INVASIVE SPECIES MANAGEMENT STRATEGY 2013 – 2023 SOUTH COAST NATURAL RESOURCE MANAGEMENT REGION

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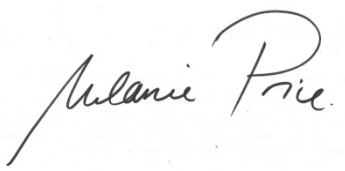
Author:	Melanie Price Associate Environmental Scientist		23 September 2013
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LIST OF ABBREVIATIONS

CRC	Cooperative Research Centre
DAFWA	Department of Agriculture and Food Western Australia
DoW	Department of Water
DPaW	Department of Parks and Wildlife (previously Department of Environment and Conservation)
DWAG	Denmark Weed Action Group
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EWAG	Esperance Weed Action Group
FBG	Fitzgerald Biosphere Group
LCDC	Land Conservation District Committee
LMDCFPEG	Lake Muir Denbarker Community Feral Pig Eradication Group
NMDSG	Northern Mallee Declared Species Group
NRM	Natural Resource Management
OHCG	Oyster Harbour Catchment Group
RHD	Rabbit Haemorrhagic Disease
RCFRF	Red Card for Rabbit and Fox Program
RDSG	Ravensthorpe Declared Species Group
SCMG	South Coast Management Group
South Coast NRM	South Coast Natural Resource Management Incorporated
UCL	Unallocated Crown Land
WC Act	*Wildlife Conservation Act 1950* (Western Australia)

THE FUTURE FOR INVASIVE SPECIES MANAGEMENT

Welcome to the *Invasive Species Management Strategy 2013 – 2023* (the Strategy) which outlines actions and priorities to manage invasive species in the South Coast Natural Resource Management (NRM) region of Western Australia.

The South Coast region community values its key resources, in the following theme areas:

- Land;
- Water;
- Coastal and marine;
- Biodiversity; and
- Cultural heritage.

Invasive species represent a serious threat to these theme areas. In response to this threat, the South Coast NRM community has a vision for management of invasive species.

Vision…

To integrate the knowledge, enthusiasm and resources of community, Government and industry to remove, contain and/or manage the threat of invasive species using a holistic landscape scale approach to natural resource management.

PURPOSE

The purpose of this Strategy is to reflect on past achievements and outline actions and priorities for the management of invasive species on the South Coast between 2013 and 2023. While the long term view of this Strategy is 10 years and beyond, most actions identified are for the next 3 – 5 years.

This Strategy describes:

- Priorities for government, industry and community to minimise the economic, environmental and social impacts of invasive species;
- Landscape focused priorities for future funding;
- Recommendations for investment when developing works programs and projects;
- How to maximise public benefit from public investment; and
- Key responsibilities for stakeholders.

HOW TO USE THIS STRATEGY

The Strategy has been structured as shown in Table 1.

TABLE 1: STRATEGY STRUCTURE

Section 1	Describes the framework that we work within and partners: • National, state, regional and sub-regional; • Funding; and • Key stakeholders.
Section 2	Outlines consultation undertaken in the preparation of this Strategy.
Section 3	What we know: • Impacts; • Priority species; and • Priority assets to protect.
Section 4	Details past achievements.
Section 5	Considers governance, including formation of a regional biosecurity group.
Section 6	Outlines future actions, priorities and responsibilities.
Section 7	Outlines monitoring, evaluation, reporting and improvement strategies.

Key priorities for invasive species projects fall into categories listed in Table 2.

TABLE 2: KEY PRIORITIES FOR INVASIVE SPECIES PROJECTS

PRIORITY CATEGORIES	ACTION TYPE
Planning and Policy Frameworks	Plan for effective projects that use best practice methodology and are cost effective, consultative and targeted.
Capacity Building	Raise knowledge, skills and awareness through sharing of information, training, facilitation and support.
On-ground Actions	Target priority invasive species in priority asset categories and areas.
Measures and Monitoring	Monitor, evaluate, report and constantly improve.

Strategy Review

This Strategy will be reviewed regularly as circumstances in the South Coast NRM region change (e.g. to take into account climate change, emerging species and other influences). A major review will be undertaken in 2018.

1 INTRODUCTION

South Coast NRM Incorporated (South Coast NRM) coordinates and administers funding provided by the Australian Government and the Government of Western Australia specifically allocated for natural resource management (NRM). The organisation benefits from strong community, industry and government support for on-ground work organised under the themes of Land, Water, Biodiversity, Cultural Heritage and Coastal and Marine. Through partnerships, South Coast NRM has developed a framework for managing the future of key natural resources in the region.

All regional activity and funding are directed by Southern Prospects 2011-2016, the regional strategy for NRM. South Coast NRM is one of 56 Australian NRM groups committed to the sustainable long-term management of natural and cultural resources to achieve positive social and economic outcomes. The other regional NRM groups in Western Australia are Rangelands NRM, Perth Region NRM, Wheatbelt NRM, The Northern Agricultural Catchments Council and the South West Catchments Council.

Southern Prospects 2011-2016 has identified that invasive species pose a significant threat to theme areas with effects already felt economically, socially and environmentally. Through the implementation of this Strategy, which has been developed in consultation with stakeholders, South Coast NRM aims to make the best use of available resources to manage priority invasive species across the region.

1.1 WHAT ARE INVASIVE SPECIES?

Invasive species:

- Occur as a result of human activities, beyond its accepted normal distribution;
- Threaten valued environmental, agricultural or other social resources by the damage they cause.
- Have a major impact on Australia's environment, threatening biodiversity and reducing overall species abundance.

Invasive species may include:

- Diseases, fungi and parasites;
- Feral animals;
- Insects and other invertebrates;
- Introduced marine species; and
- Weeds.

Dieback (*Phythophthora sp.*) management in Western Australia is outlined by 'Project Dieback'[1] across the South Coast, Perth, South West, Avon and Northern Agricultural NRM regions, and is only considered in this Strategy in the context of integration of management approaches.

[1] Project Dieback – www.dieback.net.au

1.2 GOAL OF INVASIVE SPECIES MANAGEMENT

Southern Prospects' 2011 – 2016 overarching goal for invasive species management in the South Coast Region is:

"Improved landscape resilience through ecological balance – reduced threats from invasive species and diseases.'

This can be achieved through:

- Fostering partnerships and building capacity among stakeholders and the wider community;
- Preventing the introduction and spread of invasive species through appropriate planning and on-ground works;
- Protecting high value regional assets from the impacts of invasive species;
- Basing priorities and control methods on best practice, scientific or quantitative knowledge;
- Where specific knowledge or data is lacking, taking a precautionary approach; and
- Continuous improvement in invasive species management in the region through effective monitoring, evaluation and reporting.

1.3 SCOPE OF PLANNING FOR INVASIVE SPECIES MANAGEMENT

South Coast NRM and its partners recognise that invasive species management is a complex issue that requires:

- Priority setting;
- Asset protection;
- Use of best practice methods of control of individual species;
- Support of essential research;
- Building community capacity;
- Education and engagement of stakeholders;
- Involvement of educational institutions;
- Provision of adequate and ongoing support;
- Data management; and
- Monitoring and evaluation.

This Strategy forms a blueprint for priority actions to be undertaken by South Coast NRM and its partners. In preparing this Strategy, consideration has been given to the invasive species that:

- Have been identified as a threat in the South Coast region;

- Have a realistic chance of being contained and/or eradicated;
- Represent a threat to sustainable agriculture and biodiversity values;
- Represent a threat to key assets; and
- Are not necessarily included in State and National programs.

The Strategy adopts a cross tenure approach to the treatment of invasive species including freehold land, Crown Land (e.g. Department of Parks and Wildlife (DPaW) conservation estate, land managed by local government, areas leased for mining and agriculture and other publicly owned land) and unallocated crown land (UCL) across the South Coast NRM region (Figure 1).

1.4 POLICY CONTEXT

This Strategy has been prepared in the context of national, State and regional policies, legislation and regulations. Importantly, the Strategy reflects specific regional knowledge and needs and addresses gaps left by national and State programs. The national, State, regional and subregional context for this Strategy, is outlined in Table 3.

In Western Australia, the *Biosecurity and Agricultural Management Act 2007* came into effect in 2013, providing additional tools for biosecurity and agriculture management by allowing for:

- Control of the entry, establishment, spread and impact of organisms that have or may have an adverse effect on:
    - Other organisms;
    - Human beings; and
    - The environment or part of the environment; and
    - Agricultural, fishing or pearling activities, or related commercial activities, carried on, or intended to be carried on, in the State or part of the State.
- Control the use of agricultural and veterinary chemicals;
- Establishment of standards to ensure the safety and quality of agricultural products, and
- Raising of funds for biosecurity-related purposes.

TABLE 3: CONTEXT FOR INVASIVE SPECIES MANAGEMENT – SOUTH COAST NRM REGION

NATIONAL, STATE AND REGIONAL STRATEGIES	INVASIVE SPECIES STRATEGIES, POLICIES AND LEGISLATION
National	Australian Pest Animal Strategy – A national strategy for the management of vertebrate pest animals in Australia (2007)
	Australian Weeds Strategy – A national strategy for weed management in Australia (2006)
	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Outlines nationally declared species and threat abatement plans.

NATIONAL, STATE AND REGIONAL STRATEGIES	INVASIVE SPECIES STRATEGIES, POLICIES AND LEGISLATION
Western Australia	*Biosecurity and Agriculture Management Act 2007* (BAM Act)
	Ecologically Significant Invasive Species (2010) A Monitoring Framework for Natural Resource Management Groups in Western Australia – Department of Agriculture and Food Western Australia (DAFWA)
	Environmental Weed Strategy (1999) - DPaW
South Coast NRM region	*Southern Prospects 2011 – 2016 – The South Coast Regional Strategy for Natural Resource Management. South Coast NRM.* This invasive species strategy satisfies Objective L1 for the Land Theme: Identify Priorities - Review and establish South Coast communities focus for priority land assets for next 5 years by 2012 (to be informed by review of existing data, community knowledge and prior investment). *Southern Shores* (South Coast Management Group and Coffey Environments, 2009) identifies invasive species strategies and actions related to coastal and marine areas.
Sub-regional	Other organisations, community and local government driven plans, guidelines and policies.

A more comprehensive list of national, State, regional and local plans relating to invasive species management is included in Appendix 1.

1.5 CAPACITY

An understanding and awareness of invasive species and the importance to manage these species has increased over the past five years but is inconsistent across the region (South Coast NRM, 2011). Invasive species management is often not well integrated with other land management practices. Projects that increase knowledge, skills and awareness and result in positive behaviour changes are important to have an overall effect on invasive species.

While Federal and State funding has declined and State Government agencies have reduced their roles in operational projects, the onus has increasingly fallen on volunteers and private landholders to provide leadership and strategic direction. Local Governments often assist 'Friends of' groups and have programs for weed management.

If a long term approach is needed, this must be clear at the start of any program. Years of work can be quickly undone if a program is not sustained.

Unfortunately, the necessity of have prolonged and ongoing programs for most invasive species can often take its toll due to high costs, time consuming management and implementation and burnout of champions and key stakeholders. This means that careful consideration must be given to which invasive species to tackle, where they should be targeted and the implications of lengthy campaigns.

1.6 FUNDING

Funding for management of invasive species is supported by the Australian government, Western Australian State government and increasingly, from industry. Funding varies depending on public need perceptions, and policy priorities. As funding becomes more competitive, it is likely that funding will be more focused on empowering landowners with information and provision of advice in the management of invasive species.

1.7 GUIDING PRINCIPLES - INVASIVE SPECIES MANAGEMENT

Overarching principles for invasive species management include:

- A risk assessment approach needs to be used to prioritise species to be managed, planning and on-ground works;
- Integrated planning and management produce the most effective outcomes;
- A whole of landscape approach to planning and management to assist in integrating actions across resource types, issues and interests;
- Consultation with stakeholders on actions and priorities. With this comes the responsibility for Agencies, organisations and the community to take an appropriate level of responsibility for the management of natural resources;
- Prevention is better than cure;
- Address underlying causes of threats where ever possible (not just the symptom);
- Use best and most relevant information;
- Selecting the most appropriate ways to monitor, evaluate, report and improve;
- Collect, store and distribute information;
- Public investment must target action from which greatest public benefit can be gained; and
- Invest in improving community capacity and recognising achievements.

No Government or stakeholder, no matter how well resourced or prepared, can effectively act alone in managing and responding to the threat of invasive species…

Risk assessment can help identify relative impacts and therefore, priorities for invasive species management.

1.8 APPROACH TO MANAGEMENT OF INVASIVE SPECIES

There are many introduced species in Western Australia, but only a small percentage become problematic environmentally, economically or socially. A risk assessment approach to management is the best way to consider and compare the possible impacts of invasive species so that priorities can be determined (Plate 1). Risk assessments differ depending on what is at risk and the predicted best and worst case scenarios for threat mitigation. A basic knowledge of the biology of the pest is

required, with the best indicator of invasiveness being whether a species has been identified as invasive elsewhere, especially if conditions are similar. The Australian Government has developed a risk assessment approach for potential weeds in Australia (Department of Agriculture, Fisheries and Forestry, 2013).

PLATE 1: RISK ASSESSMENT MATRIX - LIKELIHOOD VERSUS IMPACTS

	Impact (Economic, Environmental and/or Social)			
Likelihood	High (High cost and social impacts, loss of species)	Medium (Medium cost and social impacts, loss of biodiversity)	Low (Low cost and social impacts, impacts on biodiversity)	Negligible (No significant impact on economy, environment or society)
Very Likely (and will almost certainly happen)	Extreme	High	High	Medium
Likely (and will probably happen at some time)	High	High	Medium	Medium
Unlikely (but could happen at some time)	High	Medium	Medium	Low
Very unlikely (and might happen only rarely)	Medium	Medium	Low	Low

Questions to Determine Risk
How likely is this species to be invasive?
Are the traits of the pest likely to have high economic, biodiversity and social costs (e.g. agriculture, species distribution and abundance, tourism)
Does the species display suitability to South Coast conditions?
How detectable is the species?
How accessible is the species or infestation?
How high are the costs of control vs. costs of impacts?
What is the current vs. potential distribution?
Is the species considered hardy (e.g. tolerate drought, salt, have natural predators)?
Does the species reproduce prolifically?
Does the species disperse quickly and widely?
Does the species have dormancy or other characteristics?

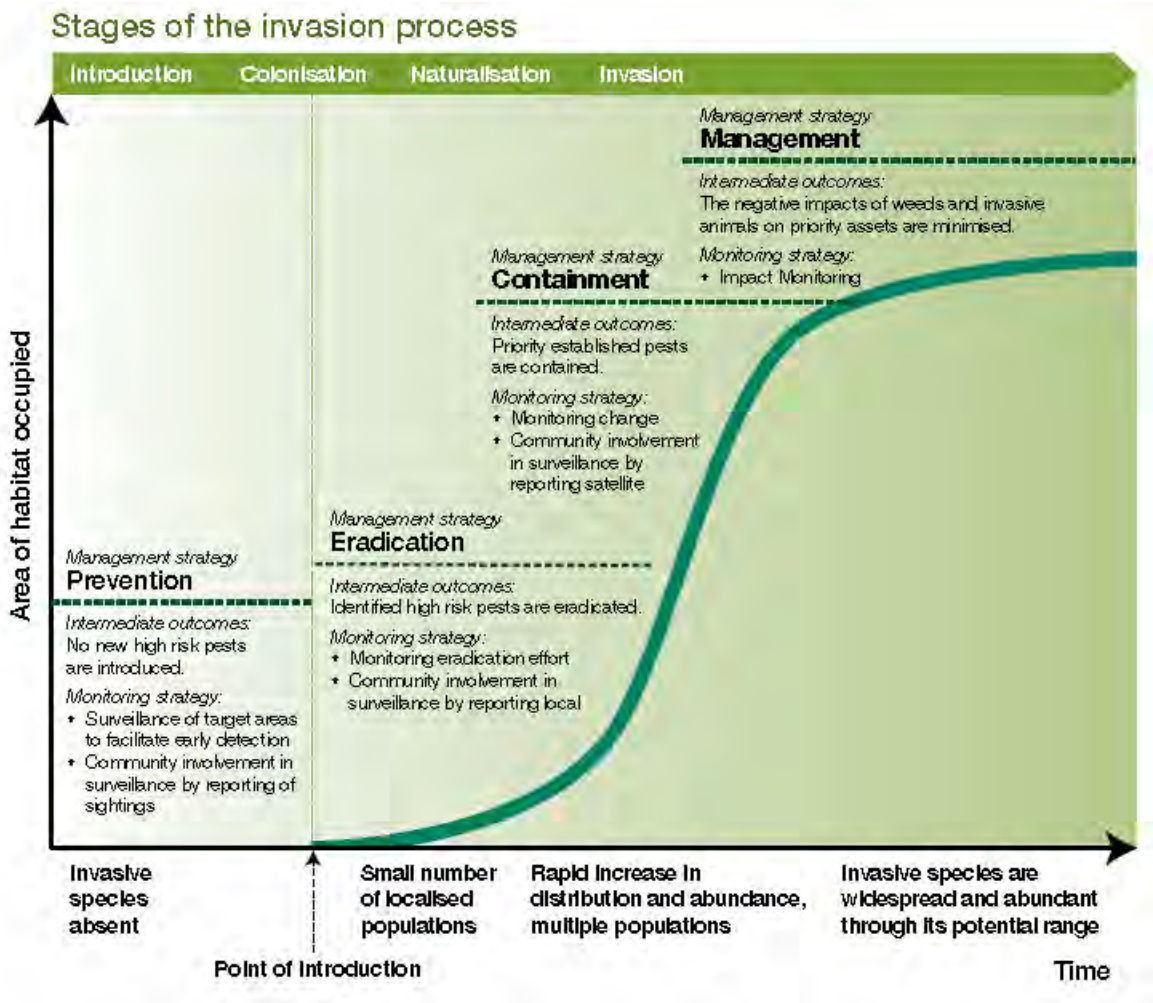
Experience around the world has shown that the return on investment for different phases of invasive species control activity is greatest when focused on prevention and early intervention, compared to waiting until species are widespread and established (illustrated in Plate 2).

