutting		X	X		X
<i>Agonis</i> <i>linearifolia</i> •	see Taxandria										
<i>Agonis</i> <i>parviceps</i> •	See Taxandria										
<i>Allocasuarina</i> <i>humilis</i>	dwarf sheoak	Med OAWB	Red, brown, orange		Sand, gravel, dunes.	Seed	X		X		X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Alyogyne huegelii</i>	lilac hibiscus	Med-tall OA	White, cream, red, blue, purple, Jun-Jan		Sand, clay, gravel, granite, limestone.	Seed, cutting			X		
<i>Andersonia caerulea</i>	foxtails	Sml	Pink, blue, white, Jan-Dec		Sand.	Cutting					
<i>Andersonia ferricola</i>		Sml P1	Purple	X	Sand, loam, ironstone, winter-wet.						
<i>Andersonia involucreta</i>		Sml	White, pink, Sep-Dec	X	Sand, gravel, peat, winter-wet.	Cutting					
<i>Andersonia muriantha</i>		Sml	White, Sep-Dec		Sand, loam.	Cutting					
<i>Andersonia sprengeloides</i>		Sml cushion like	Pink, blue, purple, Jul-Apr		Sand, granite, hills, coast.	Cutting					
<i>Anthocercis littorea</i>		Varies	Yellow, Jan-Dec		Calcareous sand, dunes.	Cutting					
<i>Astartea laticifolia</i>		Med	White, Jan-Feb	X	Sand, limestone, winter-wet.	Seed, cutting			X		
<i>Astartea scoparia</i>	was juniperina [fascicularis?]	Sml-med OA	White, pink, Jan-Jul/Oct-Dec	X	Sand, gravel.	Seed, cutting			X		
<i>Astartea sp</i> Scott River		Sml	White, pink, Jan-Apr/Nov-Dec	X	Sand.	Seed, cutting			X		
<i>Astroloma ciliatum</i>	candle cranberry	Sml, adaptable	Purple, red, black		Gravel, sand.	cutting					
<i>Astroloma pallidum</i>	kick Bush	Sml	White, cream, pink, red		Any.	cutting					
<i>Astroloma sp</i> Nannup		P4 sml	Red, orange, Jan-Apr		Sand, gravel.						
<i>Beaufortia sparsa</i> •	swamp bottlebrush	Med-tallOA	Red, orange, Jan-Apr/Sep-Nov	X	Sand, swampy areas, river banks.	Seed, cutting		X	X		X
<i>Boronia alata</i> •	winged boronia	Med-TallOA	Pink, white, Jul-Dec		Coastal sand, limestone, dunes, cliffs.	Cutting			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Boronia anceps</i>		P3 sml O	Pink, purple, Sep-Jan	X	White sand, gravel, swamp, winter-wet.	Cutting			X		
<i>Boronia capitata</i> subsp <i>capitata</i>	cluster boronia	Sml-tall O	Pink, Jan-Dec		winter-wet.						
<i>Boronia capitata</i> subsp <i>gracilis</i>		P2 sml-tall O	Pink, Jun-Nov	X	Sand, winter-wet.	Cutting			X		
<i>Boronia coerulea</i>		Sml-med O	Blue, pink, white, Apr/Jul-Nov		Sand, clay, gravel, laterite.	Cutting			X		
<i>Boronia crenulata</i>	aniseed boronia	Sml-Med OA	Pink, purple, red, May-Feb	X	Sand, clay, clay loam, gravel, laterite, winter wet, swamps.				X		
<i>Boronia crenulata</i> var <i>crenulata</i>		Sml-med OA	Red, pink, Jul-Jan		Sand, various.	Cutting			X		
<i>Boronia crenulata</i> subsp <i>pubescens</i>		Sml O	Pink, red, Sep-Dec		Sand.	Cutting			X		
<i>Boronia defoliata</i>		Sml O	Blue, Sep-Nov	X	Sand ,gravel , laterite, swamps.	Cutting			X		
<i>Boronia dichotoma</i>		Sml O	Pink, red, white, Aug-Dec	X	Sand, clay, swamp.	Cutting			X		
<i>Boronia fastigiata</i> •	bushy boronia	Sml-tall OA	Pink, purple, blue, Sep-Dec	X	Sand, gravel, loam, clay, laterite, streams, winter-wet.	Cutting			X		
<i>Boronia fastigiata</i> subsp <i>tenuiflor</i>		Sml-tall OA	Pink, purple, blue, Sep-Dec	X	Sand, gravel, sandy loam, clay, streams, winter-wet.	Cutting			X		
<i>Boronia gracilipes</i>	karri boronia	Sml-tall O	Pink, Jan/Apr/Jul-Dec		Loam, clay, sand, laterite.	Cutting			X		
<i>Boronia juncea</i>		Sml-tall O	Pink, white, Oct-Apr	X	Sand, peaty sand, clay.	Cutting winter-wet			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Boronia juncea</i> subsp. <i>minima</i>		Sml O	Pink, white, Nov-Jan	X	Grey or peaty sand, swamps.	Cutting			X		
<i>Boronia megastigma</i>	scented boronia	Sml-tall O	Brown, yellow, green, Jul-Oct	X	Peaty sand, winter-wet swamps.	Cutting			X		
<i>Boronia molloyae</i>	tall boronia	Tall OA	Pink, red, Sep-Dec	X	Sand, loam, clay, streams, swamps.	Cutting			X		
<i>Boronia spathulata</i>	Boronia	Sml OA	Pink, red, Jan-Dec	X	Sandy, wet.	Cutting			X		
<i>Boronia stricta</i>		Med-tall OA	Pink, Sep-May	X	Sand, sandy clay, swamps, winter-wet.	Cutting			X		
<i>Boronia tenuis</i>	blue boronia	P4 sml, Yall. O	Blue, pink, white, Aug-Nov		Laterite, granite.	Cutting			X		
<i>Boronia tetragona</i>		P3 sml O	Pink, red, Oct-Dec	X	Black, white sand, laterite, brown sandy loam, swamps, winter wet.	Cutting			X		
<i>Bossiaea aquifolium</i>	water bush	Med-tall OASH	Orange, yellow, red, brown, Jul-Nov		Clay loam, laterite, granite.	Seed	X		X		
<i>Bossiaea aquifolium</i> subsp. <i>aquifolium</i>	water bush	Med-tall OASH	Yellow, red, brown Jul-Nov		Clay loam, laterite.	Seed	X		X		
<i>Bossiaea aquifolium</i> subsp. <i>laidlawiana</i>		Med tall OASH	Orange, yellow, red, brown, Sep-Nov		Clay loam, gravel, laterite.	Seed	X		X		
<i>Bossiaea disticha</i>		P3 sml-med OASH	Yellow, brown, red, Sep-Nov		Sand, limestone.	Seed	X		X		
<i>Bossiaea linophylla</i>		Sml-tall OASH	Yellow, red, Jul-Dec		Sand, limestone, granite.	Seed	X		X		
<i>Bossiaea ornata</i> •	broad leaved brown pea	Sml-med OASH	Yellow, brown, red, Jul-Nov		Laterite, granitic.	Seed	X		X		
<i>Bossiaea praetermissa</i>		Sml-med OASH	Yellow, red, brown, Sep-Nov	X	Sand, clay, limestone, swamps.	Seed	X		X		
<i>Bossiaea rufa</i>		Med-tall OASH	Yellow, brown, red, Sep-Jan	X	Sandy, alluvial, peat, streams, swamps.	Seed	X		X		
* <i>Brachysena modestum</i>		R sml, spreading O	Green, pink, cream, Sep-Nov	X	Grey sand, clay loam over ironstone.	Seed, cutting		X	X		X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Brachyena praeorsum</i>		Med, spreading OA	Red, green, yellow, Aug-Jan	X	Sand, clay, loam, riverbank, swamp.	Seed, cutting		X	X		X
<i>Calothamnus lateralis</i>		Sml-med OA	Red, Jan/May-Dec	X	Sand, clay, swamps, winter-wet.	Seed		X	X		X
<i>Calothamnus pallidifolius</i>		P4 Sml red, pink,	Green, yellow, Nov-Jan		Gravel.	Seed		X	X		X
<i>Calothamnus sanguineus</i>	silky-leaved blood flower	Sml-med OAWb	Red, Mar-Nov		Sand, gravel.	Seed		X	X		X
<i>Calothamnus</i> sp Scott River		P2 Med	Red, Aug-Sep	X	Sand.	Seed		X	X		X
<i>Calothamnus</i> sp Whicher		P1 Tall	Red, Nov		Sand, clay loam.	Seed		X	X		X
<i>Calytrix flavescens</i>	summer starflower	Sml O	Yellow, Jan-Dec	X	Sand, laterite, granite, sandstone.	Cutting			X		
<i>Calytrix tenuiramea</i>		Sml	Purple, Dec-Mar		Sand.	Cutting			X		
<i>Chorilaena quercifolia</i>	chorilaena	Tall OA	Yellow, cream, white, green, Apr-Jan		Sand, loam.	Seed, cutting		X	X		
* <i>Chorizema cordatum</i>		Med O	Yellow, orange, red, pink, Jul-Dec	X	Sand, sandy loam, clay, gravel, winter-wet.	Seed, cutting	X		X		
<i>Chorizema glycinifolium</i>		Med O	Orange, pink, red, Jul-Oct	X	Sand, gravel, winter-wet.	Seed, cutting	X		X		
<i>Chorizema ilicifolium</i>	holly flame Pea	Sml O	Yellow, orange, red, Jul-Oct		Sand, limestone, dunes.	Seed, cutting	X		X		
<i>Chorizema nanum</i>		Sml O	Yellow, pink, May/Aug-Nov		Sand, clay loam.	Seed, cutting	X		X		
<i>Chorizema reticulatum</i>		P3 Sml O	Pink, orange, Aug-Oct		Sand, gravel.	Seed, cutting	X		X		
<i>Chorizema rhombeum</i>		Sml, twiner O	Orange, pink, red, yellow, Aug-Dec		Sand, sandy clay, sandy loam, gravel.	Seed, cutting	X		X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Chorizema spathulatum</i>		Sml O	Yellow, Oct-Dec		Sand, gravel, clay.	Seed, cutting	X		X		
<i>Comesperma calymega</i>	blue-spike milkwort	Sml, AO	Blue, Aug-Jan		Sand, sandy clay, laterite.	Seed, cutting			X		
<i>Comesperma conferturn</i>		Med AO	Pink, blue, Sep-Dec		Sand, limestone, dunes.	Seed, cutting			X		
<i>Comesperma flavum</i>		Med AO	Cream, yellow, Oct-Mar	X	Sand, swamps, winter wet.	Seed, cutting			X		
<i>Comesperma nudiusculum</i>		Sml AO	Blue, Nov-Jan	X	Peaty sand, swamps, winter wet.	Seed, cutting			X		
<i>Comesperma virgatum</i>	milkwort	Med AO	Pink, purple, Sep-Mar	X	Sand, gravel, swamps, winter wet.	Seed, cutting			X		
<i>Conospermum caeruleum</i>	blue brother	Sml O	Blue, pink, Mar/Jun-Nov	X	Sand, sandy peat, stony clay, laterite, granite, winter wet, swamp.	Seed, cutting difficult			X		
<i>Conospermum capitatum</i>		Sml O	Cream, yellow, brown, red, Aug-Dec	X	Sand, loam, sandy clay, gravel, laterite, granite, winter wet.	Seed, cutting, difficult			X		
<i>Cosmelia rubra</i>	spindle heath	Sml-tall	Red, pink, Jan-Dec	X	Sandy peaty, swamps.	Cuttings					
<i>Cryptandra arbutiflora</i>		Sml	White, Jul-Sep	X	Sand, limestone, granite, creeks.						
<i>Dampiera alata</i>	winged-stem dampiera	Sml, OA	Blue, Jul-Dec	X	Sand, clay, gravel, laterite, swamps.	Cuttings			X		
<i>Dampiera hederacea</i>	karri dampiera	Sml or twiner OA	Blue, white, Jun-Jan	X	Sand, clay, gravel, swamps, creeks.	Cuttings			X		
<i>Dampiera heteroptera</i>		P3 sml	Blue, Sep-Oct	X	Sand, swamps.	Cuttings			X		
<i>Dampiera leptoclada</i>	slender-shooted dampiera	Sml	Blue, Aug-Nov	X	Sand, peat, swamps.	Cuttings			X		
<i>Dampiera linearis</i>	common dampiera	Sml OA	Blue, Jul-Dec	X	Sand, clay, laterite,	Cuttings winter wet.			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
Dampiera trigona	angled-stem dampiera	Sml OA	Blue, white, Aug-Jan	X	Sand, clay, winter wet.	Cuttings			X		
Darwinia citriodora	lemon-scented darwinia	Med OA	Yellow, green, red, May-Dec		Laterite, granite, hills.	Cutting		X	X		
Dasygpon hookeri	pineapple bush	Med-tall O	White, black, Aug-Jan	X	Sand, sandy gravel, sandy clay, often wet.	Seed	X		X		
*Daviesia angulata		Med O	Yellow, red, Mar-Sep		Sand, laterite.	Seed			X		
Daviesia cordata	bookleaf	Med OA	Yellow, orange, red, brown, Jul-Jan		Laterite, granite.	Seed			X		
Daviesia decurrens	prickly bitter-pea	Sml	Orange, red, Jun-Sep		Loam over clay, gravel, laterite.	Seed			X		
Daviesia horrida	prickly bitter-pea	Med	Yellow, orange, red, brown, Jul-Nov		Laterite, granite.	Seed			X		
Daviesia inflata		Med	Orange, red, Aug-No	X	Grey sand, sandy clay, swamps, dunes.	Seed			X		
Daviesia longifolia		Med O	Yellow, red, brown, purple, Sep-Dec		Gravel.	Seed			X		
Daviesia preissii		Med O	Yellow, red, Dec-Feb		Sand, clay, gravel, hillsides, granite.	Seed			X		
Daviesia rhombifolia		Sml O	Yellow, orange, red, brown, Jul-Sep		Gravel, sand or clay.	Seed			X		
Diaspasis filifolia	thread-leaved diaspasis	Sml O	White, pink, purple, Sep-Feb/May	X	Sand, clay, winter wet.	Cuttings					
*Dillwynia uncinata	silky parrot Pea	Med O	Orange, yellow, red, Aug-Oct	X	Sand, gravel, clay, laterite, swamps.	Seed, cutting	X		X		
Diplolaena dampieri	southern diplolaena	Sml-med O	Red, orange, Jul-Nov		Sand. Coastal limestone dunes, granite rocks.	Cutting		X			
Dodonaea ceratocarpa		Med-tall	Cream, green, May-Oct		Sand, granite, limestone.	Seed	X				