Use the best approach for the species depending on the stage of invasion:

- Prevention;
- Eradication;
- Containment; and/or
- Asset protection.

Prevention, eradication and containment measures are used before a target species has reached its full potential for impact, distribution and abundance. In these situations, direct action against those species is the most effective means of control (the species-led approach). However, where invasive species are abundant and widespread, the asset protection approach is considered to be more cost effective (Department of Sustainability and Environment, 2009). This means that effort is focused on protection of priority assets (e.g. catchment, National Parks, coastal zone), ideally addressing all threats, not just invasive species. An asset is defined as a biophysical or physical element of the environment that is valued for the social, economic and environmental services that they provide (Adamson and Annett, 2008). This means that different approaches to management of invasive species are required, depending on invasion stage and the possible impacts of the species.

PLATE 2: INVASIVE SPECIES CURVE



Source: De Milliano *et al.* 2010.

1.9 TRADE-OFFS

While some invasive species may cause damage, they may also have some positive benefits that need to be considered.

Invasive species impact negatively on biodiversity, agriculture, forestry and have been identified as the second largest global threat after habitat destruction (Walker and Steffen, 1999). However, invasive species control requires consideration of trade-offs. The control and eradication of most invasive species is time consuming and requires a long term approach, especially if the species has become well established. It is best not to start on a control or eradication program unless there is agreement that the impacts of the species are likely to be significant enough that a long term approach is supported. Short term projects that do not allow for adequate follow up generally have a poor outcome.

While invasive species present a threat to biodiversity and agricultural sustainability, there are some trade-offs in their presence. While introduced plants can be weedy and crowd out native species or lower the value of crops, some can also provide a food resource (e.g. pine trees for Black Cockatoos)

and/or shelter (e.g. roosting for raptors and shelter for other animals). Also, pest animals (e.g. foxes and wild dogs) may prey on native animals and livestock, however they also prey on other pest animals (e.g. rabbits). This means that an integrated approach is needed (i.e. implementing multiple species control programs), or there is likely to be unforeseen consequences in other invasive species populations. While the European honey bee uses hollows, often to the exclusion of native animals, the bees provide an important service as a pollinator of native plants and agricultural crops.

Public perception regarding invasive species can be mixed. For example, many people feel that destroying plants or animals simply because they are introduced does not make sense and seems wrong (van Wilgen, 2012). Education regarding the relative impacts of invasive species is, therefore, essential.

2 STAKEHOLDER CONSULTATION AND INPUT

2.1 KEY PARTNERS AND STAKEHOLDERS

Key partners and stakeholders in invasive species management have been identified in Table 4. These individuals, groups and Agencies have roles in strategic planning, engagement, education, training and/or on-ground works. A more detailed outline of stakeholders is included in Appendix 2.

TABLE 4: KEY STAKEHOLDERS AND PARTNERS

STAKEHOLDER CATEGORIES
Land Owners and Managers
Regional Community
Local Community Groups
Specific Invasive Species Groups
Major Sub-regional Groups
Local Government
Non-government Organisations
Educational, Research and Development Groups
Industry Groups (including agriculture, mining, forestry and other corporate bodies)
Aboriginal Groups
Australian and State Government Agencies

2.2 STAKEHOLDER CONSULTATION

Partnerships, inclusion of stakeholders and consultation are critical to achieving long term outcomes for invasive species management. Groups and individuals involved in NRM on the South Coast have a long history of success because they have been able to recognise and adapt to changes in political, economic, social and biophysical conditions in order to address the challenges of managing invasive species. The largest challenge that stakeholders face is the need to continue projects for the timeframes required to meet the desired outcomes for invasive species control. Feedback indicates that long term funding of control programs is usually essential, so uncertainty relating to continuity is a concern.

This Strategy, its action plan and priorities has been developed based on the knowledge and experience of key personnel and consultation with key stakeholders including community groups, local government authorities and State government agencies.

Consultation for the preparation of this Strategy has included on-going interaction with South Coast NRM staff with key stakeholders (Appendix 2).

A targeted workshop was held on 7 August 2013 to provide specific input into this Strategy and was attended by:

- DAFWA;
- DPAW;
- Denmark Weed Action Group;
- Friends of the Porongurup Ranges;
- Green Skills;
- Local government authorities;
- Main Roads Western Australia;
- Oyster Harbour Catchment Group; and
- South Coast NRM.

The workshop attendees provided information regarding the management of invasive species on the South Coast, including:

1. What has worked best in previous years of invasive species management.
2. Threats to invasive species management.
3. Approaches that could help improve management.
4. Priority invasive species.
5. Priority assets in the region.
6. Future project priorities (e.g. on-ground actions, capacity building, planning, educational materials).

A summary of the outputs for points 1 - 3 (above) are included in Table 5. Priority species are discussed in section 3.3, priority assets in section 3.4 and future projects in section 6.

TABLE 5: OUTPUTS FROM STAKEHOLDER WORKSHOP

What has worked best?	Supporting 'champions' to reduce burnout. Getting started and maintaining momentum.
	Planning (provides a framework and helps with securing funds)
	Using a risk based approach to prioritisation and management
	Use of proper techniques such as the Bradley Method for weed management (Bradley, 2002)
	Community based action groups who are able to determine own priorities and timeframes using local knowledge.
	Collaboration, networking and cooperation between agencies, organisations, groups and individuals with a multidisciplinary approach.

	A 'no boundaries' by tenure approach to management
	Long term commitment of funding and consideration of management requirements and follow up
	Knowledge of invasive species biology and treatment
	Raising community awareness (leading to behaviour change)
	Keeping the 'brains trust' (reducing loss of knowledge from the region)
	Training and building skills, capacity and resources
	Targeting invasive species issues when they are small and manageable
	Collection and collation of data, mapping and monitoring to learn and evaluate previous activities
Threats to invasive species management	Short term funding with uncertainty in the medium to long term
	Not having baseline information about invasive species distribution and/or populations and ecology
	Restrictive legislation, licencing and humane considerations make management much more time-consuming, difficult and expensive.
	Loss of brains trust due to short term contracts, lack of certainty, retirement, redundancy (need for succession planning)
	People unknowingly introducing or spreading pests (e.g. inappropriate garden plants)
	Promoting importance of activities to decision makers and funders
	Public section contraction (with reduced planning and on-ground support)
Approaches to improve invasive species management	Improved data management (e.g. establishment of database with agreed data attributes, format, units, use and availability)
	Promotion of cost savings related to management versus no action scenario
	Creating achievable goals
	Balance between planning and on-ground works
	Being louder achievers with more quantifiable results
	More effective advocacy, promotion and lobbying
	Chain of communication for planning, implementation, funding
	Need for more diverse and steady funding (e.g. via Regional Biosecurity Groups)
	Sharing of information between groups and regions (networking, conferences, field days)

	Identification of emerging pests and new areas of infestation
	Raising public awareness, including stewardship for own land
	Monitoring, evaluation, research and development, report cards for status
	Need for regulation and rules that make management easier (e.g. local government by-laws)
	Use of adaptive and consultative management
	Resolving difficulties faced by employment of pest control contractors (e.g. employment contracts, insurance etc.)
	Sharing of knowledge between stakeholders (e.g. between LGAs and State government agencies) regarding invasive species distribution
	Cost sharing between organisations for common assets (e.g. road reserves)
	Management of assets such as refuse sites as high risk areas for invasive species invasion
	Capacity building in town sites and urban areas to increase 'buy in' from broader community

3 WHAT WE KNOW – IMPACTS, VALUES AND PRIORITIES

3.1 IMPACTS

Invasive species have major impacts on Western Australia's biodiversity, agricultural systems, coastline, waterways backyards and transport corridors. The agricultural cost of weeds in Australia is estimated at $4 billion per annum (Natural Resource Management Ministerial Council, 2007). In 2009 it was estimated that six groups of species (birds, rabbits, wild dogs, mice, foxes and feral pigs) cost agriculture $620.8 million, with an additional $122.7 million spent on management, administration and research (Gong *et al*., 2009). It was estimated that the annual total of $743.5 million underestimates the impacts of invasive species in Australia as the environmental and social costs or the broader economic costs of invasive species as reservoirs for viruses and disease were not considered (Gong *et al*., 2009). Proactive works undertaken at the regional level are crucial to reduce future costs associated with invasive species.

ECONOMIC

The economic impacts of invasive species include:

- Costs associated with control and management across agriculture and natural resource management;
- Costs associated with drop in agriculture productivity; and
- Costs associated with land degradation and implementing biosecurity measures.

These costs are significant. Feral animals are potential carriers of other animal diseases. Diseases (such as rabies and foot and mouth disease) and parasites (such as the screw worm fly) do not yet occur in Australia. However, an outbreak in Australia, with invasive species acting as vectors would have an immediate and widespread effect, and would be disastrous for our economy, environment and communities. It would be very difficult to control these diseases and parasites if feral animals carried them.

BIODIVERSITY

Compared to other threats to biodiversity, invasive species rank second only to habitat destruction (such as clearing of native vegetation). Feral animals impact on native species by predation, competition for food and shelter, destroying habitat, and by spreading diseases. Feral cats and foxes hunt and kill native birds, mammals, reptiles and insects. It is known that this behaviour threatens the survival of many species.

Some weeds increase flammability which means that fire risk is higher. Frequent and intense fires can reduce biodiversity and facilitate the spread of invasive species (Barrett *et al.*, 2009).

COMMUNITIES

While social impacts of invasive species are difficult to quantify, they are usually associated with economic and environmental impacts and may include:

- Reduced employment in some sectors and increased employment in relation to invasive species control and management;

- Stress and anguish related to impacts of invasive species on stock, farms, natural areas;
- Time and costs associated with management;
- Injuries related to accidents;
- Ill health related to allergies, stings, bites and diseases; and
- Conflict relating to differing views on management and/or status of species.

3.2 INVASION PATHWAYS

Prevention and eradication of high risk species involves minimising the movement of new pests into and around the region. Invasive species are most likely to be spread via commercial activity (movement of stock or equipment, nurseries) or environmental factors (fire, drought, flood, climate change), including:

- Transportation of stock, fodder and other commodities;
- Contaminated vehicles, machinery and equipment;
- Cropping;
- Grazing;
- Horticulture;
- Animals and birds;
- Linear corridors (e.g. roads);
- Waterways;
- Earthmoving and excavating;
- Road construction;
- Tourism;
- Garden waste disposal; and
- Emergency responses (e.g. fire, flood).

Care should be taken when undertaking these listed activities. Where other South Coast NRM projects involve these activities, they will be properly managed to reduce the risk of invasive species introduction and spread through appropriate planning and implementation.

3.3 PRIORITY INVASIVE SPECIES - SOUTH COAST NRM REGION

Invasive species are classified in legislation and policies according to the risks they present to the economy (e.g. agriculture), biodiversity and to social values (e.g. aesthetics and recreation).

In 2008 a working group representing community groups, other organisations, local government and State government identified priority species of environmental weeds (Peltzer, 2008).

Appendix 3 lists weed species on the South Coast, grouped by risk, consequence and impact ranking. Pest animals have not been comprehensively listed or ranked for the South Coast. However, invasive species practitioners have been able to consider the main species which pose a risk to South Coast assets.

Of the species considered, management priorities have been chosen based on:

- Likelihood of eradication, containment or reduction in distribution;
- Consideration of costs that might be incurred if no action was taken;
- Consideration of likely costs and resources required to manage species;
- Importance of resource affected by species;
- Timeframes involved; and
- Community interest.

Following consultation (most recently in August 2013), the South Coast NRM community has indicated that the invasive species listed in Table 6 are the highest priority for prevention, eradication, containment and/or management across the region. It should be noted that some other species may be subject to action depending on identification of emerging invasive species[2], stressors and other threats, the opportunity to form new partnerships and integration with other projects. Threats from priority invasive species vary widely across the region due to different habitats, the value of assets and other factors. The species listed in Table 6 were identified with input and advice from invasive species experts and practitioners and the list represents a starting point for prioritising actions.

It is anticipated that the priority species list will be reviewed regularly to reflect growing knowledge, emerging invasive species and changing conditions. When the list is reviewed, it would be useful to estimate the cost of invasive species management now versus the cost of action later when species are more widespread or generating more impacts. However, insufficient information is available to quantify costs at this stage.

[2] An emerging invasive species is one that becomes apparent through introduction into a new area where it was not previously considered a risk.

TABLE 6: PRIORITY INVASIVE SPECIES

Priority Species	Location/s	Timeframe For Control* Short: 1 to 5 years Medium: 5 to 10 years Long term: 10 to 20 years Ongoing: Ongoing management likely to be needed	Risk Analysis – if no action taken Likelihood of Impact Very likely Likely Unlikely Very unlikely	Impact Negligible Low Medium High	Overall Risk Low Medium High Extreme	Best approach for management (See Plate 2)	Comments E.g. Existing programs, next actions needed (including more foundation information, research on control methodology, community campaign and/ or government program, lobbying and/ or awareness raising)
Acacia species	Includes A. *decurrens, A. dealbata, A. baileyana, A. paradoxa, A. longifolia, A. pycnantha, A. melanoxylon, A. iteaphylla and A. podalyriifolia.* Across the region dependant on species, climate and geology	Long term	Very likely	High	Extreme	Focus on priority assets	Predicted to severely impact on peri-urban and urban areas of Albany (social and biodiversity values). Probable high impacts and high costs for management. City of Albany Weed Program, Wilson Inlet Catchment Committee and Shire of Plantagenet projects, Porongurup Range National Park program and other government, community and private projects. A more strategic, consolidated and coordinated program is needed.
African Boxthorn	Pallinup River to Esperance	Medium	Likely	Low	Medium	Eradication	Present in isolated pockets and spreading. Ravensthorpe Agricultural Initiative Network projects. Community awareness needed.
Arum Lily	Western (high rainfall) part of the region	Ongoing	Likely	Medium	High	Focus on priority assets	This weed is becoming an increasing problem due to its spread into new areas. Community awareness and programs needed.
Asparagoides species (Bridal Creeper, Bridal Veil etc.)	Across the region	Long term	Unlikely	Medium	Medium	Focus on priority assets	Bio-control for Bridal Creeper has reduced rate of spread but presence is still widespread. Community awareness and programs needed.
Cats	Across the region	Ongoing	Very likely	High	Extreme	Focus on priority assets	Actual and predicted loss of species if feral cats are not controlled. DPAW and RCFRF programs for research and management.
Deer (feral)	Across region, in isolated populations	Long term	Very unlikely	Low	Low	Eradication	This species needs to be eradicated or maintained at low densities or impacts are likely to be significantly higher. Community awareness and campaign needed.
Dogs (feral)	Esperance Mallee and Sandplains subregions	Medium	Likely	High	High	Focus on priority assets	Current program limits livestock impacts and more information needed regarding impacts on native species. Northern Mallee and Ravensthorpe Declared Species Groups programs with support from DAFWA.
Dolichos Pea	High rainfall areas of region	Long term	Likely	Low	Medium	Focus on priority assets	Successfully treated and contained in the Porongurup Range National Park. Community awareness and programs likely to be most effective.
Foxes	Across the region	Ongoing	Very likely	High	Extreme	Focus on priority assets	Actual and predicted loss of species if feral cats are not controlled. DPAW, DAFWA and RCFRF programs. Community and government programs likely to be most effective.
Goats (feral)	Albany, Kent Frankland, Esperance Mallee and Fitzgerald Biosphere sub-regions	Long term	Likely	Medium	High	Eradication	Currently small isolated populations across the South Coast NRM region but likely to spread. Data needs to be compiled. Community based program most likely to be most effective.
Gorse	Albany Hinterland Subregion	Medium	Very likely	Medium	High	Eradication	Infestations well mapped and monitored. DAFWA and South Coast NRM programs. Community and government partnership likely to be most effective.
Opuntia cactus	Esperance Mallee and Sandplains subregions	Medium	Likely	Medium	High	Containment	Next action is bio-control project in 3 target areas.
Myrtle Rust	Emerging pest species not yet identified in WA	Prevention	Very Likely	High	Extreme	Prevention/ Eradication	Research and strategies need to be developed with government lead (DAFWA and DPAW).

Pigs (feral)	Kent Frankland Subregion	Ongoing	Very likely	High	Extreme	Focus on priority assets	High biosecurity risk and damage to key habitat and assets if pigs are not controlled. Long term program with high success rate. Lake Muir Denbarker Community Feral Pig Eradication Group program. Develop use of technology such as thermal imaging.
Rabbits	Across the region	Ongoing	Likely	Medium	High	Focus on priority assets	Existing measures such as myxomatosis and calicivirus currently help to reduce rabbit numbers. Resistance is evident and numbers are increasing slightly annually (depending on climate, rabbit distribution and densities and virus dynamics). Community and government partnerships likely to be most effective.
Saggitaria	Aquatic (freshwater) weed (Albany)	Ongoing	Unlikely	High	High	Eradication/ Prevention	Currently present and contained in a small reserve in Albany. Next action: to support City of Albany in eradication and/or containment.
Salvinia	Aquatic (freshwater) weed	Prevention	Unlikely	High	High	Prevention	Not present in South Coast NRM region yet. Community awareness and government agency involvement likely to be most effective.
Senecio glastifolius	Albany Hinterland Subregion	Medium	Likely	Medium	High	Eradication	Green Skills and partner's projects have been effective. Monitoring and follow up required.
Starlings	Esperance Sandplain Subregion	Ongoing	Very likely	High	Extreme	Prevention	DAFWA program has been running for four decades. Government program with community monitoring likely to be most effective.
Taylorina	Emerging species in Kent Frankland (exists in Albany Hinterland)	Long Term	Likely	Low	Medium	Focus on priority assets	This weed has displaced native species to establish a mono-culture in some instances. Current vs. potential distribution of information needed. Community programs with government support likely to be most effective.
Victorian Tea-tree	Across the region	Ongoing	Likely	Medium	High	Focus on priority assets	Distribution of information required. A consolidated and coordinated program is needed, and is likely to be most effective if community based with government support.

3.4 ASSETS

3.4.1 Assets by Category

A cross tenure approach to invasive species management is one of the key-stones for success. However there are some categories of land that have particular values that require protection due to their economic, environmental or social importance.

Table 7 lists categories of assets. Assigning asset classes allows for types of land to be prioritised for invasive species management.

TABLE 7: CATEGORIES OF ASSETS

Land Tenure	•Crown Land for conservation (National Parks, nature reserves) •Unallocated Crown Land •Crown land managed for various purposes (e.g. Local Government) •Freehold land
Conservation Status	•Threatened flora and fauna •Threatened and priority ecological communities •Endemic species •RAMSAR Wetlands
Land Type	•Wetlands •Watercourses •Coastal and marine zone •Native vegetation •Macro corridors •Agricutural land •Tourist attractions •Landmarks

3.4.2 Priority Assets by Subregion

The South Coast NRM region comprises six subregions (Figures 2 – 7). From west to east, these subregions are:

- Kent – Frankland;
- Albany Hinterland;
- North Stirlings – Pallinup;
- Fitzgerald Biosphere;
- Esperance Sandplain; and
- Esperance Mallee.

Each subregion of the Great Southern has areas that have high values relating to:

- Conservation value;

- Productivity (e.g. agricultural);
- 'Services' provided (e.g. water, recreation);
- Linkage (e.g. road reserves); and/or
- Cultural heritage.

Table 8 lists the 'crown jewels' of each sub-regional area on the South Coast which will be priority area for invasive species management. These assets are also shown in Figures 2 -7. Buffer areas to these assets also become a high priority, depending on the particular values and invasive species threats.

TABLE 8: PRIORITY ASSETS BY SUBREGION

Kent - Frankland	•Walpole Wilderness •Lake Muir and associated wetlands •Wilson Inlet catchment
Albany Hinterland	•Porongurup, Torndirrup, Mt Lindsay/Mt Roe, West Cape Howe and Waychinicup national parks •Two Peoples Bay Nature Reserve •Oyster Harbour and Torbay catchments
North Stirlings - Pallinup	•Stirling Range National Park •Camel Lake and Corackerup Nature Reserves •Pallinup River
Fitzgerald Biosphere	•Fitzgerald River National Park and associated water courses •Lake Magenta •Dunn Rock and Lake King nature reserves •Ravensthorpe Ranges
Esperance Sandplain	•Recherche Archipeligo •Jerdacuttup Lakes and Lake Shaster nature reserves •Stokes, Cape Le Grande and Cape Arid national parks •Lake Gore and Lake Warden
Esperance Mallee	•Western Woodlands •Peak Charles and Lake Tay Salt Lake Systems •Cape Arid National Park

4 ACHIEVEMENTS

Managing invasive species is a complex issue that requires input from a range of stakeholders and good outcomes can only be achieved through cooperation, communication and coordination. South Coast NRM has worked with its partners to actively manage priority invasive species. Integration with other management issues has always been a strong focus. Projects have been strongly linked to restoration, with invasive species such as weeds only treated if secondary invasion could be reduced through rehabilitation or revegetation.

A list of projects, including highlights and lessons learned are included in Appendix 4.

Previous projects have targeted the following species:

- Feral pigs;
- Wild dogs;
- Rabbits;
- Foxes;
- Cats;
- Starlings;
- Deer;
- Bridal Creeper and other asparagus species;
- Sydney Golden Wattle and other invasive Acacia species;
- Victorian Tea-tree;
- Pine trees in the Kalgan River foreshore;
- Lantana;
- Pyp Grass
- Box-thorn;
- Blackberry;
- Gorse;
- Love Grass;
- Boneseed;
-
- Agave;
- Dolichos Pea;
- Red Valerian;
- Forget-me-not;
- Taylorina;
- Broom;
- Arum Lily;
- Watsonia;
- Blue-gums;
- Apple of Sodom;
- Castor Oil Plant;
- Knotweed;
- Polygala; and
- Poplars.

The following species were also managed opportunistically as part of core projects:

- Sagittaria;
- Artichoke Thistle;
- Olives;
- Ink Weed;
- Gladioli species;
- Chasmanthe;
- Patterson's Curse;
- Pittosporum; and
- Fleabane;

Previous projects have targeted the following priority areas:

- Porongurup Range National Park;
- Stirling Ranges National Park;
- Cape Arid National Park;
- Lake Warden and Lake Gore wetland systems;
- Road reserves in the City of Albany and Shire of Jerramungup;
- Fitzgerald Biosphere;
- Lake Muir and associated wetlands;
- Walpole Wilderness;
- Stokes Inlet;
- Leda Reserve in Esperance;
- Key reserves in Denmark,
- Albany Senior High School, St Joseph's College, Flinders Park Primary School, Kalgan River, Wellstead and the broader hinterland in City of Albany; and
- Other areas of the South Coast NRM region.

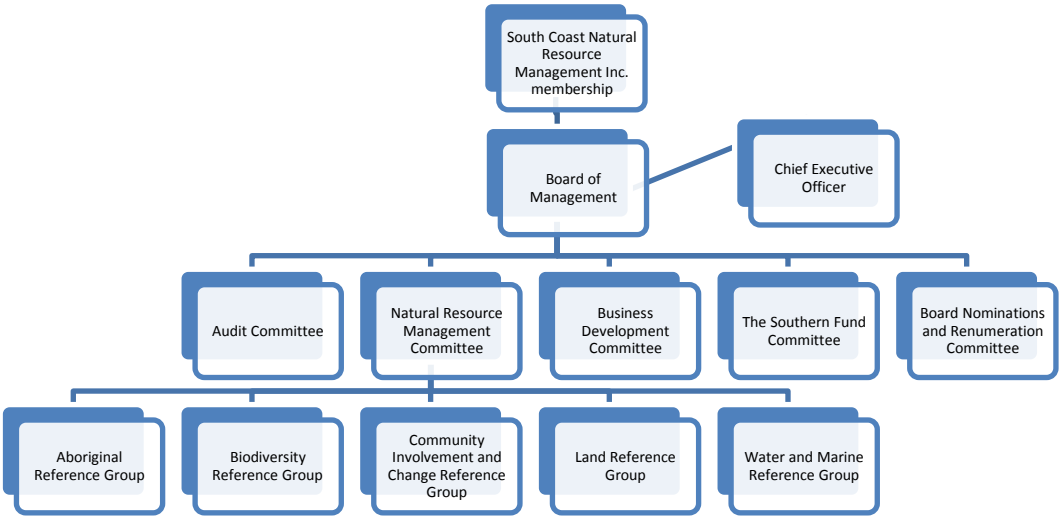
Previous projects have raised awareness and increased capacity by:

- Providing devolved grants and resources (e.g. vehicle, technical advice and executive support) to community groups;
- Identifying priority weeds and management protocols for local government (Esperance, Plantagenet) and other areas;
- Encouraging community surveillance and reporting; and
- Providing material for community use including production of a weed calendar in Esperance, and distribution of copies of *Southern Weeds and Their Control* (Moore and Wheeler, 2008).

5 GOVERNANCE

South Coast NRM has a governance structure which is set up to allow for the integration of community knowledge and expertise into NRM projects. For example, South Coast NRM staff are guided by committees and reference groups to provide support across the region to those who are involved in the management of invasive species (Plate 3). Support has included provision of technical advice, support in applying for grants (and subsequent acquittal), providing training, facilitating networking opportunities for information sharing and executive support.

PLATE 3: SOUTH COAST NRM GOVERNANCE STRUCTURE



The Western Australian Biosecurity and Agriculture Management Act 2007 allows for the establishment of regional biosecurity groups (RBGs) which can raise funds in their area of operation to carry out programs to control invasive species (e.g. a levy on landowners and/or industry). The funds are matched dollar for dollar by the State Government. The RBG can identify priority pests, then plan and coordinate efforts to tackle priorities. The framework is based on the concept that a cross tenure approach is needed and that co-operation between government agencies, other organisations and landowners will result in the best outcomes. There are currently no RBGs in the south west of Western Australia (although there has been a long history of RBGs in pastoral areas).

Discussion with South Coast stakeholders indicates that the following would be useful for regional governance:

- Formation of a RBG in the region;
- RBG to set priorities for activities, in consultation with existing organisations and groups and guided by this Invasive Species Strategy (i.e. community based priorities);
- RBG to be an umbrella group for existing groups that are mostly focussed on either a single asset/asset type/species.
- South Coast NRM to provide executive support with expert advice and support from DAFWA Biosecurity Officer.

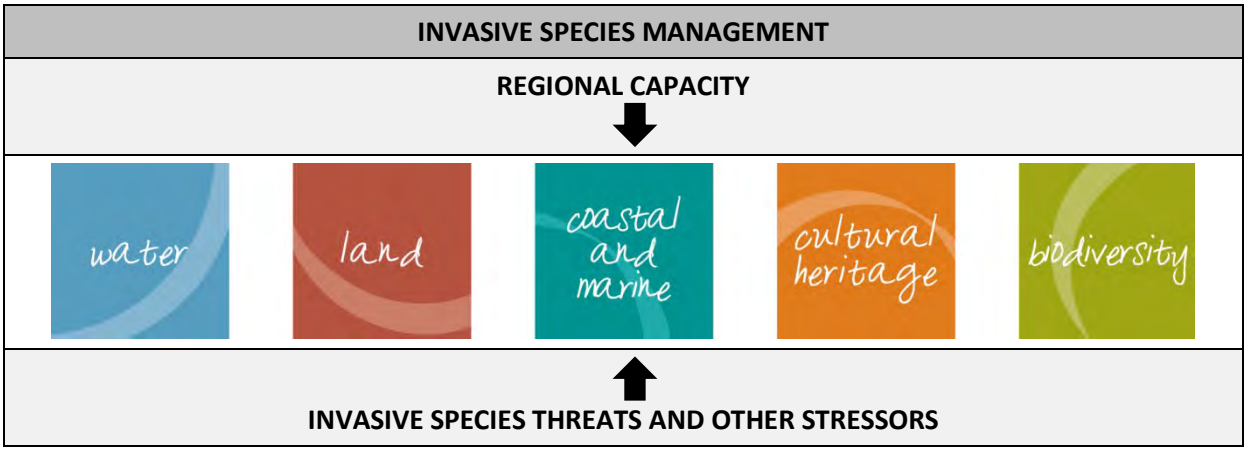
It is noted that existing biosecurity groups are funded via a declared pest rate which are applied to affected lands with RBG area of operation. While each RBG sets the rate based on the funds needed to carry out annual programs, the setting and collection of funds is likely to cause some concern from landowners unless extensive consultation is undertaken and general support is provided.

6 INVASIVE SPECIES – ACTIVITIES AND PRIORITIES

South Coast NRM and its partners are guided by Southern Prospects (South Coast NRM, 2011) which considers NRM issues by themes, including land, water, biodiversity and culture and heritage (Plate 4). Actions for invasive species management include consideration of these theme areas with some actions common to all theme areas.

Aspirations and goals for invasive species management for the South Coast NRM region have been outlined in Southern Prospects 2011 – 2016 and are included in Appendix 5.

PLATE 4: INVASIVE SPECIES STRATEGY AND NRM THEME AREAS



Priority activities, desired outcomes, responsibly parties and timeframes for invasive species management are summarised in Table 9 by themes and types of activities, including:

- Planning and policy frameworks;
- Capacity building;
- On-ground works; and
- Measures and monitoring.

TABLE 9: ACTIVITIES AND PRIORITIES BY THEME

THEMES	OUTCOME/ OBJECTIVES MET	ACTIVITY AREA	STRATEGY	ACTIVITIES	OUTCOMES	RESPONSIBILTY	BY WHEN
All	L7, L8, B13, W11, C8	Capacity Building	Improve early detection of existing and emerging invasive species and/or presence in priority assets	Coordinate activities with LGAs, South Coast NRM and key stakeholders to raise awareness and increase recognition of existing and/or emerging invasive species	Reduced distribution and spread of emerging invasive species	South Coast NRM (Invasive Species Coordinator), LGAs, South Coast Management Group, DAFWA, DPAW, other stakeholders	2013
All	B1, B2, B3	Measuring and Monitoring	Improve knowledge regarding distribution, spread and risks associated with priority invasive species	Survey and map key invasive species in priority asset areas	Maps and associated data held in invasive species database with information used to set and refine priorities	South Coast NRM (Invasive Species Coordinator), key stakeholders	2015 and ongoing
All	B1, B3	Measures and Monitoring	Analyse invasive species project outcomes to improve future projects and overall outcomes	Record goals, actual outcomes and reasons for success (or difficulties) of on-ground invasive species activities funded by South Coast NRM (including mapping)	Standard invasive species reporting formats prepared, completed by project managers and entered into invasive species database	South Coast NRM (Invasive species coordinator / Spatial information officer / MERI Officer	2014
All	B1, B2, B3	Measures and Monitoring	Collate invasive species management data to inform practitioners and allow for continual improvement	Create invasive species data base including past and present project work and spatial information.	Regional invasive species database created and kept up to date for use by South Coast NRM and stakeholders	South Coast NRM with University / Secondary school student	2015
All	B1	Measures and Monitoring	Increase access and standardise information collected from invasive species projects	Develop standard reporting and MERI formats for invasive species activities with information stored in an invasive species database.	Standard invasive species reporting formats completed. Mapping and information database set up and available to the public. All management activities are mapped and recorded. Database available on-line.	South Coast NRM (Invasive Species Coordinator / Spatial Information Officer / MERI Officer)	2014
All	B1, B2, B3	Measures and Monitoring	Review invasive species management outcomes	Review outcomes of projects annually in a workshop or similar format, with input from stakeholders. Use to evaluate performance of Invasive Species Strategy.	Annual MERI workshop held to determine if outcomes have been satisfactory. Redefine priorities and set future goals.	South Coast NRM (Invasive Species Coordinator, program theme leaders, Reference Groups), DAFWA, DPAW, Stakeholders	Annually
All	B2	Measures and Monitoring	Review priority assets (categories and places) based on risk assessment	Review asset priorities (categories and places) annually, based on risks and threats, with input from stakeholders.	Up to date asset priorities based on risks, threats and values.	South Coast NRM (Program leaders) and stakeholders	Annually
All	L9	Planning and Policy	Identify and review strengths, weaknesses, opportunities and threats (SWOT) to existing and proposed invasive species projects and planning	Undertake risk assessment for all activities associated with invasive species management. This particularly applies to assessment for projects that may require significant follow up and include consideration of consequences of program termination	Projects more likely to succeed if SWOT and risk analysis undertaken	South Coast NRM (Program leaders) and stakeholders	2013 and ongoing
All	L7, L8, W11, C8	Capacity Building	Raise awareness and develop skills to use invasive species database tools	Run training program annually for South Coast NRM region on use of invasive species database	Project partners trained and using invasive species database.	South Coast NRM (Invasive Species Coordinator), DAFWA and project partners	Annually
All	L9, B2, B3	Capacity Building; Planning and Policy Framework; Measures and Monitoring	Develop grant applications for invasive species management in collaboration with stakeholders	Develop or assist in preparation of grant applications which address priority invasive species and assets as outlined in Invasive Species Management Strategy	Program and projects funded and delivered addressing priority invasive species and assets	South Coast NRM (Invasive Species Coordinator), stakeholders	Ongoing
All	L7, B13, C8	Capacity Building	Raise community awareness regarding the dumping of unwanted pets and garden waste and subsequent invasive species issues	Prepare and distribute at least five media, information presentations and other promotional material (including for coastal and marine information events)	At least five media releases, presentations and other promotional material prepared and distributed	South Coast NRM (Invasive Species Coordinator and program leaders)	2018
All	L9	Planning and Policy	Identify resources needed for Agencies, LGAs and other stakeholders to manage invasive species in the South Coast NRM region	Review resource requirements of stakeholders to deliver invasive species management outlined in South Coast NRM Invasive Species Management Strategy (this document). Focus on resource sharing and collaboration	Identify resource gaps for invasive species stakeholders	South Coast NRM (Invasive Species Coordinator), Agencies, LGAs, stakeholders, University Student	2016
All	L7, L8, B13, W11, C8	Capacity Building	Raise community awareness regarding impacts of invasive species and increase capacity for management	Deliver presentations and information regarding invasive species management at workshops, field trips and other events	Invasive species information delivered / presented to at least 10 local, regional, State or National events annually (including interpretive material)	South Coast NRM (Invasive Species Coordinator)	2018