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Dodonaea</i> • <i>viscosa</i> ssp <i>angustissima</i>	sticky hopbush	Med-tall Wb	Fl. Jun-Aug		Sand, loam, clay, granite.	Seed	X				
<i>Dryandra</i> <i>armata</i>	prickly dryandra	Med-tall	Yellow, cream, Jun-Nov		Sand, clay, loam, gravel, granite, laterite, limestone-Yall.	Seed		X	X		X
<i>Dryandra</i> <i>nivea</i> ssp <i>nivea</i> Can add <i>Dryandra nivea</i> ssp <i>uliginosa</i>	couch honeypot	R Med O	Yellow, brown, Aug-Sep		Sandy clay, gravel.	Seed		X	X		X
<i>Dryandra sessilis</i> var <i>cordata</i>	parrot bush	P2 tall	Cream, yellow, Jul-Oct		Sand, coastal limestone.	Seed		X	X		X
<i>Dryandra</i> <i>squarrosa</i> subsp <i>argillacea</i>	pinge	R med-tall	Yellow, Jun-Nov	X	Sand, gravelly clay, loam., winter wet.	Seed		X	X		X
<i>Dryandra</i> <i>squarrosa</i> subsp <i>squarrosa</i>		Med-tall	Yellow, Jun-Nov		Gravel.	Seed		X	X		X
<i>Epilobium</i> <i>billardiereanum</i> spp <i>billardiereanum</i>	glabrous willow herb	Sml	White, pink, purple, Oct-Apr	X	Peaty sand, loam, granite.						
<i>Epilobium</i> <i>billardiereanum</i> subsp intermedium		Sml	Pink, white, Oct-Nov/Apr	X	Peaty sand.						
<i>Epilobium</i> <i>hirtigerum</i>	hairy willow herb	Med	Pink, white, Oct-Nov/Apr	X	Peaty sand.						
<i>Eryngium</i> <i>pinnatifidum</i>	blue devils	Sml O	Blue, white, Aug-Nov		Clay, sandy clay, peaty sand, winter wet.	Seed			X		
* <i>Eutaxia</i> <i>epacridoides</i>		Sml O	Yellow, red, brown, Apr/Sep-Oct	X	Sandy, swamps.	Seed, cuttings	X		X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Eutaxia myrtifolia</i>		Sml-med OA	Yellow, orange, red, brown		Various.	Seed, cuttings	X		X		
<i>Eutaxia virgata</i>		Med OA	Yellow, orange, red, brown, Aug-Feb	X	Sand, clay, swamps.	Seed, cuttings	X		X		
<i>Exocarpos odoratus</i>	scented ballart	Med hemi-parasitic	Yellow, green, Feb/Jun-Dec	X	Grey sand, sandy clay, coastal winter wet.	V. fresh seed	X				
<i>Exocarpos sparteus</i>	broom ballart	Med hemi-parasitic	Yellow, green, white, Feb-Oct		Sand over limestone, red sand, laterite, coastal, dunes.	V. fresh seed	X				
<i>Franklandia triaristata</i>	lanoline bush	P4 sml	White, cream, yellow, brown, purple, Aug-Oct		Sand.	Seed, cutting, difficult					
<i>*Gastrolobium bilobum</i>	heart Leaf poison	Med-very tall O	Orange, yellow, red, Aug-Dec		Sand, clay, loamy, near rivers, hills.	Seed, cutting	X		X		
<i>Gastrolobium cuneatum</i>	river poison	Med-tall O	Yellow, orange, purple, brown, Oct-Feb	X	Sand, loam, gravel, riverbanks.	Seed, cutting	X		X		
<i>*Gompholobium capitatum</i>		Sml O	Yellow, Sep-Jan	X	Sand, laterite. Swamps, river banks, ridges.	Seed, cutting	X		X		
<i>Gompholobium knightianum</i>		Sml O	Pink, purple, Jul-Dec		Gravel.	Seed, cutting	X		X		
<i>Gompholobium marginatum</i>		Sml O	Yellow, Aug-Nov		Lateritic gravel, granite.	Seed, cutting	X		X		
<i>Gompholobium ovatum</i>		Sml O	Yellow, orange, red, brown, purple, pink, Aug-Dec		Sand, sandy clay, laterite, granite.	Seed, cutting	X		X		
<i>Gompholobium polymorphum</i>		Sml O	Yellow, orange, red, Sep-Jan		Laterite, granite.	Seed, cutting	X		X		
<i>Gompholobium preissii</i>		Sml O	Yellow, orange, red, brown, Aug-Dec		Gravel.	Seed, cutting	X		X		
<i>Gompholobium scabrum</i>		Med-tall O	Pink, purple, Aug-Nov		Sand, gravel	Seed, cutting	X		X		
<i>Gompholobium tomentosum</i>	hairy yellow Pea	Sml O	Yellow, Jul-Jan		DSnd, sandy clay, laterite, limestone, dunes.	Seed, cutting	X		X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
Gompholobium villosum		Med-tall O	Violet, purple, pink, Sep-Jan	X	Sand, swamps.	Seed, cutting	X		X		
Gonocarpus benthamii		Med	Red, green, Nov-Mar	X	Clay loam, grey sand, peaty loam, schist, granite.	Cutting					
Gonocarpus benthamii		Sml	Red, green, Nov-Jan	X	Sand, loam, clay loam, granite.	Cutting					
Gonocarpus diffusus		Sml	Pink, red, Oct-Dec	X	Sand, clay, stream beds, swamps.	Cutting					
Gonocarpus hexandrus		Med	Green, cream, Feb	X	Sand, swamps, creeks.	Cutting					
Gonocarpus hexandrus		Med	Green, cream	X	Sand, swamps, creeks.	Cutting					
Goodenia caerulea		Sml O	Blue, white, Sep-Jan		Sand, clay, gravel.	Seed, cutting, div.			X		
Goodenia eatoniana		Sml O	Blue, Oct-Apr	X	Sand, laterite, winter wet.	Seed, cutting, div.			X		
Goodenia incana	hoary goodenia	Sml O	Blue, Jun/Sep-Jan		Sand, clay, laterite.	Seed, cutting, div.			X		
Grevillea • brachystylis	short-styled grevillea	Sml OA	Red, Jan/Apr/Aug-Dec	X	Sand, sandy clay, swamps, streams.	Seed, cutting		X	X		X
Grevillea brachystylis subsp australis		R med OA	Red, Sep-Jan	X	Sand, sandy clay.	Seed, cutting		X	X		X
Grevillea brachystylis subsp brachystylis		P3 sml, spreading OA	Red, Aug-Nov	X	Sand, sandy clay, swampy.	Seed, cutting		X	X		X
Grevillea brachystylis subsp grandis		R Med OA	Red, Aug/Dec	X	Loam over clay, laterite.	Seed, cutting		X	X		X
Grevillea bronwenae		Med OA	Red, Jun-Dec		Sand over laterite, lateritic loam.	Seed, cutting		X	X		X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Prop'g'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Grevillea diversifolia</i>	variable-leaved grevillea	Med-tall	Yellow, green, cream, white, red, Apr-Jan	X	Loam, gravel, laterite, winter wet.	Seed, cutting			X		
<i>Grevillea manglesioides</i>		Med-tall	Red, green, yellow, white, cream, Feb/Jun-Dec	X	Swamps, winter-wet flats, creeklines.	Seed, cutting			X		
<i>Grevillea manglesioides subsp ferricola</i>		P2 Med	Red, green, Oct	X	Red sandy clay over ironstone, winter wet flats.	Seed, cutting			X		
<i>Grevillea manglesioides subsp metaxa</i>		Med	Cream, green, Oct-Apr	X	Riparian.	Seed, cutting			X		
<i>Grevillea papillosa</i>		P3 Med	White, yellow, red, Apr/Sep-Oct	X	Brown, peaty sand, sandy clay, loam. winter-wet, swamps.	Seed, cutting			X		
<i>Grevillea pulchella</i>	beautiful grevillea	Med O	White, cream, Jun-Mar		Sand, gravel, loam, laterite, granite.	Seed, cutting			X		
<i>Grevillea pulchella subsp pulchella</i>		Sml, spreading	White, cream, Jun/Sep-Dec		Sand, gravel, loam.	Seed, cutting			X		
<i>Grevillea quercifolia</i>	oak-leaf grevillea	Sml, spreading OA	Pink, red, purple, Jul-Dec		Sand, loam, gravel, laterite.	Seed, cutting		X	X		X
<i>Grevillea trifida</i>		Med	White, cream, Jul-Feb	X	Sand, gravel, swamps, streams.	Seed, cutting			X		
<i>Hakea amplexicaulis</i>	prickly hakea	Med-tall	White, cream, pink, Aug-Oct		Lateritic gravel or loam.	Seed			X		
<i>Hakea ceratophylla</i>	horned leaf hakea	Sml-tall O	Brown, red, Sep-Dec	X	Grey/brown, black sand, loam, winter wet flats, granite outcrops.	Seed		X	X		
<i>Hakea cyclocarpa</i>	ramshorn	Med	White, red, brown, Aug-Oct		Lateritic soils [Yall].	Seed			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Hakea falcata</i>		Sml-tall	White, cream, yellow, pink Aug-Nov	X	Yellow-grey peaty sand, sandy clay, inter-wet.	Seed			X		
<i>Hakea lasiantha</i> •	woolly flowered hakea	Med-tall OWbA	White, May-Sep		Gravel, sandy clay.	Seed			X		
<i>Hakea linearis</i>		Med-tall	White, cream, Sep-Jan	X	Grey, brown, black sand, sandy clay, winter-wet flats, granite rocks.	Seed			X		
<i>Hakea lisocarpa</i>	honey bush	Med-tall A Wb	White, cream, yellow, pink, Jun-Oct		White, grey, yellow sand, sandy loam, granitic soils, laterite.	Seed			X		
<i>Hakea oleifolia</i>	dungyn	Tall OAWb	White, Jul-Oct		Grey, red/brown sand, sandy loam over laterite, coastal limestone, granite.	Seed			X		
<i>Hakea prostrata</i>	harsh hakea	Sml-tall Wb	White, cream Aug-Oct		Sandy soils, often over laterite, loam. Hillslopes, granite outcrops, coastal dunes .	Seed			X		
<i>Hakea ruscifolia</i> •	candle hakea	Med-tall OA	White, Dec-Jun		White, grey, red/brown sand, gravelly clay laterite.	Seed			X		
<i>Hakea trifurcata</i> •	two-leaf hakea	Med-tall OAWb	White, cream, pink, May-Oct		White, grey/brown sand over limestone or laterite, gravel.	Seed			X		
<i>Hakea varia</i> •	variable leaved hakea	Med-tall	White, cream, yellow, May-Dec.	X	White, grey, red loamy sand, clay loam, laterite, winter wet.	Seed			X		
<i>Helichrysum macranthum</i>		Sml-med	White, Aug- Jan/Jun		Most.	Seed, cutting			X		
<i>Hemianandra glabra</i>		Sml-med OA	Blue, purple, pink, white, Sep-Nov		White, grey sand, shrubland, coastal dunes. [Yall].	Fresh seed			X	X	

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
Hemigenia rigida		Sml O	Blue, purple, violet, Aug-Jan.		Sand, lateritic gravelly. Hillslopes, granite outcrops, flats, ironstone ridges.	Fresh seed					
Hibbertia amplexicaulis		Sml-med, sprawling O	Yellow, Aug-Dec/Mar	X	Laterite, granite, sand, often over limestone, coastal areas, swamps, ridges.	Cuttings			X		
Hibbertia commutata		Sml O	Yellow, Jul-Nov		Laterite.	Cuttings			X		
Hibbertia cuneiformis•	cutleaf hibbertia	Med-tall OA	Yellow, Jan-Mar/Jun-Nov	X	White/grey sand, loamy soils, coastal dunes, swampy plains.	Cuttings			X		
Hibbertia cunninghamii		Sml O	Yellow, Aug-Dec	X	Sandy soils, loam, laterite, swampy areas floodplains, granite outcrops.	Cuttings			X		
Hibbertia diamesogenos		Sml, O	Yellow, Sep-Dec		Red-brown sandy clay, dark loam, gravel, laterite, granite. Outcrops, flats, hills & ridges, river banks, road verges.	Cuttings			X		
Hibbertia ferruginea		Sml	Yellow, Jul-Nov		White/grey or yellow sand.	Cuttings			X		
Hibbertia glomerata		Sml O	Yellow, Aug-Jan		Gravelly lateritic soils, yellow or grey sand, granite.	Cuttings			X		
Hibbertia hypericoides•	yellow buttercups	Sml O	Yellow, Apr-Dec		Most.	Cuttings			X		
Hibbertia inconspicua		Sml O	Yellow, Aug-Dec		Lateritic, sandy & loamy, granite.	Cuttings			X		
Hibbertia lasiopus	large hibbertia					Cuttings			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Hibbertia pachyrhiza</i>		Sml O	Yellow, Sep-Jan		Lateritic	Cuttings			X	X	
<i>Hibbertia perfoliata</i>		Sml O	Yellow, Sep-Mar	X	Black moist sandy, loam over granite, winter wet depressions, along creeks & swamps.	Cuttings			X		
<i>Hibbertia pilosa</i>	hairy guinea flower	Sml-med O	Yellow, Sep-Dec		Sandy, loamy over granite, lateritic.	Cuttings			X		
<i>Hibbertia quadricolor</i>		Sml O	Yellow, Jul-Oct		Laterite.	Cuttings			X		
<i>Hibbertia racemosa</i> •	stalked guinea flower	Sml O	Yellow, Jul-Dec		Grey, white or yellow sand, coastal areas: dunes, plains & limestone.	Cuttings			X		
<i>Hibbertia spicata</i>		Sml O	Yellow, Jul-Nov		Sand, limestone & laterite soils. Near-coastal areas of limestone [Yall].	Cuttings			X		
<i>Hibbertia stellaris</i>	orange stars	Sml O	Orange, yellow, Aug-Dec	X	Sandy, clay, swampy areas, winter-wet depressions.	Cuttings			X		
<i>Hibbertia vaginata</i>		Sml O	yellow, Jul-Oct		White/grey sand over laterite, gravelly soils, grey sand over sand.	Cuttings			X		
<i>Homalospermum firmum</i>		Med- v-tall OWb	White, pink, Aug-Dec	X	White, grey, yellow or black peaty sand, loam, winter wet depressions, swamps.	Seed, cutting			X	X	
* <i>Hovea chorizemifolia</i>	holly-leaved hovea	Sml OA	Blue, purple, May-Oct		Sand, laterite, gravel.	Pre-treat seed, cutting			X		
<i>Hovea elliptica</i> •	tree hovea	Med-tall OA	Blue, purple, white, Aug-Dec		Laterite, gravel, clay loam, sandy loam, sand.	Pre-treat seed, cutting			X		
<i>Hovea pungens</i> • pins	devil's OA	Sml-med May-Nov	Blue, purple,		Shallow soils on rock, sandy soils, laterite, gravel, clay & loam.	Pre-treat seed, cutting			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Hovea stricta</i>		Sml OA	Purple, blue, Jun-Oct		White/grey or yellow sand.	Pre-treat seed, cutting			X		
<i>Hovea trisperma</i>	common hovea	Sml OA	Purple, blue, May-Nov		Sandy soils, laterite, gravel, clay loam.	Pretreat seed, cutting			X		
<i>Hybanthus debilissimus</i>		Sml	Blue, purple, Aug-Dec		Laterite.	Fresh seed, cuttings			X		
<i>Hypocalymma angustifolium</i> •	white myrtle	Sml OA	White, pink, Jun-Nov	X	Winter-wet depressions, along watercourses, outcrops, hillsides.	Cuttings			X		X
<i>Hypocalymma cordifolium</i> •		Sml OA	White, pink, Sep-Feb/May-Jul	X	Sand, sandy loam, peaty sand, granite, laterite. Along watercourses, winter- wet.	Cuttings			X	X	X
<i>Hypocalymma cordifolium subsp minus</i>		P4 Sml OA	White, pink, Sep-Dec.	X	Peaty sand, grey sand, damp sites, swamps.	Cuttings			X	X	X
<i>Hypocalymma ericifolium</i>		Sml	Cream, yellow, Aug-Nov	X	Grey/black sand. winter wet flats.	Cuttings			X	X	X
<i>Hypocalymma robustum</i> •	Swan River myrtle	Sml OA	Pink, red, Jun-Nov		Gravelly lateritic, sand.				X		
<i>Hypoxis glabella</i>		Med	Yellow, green, May-Oct		Sand, clay, loam.	Seed					
<i>Hypoxis occidentalis</i>		Sml	Yellow, May-Nov	X	Sand, clay, laterite, winter wet areas	Seed					
<i>Hypoxis occidentalis var quadriloba</i>		Sml-Med	Yellow, May-Nov	X	Black or grey sand, sandy clay, laterite, winter wet.	Seed				X	
<i>Isopogon formosus</i>	rose cone flower	Sml-med OA	Pink, purple, red, Jun-Dec	X	Sand, laterite, granite, swamps.	Seed, cutting		X		X	X
<i>Isopogon formosus subsp Dasylepis</i>		P3 Sml-med OA	Pink, purple, red, Jun-Dec	X	Sand, sandy clay, gravelly sandy soils over laterite. Often swampy.	Seed, cutting		X		X	X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Progp'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Isopogon sphaerocephalus</i>	drumstick isopogon	Sml-med OA	Cream, yellow, Jul-Jan		Laterite, sand, often gravel.	Seed, cutting		X			X
* <i>Isotropis cuneifolia</i>	granny bonnets	Sml	Yellow, orange, red, Jul-Nov	X	Sand, clay loam, laterite, granite, winter wet.	Fresh seed			X		
* <i>Jacksonia furcellata</i>	grey stinkwood	Sml	Yellow, orange, red, Oct-Mar.	X	Sand. Sandplains, rises, swampy depressions, river banks.	Pretreated seed			X		
<i>Jacksonia horrida</i>		Med-tall	Yellow, orange, red, Jan-Mar/Jun-Dec	X	Sand Coastal areas, sand dunes winter wet.	Pretreated seed			X		
<i>Jansonia formosa</i>		P3 med, local endemic O	Red, Sep-Dec		Sand, river banks.	Pretreated seed			X		
<i>Kingia australis</i>	kingia, grass tree	Med-tall O	Yellow, green, brown, Jul-Aug	X	Sand, sandy loam, clayey loam.	Seed	X		X		
<i>Kunzea ciliata</i>		Sml-tall OA	Pink, Oct-Nov		Loamy sand.	Seed, cutting			X		
<i>Kunzea glabrescens</i> •	spearwood	Med-tall OAWb	Yellow, Oct-Nov	X	Clay, sandy soil, swamps, lakes, rivers, moist.	Seed, cutting			X	X	X
<i>Kunzea micrantha</i> •		Med-tall OA	Pink, purple, white, cream, Sep-Dec	X	Sand, clay, loam or peat, winter wet.	Seed, cutting			X	X	X
<i>Kunzea micrantha</i> subsp <i>micrantha</i>		Sml-tall OA	Pink, purple, white, cream, Aug-Dec	X	Sandy clay loam, peat, winter wet.	Seed, cutting			X	X	X
<i>Kunzea recurva</i> •		Med OA	Pink, purple, red, Aug-Dec	X	Most, inc. winter wet.	Seed, cutting		X	X	X	X
<i>Kunzea rostrata</i>		Tall OA	Pink, Oct-Nov	X	Grey sand, peat.	Seed, cutting			X	X	X
<i>Kunzea spathulata</i>		Tall OA	Yellow, green, Oct-Nov	X	Sand, swamps.	Seed, cutting			X	X	X
* <i>Labiichea punctata</i>	lance-leaved cassia	Sml OA	Yellow, Jul-Oct		Sand, lateritic.	Seed			X		
<i>Lagenophora huegelii</i>		v.sml	White, pink, purple, Jul-Dec	X	Most, wet.	Seed					

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Lasiopetalum floribundum</i>	free flowering lasio-petalum	Med-tall	Pink, blue, purple, white, Aug-Feb		Most.	Seed, cutting					
<i>Latrobea diosmifolia</i>		Sml-med	Yellow, Sep-Jan	X	Peaty sand, swamps, winter- wet.	Pretreat seed					
<i>Latrobea tenella</i>		Sml-med	Yellow, Aug-Feb	X	Sand, peat, swamps, winter wet.	Pretreat seed					
<i>Lechenaultia biloba</i> •	blue lesche-naulia	Sml-med OA	Blue, Jul-Dec		Lateritic or granitic.	Cutting			X		
<i>Lechenaultia expansa</i>		Sml O	Blue, purple, white, Oct-Jan	X	Sand, swamps.	Cutting			X		
<i>Lechenaultia</i>	free-floribunda lesche-naulia	Sml O flowering	Blue, white, Aug-Dec		White/grey or yellow sand.	Cutting			X		
<i>Leptomeria cunninghamii</i>		Sml, parasitic	Yellow, orange, brown, Jul-Dec		Sandy clay, sand, gravel.	Seed, cutting	X				X
<i>Leptomeria ellytes</i>		Med	Green, orange, red, brown, Nov-Jan/ Apr-May		Gravelly lateritic clay, sand over limestone.	Seed, cutting	X				X
<i>Leptomeria furtiva</i>		Sml P2	Orange, brown, Aug-Oct	X	Grey or black peaty sand, winter wet.	Seed, cutting	X				X
<i>Leucophyta brownii</i>	cushion bush	Sml OA W/b	Yellow, Jan-Dec		Coastal foredunes, limestone rocks, salt marshes.	Seed, cutting			X		
<i>Leucopogon alternifolius</i>		Sml-med	White, pink, Aug-Dec	X	Grey/white sand, swamps, winter wet.	Seed, cutting [difficult]					
<i>Leucopogon assimilis</i>		Sml-med	White, pink, Mar-Apr/Aug-Nov.		Sand, gravel, limestone, coastal.	Seed, cutting [difficult]					
<i>Leucopogon australis</i> •	Spiked Beard-heath	Sml-Med	White, Jun-Dec.	X	Sand, gravelly.	Seed, cutting [difficult]					

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Leucopogon capitellatus</i>		Sml-med	White, May-Nov		Various.	Seed, cutting [difficult]					
<i>Leucopogon conostephioides</i>		Sml-med	White, Mar-Oct		Sand.	Seed, cutting [difficult]					
<i>Leucopogon cordatus</i>		Sml	White, Jul-Nov	X	Sand, inc. winter-wet.	Seed, cutting [difficult]					
<i>Leucopogon distans subsp distans</i>		Sml	White, Jul-Feb	X	Sand gravel, swamps.	Seed, cutting [difficult]					
<i>Leucopogon distans subsp contractus</i>		Sml	White, Jul-Nov		Deep white/grey sand, sand.	Seed, cutting [difficult]					
<i>Leucopogon elatior</i>		Sml	White, Jan-Nov	X	White/grey sand, inc. winter wet.	Seed, cutting [difficult]					
<i>Leucopogon elegans</i>		Sml	White, pink, Jun-Jan	X	White/grey sand, gravelly loam.	Seed, cutting [difficult]					
<i>Leucopogon gilbertii</i>		Sml-med	White, Aug-Nov	X	White/grey, black.	Seed, cutting or peaty sand. [difficult]					
<i>Leucopogon glabellus</i>		Sml-med	White, Jan-Dec	X	Sand & gravel.	Seed, cutting [difficult]					
<i>Leucopogon hirsutus</i>		Sml	White, Aug-Dec	X	Sandy peaty soils, clay.	Seed, cutting [difficult]					
<i>Leucopogon obovatus</i>		Med	White, Mar-Nov		Grey/white sand, rocky loam, gravel.	Seed, cutting [difficult]					
<i>Leucopogon parviflorus</i> •	coast beard- heath	Med-tall	White, Feb-Mar/Jun-Oct		Coastal dunes & limestone.	Seed, cutting [difficult]					
<i>Leucopogon pendulus</i>		Sml-med	White, Mar-Oct	X	Sand, gravel.	Seed, cutting [difficult]					
<i>Leucopogon propinquus</i>		Sml-med	White, Jan-Jul		Sand, gravel.	Seed, cutting [difficult]					
<i>Leucopogon racemulosus</i>		Sml-med	White, Feb-Jul		Sand.	Seed, cutting [difficult]					

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Leucopogon revolutus</i>		Med-tall	White, Jul-Oct		Coastal sandhills.	Seed, cutting [difficult]					
<i>Leucopogon</i> sp Margaret River		Sml	White, Mar-Nov	X	Sand, sandy to gravelly loam, sandy clay, laterite granite.	Seed, cutting [difficult]					
<i>Leucopogon</i> sp Windy Harbour		Sml	White, Sep-Dec	X	Clay, grey sand, black peaty sand, winter wet.	Seed, cutting [difficult]					
<i>Leucopogon</i>	unilateralis	Sml-med	White, Apr-Nov	X	Sandy, rocky, granite, quartzite.	Seed, cutting [difficult]					
<i>Leucopogon verticillatus</i> •	tassel flower	Sml-tall	Pink, red, Aug-Nov	X	Gravel, lateritic, granitic.	Seed, cutting [difficult]					
<i>Linum marginale</i>	wild flax	Sml-med	Blue, white, Oct-Jan	X	Sand, loam clay.	Seed, cutting					
<i>Logania campanulata</i>	bell- flowered logania	Sml	White, Jan-Dec		Sand.	Seed					
<i>Logania serpyllifolia</i> subsp <i>angustifolia</i>		Sml	White, Aug-Dec	X	Sand, coastal.	Seed					
<i>Logania serpyllifolia</i> subsp <i>serpyllifolia</i>		Sml	White, Aug-Dec	X	Sand, loam, clay, gravel.	Seed					
<i>Logania vaginalis</i>	white spray	Sml-tall	White, Sep-Nov		Sand, coastal.	Seed					
<i>Lysinema ciliatum</i>	curry flower	Sml-med	White, cream, pink, brown, May-Jan		Sand, clay, gravel, laterite, limestone.						
<i>Lysinema conspicuum</i>		Sml	White, Jul-Mar	X	Sand, swamps.						
<i>Macrozamia riedlei</i> •	zamia	Med-tall O	Sep-Oct		Lateritic, jarrah forests.	Seed					
<i>Melaleuca basicephala</i>		P4 sml	Pink, purple, Dec-Jan	X	Peaty sand, clay, winter wet.	Seed					

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propr'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Melaleuca densa</i> •		Med-tall OAWb	Cream, yellow, Oct-Nov	X	Sand, clay, winter wet, rivers.	Seed			X		
<i>Melaleuca huegelii</i> subsp <i>huegelii</i> •	chenille honey myrtle	Med-tall OAWb	Pink, white, Oct-Jan		Sand, coastal, limestone.	Seed			X		
<i>Melaleuca incana</i> subsp <i>Incana</i> ssp <i>ginilup</i> •	grey honey myrtle	Med-tall OAWb	White, cream, yellow, Jul-Nov	X	Sand, clay, winter wet, swamps.	Seed			X		
<i>Melaleuca lateritia</i> •	robin redbreast bush	Sml-tall OAWb	Red, orange, Sep-Apr	X	Sandy, swamps.	Seed		X	X		X
<i>Melaleuca pauciflora</i>		Med	White, cream, Dec-Mar	X	Sand, winter-wet.	Seed			X		
<i>Melaleuca systena</i> [was <i>acerosa</i>]		Sml-med OAWb	Yellow, cream, Feb-Mar/Aug-Dec		Sand over laterite, yellow/ orange sand over limestone.	Seed			X		
<i>Melaleuca thymoides</i>		Med O	Cream, yellow, Sep-Jan	X	Sand, winter wet.	Seed			X		
<i>Melaleuca viminea</i> ssp <i>demissa</i>	mohan	Med-tall OAWb	White, cream, Jul-Nov	X	Sand, clay, winter wet, streams, coastal.	Seed			X		
<i>Melaleuca viminea</i> subsp <i>viminea</i>		Med-tall	White, cream, Jul-Nov	X	As above, not coastal.	Seed			X		
* <i>Mirbelia dilatata</i> •	holly- leaved mirbelia	Med-tall	Pink, violet, purple, Sep-Jan		Gravel, laterite, sand.	Seed			X		
<i>Monotaxis</i>	diamond grandiflora desert	Sml of the	White, yellow, pink, Apr/Sep-Dec		Sand, gravel, over clay.	Seed					
<i>Monotaxis occidentalis</i>		Sml	White, Sep-Jan	X	Sand, swamps.	Seed					
<i>Myoporum oppositifolium</i>	twin-leaf myoporum	Sml-med	White, purple, Aug-Apr		Sand, loam, streamsides.	Seed	X		X		X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Myriophyllum salsugineum</i>		Sml-med aquatic	Green, purple, red, Oct	X	Sand, lakes, swamps.	Cuttings				X	X
* <i>Nemcia capitata</i>		Sml	Orange, yellow, brown, red, Jul-Oct	X	Laterite, granite, clay.	Seed			X		
<i>Olax benthamiana</i>		Med	Cream, white, Jun-Dec		Laterite, gravel, grey, white or yellow sand.						
<i>Olearia axillaris</i> •	coastal daisybush	Med-tall OAW'b	White, cream, , yellow Jan-Jul/ Nov-Dec		Sand, loam.	Cuttings					
<i>Olearia elaeophila</i>		Sml O	White, blue, yellow, Jan-Dec	X	Sand & clay, winter wet.	Cuttings					
<i>Olearia paucidentata</i>	autumn scrub daisy	Sml O	Purple, blue, violet, white, Jan-Dec	X	Various, often wet.	Cuttings					
<i>Olearia rudis</i>	rough daisybush	Sml O	Blue, purple, yellow, Jul-Nov		Sand or gravel.	Cuttings					
<i>Opertularia apiciflora</i>		Sml	Cream, white, green, Jul-Dec	X	Clay, sand, laterite, granite.						
<i>Opertularia echinocephala</i>	bristly headed stink weed	Sml	Green, pink, Aug-Nov		Laterite, grey sand.						
<i>Opertularia vaginata</i>		Sml	Green, yellow, Jul-Dec		Sandy, lateritic or granitic.						
* <i>Oxylobium lineare</i> •	narrow- leaved oxylobium	Med-tall O	Red, yellow, Aug-Jan	X	Sand, sandy clay.	Seed			X		
<i>Ozothamnus cordatus</i>		Med O	White, yellow, Oct-Apr		Sand, coastal.	Cutting			X		
<i>Ozothamnus ramosus</i>		Med	White, pink, Oct-Feb		Gravel, loam, clay loam, sand.	Cutting			X		
<i>Pelargonium australe</i>		Sml O	Pink, purple, white, Feb-May/Sep-Dec		Various, coastal.	Cutting, seed			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Pelargonium littorale</i>		Sml O	Pink, Aug-Jan		Various.	Cutting, seed			X		
<i>Pentapeltis peltigera</i>		Sml	White, Dec-Apr		Gravel.						
<i>Pentapeltis silvatica</i>	southern pentapeltis	Sml	White, pink, Dec-Apr		Gravel.						
<i>Pericalymma ellipticum</i> •	swamp teatree	Tall	White, pink, Oct-Jan	X	Sand, clay, gravel, swamps.	Seed			X		
<i>Pericalymma spongiocaule</i>		Med	White, pink, Oct-Jan	X	Sand, peat, gravel, wet.	Seed			X		
<i>Persicaria decipiens</i>		Sml, occ. aquatic	Feb-Jun/Nov-Dec	X	Sand, clay-sand, winter wet.						
<i>Persicaria hydropiper</i>	water pepper	Med	White, green, Apr/Dec	X	Wet soils.					X	X
<i>Persicaria prostrata</i>	creeping knotweed	Sml, prostrate	Green, Feb-Jun/Oct-Nov	X	Clay, sandy clay, sand, winter wet.					X	X
<i>Personia saccata</i>	snotty gobbie	Sml O	Yellow, green, Jul-Jan		Sand, gravel, sandy clay.	Suckers	X				X
<i>Petrophile acicularis</i>		Sml O	Cream, yellow, white, Sep-Nov		Sand, sandy gravel.	Seed		X	X		X
<i>Petrophile diversifolia</i>		Tall, slender O pink,	Cream, white, Sep-Dec		Gravelly sandy, clay.	Seed		X	X		X
<i>Petrophile linearis</i> •	pixie mops	Sml O	Pink, grey, white, Aug-Dec		Sand, often over laterite.	Seed		X	X		X
<i>Petrophile serruriae</i>		Med O	Yellow, cream, grey, pink, Jul-Dec		Sandy and/or gravelly soils, laterite, clay.	Seed		X	X		
<i>Petrophile squamate ssp pluridisecta</i>		Med-tall O	Yellow, cream, white, Jun-Dec	X	Sand, clay, gravel, swamps, winter wet.	Seed		X	X		X
<i>Petrophile squamata subsp squamata</i>		Med O	Yellow, cream, white, Jul-Dec	X	Swamps, winter wet.	Seed		X	X		X
<i>Philotheca spicata</i>	pepper and salt	Sml O	Pink, purple, blue, white, Jun-Nov		Various.	Seed, cutting			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Phylidrella pygmaea</i>		Sml	Yellow, Aug-Nov	X	Clay, loam, sand.						
<i>Phyllanthus calycinus</i>	false boronia	Sml-Med O	White, cream, pink, Jun-Jan		Sand.	cutting			X		
<i>Pimelea argentea</i>	silvery leaved pimelea	Sml-med O	Cream, yellow, white, green, Jul-Nov	X	Loam or clay over laterite or granite.	cutting			X		
<i>Pimelea ciliata</i> subsp <i>longituba</i>		P3 sml O	Pink, Oct-Dec		Grey sand over clay, loam.	cutting			X		
<i>Pimelea clavata</i>		Sml-tall O	White, cream, yellow, Sep-May	X	Sand.	cutting			X		
<i>Pimelea ferruginea</i>		Med OA	Pink, Aug-Feb		Sand, coastal.	cutting			X		
<i>Pimelea hispida</i>	bristly pimelea	Med O	Pink, Sep-Dec	X	Winter wet, sand.	cutting			X		
<i>Pimelea imbricata</i>		Sml O Aug-Mar	White, cream, pink	X	Sand, sandy clay, gravel, granite.	cutting			X		
<i>Pimelea lanata</i>		Sml-tall O	White, pink, Jan-Feb/May-Dec	X	Sand, sandy clay.	cutting			X		
<i>Pimelea longiflora</i> subsp <i>longiflora</i>		Med O	White, cream, Aug-Feb	X	Sand, sandy clay.	cutting			X		
<i>Pimelea preissii</i>		Sml O	White, pink, red, Aug-Dec	X	Clay or sand, often with laterite.	cutting			X		
<i>Pimelea rosea</i> subsp <i>rosea</i> •		Sml O	Pink, Jul-Dec	X	sand, sandy clay on granite or limestone coastal.	cutting			X		
<i>Pimelea spectabilis</i>	bunjong	Med O	White, pink, yellow, Aug-Dec		Sand, sandy clay, gravel.	cutting			X		
<i>Pimelea suaveolens</i> subsp <i>suaveolens</i>		Med O	Yellow, green, Jun-Oct		Sand, sandy clay, gravel.	cutting			X		
<i>Pimelea sylvestris</i>		Med O	White, pink, Aug-Dec	X	Sand, gravelly clay loam, sandy clay.	cutting			X		