THEMES	OUTCOME/ OBJECTIVES MET	ACTIVITY AREA	STRATEGY	ACTIVITIES	OUTCOMES	RESPONSIBILTY	BY WHEN
All	L6, C8	On-ground; Capacity Building	Implementation of endorsed invasive species plans	Continue to support endorsed invasive species management plans for priority species and assets throughout the South Coast Region, based on risk assessment	Priority invasive species managed to reduce impacts and risks to priority assets	South Coast NRM (Invasive Species Coordinator), stakeholders	Ongoing
All	L7	Capacity Building	Increase recognition and knowledge about invasive species, including emerging issues	Encourage and support land managers to undertake training in the recognition and control of invasive species. Provide 5 annual training workshops/sessions for landholders and stakeholders on invasive species identification and control methodologies	At least five annual training events completed	Invasive Species Coordinator and Coast and Program Leaders	2018
All	L9	Planning and Policy	Invasive species management plans prepared using South Coast NRM funding to undertake risk assessment	Invasive species management plans funded by South Coast NRM to undertake risk assessment and consideration of priority species, assets and activities	Risks and actions relating to invasive species considered in planning for NRM	South Coast NRM (Program leaders) and stakeholders	2016 and ongoing
Biodiversity	B1, B2	Measures and Monitoring	Protect priority vegetation corridors (Wilkins *et al.* 2006) and road reserves from invasive species	Remnant vegetation located in priority macro corridors and road reserves mapped and prioritised for invasive species management.	Map and priority list of remnant vegetation in vegetation and macro corridors and road reserves	South Coast NRM (Biodiversity and Land Program leaders and Reference Groups) with stakeholders	2014
Biodiversity	B1, B2	Measures and Monitoring	Identify vegetation types and fauna most at risk from invasive species	Undertake desk top review of current information relating to remnant vegetation classification, identifying threats and risk for priority vegetation types.	Desk top review completed with information fed into Invasive Species Strategy	South Coast NRM (Invasive Species Coordinator and program leaders)	2014
Biodiversity	B2, B13	Planning and Policy	Reduce introduction and spread of invasive species via nurseries	Undertake a nurseries risk assessment and continue liaison with industry groups. Prepare a list of species that should not be sold by nurseries based on risk assessment of potential impacts.	Reduce risk associated with nursery sales and activities	South Coast NRM (Invasive Species Coordinator), Nursery and Garden Industry Western Australia	2015
Biodiversity	B13	Planning and Policy	Reduce risk of introduction and spread of dieback during invasive species management projects.	Invasive species management projects will include hygiene practices in planning and implementation to reduce introduction and spread of dieback for high risk areas.	Risk of dieback introduction and spread is reduced for field activities	South Coast NRM (Invasive Species Coordinator and field staff)	Ongoing
Biodiversity	L6, B9	On-ground	Reduce loss of native vegetation communities, flora and fauna through threat mitigation relating to invasive species	Implement annual Red Card for Rabbit and Fox programs and cat baiting in priority areas	Fox, rabbit and cat control delivered in 10 or more private landholdings annually	South Coast NRM (Invasive Species Coordinator/project officer)	Annually
Biodiversity	L6, B9, W8, H2, C3	On-ground	Support on-ground invasive species management in priority areas.	Assist at least 50 land holders annually to control priority invasive species where threats to native flora and fauna exist (especially relating to migration and/or macrocorridors)	At least 50 landholders contributing annually to the preservation of remnant vegetation through invasive species control	South Coast NRM (Invasive Species Coordinator and Land Program Leader)	2018
Biodiversity	L6, B9, W6, W8, C3, H2	On-ground	Implementation of Gorse Strategic Plan 2011-2021	Implement recommendations and actions in the Gorse Strategic Plan 2011-2021	Delivery of outcomes outlined in Gorse Strategic Plan 2011 - 2021	South Coast NRM (Invasive Species Coordinator), DAFWA, Stakeholders	2021
Biodiversity	L6	On-ground	Implementation of Knotweed Strategic Plan 2012	Implement recommendations and actions of the Knotweed Strategic Plan 2012	Delivery of outcomes outlined in Knotweed Strategic Plan 2012	South Coast NRM (Invasive Species Coordinator), Tingledale Land Conservation District Committee (LCDC)	2018
Biodiversity	L6	On-ground	Implementation of Esperance Weed Strategy 2009 - 2018	Support implementation of Esperance Weed Strategy 2009 - 2018	Delivery of outcomes outlined in Esperance Weed Strategy 2009 - 2018	South Coast NRM (Invasive Species Coordinator), Shire of Esperance	2016
Biodiversity	L7, L8, W11, C8	Capacity Building	Assist landholders in recognising value of protecting native vegetation through control of invasive species	In collaboration with catchment groups, DPAW and other stakeholders, produce at least 3 interpretation documents / articles annually regarding the value and role of native vegetation and pollinators and threats presented by invasive species.	At least three Interpretation /articles completed annually	South Coast NRM (Invasive Species Coordinator, Land and Biodiversity Program leaders), DPAW and other stakeholders	2018
Biodiversity	B13	Capacity Building	Promote 'good neighbour policy' in relation to responsibilities relating to stewardship and invasive species management	Increase awareness of 'good neighbour policy' in relation to DPAW Conservation Estate and other priority assets. Collaborate with catchment groups, LGAs and DPAW and other stakeholders to produce and distribute at least 3 interpretation documents annually (e.g. articles on the values and role of native vegetation and pollinators, risks associated with invasive species)	Prepare and distribute at least three interpretation /articles annually	South Coast NRM (Invasive Species Coordinator, Land and Biodiversity Program Leaders), DPAW, Catchment Groups	2015
Biodiversity	B13	Capacity Building	Enhance knowledge about invasive species via schools	Deliver four invasive species education programs in schools in the South Coast NRM region	Four schools engaged in educating students about invasive species risks and management	South Coast NRM (Invasive Species Coordinator)	2018
Biodiversity	B2, B3	Measures and Monitoring	Collaborate with Invasive Species Cooperative Research Centre (CRC) on initiatives	Liaise with CRC. Attend events relating to relevant topics on invasive species management	Generate opportunities through enhanced relationship with Invasive Animals CRC (which will improve connections with other research, groups and projects)	South Coast NRM (Invasive Species Coordinator)	Ongoing

THEMES	OUTCOME/ OBJECTIVES MET	ACTIVITY AREA	STRATEGY	ACTIVITIES	OUTCOMES	RESPONSIBILTY	BY WHEN
Biodiversity	B9	On-ground	Reduce the impacts of invasive species on *Environment Protection Biodiversity Conservation Act* 1999 (EPBC Act) species and assets of national significance	Programs and projects which protect EPBC Act species or assets of national significance will be considered a high priority	High priority is given to projects which protect EPBC Act listed species	South Coast NRM (Invasive Species Coordinator)	Ongoing
Biodiversity	B9	On-ground	Reduce the impacts of invasive species on *Western Australian Wildlife Conservation Act 1950* (WC Act) Threatened and Priority species	Programs and projects which protect species scheduled in the WC Act (and IUCN Red List) will be considered a high priority	High Priority is given to Threatened and Priority species listed in WC Act and the IUCN Red List	South Coast NRM (Invasive species coordinator), DPAW	Ongoing
Biodiversity	L9	Planning and Policy	Integrate Species Recovery Plans into projects as a priority, where appropriate	Support of DPAW Recovery Plans are a high priority and actions will be integrated into projects where appropriate to protect threatened and priority communities, flora and fauna	Recovery Plan outcomes achieved	South Coast NRM (Invasive Species Coordinator and Biodiversity Program Leader) DPAW	Ongoing
Biodiversity	B2	Measures and Monitoring	Undertake risk assessment and analysis based on national, State, regional and local invasive species plans to review priority invasive species for management	Desk-top review of national, State, regional and local plans when reviewing priority invasive species for the South Coast region and subregions. Undertake analysis and prioritisation using risk assessment to rank invasive species to review current priority invasive species list	Review priority invasive species list to promote a targeted approach to management	South Coast NRM (Invasive Species Coordinator), University student	2015
Biodiversity	B1, B2	Measures and Monitoring	Protect priority assets and appropriate buffers from invasive species	In collaboration with DPAW and LGAs, develop maps identifying appropriate buffer areas requiring invasive species threat mitigation based on risk analysis. Incorporate into invasive species database	Buffer priorities identified, mapped and incorporated into projects/ invasive species database	South Coast NRM (Invasive Species Coordinator), DPAW, LGAs	2016
Biodiversity	B1, B2	Measures and Monitoring	Develop prohibited plant based on environmental and agricultural based weeds in partnership DAFWA and DPAW list for South Coast NRM region to complement BAM Act	Identify high risk prohibited plants and emerging invasive species which would have a high impact if introduced to South Coast NRM region (e.g. myrtle rust). Undertake risk assessment to prioritise management actions, should these species be discovered	Undertake risk assessment for species identified in BAM Act. Identify and plan for treatment for species of concern in South Coast NRM region.	DAFWA with South Coast NRM (Invasive Species Coordinator) and DPAW	2016
Culture and Heritage	L9	Planning and Policy	Assist with the development and implementation of a South Coast Cultural Management Plan (invasive species section)	Assist in setting measurable targets for invasive species targets in the South Coast Cultural Management Plan	A clear and concise set of objectives for invasive species management imbedded in the South Coast NRM Cultural Management Plan	South Coast NRM (Invasive Species Coordinator and Cultural Program Leader)	2016
Land	B2	On-ground	Integrate key programs to maximise impacts on invasive species	Prioritise RCFRF activities based on integration with Western Shield program, priority assets and risk assessment. Deliver a devolved grant scheme to support community and industry in fox, cat and rabbit control	Five Western Shield threat abatement sites complemented by baiting on private or industry owned land. 50 landholders engaged in feral animal control	South Coast NRM (Invasive Species Coordinator), DPAW, DAFWA	2018
Land	L6, B9, W6, W8, H2	On-ground	Prioritise and implement feral animal control programs that abate threats to priority conservation and agricultural assets	Consult with DAFWA, DPAW and key stakeholders to prioritise feral animal control programs based on risk assessment, priority species and assets	20% of the Northern Mallee Declared Species Group (DSG) management Plan funded. 20% of the Lake Muir DSG activities funded. Provide technical advice and representation at DSG meetings.	South Coast NRM (Invasive Species Coordinator)	Ongoing
Land	L9	Planning and Policy	Support the formation and management of a Regional Biosecurity Group (RBG) under the BAM Act, in the South Coast NRM region	Support DAFWA in the establishment of an RBG with a constitution based on stakeholder input. Develop an RBG communications strategy. Develop RBG priorities based on stakeholder consultation and risk assessment.	RBG established by 2015 based on stakeholder priorities	South Coast NRM (Invasive Species Coordinator/ Operations Manager/ Communication's Officer) DAFWA (Invasive Species Program Leader SAR)	Established by 2015
Land	L9	Planning and Policy	Integrated approach to invasive species threat abatement through implementation of farm plans and/or revegetation works	Provide technical input to farm plans, revegetation and pasture establishment projects to ensure integrated approach to invasive species management	All relevant proposals and applications relating to threat abatement works are assessed for integration with invasive species management	South Coast NRM (Invasive Species Coordinator / Program Leaders / Facilitators)	Ongoing
Land	L9	Planning and Policy	Invasive species management planning is integrated with other issues and factors	Invasive species management planning is integrated and considers other management issues, including native vegetation, water courses, coastal and marine areas, heritage and social factors	All assets considered and protected by invasive species management planning. The ecology of at least 30 privately owned remnant vegetation areas are enhanced by threat abatement works	South Coast NRM (Invasive species coordinator) Landholders	2018

THEMES	OUTCOME/ OBJECTIVES MET	ACTIVITY AREA	STRATEGY	ACTIVITIES	OUTCOMES	RESPONSIBILTY	BY WHEN
Land	L7	Capacity Building; Planning and Policy Framework; Measures and Monitoring	Support studies into eradication methods for feral cats and foxes	Assist DPAW with invasive species baiting and eradication trials	Achieve integrated pest management options for control of cats and foxes	South Coast NRM (Invasive Species Coordinator) and DPAW	Ongoing
Land	L7	Capacity Building	Support and promote research into rabbit control	Assist and support the RHD Boost program for Rabbit Haemorrhagic Disease Virus (RHD) and similar projects	Up to date information and data on rabbit bio-control research outcomes leading to on-ground reduction of rabbit populations	Invasive Species Coordinator, DAFWA and Biosecurity Team Southern Agricultural Region	Ongoing
Water – Aquatic and Riparian	W8	On-ground	Protect and enhance the ecological function and diversity of priority water based assets (e.g. RAMSAR wetlands and other priority wetlands and waterways)	Deliver 5000 ha of invasive species control to protect priority flora and fauna species	5000ha of invasive species control delivered	South Coast NRM (Invasive Species Coordinator and Coastal and Marine Program Leader)	2018
Water – Aquatic and Riparian	W6, W8	On-ground	Support on ground works to protect priority aquatic and riparian systems	Deliver 2000 ha of invasive species control to protect priority aquatic systems	2000 ha of invasive species control delivered	South Coast NRM (Invasive species Coordinator and Coastal and Marine Program Leader)	2018
Water – Aquatic and Riparian	W6, W8	On-ground	Protect and enhance the ecological function and diversity of priority river systems	Resource and implement recommendations of the Upper Hay Strategic Catchment Plan (Wilson Inlet Catchment Committee, 2007)	Invasive species components of the Hay River Management plan are delivered	WICC project Officer, South Coast NRM (Invasive Species Coordinator)	Ongoing
Water – Aquatic and Riparian	W6, W8	On-ground	Implement invasive species recommendations from adopted estuary/ river management plans	Assist in the delivery of key actions relating to invasive species in estuary and river management plans which target priority assets	Key South Coast NRM estuaries and river assets are protected and enhanced	South Coast NRM (Invasive Species Coordinator and Water Program Leader), DOW, DPAW	Ongoing
Water - Coastal and Marine	B1, B2, B9	On-ground; Measuring and Monitoring	Prioritise, coordinate and support invasive species activities in the coastal zone based on endorsed strategies and management plans	Undertake activities according to outlined priorities, including MERI.	Priority projects undertaken	South Coast NRM (Invasive Species Coordinator and Water Program Leader), South Coast Management Group	Ongoing
Water - Coastal and Marine	B9	On-ground	Seek funding for the implementation of priority invasive species management strategies in the coastal zone	Incorporate Coastal and marine priorities into 5 grant applications were coast and marine environments fall in target areas	At least five coastal invasive species projects delivered	Invasive Species Coordinator and Coast and Marine Program Leader	2018
Water - Coastal and Marine	C8	Capacity Building	Increase knowledge regarding invasive species in the coastal and marine zone	Develop and maintain information packages on invasive species in the coastal zone. Publish information on priority environmental weeds and management recommendations relating to the coastal zone. Develop, print and distribute at least 2 interpretation or media articles annually, related to invasive species and the coastal zone	Completion of interpretation package, including at least two interpretation or media articles completed and distributed to community annually. Information used is accurate and current	Invasive Species Coordinator and Coast and Marine project officer	2018
Water - Coastal and Marine	C8	Capacity Building	Support education programs to raise awareness among small boat owners and general public on how to reduce the likelihood of introducing marine pests	Support Department of Fisheries in development of marine invasive species awareness raising program	Department of Fisheries and South Coast NRM partners in marine invasive species awareness raising program	Invasive Species Coordinator and Coastal and Marine Coordinator	2018
Water - Coastal and Marine	C8, L9	Capacity Building, Planning and Policy	Identify resources required to identify and manage introduced marine organisms based on risk assessment	Support Department of Fisheries in assessment of risk for priority species/assets	Identification of species and assets based on risk assessment. Preparation and distribution of information to build community capacity. Support for monitoring and on-ground works related to invasive marine species.	South Coast NRM - Coast and Marine Program Leader, Department of Fisheries	2015
Water – Wetlands and Watercourses	W6, W8	On-ground	Support implementation of recommendations in adopted foreshore assessment reports	Assist in the delivery of key actions relating to invasive species in foreshore assessment reports which target priority assets	Key South Coast NRM foreshore assets are protected and enhanced through control of invasive species	South Coast NRM (Invasive Species Coordinator, and Coastal and Marine Program Leader), DOW, DPAW	Ongoing
Water – Wetlands and Watercourses	W6, W8	On-ground	Increase awareness about invasive species in wetlands and watercourses	Develop and install 4 interpretive signs to educate users and visitors about invasive species in wetlands	Four interpretive signs completed and installed	South Coast NRM (Invasive Species Coordinator and Coastal and Marine Program Leader)	2018
		Measures and Monitoring	Review priority invasive species based on risk assessment	Review priority invasive species annually, based on risks and threats, with input from stakeholders	Up to date priority invasive species based on risks, threats and values	South Coast NRM (Program leaders) and stakeholders	Annually

7 MONITORING, EVALUATION, REPORTING AND IMPROVEMENT

South Coast NRM has established a monitoring, evaluation, reporting and improvement (MERI) framework for all its activities which is used to:

- Assess projects that are proposed for funding;
- Analyse the outcomes of projects compared to original objectives;
- Compare the overall benefits of different projects; and
- Allow for continual improvement in project planning and implementation.

The MERI framework is constantly being assessed and improved to improve operations based on lessons learned, innovation, best practice and new information. One of the goals of the MERI process is to make project reporting and other information collected as meaningful as possible by making it accessible and in formats that satisfy grant funders, practitioners and other stakeholders. Ideally, the MERI process also shows how projects are satisfying overarching strategies, including *Southern Prospects* (South Coast NRM, 2011).

South Coast NRM intends to develop an invasive species database as part of the MERI process. The database format is yet to be determined, but it will ideally:

- Including information, maps and statistics from past and present invasive species projects undertaken in the South Coast NRM region;
- Incorporate social statistics (when appropriate) from sources such as the Australian Bureau of Statistics (such as the annual Agricultural Resource Management Survey);
- Be in a format consistent with *State of the Environment* reporting;
- Be compatible with or add value to existing information systems such as *Atlas of Living Australia* and Department of Agriculture and Food's *Weed Watcher*;
- Form the basis for continual improvement of invasive species training, planning and project development; and
- Allow South Coast NRM and stakeholders how projects contribute to Southern Prospects and other invasive species strategies, policies and legislation.

The Western Australian Government has proposed the development of an invasive species monitoring framework (De Milliano *et al.*, 2010). In an ideal situation, the framework would involve collection of data attributes outlined in Table 10, including baseline distribution and abundance, impacts and extent of active management. In reality, baseline data is difficult to determine and impacts are hard to quantify. South Coast NRM will require that projects record and report data (including mapping) in line with Table 10, where appropriate.

The DAFWA monitoring framework for ecologically significant invasive species (De Milliano *et al.,* 2010) points out that Western Australia faces two issues in its ability to meet national resource condition monitoring requirements for invasive species:

- There is limited strategic monitoring of invasive species by government departments across the state's large geographic area (Gibson & West 2006); and

- The six regional natural resource management groups in Western Australia do not have statutory responsibility for the control of invasive species and do not have a large staff of scientific experts.

These points are serious constraints on the collection of meaningful data, including that there is usually little or no base information regarding population size and distribution of invasive species at the start of programs. However, well informed and considered qualitative data can be used to support project planning where quantitative information is not available. The aim, of course is to build on existing knowledge with quantitative data so that definitive decisions can be made regarding priorities, timeframes and budgets.