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<i>Pithocarpa pulchella</i>		Sml	White, yellow, Jan-Aug/Nov-Dec	X	Sand, gravel, loam.						
<i>Platysace compressa</i>	tapeworm plant	Sml	White, cream, Sep-Mar		Coastal, sand.						
<i>Platysace filiformis</i>		Sml	White, cream, Jan-Dec	X	Gravel.						
<i>Platysace haplosciadia</i>		Med		X	Sandy clay.						
<i>Platysace pendula</i>		Sml	White, Nov-Mar	X	Sand.						
<i>Platysace tenuissima</i>		Sml	White, cream, yellow, pink, Sep-Apr		Gravel, sand, lime.						
<i>Platysace xerophila</i>		Sml	White, cream, Oct-Feb		Sand.						
<i>Platytheca galioides</i>		Sml	Blue, violet, purple, Jul-Nov	X	Sand, gravel.	Cutting			X		
<i>Podocarpus drouynianus</i>	wild plum	Med-tall	Aug-Apr	X	Sand, sandy loam or gravelly loam.	Cutting, suckers	X			X	
<i>Poranthera huegelii</i>		Sml	White, Sep-Dec		Sand, sandy clay, lateritic gravel.						
<i>Potamogeton drummondii</i>		aquatic	Green, Oct-Feb	X	Freshwater lakes, rivers, swamps, dams.					X	X
<i>Praecoxanthus aphyllus</i>		Sml	White, cream, Mar-May	X	Sand.						
<i>Pteridium esculentum</i> •	bracken	Med		X	Laterite gravel, white sand, red loam, brown clay.	Suckers				X	X
<i>Ptilotus drummondii</i>	narrowleaf mulla mulla	Sml O	White, cream, pink, Mar-Dec		Sand, clay, loam, gravel.						
<i>Ptilotus manglesii</i>	pom poms	Sml O	Pink, Sep-Jan		Sand, gravel.						
<i>Ptilotus serotostachyus</i>		Sml O	Pink, white, Sep-Dec		Sand.						
<i>Ptilotus stirlingii</i>	stirling's mulla mulla	Sml O	Red, pink, white, cream, Sep-Mar		Sand, sandy clay, coastal.						

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Progp'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
*Pultenaea pinifolia		P3 med-tall OA	Yellow, orange, Oct-Nov	X	Loam or clay.	Seed			X		
Pultenaea radiata		Sml O	Yellow, orange, red, pink, purple, Sep-Oct		Gravel.	Seed			X		
Pultenaea reticulata		Sml-tall O	Yellow, orange, red, brown, Aug-Dec	X	Sand, winter wet.	Seed			X		
Pultenaea skinneri •	skinner's pea	Med O	Yellow, orange, red, Jul-Sep	X	Sand, clay, winter wet.	Seed			X		
Pultenaea verruculosa		Sml O	Yellow, orange, brown, Sep-Nov		Sand.	Seed			X		
Rhadinothamnus anceps [was phebalium]		Med-tall	White, Aug-Dec	X	Peaty sand.						
Rhagodia baccata subsp Baccata	berry saltbush	Med	Cream, yellow, green, Feb-May/Oct-Dec		Sand, limestone, granite, coastal.						
Ricinocarpus glaucus		Sml-med	White, Jul-Dec		Sand, loam, laterite or granite.	Cutting			X		
Scaevola anchusifolia		Sml-med O	Blue, white, Jun-Nov		Red sand, clay loam.	Cutting			X		
Scaevola calliptera		Sml O	Blue, purple, Sep-Jan		Sand, gravel.	Cutting			X		
Scaevola crassifolia •	thick-leaved fan-flower	Sml-med O	Blue, white, Jul-Feb		Sand, coastal.	Cutting			X		
Scaevola glandulifera	viscid hand-flower	Sml O	Blue, purple, Aug-Jan		Gravel, granite.	Cutting			X		
Scaevola globulifera		Sml-med O	Blue, white, Aug-Dec		Sand.	Cutting			X		
Scaevola microphylla	small-leaved scaevola	Sml O	Blue, purple, Sep-Mar	X	Sand, loam, clay.	Cutting			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Scaevola nitida</i>	shining fanflower	Sml O	Blue, purple, Aug-Dec		Sand, clay, coastal.	Cutting			X		
<i>Solanum symonii</i>		Med-tall	Blue, purple, Aug-Mar		Sandy soils, coastal limestone.						
* <i>Sphaerolobium drummondii</i>		Sml O	Red, yellow, orange, Jul-Nov	X	Grey sand, sandy clay or loam.	Seed	X		X		
<i>Sphaerolobium fornicatum</i>		Sml O	Yellow, orange, red, Oct-Jan	X	Sand, winter wet.	Seed	X		X		
<i>Sphaerolobium grandiflorum</i>		Med O	Red, yellow, orange, Sep-Nov	X	Sand, seasonally wet.	Seed	X		X		
<i>Sphaerolobium macranthum</i>		Sml O	Yellow, orange, red, Sep-Oct		Sand.	Seed	X		X		
<i>Sphaerolobium medium</i>		Sml O	Yellow, orange, red, Aug-Dec		Sand, clay, gravel.	Seed	X		X		
<i>Sphaerolobium nudiflorum</i>		Sml O	Yellow, orange, Oct-Jan		Sand, gravel.	Seed	X		X		
<i>Sphaerolobium racemosum</i>		Sml O	Red, orange, Jul-Nov	X	Sandy soils, clay, clayey loam.	Seed	X		X		
<i>Sphaerolobium vimineum</i>	leafless globe pea	Sml-med O	Orange, yellow, red, Aug-Dec.	X	Peaty soils, sandy clay, clay.	Seed	X		X		
<i>Sphenotoma capitatum</i>		Sml-med	White, Aug-Dec		Sandy, lateritic or granitic.						
<i>Sphenotoma gracile</i>	swamp paper-heath	Sml	White, Aug-Feb	X	Swamps, winter wet.						
<i>Sphenotoma parviflorum</i>		P3 sml	White, Feb-Apr/Sep-Nov	X	Sand, swampy.						
<i>Spyridium globulosum</i> •	basket bush	Tall	White, Jun-Nov		Sand.						
<i>Stackhousia monogyna</i>		Sml	White, cream, yellow, Jun-Dec		Sand, laterite, gravel, clay, granite.						
<i>Stirlingia latifolia</i> •	blueboy	Sml-med	Yellow, brown, red, Aug-Oct		Sand, sometimes with lateritic gravel.						

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<i>Strangaea stenocarpoides</i>		Sml-med	Green, yellow, Aug-Oct.		Sandy gravelly, sandy clay.						
<i>Styphelia tenuiflora</i>		Sml-med	White, cream, Mar-Jul		Gravel.						
<i>Synaphea gracillima</i>		Sml O	Yellow, Jul-Nov		Gravel, sand.						
<i>Synaphea macrophylla</i>		P1 small O	Yellow, Oct		Gravelly loam.						
<i>Synaphea petiolaris</i> subsp <i>triloba</i>		Sml O	Yellow, Aug-Oct	X	Sandy, swampy.						
<i>Synaphea whicherensis</i>		Sml O	Yellow, Oct-Nov	X	Gravel, sand winter wet.						
<i>Taxandria linearifolia</i> •	swamp peppermint	Med	White, most of year	X	Clay, sand, loam (all), winter wet.	Seed, cutting	X		X	X	
<i>Taxandria parryae</i> •	fine teatree	Sml-med	White, pink, most of year	X	Clay, sand, loam (all), winter wet.	Seed, cutting	X		X	X	
<i>*Templetonia retusa</i> •	cockies tongues	Med-tall OAWb	Red, white, yellow, Apr-Nov		Limestone or sand or loam over limestone, coastal.	Seed	X	X	X		
<i>Tetradlea filiformis</i>		Sml O	Pink, purple, Oct-Jan	X	Sandy damp.	Cutting			X		
<i>Tetradlea setigera</i>		Sml O	Pink, purple, Aug-Dec	X	Sand, gravel.	Cutting			X		
<i>Thomasia foliosa</i>		Med OA	White, pink, purple, May-Nov		Gravel, granite.	Cutting			X		
<i>Thomasia glutinosa</i>	sticky thomasia	Sml OA	Pink, purple, Sep-Dec		Gravel, granite.	Cutting			X		
<i>Thomasia grandiflora</i>	large flowered thomasia	Sml OA	Pink, purple, Jul-Nov		Gravel.	Cutting			X		
<i>Thomasia heterophylla</i>		Sml-med OA	Pink, purple, white, Oct-Dec	X	Sand, loam, clay.	Cutting			X		
<i>Thomasia laxiflora</i>		P1 sml OA	Pink, purple, Oct-Nov		Gravel.	Cutting			X		

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<i>Thomasia macrocarpa</i>		Med OA	Pink, blue, purple, white, Aug-Nov		Loam, granite.	Cutting			X		
<i>Thomasia paniculata</i>		Med-tall OA	Pink, purple, Sep-Mar	X	Alluvium, granitic or lateritic.	Cutting			X		
<i>Thomasia pauciflora</i>	few flowered thomasia	Med OA	Pink, purple, white, Jul-Jan	X	Sand.	Cutting			X		
<i>Thomasia petalocalyx</i>	paper flower	Sml OA	Pink, blue, purple, Aug-Oct/Jan		Sandy.	Cutting			X		
<i>Thomasia rhynchocharpa</i>		Sml-med OA	Pink, purple, Apr/Jul-Dec	X	Sand over laterite, peaty sand.	Cutting			X		
<i>Thomasia sp</i> Big Brook		Sml-med OA	Pink, purple, Oct-Nov	X	Peaty sand or sandy gravelly.	Cutting			X		
<i>Thomasia triloba</i>		P3 sml OA	Pink, purple, Oct-Nov		Sandy gravel over laterite, loamy soils, clay.	Cutting			X		
<i>Thomasia triphylla</i>		Sml-med OA	Pink, purple, white, Jul-Nov		Calcareous sand.	Cutting			X		
<i>Threlkeldia diffusa</i>	coast bonefruit	Sml-prostrate	Green, Oct-Nov		Sand, clay, coastal.						
<i>Thryptomene saxicola</i>	rock thryptomene	Sml OA Feb-Nov	White, pink		Sand, loam.	Cutting			X		
<i>Trenandra diffusa</i>		Sml O	White, Sep-Jan.		Sand, loam, gravel.	Cutting			X		
<i>Trenandra stelligera</i>		Sml-med OA	Pink, purple, blue, Jan-Dec		Sand, loam, various.	Cutting			X		
<i>Tribonanthes australis</i>		Sml	White, Aug-Nov	X	Sand, peat, sandy clay.					X	X
<i>Trichocline sp</i> Treeton		P3 Med		X	Sand, sandy clay.					X	X
<i>Trichocline spathulata</i>	native gerbera	Sml	White, cream, Oct-Feb	X	Gravel, sand, clay loam.					X	X
<i>Triglochin huegelii</i>		Med.aquatic	Green, yellow, Jun-Nov	X	Sand, mud, rivers, creeks.					X	X