TABLE 10: ALIGNMENT OF DATA ATTRIBUTES, MANAGEMENT OF STRATEGIES AND INDICATORS

	INDICATORS	**DISTRIBUTION AND ABUNDANCE**			**IMPACT**	**EXTENT OF ACTIVE MANAGEMENT**	**ADMINISTRATIVE/ ANALYTICAL**						
	Data attributes / Management Strategy	Occurrence	Abundance	Distribution	Impact	Management Activities and/or Control Activities	Number and Scale of New Incursions	Invasive Species Identity	Data Collection Date	Area of Interest	Trend Information	Contact Details of Data Collector	Quality of Information Collected
Species Led Approach		Data attributes only need to be collected in relation to one or more **target species** and in relation to their **pathways of entry and spread**											
	Prevention	✓	X	X	X	Preferable	✓	✓	✓	✓	✓	✓	✓
	Eradication	✓	✓	✓	X	Preferable	Preferable	✓	✓	✓	✓	✓	✓
	Containment	Data attributes only need to be collected in relation to the core infestation											
		✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓
		Data attributes only need to be collected in relation to the satellite infestation											
		✓	✓	✓	X	Preferable	Preferable	✓	✓	✓	✓	✓	✓
Asset Based	Management	Data attributes only need to be collected in relation to the **asset** being protected from the negative impacts of invasive species											
		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: De Milliano *et al.* 2010

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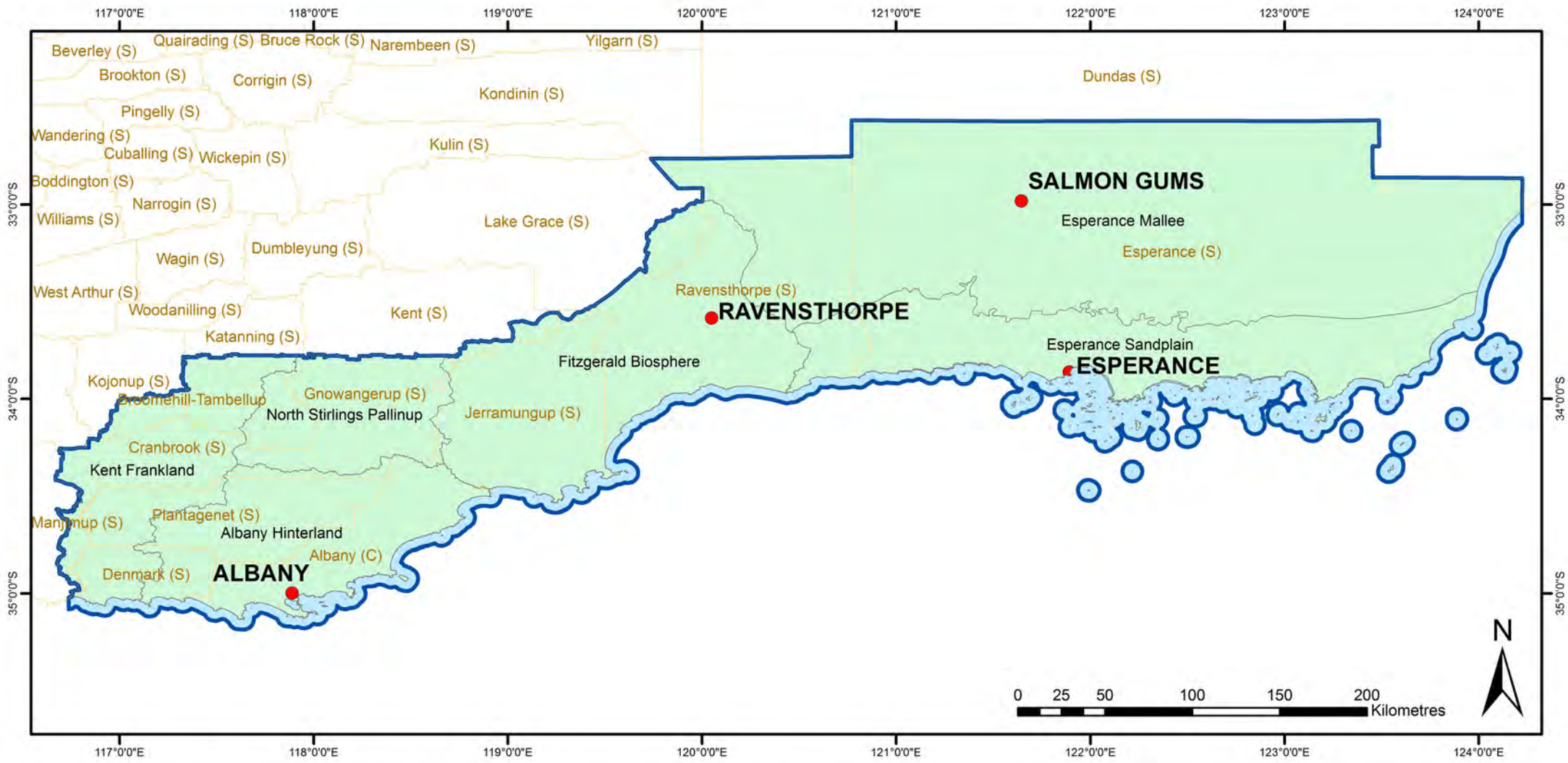
FIGURES



Map 1 - South Coast Region

Legend

- South Coast Boundary
- Local Government Boundaries
- SCNRM Sub-regions

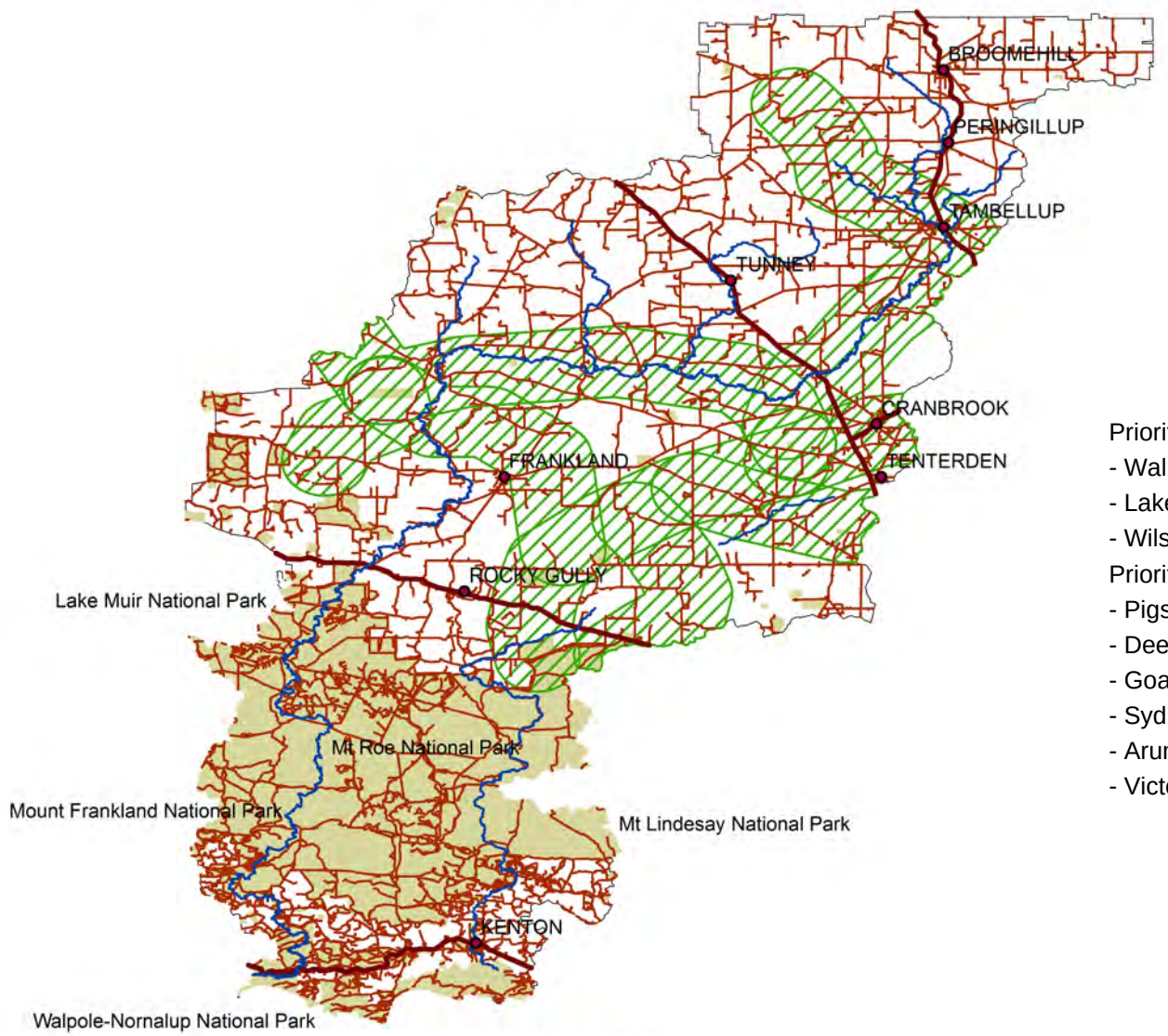
Data
South Coast NRM region extends to the 3nm maritime boundary

Acknowledgements
Local Government boundaries supplied by the Australian Bureau of Statistics

Reference
Datum: Geocentric Datum of Australia 1994

Disclaimer
The data used in this map may be provisional and thus subject to revision. All parties specifically disclaim any warranty either expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a perticular use even if the pparties have been advised of the possibility of such change. The entire risk as to quality and performance is with the user.

MAP 2: **KENT FRANKLAND**



Legend

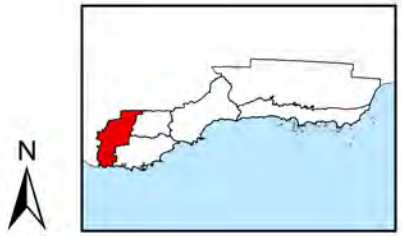
- Towns
- Major Streams
- Highways
- Major Roads
- Macro Corridor
- Parks and Reserves

1:1,000,000

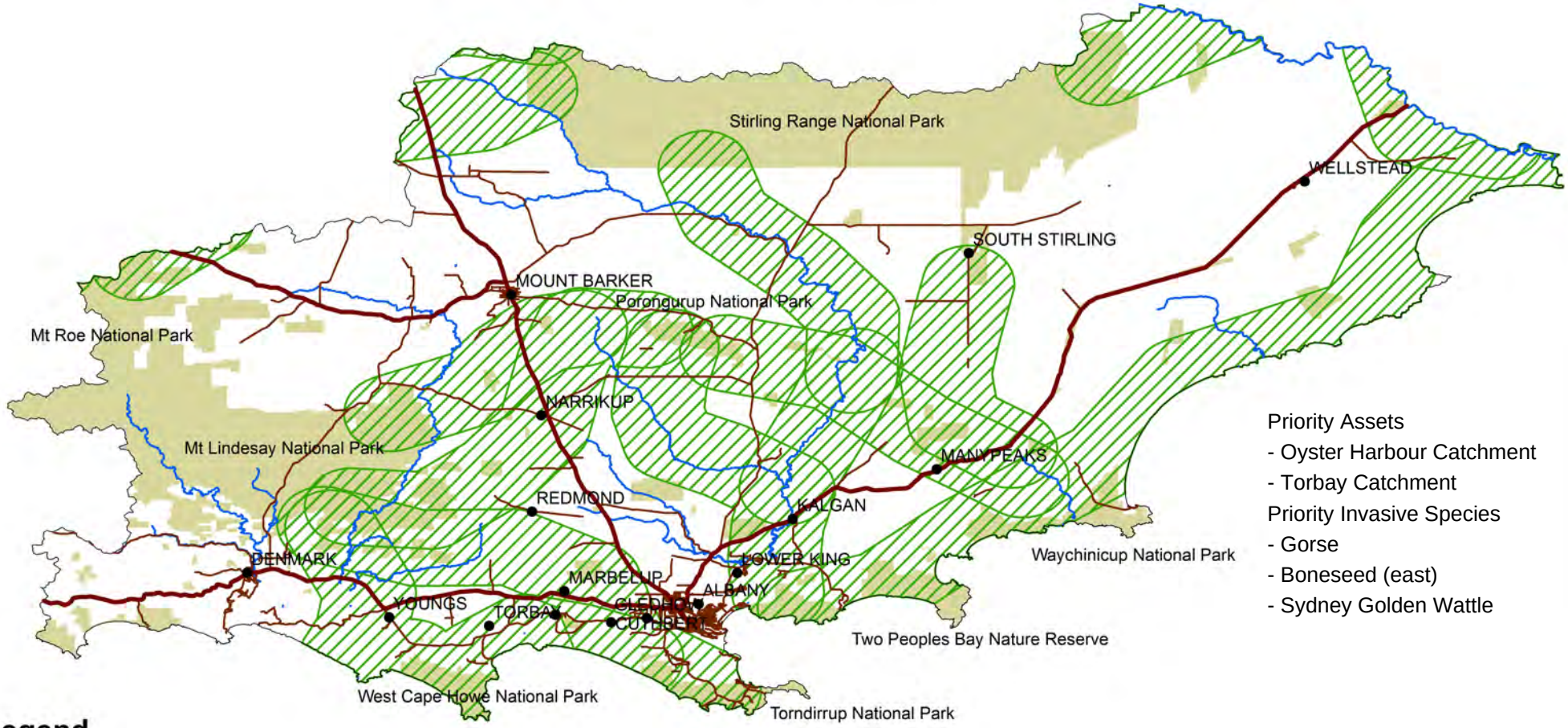
0 15 30 60 Kilometres

Priority Assets
- Walpole Wilderness
- Lake Muir and associated wetlands
- Wilson Inlet Catchment

Priority Invasive Species
- Pigs
- Deer
- Goats
- Sydney Golden Wattle
- Arum Lily
- Victorian Tea-tree (emerging)



MAP 3: **ALBANY HINTERLAND**



Priority Assets
- Oyster Harbour Catchment
- Torbay Catchment

Priority Invasive Species
- Gorse
- Boneseed (east)
- Sydney Golden Wattle

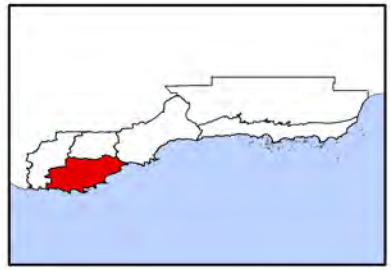
Legend

- Towns
- Highways
- Sealed Roads
- Major Streams
- Macro Corridors
- Parks and Reserves

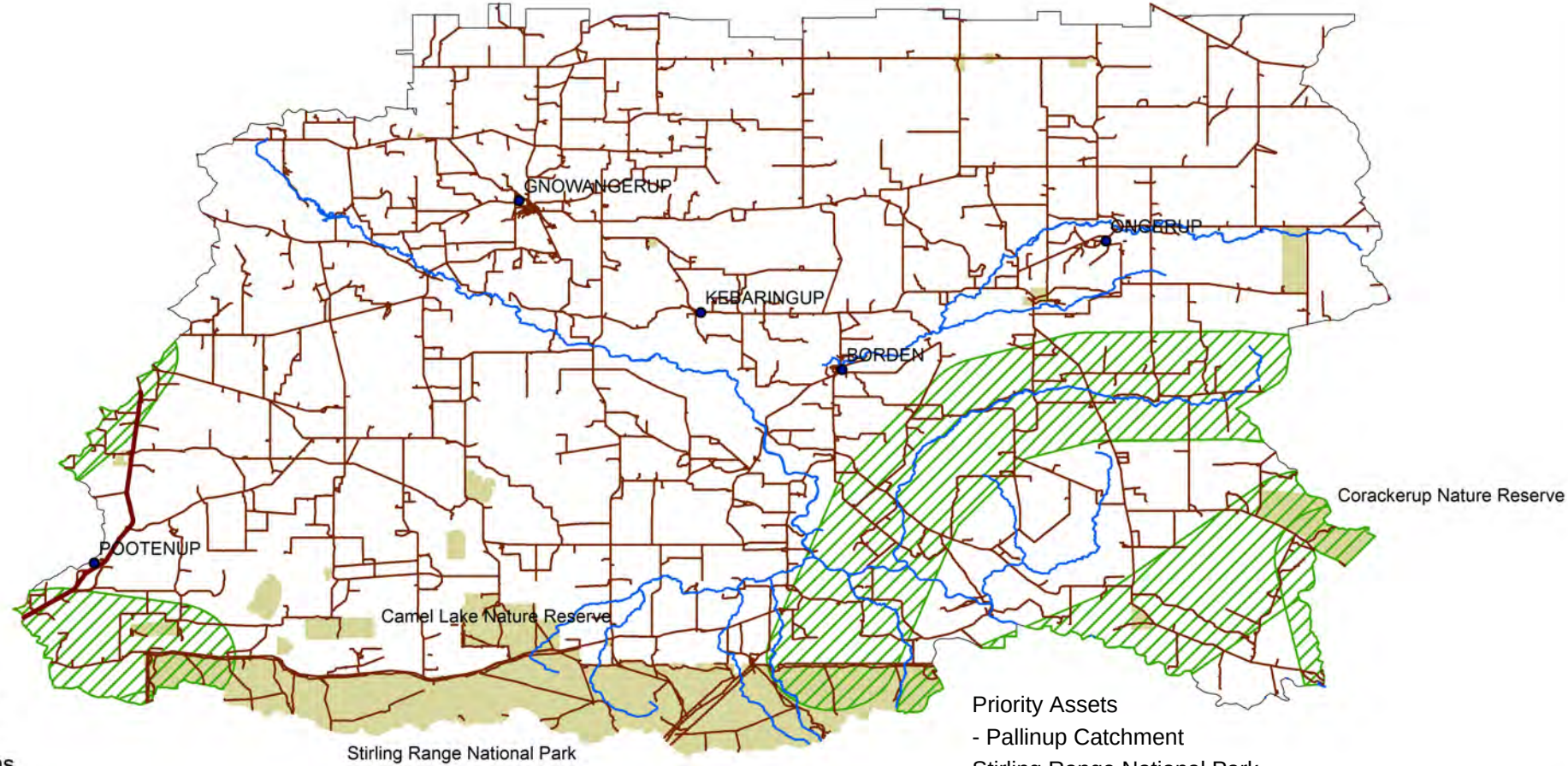
N

1:800,000

0 15 30 60 Kilometres



MAP 4: **NORTH STIRLINGS PALLINUP**



Legend

- Towns
- Highways
- Major Streams
- Major Roads
- Macro Corridor
- Parks and Reserves