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<i>Triglochin striata</i>		Sml,aquatic	Green, Mar-Nov	X	Sand, winter wet.					X	X
<i>Tripterococcus brunonis</i>	winged stackhousia	Sml	Yellow, green, white, brown, black, Jul-Mar		Sand, sometimes in loam or gravel.						
<i>Trymalium floribundum</i>		Med-tall ASH	White, cream, yellow, green, Jul-Dec	X	Clay, sandy clay or gravelly.	Cutting			X		
<i>Trymalium floribundum</i> subsp <i>Trifidum</i>	As above					Cutting			X		
<i>Trymalium ledifolium</i>		Med-tall ASH	White, cream, Jun-Nov		Sand, clay, loam, gravel, granite, limestone.	Cutting			X		
<i>Trymalium ledifolium</i> var <i>rosmarinifolium</i>		Med ASH	White, cream, Jun-Nov		Clay, loam, sand.	Cutting			X		
<i>Velleia macrophylla</i>	large-leaved velleia	Sml-med	Yellow, Oct-Jan	X	Damp areas.	Seed				X	X
<i>Velleia trinervis</i>		Sml	Yellow, orange, brown, Aug-Jan	X	Damp areas.	Seed				X	
<i>Veronica distans</i>		Sml	Blue, purple, Oct-Jan		Sand, loam, gravel over granite.						
<i>Verticordia lehmannii</i>		P4 sml O	Pink, Jan/Apr -Aug/Dec	X	Sandy clay, winter wet.	Cutting			X		
<i>Verticordia plumosa</i>		Sml-med	Pink, purple, blue, red, white, Jul-Feb	X	Sand, granite, clay, gravel, winter wet.	Cutting			X		
<i>Verticordia plumosa</i> var <i>plumosa</i>		Sml-med O	Pink, purple, white, Aug-Jan		Granite outcrops.	Cutting			X		
<i>Villarsia albiflora</i>		Sml-med, aquatic, semi- aquatic OSh	White, cream, Sep-Jan	X	Sandy peaty, waterways.	Div.				X	X

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<i>Villarsia lasiosepala</i>		Sml-med aquatic, semi-aquatic OSh	White, Sep-Jan	X	Sandy clay, peaty sand, mud.	Div.				X	X
<i>Villarsia latifolia</i>		Sml-med, semi-aquatic OSh	Yellow, Sep-Feb	X	Sandy & loamy, peat. Moist places.	Div.				X	X
<i>Villarsia parnassifolia</i>		Sml-med aquatic, semi-aquatic OSh	Yellow, Jul-Mar	X	Shallow waters, damp soil.	Div.				X	X
<i>Viminaria juncea</i> •	swishbush	Med-tall OA	Yellow, Oct-Jan	X	Sand, clay.	Seed	X		X		X
<i>Wahlenbergia multicaulis</i>		Sml O	Blue, Sep-Feb	X	Sand, loam, clay.	Seed				X	X
<i>Xanthorrhoea brunonis subsp brunonis</i>		Med O	White, cream, Oct-Dec		Sand, sandy clay, laterite.	Seed	X		X		X
<i>Xanthorrhoea brunonis subsp semibarbata</i>		Med O	White, cream, Oct-Dec		Grey sand, laterite, sandy clay	Seed	X		X		X
<i>Xanthorrhoea preissii</i> •	grass tree	Med-Tall O	White, cream, Jan-Nov		Sand, gravel.	Seed	X		X		X
<i>Xanthostia atkinsoniana</i>		Sml	White, Oct-Apr		Gravel, sand.						
<i>Xanthostia candida</i>		Sml	White, green, cream, yellow, Sep-May		Various.						
<i>Xanthostia huegelii</i>		Sml	Yellow, green, white, cream, Mar-Jan	X	Any, winter wet.						

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<i>Allocasurina fraseriana</i> •	sheoak	Sml-med. Useful to smother weeds	Sml, rusty red, Jan-Dec		Sand, gravel.	Seed, easy	X		X		Browse
<i>Agonis flexuosa</i> •	peppermint	Sml-med. important for ringtails, insects	White, Oct-Dec	X	Sand, gravel, loam.	Seed, easy			X		X
<i>Banksia attenuata</i> •	candle banksia	Sml-Med	Yellow, Nov-Jan		Sand.	Seed	X	X	X		X Nectar
<i>Banksia grandis</i> •	bull banksia	Sml-Med	Yellow, Oct-Jan		Sand, gravel.	Seed	X	X	X		X Nectar
<i>Banksia ilicifolia</i> •	holly banksia	Sml	Green-pink, anytime		Sand.		X	X	X		
<i>Banksia littoralis</i> •	swamp banksia	Med, will grow in lawn.	Yellow, Mar-May	X	Sand.	Seed	X	X	X		Nectar
<i>*Callistachys lanceolata</i> •	native willow	Sml	Yellow, Sept-Jan	X	Sand, loam.	Seed, easy	X		X		
<i>Corymbia calophylla</i> •	marri, redgum	Tall. Profuse, ornamental flowers	Cream or pink, Feb-April		Sand, loam, gravel.	Seed, easy	X	X	X		Nectar, bark, hollows
<i>Corymbia haematoxylon</i>	mountain marri	Sml-tall Ironstone [Whicher]	White, Oct-Mar		Sand, laterite.	Seed, easy		X	X		X hollows bark
<i>Eucalyptus calcicola</i>	hamelin bay mallee	Sml Endemic	Cream, April-June		Sand, limey.	Seed, easy	X	X	X		X
<i>Eucalyptus cornuta</i> •	yate	Tall [sml in tough conds] Hardy and adaptable. Good in clay	Yellow, winter-spring	X	Clay, loam.	Seed, easy	X	X	X		X
<i>Eucalyptus diversicolor</i> •	karri	Very tall, ornamental bark	White, Sep-Feb		Loam.	Seed, easy	X		X		X hollows

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Progp'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Eucalyptus marginata</i> •	jarrah	Tall, slow to start Difficult to sustain	White, Sep-Dec		Gravel, gravelly loam, sand.	Seed, easy	X				hollows
<i>Eucalyptus megacarpa</i> •	bullich	Med-tall Exc. for clay. Ornamental bark, nuts.	White, May-Aug	X	Clay, loam.	Seed, easy	X				hollows
<i>Eucalyptus patens</i> •	blackbutt yarri	Tall, majestic tree, exc for clay	White, Nov-Feb	X	Clay, loam.	Seed, easy	X		X		X hollows, bark
<i>Eucalyptus rudis</i> •	flooded gum, blue gum	Tall	White, Jul-Sep	X	Clay, loam, sand.	Seed, easy	X		X		X
<i>Hakea lasianthoides</i> •	willow hakea	Sml, very ornamental, ^ likes moisture.	White, Aug-Nov	X	Clay, loam, sand.	Seed, easy			X		
<i>Hakea oleifolia</i> •	frog or olive hakea	Sml	White, Aug-Oct		Sand/loam, clay.	Seed, easy			X		Browse
<i>Melaleuca cuticularis</i> •	salt water paperbark	Sml, very tolerant of saline sites	White, Oct-Dec	X	Sand, peat, clay, loam.	Seed, easy			X		
<i>Melaleuca lanceolata</i> •	moonah, rotnest teatree	Sml-med	White, cream, Jan-Mar	X	Limestone, clay, loam, sand.	Seed, easy			X		X
<i>Melaleuca preissiana</i> •	modong stout paperbark	Sml-Med	yellow, cream, white, Nov-Feb	X	Sand, swamps, waterlogged ironstone.	Seed, easy, suits direct seeding			X		X
<i>Melaleuca raphiophylla</i> •	swamp paperbark	Sml-med	white, cream, Jul-Jan	X	Sand, clay soils, limestone. Saltmarshes, swamps, watercourses [north, south, not central].	Seed, easy, suits direct seeding		X	X		X
<i>Nuytsia floribunda</i>	christmas tree	Sml, parasitic	Orange, Dec-Jan		Sand.	Seed, must have host			X		
* <i>Paraserianthes lophantha</i> var <i>lophantha</i>	cape wattle	Sml, shrubby	White, July-Sep	X	Sand, loam.	Seed			X		

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<i>Personia elliptica</i>	spreading snotty-gobbler	Sml-med bush Tucker	Yellow, Oct-Jan		Sand, loam, laterite.	Seed/cuttings w. difficulty. Suckers.	X		X		X fruit
<i>Personia longifolia</i>	snotty-gobbler	Sml bush Tucker	Yellow, Nov-Feb		Sand, loam, laterite.	As above.	X		X		X
<i>Taxandria juniperina</i> •	wattle	Med	White, Dec-Mar	X	Wet sandy, loam.	Seed, easy fruit.			X		
<i>Xylomelum occidentale</i>	woody pear	Sml ornamental foliage, fruit, flrs	Cream, white Dec-Feb		Sand, loam.	Seed.			X		

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Acanthocarpus preissii</i>		Sml	White, April/May		Sand, limestone, dunes.	Seed					
<i>Agrostocrinum scabrum</i>		Sml OA	Blue, Sep-Dec		Any.	Pre-treated seed					
<i>Amperea simulans</i>		Sml	Cream, brown, Sep-Nov		Sand, gravel.	Seed, cutting					
<i>Amphipogon amhipogonoides</i>		Sml	Grey, cream, purple, Sep-Apr	X	Gravel, clay, sand, swamps.	Seed, div				X	
<i>Amphipogon debilis</i>		Sml	Purple, green, Nov-Dec	X		Seed, div				X	
<i>Amphipogon laguroides</i>		Sml	Purple, green, Sep-Apr	X	Sand, loam, gravel, swamps.	Seed, div				X	
<i>Anarthria gracilis</i>		Sml O	Brown, Aug-Nov	X	Sand, gravel, winter wet.	Seed				X	
<i>Anarthria prolifera</i>		Sml O	Brown, Aug-Nov	X	Peaty sand, loam, dunes, winter wet.	Seed				X	
<i>Anarthria scabra</i>		Robust Med O	Brown/yellow, Aug-Dec	X	Peaty sand, winter wet, dunes.	Seed				X	
<i>Anigozanthus flavidus</i>	tall kangaroo paw	Adaptable & hardy Med-tall OA	Red, local form is red	X	Sand, clay, gravel.	Seed, division		X	X	X	X
<i>Anigozanthus manglesii</i> •	mangles kangaroo paw	State floral emblem Sml O	Green, red, Aug-Nov		Sand, sandy loam.	Seed, division		X	X		X
<i>Anigozanthus viridis</i> •	green kangaroo paw	Sml O	Green, Aug-Oct	X	Sand, loam, clay, winter wet.	Seed		X	X	X	X
<i>Anthotium junceiforme</i>		P4 Sml	Blue, violet, purple	X	Clay, sandy clay, winter wet.	Cutting				X	
<i>Aotus carinata</i>		P4 Med O	Orange, red, yellow, Sep-Nov	X	Sand.	Seed, pretreat, cutting			X		
<i>Aotus cordifolia</i>		P3 Med O	Yellow, Aug-Jan	X	Peat, swamps.	Seed, pretreat, cutting				X	
<i>Aotus intermedia</i>		Med O	Yellow, red, brown	X	Sand, swamps.	Seed, pretreat, cutting				X	

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<i>Austrodanthonia acerosa</i>		Sml OA	Purple, green, Sep-Dec		Sand, loam.	Seed	X				X
<i>Austrodanthonia caespitosa</i>	common wallaby grass	Sml OA	Purple, green, Oct-Jan	X	Any, swamps.	Seed	X			X	X
<i>Austrodanthonia compressa</i>		Sml OA	Green, Sep-Dec	X	Sand, clay, dunes, winter wet.	Seed, div.	X			X	X
<i>Austrospiza flavescens</i>		Sml OA	Green, yellow, Sep-Oct		Sand, limestone, dunes.	Seed, div.	X				X
<i>Austrodanthonia occidentalis</i>		Sml OA	Purple, green, Sep-Nov		Sand, clay, dunes.		X			X	X
<i>Austrostipa semibarbata</i>	fibrous beardgrass, spiked beardgrass	Sml OA	Green, purple, Aug-Nov	X	Sand, gravel.	Seed, div.	X		X	X	X
<i>Austrostipa campylachne</i>		Sml O	Green, Aug-Oct		Gravel, sandy loam.	Seed	X		X		X
<i>Austrostipa compressa</i>		Sml O	Green, Sep-Dec	X		Seed	X		X	X	X
<i>Baumea acuta</i>	pale twig-rush	Sml, robust, dense sedge O	Brown, Sep-Nov	X	Summer damp sand, winter wet, swamps.	Seed, div.			X	X	X
<i>Baumea articulata</i>	jointed rush	Med-tall robust sedge O	Red, brown, Jan-Dec	X	Wet, black sand, waterlogged soils, winter wet swamps, lakes.	Seed, div.			X	X	X
<i>Baumea juncea</i> •	bare twig-rush	Med sedge O	Brown, grey, Oct-Mar.	X	Dark grey sand, waterlogged soils.	Seed, div.			X	X	X
<i>Baumea preissii subsp laxa</i>		Med sedge O grey, Jul-Dec	Purple, brown,	X	Silty sand, fresh water swamps, bordering lakes and watercourses.				X	X	X
<i>Baumea riparia</i>		Med sedge O	Brown, Aug-Oct	X	Black peaty sand, seasonal swamps, often brackish.	Seed, div.			X	X	X
<i>Baumea rubiginosa</i>		Tall sedge O	Brown, Aug-Mar	X	Streams, swamps.	Seed, div.			X	X	X

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<i>Baumea vaginalis</i> •	sheath twigrush	Med sedge O	Brown, Oct-Nov	X	Winter wet and along watercourses.	Seed, div.			X	X	X
<i>Bolboschoenus caldwellii</i>	marsh club-rush	Med salinity	Yellow, brown, Aug-Mar	X	White/grey sand, mud, saline silt, sandy clay, swamps.	Seed, div.				X	X
<i>Burchardia multiflora</i>	dwarf burchardia	Sml OA	Pink, white, Jul-Oct	X	Sand, clay, swamps, streams.	Seed			X	X	
<i>Burchardia umbellata</i>	milkmaids	Sml OA	White, Aug-Oct		Sand, laterite, granite, sandy clay.	Seed			X		
<i>Caesia micrantha</i>	pale grass-lily	Sml O	White, blue, purple, Sep-Nov	X	Sand, sandy loam, laterite, granite, winter wet.	Seed			X	X	X
<i>Caesia occidentalis</i>		Sml O	White, brown, Sep-Feb	X	Grey/black sand, clay, loam, winter wet.	Seed			X	X	X
<i>Carex appressa</i>	tall sedge	Tall	Brown, Sep-Oct	X	Sandy peaty loam, swamps.	Seed				X	X
<i>Carex preissii</i>		Sml	Fl. green, Jul-Oct		Grey/black sand, sandy clay, dunes.	Seed				X	
<i>Chaetanthus leptocarpoides</i>		Sml sedge	Red, brown, Nov-Dec	X	Sand, winter wet.	Seed, div.				X	X
<i>Chaetanthus tenellus</i>		Sml sedge	Brown, red, Sep-Nov	X	Sand, swamps, winter wet.	Seed, div.				X	X
<i>Chordifex isomorphus</i>		P2 Sml	Brown, Mar-May	X	Sand, wet ironstone, swamps, winter wet.	Seed, div.				X	X
<i>Chorizandra cymbaria</i>	heron bristle rush	Sml sedge	Purple, Oct-Dec	X	Sand; sandy clay, peaty swamps.	Div.				X	X
<i>Chorizandra enodis</i>	black bristlerush	Med sedge	Purple, brown, black, Jul-Nov	X	Grey clayey sand, gravel, red clay, swamps.	Div.				X	X
<i>Conostylis aculeata</i>	prickly conostylis	Sml, AO [all]	Yellow, Aug-Nov	X	Sand, loam, clay, gravel, limestone, winter wet.	Seed, div.				X	
<i>Conostylis aculeata subsp aculeata</i>		Sml	Yellow, Aug-Nov		Sandy loam, yellow/white/grey sand.	Seed, div.				X	X
<i>Conostylis aculeata subsp preissii</i>		Sml [Yall]	Yellow, Sep-Nov		Sand, gravelly loam.	Seed, div.				X	X

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<i>Conostylis candicans</i>	grey cottonhead	Sml	Yellow, Jul-Nov		Sand, sandy loam, limestone. Coastal dunes, sand dunes.	Seed, Div.				X	X
<i>Conostylis juncea</i>		Sml	Yellow, green, Jul-Sep.		Sand.	Seed, Div.				X	X
<i>Conostylis laxiflora</i>		Sml	Yellow, cream, Oct-Nov	X	Sandy clay, white/grey sand, swamps, creeks.	Seed, Div.				X	X
<i>Conostylis serrulata</i>		Sml	Yellow, cream, Aug-Oct		Sand, gravel.	Seed, Div.				X	X
<i>Conostylis setigera</i>	bristly cottonhead	Sml	Yellow, red, Aug-Nov		Sand, loam, gravel.	Seed, Div.				X	X
<i>Cyathochaeta avenacea</i>		Med Sedge	Brown, Nov-Mar	X	Sand, loam, peaty swamps.	Div.				X	X
<i>Cyathochaeta clandestina</i>		Med-tall sedge	Brown, Oct-Dec	X	Sand, swamps, streams.	Div.				X	X
<i>Cyathochaeta equitans</i>		Med	Jan-Feb		Sand.	Div.					X
<i>Cyathochaeta teretifolia</i>		P3 Tall	Brown	X	Sand, sandy clay. Swamps, creek edges.	Div.				X	X
<i>Dasyopogon bromeliifolius</i> •	pineapple bush	Med O	White, Sep-Jan			Seed					
<i>Desmodiadus fasciculatus</i>		Sml, sedge-like	Aug-Dec		White, yellow, peaty or lateritic sand, dry heath.						
<i>Desmodiadus flexuosus</i>		Sml-med	Jul-Oct		White, red or lateritic sand, limestone [creek margins, dry].						
<i>Deyeuxia quadrisetata</i>	reed bentgrass	Sml-med	Purple, Aug-Dec	X	Loam, peaty sand, clay, wet.	Seed, stored before sowing				X	X
<i>Dianella brevicaulis</i>		Sml	Blue, purple, Oct-Dec		Sand, clay.	Seed, stored, div.			X	X	X
<i>Dianella revolute</i> •	blueberry lily	Sml-med OA	Blue, purple, violet, Aug-Jan/Apr		Any.	Seed, stored, div.			X	X	X
<i>Dichelachne crinita</i>	longhair plumegrass	Sml	Green, Sep-Nov		Sand, limestone.						X

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<i>Dichopogon capillipes</i>		Sml	Purple, pink, Sep-Mar		Grey sand over limestone, loam, clay, sandy clay, granite, laterite [Yall].	Seed			X		X
<i>Empodisma gracillimum</i>		Med	Brown, Jul-Feb	X	Grey/black sand, peat, winter wet.	Seed				X	X
<i>Evandra aristata</i>		Med-tall	Brown, Oct-Dec	X	Grey-black sand, winter wet.					X	X
<i>Ficinia nodosa</i> • [was <i>Isolepis</i>]		Sml OA		X	Sand, peaty sand.	Seed				X	X
<i>Gahnia aristata</i>		Med sedge HvO	Brown, May		Gravelly sandy loam, laterite.	Seed, div.			X	X	X
<i>Gahnia decomposita</i>		Med-tall sedge HvO	Brown, black, Sep-Nov	X	Sand, wet black sandy loam, swamps, streams, winter wet.	Seed, div.			X	X	X
<i>Gahnia scleroides</i>		P3 med HvO		X	Loam, sandy soils, moist, shaded.	Seed, div.			X	X	X
<i>Gymnoschoenus aeneus</i>		Med sedge	Brown, Oct-Jan	X	Grey/black sand, swamps, winter wet.					X	X
<i>Haemodorum discolor</i>		Sml	Brown, black, Sep-Nov		Sandy clay, grey, yellow sand, clay. [Yall].	Fresh seed	X		X	X	X
<i>Haemodorum laxum</i>		Sml	Black, brown, green, Oct-Nov	X	Grey or yellow sand, clay, gravel, laterite.	Fresh seed	X		X		X
<i>Haemodorum spicatum</i>	mardja	Sml	Black, brown, yellow, Oct-Jan	X	White, grey or yellow sand, laterite, sandy clay.	Fresh seed	X		X		X
<i>Hemarthria uncinata</i>	matgrass	Sml	Green, Dec-Apr	X	Sand, sand dunes, stream banks.	Seed, div.	X		X	X	X
<i>Hodgsoniola junciformis</i>		Sml	Purple, blue, Sep-Dec	X	Grey/black sand, swamps.	Seed				X	X
<i>Hypolaena caespitosa</i>		Sml O		X	Grey sand, lateritic gravel, swampy.	Div.				X	X
<i>Hypolaena exsulca</i>		Sml O	Brown, grey, Sep-Dec	X	Grey or black sand, winter wet.	Div.				X	X
<i>Hypolaena fastigiata</i>		Sml O	Brown, Sep-Nov	X	White or grey peaty sand, swamps. [Yall].	Div.				X	X

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<i>Hypolaena pubescens</i>		Sml O	Jan-Mar/Jun	X	White or grey/black sand, loam, winter wet.	Div.				X	X
<i>Hypolaena viridis</i>		Sml O		X	Sand, sandy clay, swampy sites, creeks, stream.	Div.				X	X
<i>Isolepis cernua</i>	nodding club-rush	Sml	Green, brown, Aug-Mar	X	Various, inc. saline, swamps.	Seed, div.				X	X
<i>Isolepis cyperoides</i>		Sml	Green, brown, Jan-Dec	X	Various.	Seed, div.				X	X
<i>Isolepis nodosa</i> •	see <i>Ficinia nodosa</i>										
<i>Johnsonia acaulis</i>		Sml O	White, pink, green, Aug-Dec		White, grey or lateritic sand.	Seed, div.					X
<i>Johnsonia inconspicua</i>		P3 Sml O	Green, white, pink, Oct-Nov	X	White, grey or black sand, winter wet.	Seed, div.				X	X
<i>Johnsonia lupulina</i>	hooded lily	Sml O	Cream, white, Sep-Dec	X	Grey or black peaty sand, lateritic gravel.	Seed, div.				X	X
<i>Juncus caespiticius</i>	grassy rush	Sml	Oct-Dec	X	Peaty or saline sand.	Seed				X	X
<i>Juncus kraussii</i> subsp <i>australiensis</i> •	sea rush	Med	Brown, red, Oct-Jan	X	White or grey sand, clay, alluvium, swamps, brackish estuaries, saline.	Seed				X	X
<i>Juncus pallidus</i> •	pale rush	Med-Tall	Green, Oct-Dec	X	Clay, swamps.	Seed				X	X
<i>Juncus pauciflorus</i>	loose flower rush	Sml	Sep-Oct	X	Clay, swamps.	Seed				X	X
<i>Juncus planifolius</i>	broadleaf rush	Sml	Sep-Dec	X	Clay, swamps.	Seed				X	X
<i>Laxmannia jamesii</i>	james' paperlily	R sml	Red, white, May-Jul	X	Grey sand, winter wet.	Seed, div.				X	X
<i>Lepidosperma effusum</i>	spreading sword-sedge	Tall O	Brown, dull grey, Apr-Jun/Sep-Nov	X	White sand, brown loam, creeks, rivers.	Div			X	X	X
<i>Lepidosperma gladiatum</i>	coast sword-sedge	Med-Tall OwB	Brown, Nov-May	X	Sand, limestone, loam, dunes, creeklines.	Seed, div.			X	X	X

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<i>Lepidosperma leptostachyum</i>		Sml O	Brown, Apr-Jun		Various.	Div.			X	X	X
<i>Lepidosperma longitundinale</i>	pithy sword-sedge	Med O	Brown, May-Oct	X	Sand, clay, winter wet.	Seed, div.			X	X	X
<i>Lepidosperma pubisquamum</i>		Sml O	Brown, May		Sand, sandy clay, loam.	Div.			X	X	X
<i>Lepidosperma squamatum</i>		Sml O	Brown, Mar-Nov	X	Sand, sandy clay, gravel.	Dunes, div. swamps			X	X	X
<i>Lepidosperma tenue</i>		Sml O	Brown, May-Oct		Sand, sandy clay, sandy loam, granite.	Div.			X	X	X
<i>Lepidosperma tetraquetrum</i>		Tall O	Brown, Nov-Mar	X	Sand, gullies, swamps, streams.	Div.			X	X	X
<i>Leptocarpus laxus</i>		Sml	Red, Apr/Nov	X	Sand, saline soils, clay, laterite, swamps, creeks.	Div.			X	X	X
<i>Leptocarpus tenax</i>	slender twine rush	Sml	Brown, red, Nov-Jan	X	Sand, clay.	Div.			X	X	X
<i>Lepyrodia drummondiana</i>		Sml	Sep-Nov	X	Sand & sandy peat.	Seed				X	X
<i>Lepyrodia glauca</i>		Med	Sep-Dec	X	Sand or clay, wet.	Seed				X	X
<i>Lepyrodia heleocharoides</i>		Sml	Dec	X	Moist peaty sand.	Seed				X	X
<i>Lepyrodia porterae</i>		Sml	Brown, Dec-Jan	X	Clay, ironstone, sand, peat, swamps.	Seed				X	X
<i>Lomandra caespitosa</i>	tufted mat rush	Sml O	Yellow, cream, Jul-Oct		Sand, gravel.	Seed, div.			X		X
<i>Lomandra drummondii</i>		Sml O	Green, yellow, purple, May-Aug.		Gravel.	Seed, div.			X		X
<i>Lomandra hermaphrodita</i>		Sml O	Purple, yellow, Apr-Jun		Sand, gravel.	Seed, div.			X		X
<i>Lomandra integra</i>		Sml O	White, Aug-Nov		Sand, gravel, loam.	Seed, div.			X		X
<i>Lomandra micrantha</i>	small-flower mat-rush	Sml O	Green, purple, brown, Apr-Jul		Sand, sandy clay, sandy loam.	Seed, div.			X		X

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<i>Lomandra micrantha</i>		Sml O	Green, purple, brown, Apr-Jul		Sand, sandy clay.	Seed, div.			X		X
<i>Lomandra nigricans</i>		Sml O	White, May-Aug		Sand, gravel.	Seed, div.			X		X
<i>Lomandra pauciflora</i>		Sml O	Yellow, cream, Nov-Feb	X	Gravelly sand, loam, sandy clay, granite, often wet.	Seed, div.			X		X
<i>Lomandra preissii</i>		Sml O	Green, yellow, purple, Apr-Jul.		Sand, gravel.	Seed, div.			X		X
<i>Lomandra purpurea</i>		Sml O	Purple, black, yellow, Oct-Nov		Sand, gravel.	Seed, div.			X		X
<i>Lomandra sericea</i>	silky mat rush	Sml O	Purple, yellow, Aug-Oct		Sand, laterite, lateritic gravel.	Seed, div.			X		X
<i>Lomandra sonderi</i>		Sml O	Yellow, purple, Sep-Nov	X	Sand, gravel, wet.	Seed, div.			X	X	X
<i>Lomandra suaveolens</i>		Sml O	Purple, yellow, cream, Apr-Jul		Sand, sandy clay, limestone, gravel.	Seed, div.			X		X
<i>Loxocarya cinerea</i>		Sml O	Brown, red, Aug-Nov	X	Clay, lateritic loam, sand.	Div.			X	X	X
<i>Loxocarya magna</i>		Sml O	Sep-Nov	X	Sand, loam, clay, ironstone.	Div.			X	X	X
<i>Luzula meridionalis</i>	field woodrush	Sml O	Brown, Aug-Sep		Sand, sandy clay, loam.	Seed, div.			X		X
<i>Lyginia barbata</i>		Sml	Brown, Aug-Apr	X	Sand, winter wet.					X	X
<i>Meeboldina coangustata</i>		Sml O	Brown, red, Jun-Oct	X	Sand, clay, sandy clay, rivers, lakes, swamps.	Seed, Div.				X	X
<i>Meeboldina crebriculmis</i>		Med O		X	Sand, winter wet, swamps.	Seed, Div.				X	X
<i>Meeboldina denmarkica</i>		Sml O	Red, brown, Aug-Jan	X	Sand, winter wet, swamps.	Seed, Div.				X	X
<i>Meeboldina roycei</i>		Med O	Brown, Oct-Nov	X	Sand, clay, Swamps, creeklines.	Seed, Div.				X	X
<i>Meeboldina scariosa</i>		Med O	Red, brown	X	Sand, sandy clay, winter wet.	Seed, Div.				X	X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Progp'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Meeboldina tephрина</i>		Sml O		X	Sand, sandy clay, swamps, winter- wet.	Seed, div.				X	X
<i>Meeboldina thysanantha</i>		P3 Sml O	Brown, Dec	X	Sand, swamps.	Seed, div.				X	X
<i>Melanostachya ustulata</i>		Sml perennial	Brown, Sep-Oct	X	Sand, swamps, wet.	Seed, div.				X	X
<i>Mesomelaena graciliceps</i>		Sml sedge O	Brown, black, Mar-Jun	X	Black sand, peaty sandy clay, gravel.	Seed, div.				X	X
<i>Mesomelaena tetragona</i>	semaphore sedge	Sml O	Brown, black, Jan-Nov		Sand, loam, sandy clay, gravel	Seed, div.				X	X
<i>Microlaena stipoides</i>	weeping grass	Sml OA		X	Sand, clay.	Seed, div.	X			X	X
<i>Neurachne alopecuroides</i>	foxtail mulga grass	Sml	Green, grey, with white hairs, Jul-Nov		Lateritic sand, clay, loam.	granite					X
<i>Orthrosanthus laxus</i>	morning iris	Sml OA	Blue, Aug-Nov		Laterite, sandy loam, sand, gravel	Seed, div.			X		X
<i>Orthrosanthus polystachyus</i>	many spike orthrosanthus	Sml OA	Blue, Sep-Nov		Clayey loam, laterite, sand.	Seed, div.			X		X
<i>Patersonia babianoides</i>		Sml O	Blue, violet, Sep-Nov		Sand, laterite, gravel.	Seed, div.			X		X
<i>Patersonia occidentalis</i>	purple flag	Sml OA	Blue, violet, purple, Apr/Sep-Jan	X	Sand, lateritic gravel, granite, sandy clay Winter wet.	Seed, div.			X	X	X
<i>Patersonia umbrosa var umbrosa</i>	yellow flags	Sml O	Blue, violet, Aug-Nov	X	Sand, sand or clay loam, winter wet.	Seed, div.			X	X	X
<i>Patersonia umbrosa var xanthina</i>	yellow flags	Sml O	Yellow, Aug-Dec	X	Gravel, grey sand, sandy clay, winter wet.	Seed, div.			X	X	X
<i>Phlebocarya ciliata</i>		Sml	White, Sep-Nov	X	Sand, winter wet.					X	X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Phlebocarya filifolia</i>		Sml	White, cream, blue, Oct-Dec.		Sand, gravel.						
<i>Poa drummondiana</i>	knotted poa	Sml	Green, purple, Sep-Nov.		Black sand, red loam, clay, limestone, granite.	Seed	X		X		X
<i>Poa poiformis</i>	coastal poa	Sml	Green, yellow, Oct-Nov			Seed	X		X		X
<i>Poa porphyroclados</i>		Sml	Green, purple, Oct-Nov		Sand, granite.	Seed	X		X		X
<i>Poa serpentum</i>		Sml	Green, purple, yellow, Oct-Dec		Sand, loam, granite.	Seed	X		X		X
<i>Schoenoplectus validus</i>	lake club-rush	Sml-med sedge	Brown, Oct-Feb	X	Silt and sand.					X	X
<i>Schoenus bifidus</i>		Sml sedge	Brown, black, Aug-Nov	X	Loam, sand, clay.					X	X
<i>Schoenus curvifolius</i>		Sml sedge	Brown, black, Jul-Nov	X	Sand, winter wet.					X	X
<i>Schoenus efolius</i>		Sml-sedge	Brown, black, Sep-Nov	X	Black sand, sandy clay.					X	X
<i>Schoenus grandiflorus</i> •	large flowered bog-rush	Sml-med sedge	Brown, Jan/Apr-Jul	X	Sand, sandy clay.					X	X
<i>Schoenus subflavus</i>	yellow bog-rush	Sml sedge	Brown, May/Aug-Nov	X	Sand, sandy clay, loam, laterite.					X	X
<i>Schoenus sublateralis</i>		Sml sedge	Brown, Apr-Jun	X	Sand.					X	X
<i>Schoenus sublaxus</i>		Sml sedge	Brown, Oct-Dec/Apr.	X	Sand.					X	X
<i>Sowerbaea laxiflora</i>	purple tassels	Sml O	Purple, Aug-Nov		Sand, loam.					X	X
<i>Sporadanthus rivularis</i>		Sml		X						X	X
<i>Sporadanthus strictus</i>		Sml		X	Black sand or clay.					X	X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Progg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Sporobolus virginicus</i>		Sml	Green, purple, Jan-Dec	X	Sand, clay, peat, saline.					X	X
<i>Stenotalis ramosissima</i>		Sml-sedge	Brown, Feb-Apr/Jul-Oct	X	Sand, peat, ironstone.					X	X
<i>Stypandra glauca</i>	blind grass	Sml O	Blue, white, Aug-Nov		Laterite, granite, clay, limestone.	Seed			X		X
<i>Taraxis grossa</i>		Med		X	Sand, peat, clay.	Div.				X	X
<i>Tetraria capillaris</i>	hair sedge	Sml sedge	Brown, Jan-Dec	X	Sand, lateritic loam, mud, sandy clay.					X	X
<i>Tetraria octandra</i>		Sml sedge	Brown, black, May-Nov	X	Sand, loam, granite, gravel.					X	X
<i>Tetrarrhena laevis</i>	forrest ricegrass	Sml	Green, Sep-Nov	X	Brown sand, laterite, sandy loam.			X			X X
<i>Thysanotus arenarius</i>		Sml O	Purple, May/Oct-Dec		Sand.	Seed			X		
<i>Thysanotus dichotomus</i>	branching fringe lily	Sml-med O	Purple, Sep-Jan		Sand, granite, laterite, gravel.	Seed			X		X
<i>Thysanotus glaucus</i>		P4 sml O	Purple, Oct-Mar		Sand, sandy gravel.	Seed			X		X
<i>Thysanotus multiflorus</i>	many- flowered fringe lily	Sml OA	Purple, Aug-Jan		Sand, laterite, granite.	Seed			X		X
<i>Thysanotus patersonii</i>		Sml O	Purple, Jul-Nov		Sand, clay, sandy clay.	Seed			X		X
<i>Thysanotus pauciflorus</i>		Sml O	Purple, Sep/Dec-Jan	X	Sand.	Seed			X	X	X
<i>Thysanotus pseudojuncus</i>		Sml O	Purple, Nov-Jan	X	Peaty sand, lateritic loam, granite.	Seed			X	X	X
<i>Thysanotus sparteus</i>		Sml O	Purple, Oct-Feb	X	Lateritic sand, clay, granite.	Seed			X	X	X
<i>Thysanotus tenellus</i>		Sml O	Purple, Sep-Nov	X	Most.	Seed			X	X	X