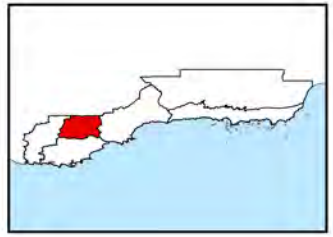
1:600,000

0 10 20 40

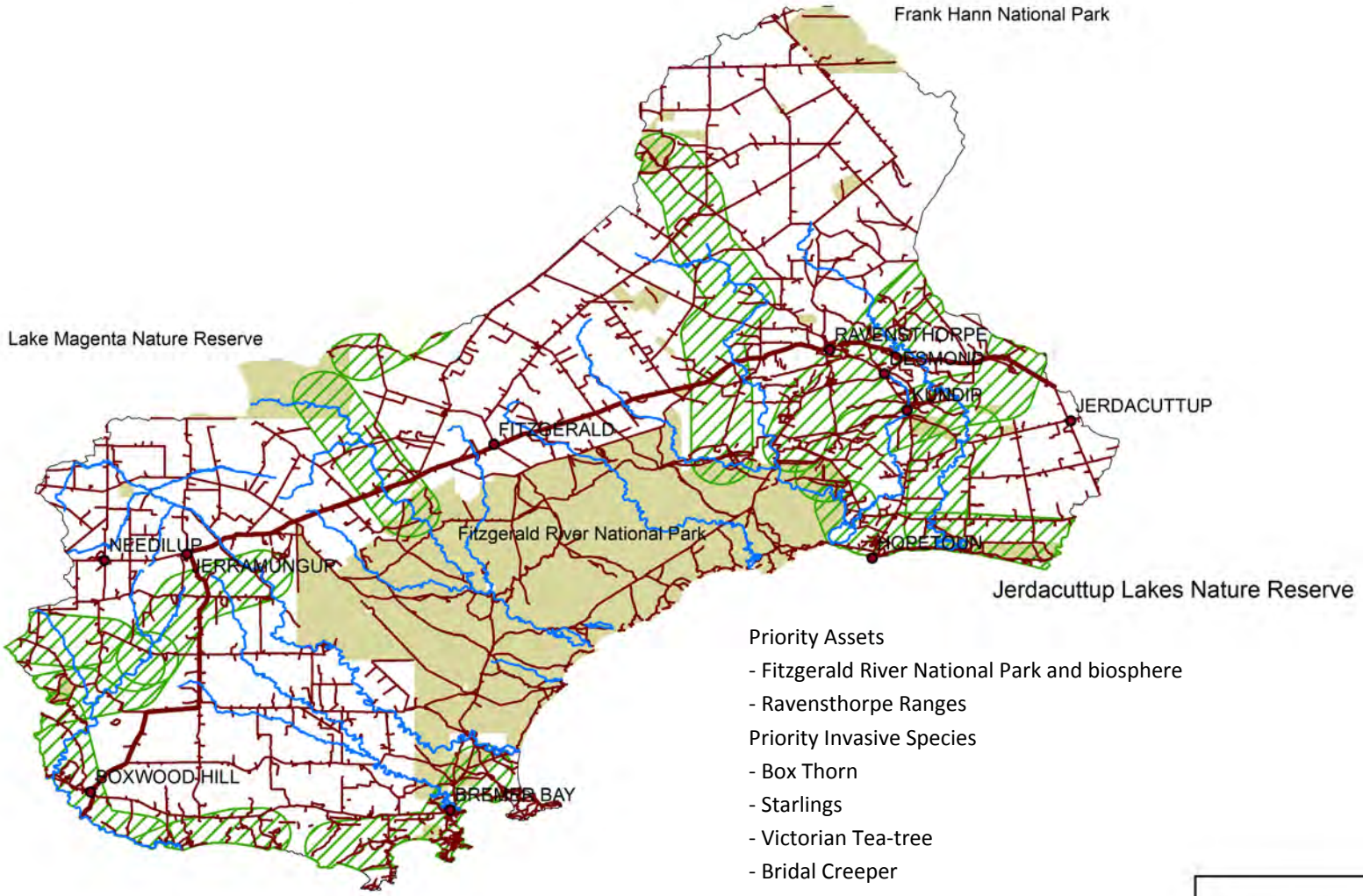
Kilometres

Priority Assets
- Pallinup Catchment
Stirling Range National Park
Priority Invasive Species
- African Boxthorn
- Bridal Creeper
- Victorian Tea-tree

N



MAP 5: **FITZGERALD BIOSPHERE**



Priority Assets
- Fitzgerald River National Park and biosphere
- Ravensthorpe Ranges

Priority Invasive Species
- Box Thorn
- Starlings
- Victorian Tea-tree
- Bridal Creeper

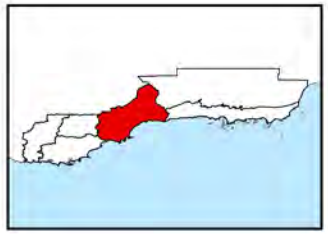
Legend
- Towns
- Major Streams
- Highways
- Major Roads
- Macro Corridor
- Parks and Reserves

1:1,300,000

0 25 50 100

Kilometres

N



MAP 6: **ESPERANCE SANDPLAIN**

Priority Assets
- Recherche Archipelago

Priority Invasive Species
- Wild dogs
- Deer
- Starlings
- Box Thorn
- Bridal Creeper
- Victorian Tea-tree
- Blackberry (emerging)
- Apple of Sodom (emerging)

Legend

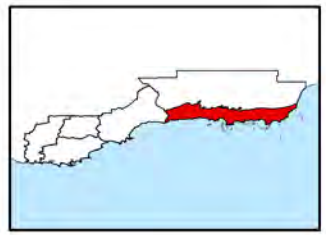
- Towns
- Major Streams
- Highways
- Sealed Roads
- Macro Corridors
- Parks and Reserves

1:1,500,000

0 30 60 120

Kilometres

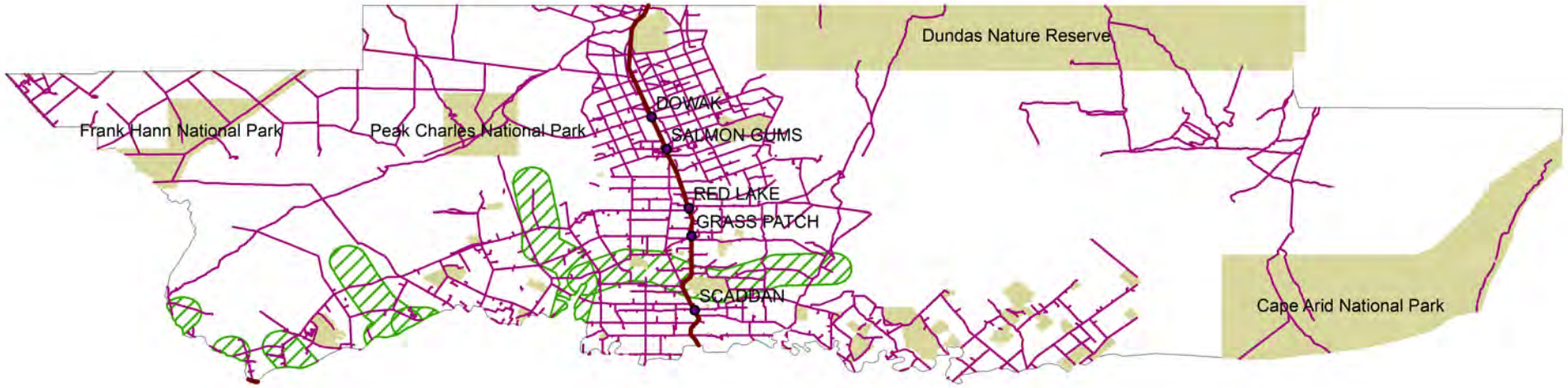
N



MAP 7: **ESPERANCE MALLEE**

Priority Assets
- Western Woodlands

Priority Invasive Species
- Opuntia Cactus
- Wild Dogs
- Camels
- Horses



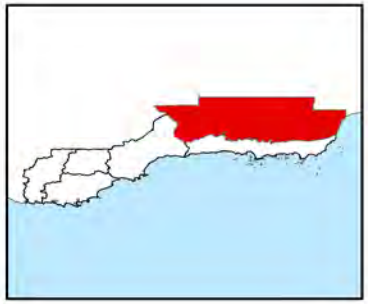
Legend

- Towns
- Highways
- Major Roads
- Parks and Reserves
- Macro Corridor

1:2,000,000

0 37.5 75 150 Kilometres

N



APPENDIX 1

Plans Relating to Invasive Species Management

Legislation, Strategy, Policy or Guidelines	**Scale**
Australian Government (2009) Gorse National Best Practice Manual. Second Edition	National
Blackberry National Best Practice Manual	National
Asparagus National Best Practice Manual	National
Boxthorn National Best Practice Manual	National
Willows National Best Practice Manual	National
Boneseed and Bitou Bush National Best Practice Manual	National
Athel Pine National Best Practice Manual	National
Australian Weed Strategy	National
Australian Pest Animal Strategy	National
Australian Threat Abatement Plan Rabbits	National
Australian Threat Abatement Plan Feral cats	National
Australian Threat Abatement Plan Feral pigs	National
Australian Threat Abatement Plan Foxes	National
Australian Threat Abatement Plan Feral goats	National
Australian Threat Abatement Plan Camels	National
WA Biodiversity Strategy	State
Gorse Control in Western Australia	State
Biosecurity and Agriculture Management Act 2007	State
A 100 year Biodiversity Conservation Strategy for Western Australia	State
Ecological Significance Invasive Species: A Monitoring Framework for Natural Resource Management Groups in Western Australia	State
Southern Prospects 2011 - 2016	Regional
Red Kangaroo (*Macropus rufus*) Management Plan	Regional
Fox Control Options	Regional
Development of a Feral Bee Control Strategy for Western Australia	Regional
Phytophthora Dieback Management Plan for the South Coast Region 2008-2015	Regional
Acacia Species threat abatement plan	Regional
Methodology of Prioritisation - Environmental Weeds	Regional
Victorian Tea-tree Threat Abatement Plan	Regional
Southern Shores	Regional
Manjimup Weed Management Plan	Regional
Shire of Albany - Environmental Weed Strategy	Subregional
Strickland Street Reserve Management Plan 2002, Denmark	Subregional
Gorse Eradication Strategy for the South Coast NRM region 2011-2021	Subregional
Shire of Denmark Weeds Strategy & Action Plan 2005 - 2010	Subregional
Mt Hallowell Weed Mapping and Control Report 2006	Subregional
A study into the Risk of *Phytophthora* Dieback in Ten Peri-urban Reserves within the Shire of Denmark July 2008	Subregional
Shire of Esperance Environmental Weed Strategy 2009-2018	Subregional
Northern Mallee Declared Species Group: Regional Wild Dog Management Plan 2001-2008	Subregional
Draft Environmental Weed Strategy 2008 - Shire of Plantagenet	Subregional
Wilson Inlet Foreshore Reserves Management Plan 2008	Subregional

APPENDIX 2

Existing and Potential Stakeholders

Appendix 2: Existing and Potential Stakeholders

STAKEHOLDER CATEGORIES	STAKEHOLDERS AND PARTNERS
Land Managers	All land managers have a duty of care to ensure that invasive species are managed to reduce risks to shared assets. These stakeholders hold the key to action and on-ground achievements.
Regional Community	There are a range of voluntary groups, some of which are solely dedicated to invasive species management, some of whom include invasive species in a range of other activities.
Local Community Groups	Community groups play an active role in local on-ground works and include invasive species, 'Friends of', catchment, bushcare, coastcare and cultural groups.
Specific Invasive Species Groups	Albany Bushcarers Denmark Weed Action Group Esperance Weed Action Group Lake Muir Denbarker Community Feral Pig Eradication Group Northern Mallee Declared Species Group
Major Sub-regional Groups	Albany Eastern Hinterland Inc. Esperance Regional Forum Fitzgerald Biosphere Group Gillamii Centre North Stirlings Pallinup Natural Resources Inc. Oyster Harbour Catchment Group Ravensthorpe Agricultural Initiative Network South Coast Management Group South Coast Natural Resource Management Inc. Wilson Inlet Catchment Committee Inc.
Local Government	Albany, Broomehill – Tambellup, Cranbrook, Denmark, Esperance, Jerramungup, Gnowangerup, Kent, Kojonup, Lake Grace, Manjimup, Plantagenet and Ravensthorpe.

Non Government Organisations	Malleefowl Preservation Group Gondwana Link Inc. Green Skills Greening Australia (WA) Progress Associations Denmark and Albany Environment Centres Centre for Sustainable Living, Denmark
Educational, Research and Development Groups	Primary and Secondary Schools Centre of Excellence for NRM Curtin University Edith Cowan Universities Esperance Community College Great Southern Institute of Technology Murdoch University University of Western Australia
Industry Groups	Agricultural consultants Blue Gum Plantation companies Grower Group Alliance Southern Dirt Evergreen Stirlings to Coast South East Premium Wheat Growers Association Pastoralists and Graziers Association Western Australian No-Till Farmers Association WA Farmers Federation Oil Mallee Association
Aboriginal Groups	Native Title Claimants Reference Groups Aboriginal Corporations Goldfields Land and Sea Council Southern Agricultural Indigenous Landholder Service

	South West Aboriginal Land and Sea Council
Government Agencies	Department of Agriculture and Food Department of Parks and Wildlife Department of Water Department of Fisheries Department of Indigenous Affairs Department of Planning Department of Regional Development and Lands Forest Products Commission Goldfields Esperance Development Commission and Great Southern Development Commission Main Roads WA Regional Development Australia Great Southern (Australian Government Agency)

APPENDIX 3

South Coast NRM Invasive Species

Appendix 3: Ranking of Weed Species for the South Coast NRM Region
Source: Department of Parks and Wildlife (not dated)

STEP 1: WEED CONSEQUENCE

POTENTIAL DISTRIBUTION	IMPACT			
	High (H)	Medium (M)	Low (L)	Unknown (U)
Extensive (E)	VH	H	M	M
High (H)	H	M	L	L
Medium (M)	M	M	L	L
Low (L)	M	L	N	L
Unknown (U)	M	L	L	FAR

VH - very high
H - high
M - medium
L - low
N - negligible
FAR - further assessment required and species will not proceed through ranking process, however this species may require ongoing monitoring in the field

STEP 2: WEED RISK

INVASIVENESS	CONSEQUENCE				
	Very High (VH)	High (H)	Medium (M)	Low (L)	Negligible (N)
Rapid (R)	VH	H	M	M	L
Moderate (M)	H	M	L	L	N
Slow (S)	M	L	L	N	N
Unknown (U)	M	L	L	L	L

VH - very high
H - high
M - medium
L - low
N - negligible

STEP 3: WEED MANAGEMENT ABILITY

CURRENT DISTRIBUTION	CONTROL FEASABILITY			
	High (H)	Medium (M)	Low (L)	Unknown (U)
Low (L)	VH	H	M	VH
Medium (M)	H	M	L	H
High (H)	M	L	L	M
Extensive (E)	L	L	N	L
Unknown (U)	M	L	L	FAR

VH - very high
H - high
M - medium

L - low
N - negligible
FAR - further assessment required and species will not proceed through ranking process, however this species may require ongoing monitoring in the field

STEP 4: WEED SPECIES RANKING

		RISK				
		Very High (VH)	High (H)	Medium (M)	Low (L)	Negligible (N)
MANAGEMENT ABILITY	Very High (VH)	VH (H,I)	H (H,I)	M (D,E,F,G)	L (B,C,D)	N (A,B)
	High (H)	H (H,I)	H (G,H,I)	M (D,E,F)	L (B,C,D)	N (A)
	Medium (M)	M (D,E,F,G)	M (D,E,F)	L (D)	L (C)	N (A)
	Low (L)	L (D,E)	L (D)	L (B,C)	N (B)	N (A)
	Negligible (N)	L (D)	L (D)	N (B)	N (B)	N (A)

VH - very high (objective is eradication)
H - high (objective is eradication or control to reduce)
M - medium (objective is control to reduce or containment)
L - low (objective is containment at key sites only)
N - negligible (no action to be undertaken but may include monitoring only)

Examples of management actions that may be considered for each ranking:

A - no action (the weed species ranking is so low as to not warrant any investment in regional strategic management actions)
B - monitor only (aims to detect any significant changes in the species' weed risk or management ability)
C - improve general weed management (aims to minimise weed impact and maintain the overall biodiversity, social, cultural and economic values in the region through improved general weed management)
D - protect priority sites (aims to prevent spread of weed species to key sites/assets of high biodiversity, social, cultural or economic value)
E - targeted control to reduce infestations at priority sites (may include biocontrol) (aims to significantly reduce the impact of a weed species on key sites/assets of high biodiversity, social, cultural or economic value through targeted management)
F - contain regional spread (aims to prevent the ongoing spread of the weed species in the region)
G - reduce regional infestations (may include biocontrol) (aims to significantly reduce the extent of the weed species in the region)
H - regional eradication (aims to remove the weed species from the region)
I - statewide eradication (aims to remove the weed species from the state)

Table 1: Species with a ranking

Scientific Name	Common Name	Step 4
Acacia longifolia	Sydney Golden Wattle	H (G,H,I)
Euphorbia terracina	Geraldton Carnation Weed	H (G,H,I)
Isolepis hystrix	Clubrush	H (H,I)
Isolepis prolifera	Budding Clubrush, Budding Club-rush	H (H,I)
Senecio glastifolius	Holly leaved Senecio	H (G,H,I)
Acacia pycnantha	Golden Wattle	M (D,E,F,G)
Asparagus aethiopicus	Ground Asparagus, Basket Asparagus	M (D,E,F)
Asparagus declinatus	Asparagus Fern, Bridal Veil	M (D,E,F)
Asparagus scandens	Asparagus Fern, Climbing Asparagus	M (D,E,F)
Chasmanthe floribunda	African Cornflag, False Watsonia	M (D,E,F,G)
Chrysanthemoides monilifera subsp. monilifera	Boneseed	M (D,E,F,G)
Dittrichia viscosa	Shrubby Stinkwort	M (D,E,F,G)
Ehrharta calycina	Perennial Veldtgrass, Perennial Veldt Grass	M (D,E,F)
Gomphocarpus fruticosus	Swan Plant, Narrowleaf Cottonbush	M (D,E,F)
Hedypnois rhagadioloides	Cretan Weed	M (D,E,F,G)
Hypolepis rugosula		M (D,E,F,G)
Juncus acutus	Spiny Rush, Sharp Rush	M (D,E,F,G)
Juncus microcephalus	Weedy Rush	M (D,E,F)
Leptospermum laevigatum	Victorian Teatree, Coast Teatree	M (D,E,F)
Monopsis debilis	Monopsis	M (D,E,F,G)
Moraea flaccida	One-leaf Cape Tulip	M (D,E,F)
Moraea setifolia	Thread Iris	M (D,E,F)
Pittosporum undulatum	Sweet Pittosporum	M (D,E,F)
Acacia iteaphylla	Flinders Range Wattle	L (C)
Agapanthus praecox	Agapanthus	L (C)
Allium triquetrum	Three-cornered Garlic	L (B,C,D)
Alocasia brisbanensis	Elephant's Ears	L (B,C,D)
Anagallis arvensis	Pimpernel	L (B,C)
Anthoxanthum odoratum	Sweet Vernal Grass	L (B,C)
Asparagus asparagoides	Bridal Creeper	L (D)
Asparagus officinalis	Asparagus	L (B,C,D)
Asphodelus fistulosus	Onion Weed	L (B,C,D)
Babiana angustifolia	Baboon flower	L (B,C,D)
Babiana nana	Baboon flower	L (B,C,D)
Bartsia trixago	Bartsia	L (D)
Callistemon viminalis		L (B,C,D)
Carduus pycnocephalus	Slender Thistle	L (D)
Carduus tenuiflorus	Winged Slender Thistle, Sheep Thistle	L (D)
Carpobrotus aequilaterus	Angular Pigface	L (C)
Carpobrotus edulis	Hottentot Fig	L (C)
Carrichtera annua	Ward's Weed	L (B,C)
Carthamus lanatus	Saffron Thistle	L (D)
Catapodium rigidum	Rigid Fescue	L (B,C)
Centaurea melitensis	Maltese Cockspur	L (D)
Centaurium erythraea	Centaury, Common Centaury	L (B,C)
Centaurium tenuiflorum	Slender Centaury	L (B,C)
Centranthus ruber	Red Valerian	L (B,C,D)
Cerastium glomeratum	Sticky Mouse-ear Chickweed, Mouse Ear Chickweed, Balearic Mouse-eared Chickweed, Small Mouse-ear Chickweed	L (B,C)
Chamaecytisus palmensis	Tree Lucerne, Tagasaste	L (B,C,D)
Cirsium vulgare	Spear Thistle	L (D)
Cleretum papulosum	"Ice Plant"	L (C)
Conyza spp	Fleabane, Flaxleaf Fleabane	L (B,C)
Coprosma repens	Mirror Plant	L (B,C,D)
Corrigiola litoralis	Strapwort	L (B,C)
Cortaderia selloana	Pampas Grass	L (C)
Cotoneaster glaucophyllus	Cotoneaster	L (B,C,D)
Cotoneaster pannosus	Cotoneaster	L (B,C,D)
Cotula coronopifolia	Waterbuttons	L (B,C)
Cotyledon orbiculata	Pigs Ear	L (B,C,D)

Crassula alata	Tiny Stonecrop	L (B,C)
Crassula decumbens	Rufous Stonecrop	L (B,C)
Crassula glomerata	Stonecrop	L (B,C)
Crassula natans		L (B,C)
Crassula tetragona		L (B,C,D)
Crassula thunbergiana	Stonecrop	L (B,C)
Cuscuta campestris	Golden Dodder	L (B,C,D)
Cyathea cooperi	Rough Tree Fern	L (B,C,D)
Cynodon dactylon	Couch	L (B,C)
Cynosurus echinatus	Rough Dog's Tail, Rough Dogstail	L (C)
Cyperus spp	Dense Flat Sedge, Dense Flat-sedge, Umbrella Sedge, Cyperus	L (B,C,D)
Cyperus tenellus	Tiny Flat Sedge, Tiny Flatsedge	L (B,C)
Dactylis glomerata	Cocksfoot	L (B,C,D)
Dipogon lignosus	Dolichos Pea	L (B,C,D)
Disa bracteata	South African Orchid	L (B,C)
Dischisma arenarium	Dischisma	L (B,C)
Dittrichia graveolens	Stinkwort	L (B,C)
Echium plantagineum	Paterson's Curse	L (B,C,D)
Ehrharta spp	Annual Veldt Grass, Panic Veldtgrass, Panic Veldt Grass, Annual Veldtgrass, Annual Veldt Grass	L (B,C)
Eragrostis cilianensis	Stinkgrass	L (D)
Eragrostis curvula	African Love Grass, African Lovegrass	L (B,C)
Eucalyptus cladocalyx	Sugar Gum	L (B,C,D)
Eucalyptus conferruminata	Bald Island Marlock	L (B,C,D)
Eucalyptus globulus	Blue Gum	L (B,C,D)
Eucalyptus maculata	Spotted Gum	L (B,C,D)
Eucalyptus saligna		L (B,C,D)
Euphorbia paralias	Sea Spurge	L (B,C)
Euphorbia peplus	Petty Spurge	L (B,C)
Ferraria crispa	Black Flag	L (C)
Freesia alba x leichtlinii	Freesia	L (C)
Fumaria capreolata	Climbing Fumitory, Whiteflower Fumitory	L (C)
Fumaria muralis	Wall Fumitory	L (C)
Galium murale	Bedstraw, Small Goosegrass	L (B,C)
Gazania linearis	Gazania	L (D)
Genista linifolia	Flaxleaf Broom	L (B,C,D)
Genista monspessulana	Broom	L (B,C,D)
Gladiolus angustus	Long-tubed Painted Lady, Long Tubed Painted Lady	L (B,C,D)
Gladiolus undulatus	Wavy Gladiolus, Wild Gladiolus	L (C)
Gladiolus watsonius	Red Afrikaner	L (B,C,D)
Holcus lanatus	Yorkshire Fog	L (B,C,D)
Holcus setiger	Annual Fog	L (B,C,D)
Hordeum spp	Northern Barley Grass, Mediterranean Barley Grass, Mediterranean Region Barley Grass, Barley Grass, Sea Barley, Barley	L (C)
Hornungia procumbens	Oval Purse	L (C)
Hyparrhenia hirta	Tambookie Grass	L (C)
Hypericum canariense		L (B,C,D)
Hypochaeris glabra	Flatweed, Smooth Catsear	L (B,C)
Hypochaeris radicata	Flatweed, Flat Weed	L (B,C)
Iris laevigata	Japanese Iris	L (B,C,D)
Isolepis marginata	Coarse Clubrush, Coarse Club-rush	L (D)
Juncus bufonius	Toadrush, Toad Rush	L (D)
Juncus capitatus	Capitate Rush	L (D)
Lachenalia aloides	Yellow Soldiers	L (B,C,D)
Lagurus ovatus	Hare's Tail Grass, Pussy Willow Grass	L (B,C)
Lampranthus glaucus	Scarlet Pigface	L (B,C,D)
Lathyrus tingitanus	Tangier Pea	L (B,C,D)
Leontodon saxatilis	Lesser Hawkbit, Hairy Hawkbit	L (B,C)
Lepidium africanum	Common Peppercress, Rubble Peppercress	L (C)
Lepidium bonariense	Peppercress	L (B,C,D)
Lepidium didymum	Lesser Swinecress	L (B,C,D)

Limonium lobatum	Winged Sea Lavender	L (B,C,D)
Lotus angustissimus	Slender Birdsfoot Trefoil, Narrowleaf Trefoil	L (B,C,D)
Lotus subbiflorus	Hairy Birdsfoot Trefoil	L (B,C,D)
Lotus uliginosus	Greater Birdsfoot Trefoil, Greater Lotus	L (B,C,D)
Lupinus angustifolius	Narrowleaf Lupin	L (B,C,D)
Lupinus cosentinii	Sandplain Lupin	L (B,C,D)
Lycium ferocissimum	African Boxthorn	L (D)
Lythrum hyssopifolia	Lesser Loosestrife	L (B,C)
Malvastrum americanum	Spiked Malvastrum	L (C)
Medicago polymorpha	Burr Medic	L (B,C)
Melaleuca armillaris		L (B,C,D)
Melilotus indicus	Common Melilot	L (B,C)
Mentha pulegium	Pennyroyal	L (B,C,D)
Mesembryanthemum aitonis	Angled Ice Plant	L (B,C,D)
Mesembryanthemum nodiflorum	Slender Iceplant	L (C)
Moenchia erecta	Erect Chickweed	L (C)
Monoculus monstrosus	Stinking Roger	L (B,C,D)
Moraea miniata	Two-leaved Cape Tulip, Two-leaf Cape Tulip	L (B,C,D)
Nerine bowdenii		L (B,C,D)
Nicotiana glauca	Tree Tobacco	L (B,C,D)
Oenothera drummondii	Coastal Evening Primrose, Beach Evening Primrose	L (B,C,D)
Oligocarpus calendulaceus		L (C)
Oncosiphon suffruticosum	Calomba Daisy	L (C)
Opuntia stricta	Common Prickly Pear	L (B,C,D)
Orobanche minor	Broom Rape, Lesser Broomrape	L (B,C)
Oxalis spp	Oxalis, Bowie Wood Sorrel, Creeping Oxalis, Yellow Wood Sorrel, Pot Oxalis, Pink Shamrock, Hairy Wood Sorrel, Climbing Oxalis, Soursob, Oxalis, Purple Oxalis, Largeflower Wood Sorrel, Violet Oxalis, Violet Wood Sorrel	L (B,C,D)
Parapholis incurva	Coast Barbgrass	L (C)
Parentucellia latifolia	Red Bartsia, Common Bartsia	L (C)
Parentucellia viscosa	Sticky Bartsia	L (B,C,D)
Paspalum distichum	Water Couch	L (B,C,D)
Paspalum vaginatum	Saltwater Couch, Salt Water Couch	L (B,C,D)
Pelargonium capitatum	Rose Pelargonium	L (B,C)
Pentaschistis airoides	False Hairgrass	L (B,C)
Petrorhagia dubia	Velvet Pink	L (B,C)
Phalaris aquatica	Phalaris	L (B,C,D)
Phalaris arundinacea	Reed Canary Grass	L (B,C,D)
Phalaris minor	Lesser Canary Grass	L (C)
Pinus pinaster	Maritime Pine, Pinaster Pine	L (B,C,D)
Pinus radiata	Monterey Pine, Radiata Pine	L (B,C,D)
Plantago coronopus	Buckshorn Plaintain	L (B,C,D)
Plantago lanceolata	Ribwort Plantain	L (B,C,D)
Poa annua	Wintergrass, Winter Grass	L (C)
Polycarpon tetraphyllum	Allseed, Fourleaf Allseed	L (C)
Polygala myrtifolia	Myrtleleaf Milkwort	L (B,C,D)
Polygala virgata		L (B,C,D)
Polypogon monspeliensis	Annual Barbgrass, Annual Beardgrass	L (C)
Populus alba	White Poplar	L (C)
Prunella vulgaris	Self Heal	L (B,C,D)
Psoralea pinnata	Psoralea, African Scurfpea	L (B,C,D)
Puccinellia ciliata	Puccinellia	L (B,C,D)
Romulea rosea	Guildford Grass	L (B,C)
Rorippa nasturtium-aquaticum	Watercress	L (B,C,D)
Rostraria cristata	Annual Cat's Tail	L (B,C)
Rostraria pumila	Rough Cat's Tail	L (B,C)
Rubus spp	Blackberry	L (D)
Rumex brownii	Weed Swamp Dock, Swamp Dock	L (B,C,D)
Rumex bucephalophorus	Crested Dock	L (B,C,D)
Rumex conglomeratus	Clustered Dock	L (B,C,D)
Rumex frutescens		L (B,C,D)

Rumex obtusifolius	Broadleaf Dock	L (B,C,D)
Rumex obtusifolius subsp. obtusifolius	Broadleaf Dock	L (B,C,D)
Rumex pulcher	Fiddle Dock	L (B,C,D)
Rumex pulcher subsp. pulcher	Fiddle Dock	L (B,C,D)
Rumex x johannis-moorei		L (B,C,D)
Rumex x muretti		L (B,C,D)
Rumex x pratensis		L (B,C,D)
Rumex x pseudopulcher		L (B,C,D)
Sagina apetala	Common Pearlwort, Annual Pearlwort	L (B,C)
Schismus barbatus	Arabian Grass	L (B,C)
Senecio angulatus	Cape Ivy	L (B,C,D)
Senecio elegans	Purple Groundsel	L (B,C)
Sherardia arvensis	Field Madder	L (B,C,D)
Sigesbeckia orientalis	Indian Weed	L (B,C,D)
Silene gallica	French Catchfly	L (C)
Silene nocturna	Mediterranean Catchfly	L (B,C,D)
Sisymbrium erysimoides	Smooth Mustard	L (C)
Sisymbrium irio	London Rocket	L (C)
Sisymbrium orientale	Indian Hedge Mustard	L (C)
Solanum americanum	Glossy Nightshade	L (B,C)
Solanum laciniatum	Kangaroo Apple	L (B,C)
Solanum nigrum	Black Berry Nightshade	L (B,C)
Sonchus asper	Rough Sowthistle	L (B,C)
Sonchus oleraceus	Common Sowthistle	L (B,C)
Sparaxis bulbifera	Sparaxis	L (B,C,D)
Sparaxis pillansii	Sparaxis, Harlequin Flower	L (B,C,D)
Spergularia bocconei	Bocconi's Sand-spurrey	L (B,C)
Spergularia diandra	Small Sand Spurrey, Lesser Sand Spurry	L (B,C)
Spergularia rubra	Red Sand Spurrey, Sand Spurry	L (B,C)
Stellaria media	Common Chickweed, Chickweed	L (B,C)
Stellaria pallida	Lesser Chickweed	L (B,C)
Tribolium uniolae	Tribolium	L (B,C,D)
Typha orientalis	Bulrush	L (D)
Ulex europaeus	Gorse	L (B,C,D)
Ursinia anthemoides	Ursinia	L (B,C)
Urtica urens	Stinging Nettle, Small Nettle	L (B,C,D)
Vellereophyton dealbatum	White Cudweed	L (B,C)
Vinca major	Blue Periwinkle	L (B,C,D)
Watsonia borbonica	Watsonia	L (C)
Watsonia knysnana	Watsonia	L (C)
Watsonia meriana	Bubil Watsonia	L (D)
Watsonia meriana var. bulbillifera	Bubil Watsonia	L (D)
Watsonia meriana var. meriana	Watsonia	L (D)
Zantedeschia aethiopica	Arum Lily	L (B,C,D)
Acacia baileyana	Cootamundra Wattle	N (A,B)
Acacia dealbata	Silver Wattle	N (A,B)
Acacia decurrens	Black Wattle, Green Wattle	N (A,B)
Acacia melanoxylon	Blackwood	N (A,B)
Arctotheca calendula	Capeweed, Cape Weed	N (B)
Arctotheca populifolia	Dune Arctotheca	N (B)
Avena spp	Bearded Oat, Wild Oat, Common Oat, Sterile Oat	N (B)
Brassica tournefortii	Prickly Turnip, Mediterranean Turnip	N (B)
Briza maxima	Blowfly Grass	N (B)
Briza minor	Shivery Grass	N (B)
Bromus spp	Prairie Brome, Prairie Grass	N (B)
Cakile maritima	Sea Rocket	N (B)
Chenopodium album	Fat Hen	N (B)
Chenopodium glaucum	Glaucous Goosefoot	N (B)
Chenopodium murale	Green Fat Hen, Nettle-leaf Goosefoot	N (B)
Crocosmia x crocosmiiflora		N (A,B)
Dimorphotheca ecklonis	Veldt Daisy	N (A,B)
Erodium spp		N (B)

Ipomoea cairica	Mile-a-minute, Coast Morning Glory	N (A,B)
Ipomoea indica	Blue Morning Glory, Morning Glory	N (A,B)
Kunzea baxteri	Kunzea	N (A,B)
Lolium spp	Annual Ryegrass, Wimmera Ryegrass	N (B)
Mesembryanthemum crystallinum	Ice Plant, Iceplant	N (B)
Ornithopus compressus	Yellow Serradella	N (B)
Ornithopus pinnatus	Slender Serradella	N (B)
Ornithopus sativus	French Serradella	N (B)
Pennisetum clandestinum	Kikuyu, Kikuyu Grass	N (B)
Phytolacca octandra	Inkweed, Red Ink Plant	N (A,B)
Pinus pinea	Stone Pine	N (A,B)
Raphanus raphanistrum	Wild Radish	N (B)
Ricinus communis	Castor Oil Plant	N (A,B)
Rosa canina	Dog Rose	N (A,B)
Rumex crispus	Curled Dock	N (B)
Ruschia macowanii	Loose-flowered Pigface	N (A,B)
Salvia reflexa	Mintweed	N (B)
Salvia verbenaca	Wild Sage	N (B)
Schinus molle var. areira	Pepper Tree	N (A,B)
Stenotaphrum secundatum	Buffalo Grass	N (B)
Tetragonia decumbens	Sea Spinach	N (B)
Trachyandra divaricata	Dune Onion Weed	N (B)
Trifolium spp	Narrowleaf Clover, Haresfoot Clover, Hop Clover, Drooping Flower Clover, Cupped Clover, Suckling Clover, Strawberry Clover, Ball Clover, Cluster Clover, Rose Clover, Alsike Clover, Crimson Clover, Ligurian Clover, Slender Suckling Clover, Birdsfoot Fenugreek, Red Clover, White Clover, Shaftal Clover, Rough Clover, Star Clover, Knotted Clover, Sub Clover, Subterranean Clover, Suffocated Clover, Woolly Clover	N (B)
Viola odorata	Violet	N (A)
Vulpia bromoides	Squirrel's Tail Fescue, Squirrel Tail Fescue	N (B)
Vulpia fasciculata	Sand Fescue	N (B)
Vulpia muralis	Wall fescue	N (B)
Vulpia myuros	Rat's Tail Fescue	N (B)
Wahlenbergia capensis	Cape Bluebell	N (B)