Species	Common Name	Notes	Flowers	Wetland/ Riparian	Soil	Propg'n	Birds Seed	Birds Nectar	Birds Insects	Frogs	Mammals
<i>Thysanotus thysoides</i>		Sml O	Purple, Sep-Nov	X	Peaty sand, gravel, sandy clay, laterite.	Seed			X	X	X
<i>Thysanotus triandrus</i>		Sml O	Purple, Sep-Dec		Sand, gravel.	Seed			X		X
<i>Tremulina cracens</i>		Sml	Red, brown, Dec-Jan	X	Sand, peat.						
<i>Tricostularia neesii</i>		Sml sedge	Brown, Sep-Feb								X
<i>Tricostularia neesii</i>		Sml sedge	Brown, Sep-Feb		Sand.						X
<i>Tyrbastes glaucescens</i>		P4 med		X	Sand, clay, peat.	Div.				X	X
<i>Wurmbea dioica</i>	early nancy	Sml O	White, pink, Jul-Sep			Seed			X		
<i>Wurmbea monantha</i>		Sml O	White, pink, Jul-Sep	X	Limestone, sand, clayey loam.	Seed			X	X	
<i>Xanthorrhoea gracilis</i>	graceful grass tree	Med O	White, cream, Oct-Jan.		Lateritic loam, gravel, sand.	Seed	X		X		X
<i>Xyris gracillima</i>		Sml-med O	Yellow, Oct-Dec.	X	Coastal swamps.					X	X
<i>Xyris inaequalis</i>		Sml O	Yellow, Oct-Nov	X	Swamps.					X	X
<i>Xyris lacera</i>		Sml-med O	Yellow, Oct-Mar	X	Swamps.					X	X
<i>Xyris lanata</i>		Sml O	Yellow, Oct-Dec/Apr		White sand.					X	X



*Cape to Cape
Catchments Group*

Appendix 2

Woody Weeds and Common Garden Weeds

WOODY WEEDS AND COMMON GARDEN WEEDS

Over sixty percent of the plants we now look on as weeds were introduced as ornamental garden plants. These are an increasing problem in our region and across Australia. Amongst the most prominent are many still unfortunately freely available from nurseries and garden centres. These plants are not only pests of our bush and public spaces, but frequently garden and farm pests as well. The species can be viewed on the Western Weed Website

http://members.iinet.net.au/~weeds/western_weeds.htm#contents.

DP = Declared Plant PP = Pest Plant

Asphodelus fistulosus (onion weed) is a short-lived perennial that produces a clump of hollow, cylindrical leaves up to 40cm long. These look like onion leaves but they do not smell 'oniony.' The flowers, white with a brownish central stripe, are carried on a branched stalk to 60cm high and are produced in winter and spring. Found from Exmouth to Eucla, it is a widespread and invasive weed of calcareous soils, particularly abundant along road and rail verges, where it is invading disturbed bushland. Native to southern Europe and India.

Trachyandra divaricata (strapweed, dune onion weed) is similar to onion weed, but has flat leaves and widely branched flowering stalk. It flowers in spring and the white petals often have a pair of yellow spots near their base. Again, no smell of onions. It is widespread through the lower southwest from Jurien Bay to Albany, especially in interdunal beach heathland and roadsides on calcareous sandy soils. Native to South Africa

Baeometra uniflora grows from a corm, producing a single, slender stem up to 50cm tall but usually much shorter. There are several linear leaves and a terminal spike bearing bronzy-yellow flowers about 2cm long. Known from Bullsbrook to Donnybrook, but probably more widespread as it is an inconspicuous plant, resembling a Cape Tulip when not in flower, and easily overlooked because its flowers open only on clear, cloudless days. Flowering in spring. Native to South Africa

Lachenalia is a genus of about 55 species native to southern Africa. At least four are established around settlements and in urban bushland. All flower in winter and early spring. *L. aloides* (soldiers) is the most widely planted species and is occasionally found established throughout the southwest. Its flowers are usually tricoloured (orange, green, and purple-brown) though other colour forms exist. *L. bulbifera* is quite robust and has red flowers. It produces many small bulbils, even from leaf cuttings. *L. mutabilis* has flowers that are pale blue on opening, becoming crimson-brown with age. *L. reflexa* has yellow flowers that are upturned, rather than drooping, on a short stem close to the ground. This species is established in tuart and banksia woodlands and heath in the Perth area and is potentially a serious bushland weed.

Babiana stricta (baboon flower) is the most common of the three species of spring-flowering South African babianas recorded as garden escapees in Western Australia, although intermediates commonly occur. (There are over 60 species in South Africa.) It is an abundant weed of the Perth Hills and clay-based woodlands and wetlands on the Swan Coastal Plain from Gingin southwards, and it is also spreading rapidly from other centres such as along the Avon Valley and at Albany. It forms dense clumps of flowering stems 15-40cm in height, each bearing up to about 10 flowers. The flowers are all shades from white, through lilac and pinkish-purple to deep violet, often with red or white in the throat.

Chasmanthe floribunda (African cornflag) Similar in appearance to watsonias, the cornflag grows to 1.5m with spikes of orange flowers. The seeds are bright orange and succulent. A garden escapee, it occurs in urban bushland along road verges, preferring shaded spots. Native to South Africa.

Crocasmia x crocosmiiflora (montbretia) is found along road verges and on wasteland in the wetter southwest, spreading slowly by runners and corms. It is a sterile hybrid of (French) garden origin, a cross between two South African species, now grown extensively around the world as an ornamental. Flowers in summer.

Freesia hybrid (freesia) *Freesia alba* x *F. leichtlinii*. A popular garden flower with an attractive scent has become a serious weed of urban bushland, coastal

heath, woodland and granite rocks from Gingin to Israelite Bay. The flower stems have a characteristic right-angled bend just below the lowest flower. It flowers in spring and is a hybrid of two South African species.

Gladiolus has over 200 species in Africa and the Mediterranean and eight species, all originally introduced as garden plants, have been recorded as naturalised in Western Australia. They all die back each summer to an underground corm. The three most common are *G. angustus*, *G. caryophyllaceus* and *G. undulatus*.

G. angustus (long-tubed painted lady) is found on road verges, wasteland and in bushland along the Swan River estuary and as far south as Albany. It flowers in late spring on stems up to 60cm tall. The flower tubes are 3-5cm long.

G. undulatus (wavy gladiolus) is increasing very rapidly on road verges, creek banks, wetlands and estuarine sites in the wetter southwest from Perth to Albany, invading bushland adjacent to these disturbed sites. It may be up to 80cm in height and flowers in early summer. All the other species flower in spring.

G. cardinalis is a spectacular, scarlet-flowered species found near Busselton.

G. carneus is a slender species with cream, pink or apricot flowers, found on roadsides and around old settlements between Busselton and Albany.

G. communis has purple flowers with a white mark near the throat and is found on roadsides and around old settlements between Busselton and Augusta. It comes from the Mediterranean, unlike all the other species, that are from South Africa.

Ixia maculata (yellow ixia) is a spindly plant to 50cm that bears compact spikes of yellow flowers with a dark brown centre, produced in spring. It is found around old settlements and road verges, and is spreading into adjacent woodlands from Perth to Albany.

I. polystachya (variable ixia) can be distinguished from the previous species as it flowers later and has smaller flowers and a different growth form - it has spindly stems up to a metre in height. The flowers

are in spikes, sometimes several to a stem, and are usually pink or mauve. They are produced in late spring to early summer. It has spread from old settlements into bushland and marri woodland in a few locations from Perth to Albany.

There are about 90 species of *Romulea* all from southern Africa and arising from corms. Four have been recorded in Western Australia. Their leaves are mostly cylindrical.

R. rosea (Guildford grass, onion grass) is by far the most common. The flowers, with petals up to 1.8cm in length, open first at ground level. As they mature, the flower stem elongates and bends over, eventually pushing the seed capsule back under the surrounding vegetation. It is a common lawn and pasture weed and is also ubiquitous in most woodlands, granite rocks, limestone heath and clay wetlands throughout the southwest of the state. There are two varieties, the more common is var. *australis*, with pale pink flowers, while var. *communis* has slightly larger magenta flowers.

R. flava has yellow flowers with petals up to 1.5cm long and is found in banksia, jarrah, wandoo and tuart woodlands and sedgeland, from Perth to Albany.

Cortaderia selloana (pampas grass) PP is a very large tussocky perennial with leaves up to 1m long, crowded at the base of the plant. The leaf-margins are sharp and can inflict cuts if incautiously handled. The inflorescence is a large, silvery (sometimes tinged pink or purple) plume-like panicle to 3m tall, produced in late winter. A garden escapee, it is established in sunny, swampy sites from Perth to Albany. Potentially a serious weed of wetlands, and its wind-blown seeds are capable of long-distance dispersal. Native to South America.

Vinca major (blue periwinkle) is a low-growing perennial with arched or prostrate stems that bear dark green or variegated leaves in opposite pairs and solitary, large blue or purple flowers 3-5cm in diameter, in winter and spring. Stems take root where in contact with the ground. It has escaped from gardens into shady sites, including creeklines and disturbed woodlands, from Perth to Albany. Native to the Mediterranean region.

Gomphocarpus fruticosus (swan plant, narrow-leaf cotton bush) **DP** is an escaped garden shrub, to 2m, that has spread into disturbed, moist sites on the Swan Coastal Plain and Darling Range from Perth to Busselton. Capable of forming dense thickets, with white to cream flowers and inflated seed pods. South African native.

Arctotis stoechadifolia (arctotis) is often planted in gardens or as a coastal sand stabilising plant. It is a prostrate perennial, rooting at the nodes, with grey, divided leaves and heads up to 10cm across. The ray florets are usually white but can be cream, pink or bronze and are produced from late spring to early summer. A native of South Africa, it is spreading from plantings and dumped garden rubbish between Jurien Bay and Busselton.

Chrysanthemoides monilifera (boneseed, bitou bush) **DP** is an erect shrub to 3m with dull green elliptic leaves and showy flower heads with yellow ray florets. Planted in gardens, it is an aggressive coloniser, especially of sand dune areas. Although subject to eradication efforts, it has been found occasionally near Geraldton, Wyalkatchem, Narrogin, Perth and Busselton. Native to South Africa

Myosotis sylvatica (forget-me-not) is a well-known garden annual grown for its attractive pale blue flowers produced in spring. It has escaped cultivation and is now a serious weed of creeklines in the Porongorup National Park. Many other species from this family have been planted in gardens and some have escaped onto roadsides and into disturbed land in parts of the southwest.

Lonicera are attractive, sweet-smelling climbers, that may persist at the site of old settlements, or the fleshy berries may be transported by birds into disturbed creeklines in the wetter southwest. Many different cultivars are planted.

Ipomoea cairica (mile-a-minute) is a glabrous perennial vine with tuberous roots. The young stems are red and the leaves ovate in outline but with five to seven finger-like lobes. Flowers are mauve-pink and funnel-shaped.

I. indica (blue morning glory, dunny creeper) is similar to the above, but is a softly hairy vine with tri-lobed leaves and bright blue flowers. Both are

pantropical species and occur as garden escapees on wasteland from Geraldton to Albany, flowering in spring and summer. They are common along rivers and creeks in the Perth area, where they smother fringing trees and shrubs.

Chamaecytisus palmensis (was *Cytisus proliferus*) (tree lucerne, tagasaste) **PP** is an upright bushy shrub or small tree to 4m, with drooping, softly-hairy branches and leaves with three leaflets. The scented, creamy-white flowers are produced in winter and early spring. Native to the Canary Islands, it is extensively planted as a fodder shrub or for land rehabilitation. Tagasaste regenerates prolifically from seed and occurs from Badgingarra to Esperance, along roadsides or in adjacent bushland. On lateritic soils in higher rainfall areas it is a serious invader of disturbed bushland.

Dipogon lignosus (dolichos pea) is a rampant, twining perennial, spreading by seed and rhizomes, with bright green trefoil leaves with ovate leaflets. Flowers produced in sprays from the leaf axils during spring.

Genista (broom) is a genus of shrubs from Europe and the Mediterranean, brought to Australia as ornamentals. *G. canariensis* (canary broom) is an upright shrub with bright green trefoil leaves and slightly drooping branches. Bright yellow flowers are produced in spring. Becoming quite common along roadsides in Margaret River town and on wasteland in the wetter south-west from Perth to Albany.

Lathyrus is a genus mostly of climbing herbs, often with winged stems. The leaves have two leaflets and the leaf axis is prolonged into tendrils, which are used for climbing. The flowers grow from the leaf axils, usually in racemes.

L. latifolius (was *L. sylvestris*) is a rampant perennial climber with winged stems and showy, purple, pink or white sweet-pea like flowers (2cm in size). Found on roadsides and in woodlands in the wetter south-west from Dwellingup to Pemberton. Native to Europe.

Podalyria sericea is an upright, silvery-grey shrub to 1.5m with shining silvery-hairy, elliptic leaves. Sweetly-scented mauve flowers are followed by

inflated pods. A garden escapee on wasteland and road verges from Perth to Manjimup and Margaret River. Native to South Africa.

The genus *Pelargonium* includes all garden 'geraniums' and several garden varieties persist around old settlements.

P. alchemilloides is a garden escapee found in peppermint woodland near Hamelin Bay. It is a prostrate rhizomatous perennial to 5-6m, with soft, hairy leaves and erect heads of white flowers. Native to South Africa.

P. capitatum (rose pelargonium) is a straggling shrubby perennial, softly hairy, with compact heads of pink flowers. It is a common weed of beach dunes, banksia and tuart woodlands from Cervantes to Esperance. Native to South Africa.

Myriophyllum aquaticum (parrot's feather, Brazilian water milfoil) **DP** is a vigorous aquatic weed with stems up to 2m long, densely covered with leaves of two kinds in whorls of four to six. The submerged leaves are up to 4cm long, highly dissected and feather-like, with thin segments up to 7cm long. The leaves on the aerial portion are smaller (to 3.5cm long) with short segments up to 0.5cm long. Minute solitary flowers are borne in the leaf bases from spring to autumn. All Australian populations are female. Native to South America, reproducing vegetatively in Australia. Can be found in freshwater creeks and drains from Perth to Albany. Sixteen native species of *Myriophyllum* are found in Western Australia - consult specialist references for exact identification.

Lavandula stoechas (topped lavender, Spanish lavender) is an easily-recognised, grey, many-stemmed shrub up to 60cm tall, with crowded, linear, paired leaves that are strongly aromatic when crushed. The dense flower head, produced in winter and spring, is borne on a stalk from the shoot tip and is topped by a tuft of large sterile, purple bracts. A garden escapee, native to the Mediterranean region, and found on roadsides, wasteland, creeks and drainage lines between Perth and Manjimup. Less common are *L. angustifolia* (English lavender) and *L. dentata* (French lavender), both recorded in Perth as garden escapees.

Lagunaria patersoniana subsp *patersoniana* (Norfolk Island hibiscus) is a tree up to 15m. Its leaves are entire, up to 10cm long and have white undersides when young. The petals are 2-4cm long and pale pink or mauve. It flowers in summer and autumn. This species is native to Norfolk Island and Lord Howe Island. It has escaped from gardens and is now found on the Swan River estuary and near Augusta.

Acacia baileyana (Cootamundra wattle) is a large bushy shrub or small tree to 10m with smooth grey bark and delicate-looking, silvery or blue-grey bipinnate leaves to 5cm long. The showy, golden-yellow, globular flower heads are produced in long sprays from the leaf axils in winter. A garden escapee found in jarrah forest and roadsides in the Perth area. Native to New South Wales.

A. dealbata (silver wattle) is a spreading shrub or tree to 10m, it has grey bark, corrugated when old, and angular, powdery-white branchlets. The young growth is usually silvery white. The silvery-hairy bipinnate leaves are about 10cm long. The numerous globular flower heads, produced in early spring, are in showy terminal and axillary sprays, and are sweetly scented. Distinguished from *A. baileyana* principally by the larger and differently-shaped leaves. It regenerates freely after fires and then often forms thickets. Suckers freely if roots are damaged. A garden escapee, it is found sporadically throughout the jarrah forest, in karri forest at the Porongorups and along roadsides between Perth and Albany. Native to New South Wales, Tasmania and Victoria.

A. decurrens (early black wattle) is a small tree to 10m, with dark grey bark and branchlets that have wing-like ridges giving an angular appearance. The bright green bipinnate leaves are up to 15cm long. Showy, bright yellow globular flower heads are produced in terminal sprays during winter. A garden escapee found on roadsides, creeklines and wasteland between Perth and Albany. Native to New South Wales

A. elata (mountain cedar wattle) is a tall spreading tree to 10m, with grey to blackish bark. The large (up to 25 cm) bipinnate leaves are a dark glossy green and look very much like fern leaves. The globular cream flower heads are produced in spring

in racemes borne in the leaf axils. A garden escapee, it is spreading along creeklines from old plantings in the Darling Range. Native to New South Wales.

A. floribunda (catkin wattle, white sallow wattle) is a dense, spreading shrub or small tree to 8 m. The phyllodes are narrow-linear, up to 19 cm long, with all veins indistinct. The flowers are cream or pale yellow, in long, loose, cylindrical spikes in the leaf axils, produced in spring. It is spreading from plantings at Dryandra and Araluen. Native to Queensland, New South Wales and Victoria.

A. iteaphylla (Flinders Range wattle). It is a dense large shrub to 4 m. The phyllodes are grey-green, to 14cm long, narrow-linear with one prominent vein and usually a slightly curved tip. The flower-heads are globular, lemon-yellow, in small sprays from the leaf axils. A garden escapee, it is spreading from plantings in the Perth area. Native to South Australia.

A. longifolia (Sydney golden wattle) is a dense bushy shrub or small tree to 10m with dark grey bark. The cylindrical yellow flower spikes grow singly or in pairs from the phyllode axils. Two distinct forms have been introduced. Subspecies *longifolia* has bright green, linear phyllodes that can reach 20cm long and 1.5cm wide and are mostly thin and pliable. The pods are mostly straight. Subspecies *sophorae* has thicker, shorter, broader and more rounded and sometimes fleshy phyllodes (to 12cm long and 3cm wide) and pods that are mostly coiled or contorted. A garden escapee, this species grows on roadsides, creeklines, swamps and bushland from Perth to Manypeaks. Native to eastern Australia

A. melanoxylon (blackwood) is a large tree to 30m with hard, dark grey bark, furrowed longitudinally. The phyllodes are dark green, with three to five main veins and a prominent net-like reticulation in between. Short sprays of globular cream flower heads grow in the leaf axils in spring. This species spreads by root-suckers as well as seed - the bright red seed arils are attractive to birds. It can regenerate after disturbance to form dense thickets. A garden escapee found from Perth to Albany and Dunsborough. It is a potentially serious weed of swamps from Augusta to Albany. Native to eastern Australia

A. podalyriifolia (Queensland silver wattle) is an open shrub or small tree to 5m, bark smooth and grey, young twigs white. The phyllodes are broadly ovate to 6cm long, and silvery white. The showy, deep golden, globular flower heads are produced in terminal sprays in winter. A garden escapee found on roadsides and spreading into bushland in the Perth area and around settlements. Native to Queensland and New South Wales.

A. pycnantha (golden wattle), Australia's 'floral emblem' is an upright, loosely-branched tree to 8m. The phyllodes are broad-lanceolate to 15cm and often curved into a sickle shape. Golden-yellow globular flower heads are produced in sprays from the leaf axils in early spring. When growing wild it is sometimes confused with *A. saligna*, a Western Australian native. Because of its promotional image, packets of seed are often handed out free by national bodies to encourage 'tree-planting'. This is a problem as in Western Australia it is an abundant and increasing weed of roadsides and woodland throughout the western wheatbelt and the Darling Range from Perth to Albany. Native to New South Wales, Victoria and South Australia. During revegetation works, many Western Australian wattles may be planted outside their natural local range. In some instances they may establish and thus become naturalised at that site.

Wattles that have been observed to do this include: *A. blakelyi* (Blakely's wattle), *A. lasiocalyx* (caterpillar wattle), *A. microbotrya* (manna wattle) and *A. saligna* (golden wreath wattle). All have tough and long-lived seeds and, after a disturbance such as roadside grading or fire, they will naturalise away from the planting site. The source of the seed used for such rehabilitation work is seldom local (in fact much of the seed of *A. saligna* used in Western Australia is imported from India or even South Africa, where the species has become a major noxious weed)

Leptospermum laevigatum (Victorian tea-tree) was introduced as a garden plant and is now a major bushland weed. It is a large shrub or small tree to 5m, with white flowers and small, opposite, oblong-lanceolate leaves. It is spreading rapidly along road verges between Jurien Bay and Albany and invading coastal heath and woodlands on sandy and lateritic soils.

Nymphaea. odorata (waterlily) has sweet-smelling white flowers floating on the water and circular leaf blades. A garden escapee, found around Perth, Albany, Margaret River and Busselton. Native to North America.

Eschscholzia californica (Californian poppy) is a smooth, erect, greyish annual with finely-divided leaves. It flowers in spring and the showy yellow or orange flowers have four stigmas. The fruit is a narrow, cylindrical capsule. Garden escape on wasteland between Perth and Augusta. Native to America.

Pittosporum undulatum (sweet pittosporum) is a small bushy tree with lanceolate leaves that are dark green above and paler below, with wavy margins. The creamy-white, bell-shaped flowers grow in terminal clusters. The fruiting capsules are orange, with brown seeds. Escaping from gardens onto verges, granite rocks and forest in higher rainfall areas. Native to south-eastern Australia.

Polygala (milkweed, butterfly bush) are shrubs with pea-shaped flowers, but the lowest petal has a forward-pointing, brush-like crest. They are often planted as ornamentals. The two species below are native to South Africa and are established in Western Australia and can be distinguished by the shape of their leaves.

P. myrtifolia (myrtle-leaved milkweed) is a bushy shrub to 2m with oval leaves. It is an old cultivar with pale purple flowers, green outside, the currently cultivated form has bright magenta flowers and has not yet been recorded as naturalised. A garden escapee, it can be found in disturbed areas from Perth to Albany. It is a serious bushland weed in Victoria and South Australia.

P. virgata is an upright, more open shrub to 2m, with linear leaves. It is spring flowering, with the bright purple flowers produced in a terminal spike. A garden escape on wasteland between Perth and Albany. Both are native to South Africa.

Cotoneaster are evergreen shrubs or small trees from the temperate Northern Hemisphere with simple un-toothed leaves. The flowers grow in clusters on short lateral shoots, followed by berries. They are planted for the ornamental quality of both the flowers and the fruits and the seed is spread by birds.

C. glaucophyllus forms a many-stemmed shrub to 3m, the stems often arching. It produces sprays of white flowers in early summer followed by red berries. The rounded leaves are up to 8cm long. A garden escapee, it occurs on road verges from Busselton to Albany.

C. pannosus is a very similar plant best distinguished by its much smaller leaves that seldom exceed 3cm in length. It is common in the Darling Range near Perth and spreading along roadsides between Perth and Albany.

Populus alba (white poplar) is a stout deciduous tree to 20m. Leaves palmate, dark green above, downy white below; together with the downy buds and shoots, this gives the plant an overall greyish appearance. The flowers are produced in catkins during autumn. Planted as an ornamental, it suckers freely and can form dense stands. Occurs in disturbed wetlands between Perth and Albany. Native to Europe.

Populus nigra var. italica (lombardy poplar) has an upright, columnar shape which makes it an unmistakable tree. The triangular leaves have serrate edges and, in cold districts, turn yellow before falling in winter. The flowers are produced in catkins during autumn. Planted as an ornamental, it suckers freely and will quickly block drains or septic systems.

Salix babylonica (weeping willow) is a deciduous tree with a stout trunk and slender, weeping branches, always growing near fresh water. The narrow lanceolate leaves are bright yellow-green. The flowers are produced in catkins in early winter. Often planted, spreading vegetatively from broken branches. A serious creekline weed in eastern Australia.

Candida (angel's trumpet) PP is a large, rather brittle shrub with huge (20cm) hanging white flowers, very sweetly-scented at night. It comes from Mexico and is not naturalised, but has been declared a Pest Plant so that eradication from gardens can be enforced. The plant is very toxic, and cases of poisoning have occurred where leaves or flowers have contaminated drinking water.

Tamarix aphylla (Athel pine, tamarisk) is a dense, spreading evergreen tree to 10m, often creating dense thickets by suckering. It has a stout trunk, fine, greyish-green linear leaves and spikes of tiny pink flowers in summer. Much planted as a shade tree in arid areas, it requires a good supply of water. It can spread from the plantings when broken branches take root and if the trees are fertile, masses of seedlings are also produced.

Centranthus macrosiphon (pretty betsy) is a smooth, greyish annual up to 40cm high. It has opposite, elliptic, greenish-grey leaves, some of which may have toothed margins. The small cerise flowers are displayed during spring in a rounded head above the leaves. A garden escapee, it prefers calcareous soils and has established on roadsides and in tuart woodlands from Perth to Busselton. Native to Spain. Superficially similar, *C. ruber* (red valerian) is perennial and forms a dome-shaped plant to 30cm in height. The grey-green leaves are opposite and somewhat fleshy and smooth. The flowers are produced during spring on stiffly upright stems. They are tubular with pinkish red, spreading petals. Naturalising along firebreaks and on granite rocks in the Albany area. A native of the Mediterranean.

Lantana camara (lantana) is an evergreen shrub with arching, spreading branches that can form a dense tangled mass over 3m high and wide. The ovate,

serrate leaves are rough to the touch. The flowers are arranged in flat heads, pale cream, aging to cerise, and produced in spring and summer. The black berries are edible and are spread by birds. Established in wetter wasteland areas around Perth. It was eradicated from bushland near Kununurra in 1995. Native of South America. Several other lantanas are planted in gardens, and may have the potential to become naturalised. *L. camara* is a serious bushland weed in eastern Australia.

Phyla nodiflora (lippia, fogfruit, carpet weed) is a spreading perennial, rooting at the nodes, flowering stems ascending to 20cm high. The toothed, spoon-shaped leaves are covered with hairs, making them appear grey-green. Pink or white flowers in rounded spikes are produced in early summer. Often planted as a lawn, and has been recorded as naturalised in wetlands throughout Western Australia, however it may be native in the Kimberley. Native to tropical America

Hussey, B.M.J., Keighery, G.J., Cousens, R.D., Dodd, J. and Lloyd, S.G. (1997) *Western Weeds: A Guide to the Weeds of Western Australia*. The Plant Protection Society, Victoria Park, Perth, Western Australia.
http://members.iinet.net.au/~weeds/western_weeds.htm#contents



READERS' FEEDBACK

The Cape to Cape Catchments Group welcomes your thoughts on the *Landcare Companion* to enable us improve the quality, content and effectiveness of this publication. Your assistance in completing this form would be greatly appreciated and will place you in a draw to WIN a fantastic prize.

	YES	NO	UNSURE
1. Did you find the <i>Landcare Companion</i> helpful?			
2. Were you satisfied with the quality of the information?			
3. Did you feel the information was easy to read and understand?			

Was there any additional material you would have liked to have seen in the *Landcare Companion*? _____

How do you think the *Landcare Companion* can be improved?

How did you rate the design and presentation of the *Landcare Companion* (Please circle)

Excellent

Very Good

Good

Satisfactory

Poor

Any further comments?