Table 2: Species ranked as further assessment required

Scientific Name	Common Name	Step 4
Callitriche stagnalis	Common Starwort	FAR
Centaurea solstitialis	St Barnaby's Thistle	FAR
Chloris gayana	Rhodes Grass	FAR
Chloris virgata	Windmill Grass, Feathertop Rhodes Grass	FAR
Euphorbia lathyris	Caper Spurge	FAR
Gazania rigens		FAR
Hypericum perforatum	St John's Wort	FAR
Myosotis sylvatica	Forget-me-not	FAR
Paspalum dilatatum	Paspalum	FAR
Podalyria sericea		FAR
Portulaca oleracea	Pigweed, Purslane	FAR
Reichardia tingitana	False Sowthistle	FAR
Tribulus terrestris	Caltrop	FAR
Tropaeolum majus	Nasturtium, Garden Nasturtium	FAR

Table 3: Species with no ranking as one or more factors were not given a rating (excluding species that had a rating of FAR in assessment)

Scientific Name	Common Name
Abutilon theophrasti	Velvetleaf
Acacia elata	Winged Wattle, Mountain Cedar Wattle
Acacia floribunda	Gossamer Wattle

Acacia paradoxa	Kangaroo Thorn
Acacia podalyriifolia	Queensland Silver Wattle
Acacia saligna	Coojong
Acaena echinata	Sheep's Burr
Acaena novae-zelandiae	
Acaena ovina	Sheep's Burr
Acetosa sagittata	Rambling Dock
Acetosa vesicaria	Rosy Dock, Ruby Dock
Acetosella vulgaris	Sorrel
Achillea millefolium	Yarrow
Adenocarpus complicatus	
Adonis microcarpa	Pheasant's Eye
Aeonium haworthii	Aeonium
Agave americana	Century Plant
Agrostis capillaris	Brown Top Bent
Agrostis gigantea	Red Top Bent
Agrostis stolonifera	Creeping Bent
Ailanthus altissima	Tree of Heaven
Aira caryophyllea	Silvery Hairgrass
Aira cupaniana	Hairgrass, Silvery Hairgrass
Aira elegantissima	Hairgrass
Aira praecox	Early Hairgrass
Alhagi maurorum	Camelthorn
Allium ampeloprasum	Leek
Allium neapolitanum	Naples Onion
Alopecurus geniculatus	Foxtail
Alopecurus myosuroides	Blackgrass, Slender Foxtail
Alstroemeria psittacina	Parrot Alstroemeria
Alternanthera pungens	Khaki Weed
Alyssum linifolium	Flaxleaf Alyssum
Amaranthus albus	Tumbleweed
Amaranthus caudatus	Love Lies Bleeding
Amaranthus hybridus	Slim Amaranth
Amaranthus powellii	Powell's Amaranth
Amaranthus retroflexus	Redroot Amaranth
Amaranthus viridis	Green Amaranth
Amaryllis belladonna	Easter Lily, Belladonna Lily
Ambrosia psilostachya	Perennial Ragweed
Ammi majus	Queen Anne's Lace, Bishop's Weed
Ammophila arenaria	Marram Grass
Amsinckia calycina	Yellow Burrweed
Anagallis minima	Chaffweed
Anchusa capensis	Cape Forget-me-not
Andropogon distachyos	Andropogon
Anoda cristata	Anoda Weed
Anredera cordifolia	Madeira Vine
Anthemis cotula	Stinking Mayweed
Aphanes arvensis	Parsley-Piert, Parsley Piert
Aptenia cordifolia	
Araujia sericifera	Moth Plant
Argemone ochroleuca subsp. ochroleuca	Mexican Poppy
Arrhenantherum bulbosum	Bulbous Oatgrass, Onion Couch
Arum italicum	
Arundo donax	Giant Reed
Asclepias curassavica	Redhead Cottonbush
Asparagus plumosus	Plumed Asparagus
Asterolinon linum-stellatum	Asterolinon
Astragalus prolixus	
Atriplex amnicola	Swamp Saltbush
Atriplex hortensis	Garden Orache
Atriplex leptocarpa	Slender-Fruit Saltbush
Atriplex prostrata	Hastate Orache

Atriplex semibaccata	Berry Saltbush
Avellinia michelii	Avellinia
Axonopus fissifolius	Narrow-leaved Carpet Grass
Azolla filiculoides	Pacific Azolla
Baeometra uniflora	Baeometra
Banksia canei	
Bassia scoparia	Kochia, Tumbleweed
Berkheya rigida	African Thistle
Berula erecta	Narrowleaf Water Parsnip
Boerhavia coccinea	Tar Vine
Boerhavia schomburgkiana	
Borago officinalis	Borage
Brachypodium distachyon	False Brome
Brassica barrelieri	Smooth-stem Turnip
Brassica barrelieri subsp. oxyrrhina	Smooth-stem Turnip
Brassica fruticulosa	Twiggy Turnip
Brassica juncea	Indian Mustard
Brassica napus	Canola
Brassica nigra	Black Mustard
Brassica oleracea	Inc. cabbage, broccoli and cauliflower
Brassica rapa	Turnip
Bromus coloratus	inermis
Bromus diandrus	Great Brome
Bromus hordeaceus	Soft Brome
Bromus madritensis	Madrid Brome
Bromus rigidus	
Bromus rubens	Red Brome
Buddleja madagascariensis	Buddleja
Buglossoides arvensis	Corn Gromwell
Bupleurum semicompositum	
Caesalpinia gilliesii	Bird of Paradise
Cakile edentula	American Sea Rocket
Calandrinia ciliata	Purslane
Callitris columellaris	White Cypress Pine
Callitris preissii	Rottnest Island Pine
Callitris rhomboidea	
Calothamnus quadrifidus	One-sided Bottlebrush, Freeway Calothamnus
Calothamnus validus	Barrens Calothamnus
Camelina sativa	Flax weed, Flase Flax
Canna x generalis	Canna
Capsella bursa-pastoris	Shepherd's Purse
Cardamine hirsuta	Common Bittercress
Cardamine sp. Jandakot (P. Luff s.n. 4/7/1969)	
Carduus nutans	Nodding thistle
Carex divisa	Divided Sedge
Carthamus leucocaulos	Glaucous Star Thistle
Carthamus tinctorius	
Cassia fistual	Golden Shower
Casuarina cunninghamiana	
Cenchrus ciliaris	Buffel Grass
Cenchrus echinatus	Mossman River Grass, Burrgrass
Cenchrus longispinus	Spiny Burrgrass
Centranthus macrosiphon	Pretty Betsy
Cerastium comatum	
Cerastium vulgare	Chickweed
Chamelaucium uncinatum	Geraldton Wax
Chamomilla suaveolens	Chamomile
Chenopodium giganteum	Giant Chenopodium
Chenopodium macrospermum	Weed Chenopodium
Chondrilla juncea	Skeleton Weed
Chrozophora tinctoria	Turnsole
Chrysanthemum segetum	Corn Marigold

Cicendia filiformis	Cicendia, Slender Cicendia
Cicendia quadrangularis	
Cichorium intybus	Chicory
Cinnamomum camphora	Camphor Laurel
Cirsium arvense var. arvense	Creeping Thistle
Citrullus lanatus	Pie Melon
Colocasia esculenta var. esculenta	Taro
Conium maculatum	Hemlock
Consolida ajacis	
Convolvulus arvensis	Field Bindweed
Coreopsis grandiflora	American Tickseed
Cotula australis	Common Cotula
Cotula bipinnata	Fern Cotula, Ferny Cotula
Cotula turbinata	Funnel Weed
Crambe hispanica	
Crepis capillaris	Smooth Hawksbeard
Crepis foetida	Stinking Hawksbeard, Foetid Hawksbeard
Crepis vesicaria	Beaked Hawksbeard, Dandelion Crepis
Crinum moorei	Veldt Lily
Crotalaria agatiflora	
Cucumis myriocarpus	Prickly Paddy Melon
Cucurbita pepo	Autumn Pumpkin
Cupressus sempervirens	
Cuscuta epithymum	Lesser Dodder
Cyanella hyacinthoides	Cyanella
Cylindropuntia rosea	
Cymbalaria muralis subsp. muralis	Ivy-leaved Toadflax
Cynara cardunculus	Cardoon, Artichoke Thistle
Cynoglossum amabile	Chinese Houndstongue
Cynosurus cristatus	Crested Dogstail
Cyperus involucratus	Cyperus
Cyperus polystachyos	Bunchy Sedge
Cyperus rotundus	Nut Grass
Cyperus tenuiflorus	Scaly Sedge
Cyperus vorsteri	Cyperus
Datura ferox	Fierce Thornapple
Datura inoxia	Downy Thornapple
Datura metel	Angel's Trumpet, Downy Thornapple
Datura stramonium	Common Thornapple
Datura wrightii	Hoary Thornapple, Hairy Thornapple
Daucus carota	Wild Carrot
Delairea odorata	Cape Ivy
Dennstaedtia davallioides	
Desmazeria marinum	Coastal Fescue
Dierama pendulum	
Dietes grandiflora	
Digitaria ciliaris	Summer Grass
Digitaria didactyla	Queensland Blue, Queensland Blue Couch
Digitaria sanguinalis	Crabgrass, Crab Grass
Digitaria violascens	Summer Grass
Diplolaena dampieri	Southern Diplolaena
Diplotaxis muralis	Wall Rocket
Diplotaxis tenuifolia	Lincoln Weed, Sand Rocket
Dischisma capitatum	Dischisma, Woolly-headed Dischisma
Dodonaea viscosa subsp. viscosa	Sticky Hopbush
Dorotheanthus bellidiformis	Livingstone Daisy
Drosanthemum candens	Redondo Creeper
Dysphania ambrosioides	Mexican Tea
Dysphania multifida	Scented Goosefoot
Dysphania pumilio	Clammy Goosefoot
Ecballium elaterium	Squirting Cucumber
Echinochloa spp	Barnyard Grass, Siberian Millet, Antelope Grass

Echinochloa telmatophila	Swamp Barnyard Grass
Ehrharta pusilla	
Ehrharta villosa	Pypgrass, Pyp Grass
Eichhornia crassipes	Water Hyacinth
Eleusine coracan	Indian Millet
Elytrigia repens	English Couch
Emex australis	Double Gee, Doublegee
Epilobium ciliatum	Weed Willow Herb
Epilobium tetragonum subsp. tetragonum	Square-stalked Willow Herb
Eragrostis mexicana	Mexican Lovegrass
Eragrostis minor	Small Stinkgrass
Eremocarpus setiger	Doveweed, Dove Weed
Erica baccans	Berry Flower Heath
Erigeron karvinskianus	Seaside Daisy
Eriobotrya japonica	Loquat
Erodium botrys	Long Storksbill
Erodium brachycarpum	Heronsbill
Erodium cicutarium	Common Storksbill
Erodium moschatum	Musky Storksbill, Musky Crowfoot
Eruca sativa	Rocket, Purplevein Rocket
Erythrina x sykesii	Coral Tree
Eschscholzia californica	
Eucalyptus camaldulensis	River Gum
Eucalyptus microcorys	
Eucalyptus muelleriana	Yellow Stringybark
Eucalyptus resinifera	
Euphorbia australis	Namana
Euphorbia dendroides	Tree Spurge
Euphorbia drummondii subsp. drummondii	Caustic Weed
Euphorbia helioscopia	Sun Spurge
Euphorbia segetalis	Short Stem Carnation Weed
Fagopyrum esculentum	Buckwheat
Fallopia convolvulus	Black Bindweed
Festuca arundinacea	Tall Fescue
Festuca pratensis	Meadow Fescue
Festuca rubra	Red Fescue
Ficus carica	Edible Fig, Common Fig
Filago gallica	Slender Cudweed
Foeniculum vulgare	Fennel
Fraxinus angustifolia subsp. angustifolia	Desert Ash
Fuchsia magellanica	
Fumaria densiflora	Narrow-leaved Fumitory
Fumaria parviflora	
Galenia pubescens	Coastal Galenia
Galinsoga parviflora	Potato Weed
Galium aparine	Goosegrass
Galium divaricatum	Slender Goosegrass
Galium tenerum	
Galium tricornutum	Threehorn Bedstraw
Gamochaeta calviceps	Cudweed
Gastridium phleoides	Nitgrass
Gaura lindheimeri	Gaura
Genista horrida	
Geranium dissectum	Cut-leaved Cranesbill, Cutleaf Cranesbill
Geranium molle	Dovesfoot Cranesbill, Dove's Foot Cranesbill
Gladiolus cardinalis	Red Gladiolus
Gladiolus carneus	Gladiolus
Gladiolus caryophyllaceus	Pink Gladiolus, Wild Gladiolus
Gladiolus communis	Gladiolus
Gladiolus tristis	Gladiolus, Largeflower Gladiolus
Glaucium corniculatum	
Glyceria declinata	Sweetgrass

Glyceria maxima	Reed Sweetgrass, Water Meadowgrass
Gomphocarpus physocarpus	Balloon Cottonbush
Gypsophila tubulosa	Chalkwort
Hainardia cylindrica	Common Barbgrass
Hakea francisiana	Emu Tree
Hakea pycnoneura	Hakea
Hedera helix	Ivy
Helianthus annuus	Sunflower
Helichrysum luteoalbum	Jersey Cudweed
Heliophila pusilla	Heliophila
Heliotropium curassavicum	Smooth Heliotrope
Heliotropium europaeum	Common Heliotrope
Heliotropium supinum	
Helminthotheca echioides	Ox Tongue
Herniaria cinerea	Rupture Wort
Hesperantha falcata	Hesperantha
Hibiscus diversifolius	River Hibiscus
Hibiscus trionum var. trionum	Bladder Ketmia
Hirschfeldia incana	
Homalanthus novo-guineensis	
Hydrocotyle bonariensis	Pennywort
Hydrocotyle ranunculoides	Robust Pennywort
Hypolepis dicksonioides	
Illecebrum verticillatum	
Iris germanica	Flag Iris
Ixia maculata	Yellow Ixia
Ixia maculata x I. polystachya	Ixia
Ixia paniculata	Ixia
Ixia polystachya	Variable Ixia
Juncus articulatus	Jointed Rush
Juncus hybridus	
Juncus imbricatus	
Juncus oxycarpus	Weedy Rush
Juncus usitatus	Weedy Rush, Common Rush
Kennedia nigricans	Black Kennedia
Kickxia elatine	Pointed Toadflax, Fluellen, Sharp-leaved Fluellen
Kickxia spuria	Fluellen, Roundleaf Toadflax, Blunt-leaved Fluellen
Lachenalia reflexa	Soldiers
Lactuca saligna	Willowleaf Lettuce, Wild Lettuce
Lactuca serriola	Prickly Lettuce
Lagunaria patersonia subsp. patersonia	Norfolk Island Hibiscus
Lamarckia aurea	Golden Top, Goldentop
Lamium amplexicaule	Deadnettle
Lantana camara	Common Lantana
Lathyrus latifolius	Perennial Pea
Lavandula dentata	French Lavender
Lavandula stoechas	Topped Lavender, Italian Lavender
Lavatera trimestris	Lavatera
Leonotis leonurus	Lionflower, Lion's Ear
Leonotis nepetifolia	Lionflower
Leontodon hispidus subsp. hispidus	
Lepidium perfoliatum	Perfoliate Pepperwort
Leptospermum rotundifolium	Tea Tree
Lessertia frutescens	Bladder Senna
Leucanthemum x superbum	Shasta Daisy
Leucojum aestivum	Snowflake
Limonium companyonis	Blue Mist
Limonium sinuatum	Perennial Sea Lavender
Linaria maroccana	Toadflax
Linum trigynum	French Flax
Linum usitatissimum	Flax
Lobularia maritima	Alyssum, Sweet Alyssum

Lolium loliaceum	Stiff Ryegrass
Lolium multiflorum	Italian Ryegrass
Lolium remotum	Hardy Ryegrass
Lolium temulentum	Darnel, Drake
Lonicera japonica	Japanese Honeysuckle
Lonicera x americana	
Lupinus luteus	Yellow Lupin
Malva dendromorpha	Tree Mallow
Malva multiflora	Cretan Mallow
Malva nicaeensis	Mallow of Nice, French Mallow
Malva parviflora	Small-flowered Mallow, Marshmallow
Marrubium vulgare	Horehound
Matthiola incana	Stock, Common Stock
Medicago arabica	Spotted Medic
Medicago laciniata var. laciniata	Cutleaf Medic
Medicago littoralis var. littoralis	
Medicago lupulina	Black Medic
Medicago minima	Small Burr Medic
Medicago orbicularis	
Medicago praecox	Medic
Medicago sativa	Lucerne, Alfafa
Medicago scutellata	Snail Medic
Medicago trunculata	
Megathyrsus maximus	Guinea Grass
Melaleuca diosmifolia	
Melaleuca lanceolata	Rottnest Teatree
Melaleuca nesophila	Freeway Melaleuca, Mindiyed
Melaleuca pentagona	Melaleuca
Melia azedarach	Cape Lilac
Melianthus major	Honeyflower
Melilotus albus	Bokhara Clover
Melilotus officinalis	Ribbed Melilot
Melinis repens	Natal Red Top
Mentha aquatica	Water Mint
Mentha spicata	Spearmint
Mentha suaveolens	Apple Mint
Mentha x piperita	Eau de Cologne Mint
Mercurialis annua	Annual Dog's Mercury
Mirabilis jalapa	Four O'Clock
Miscanthus sinensis	Eulalia
Misopates orontium	Lesser Snapdragon
Modiola caroliniana	Red-Flowered Mallow
Moluccella laevis	Mollucca Balm, Molucca Balm
Moraea fugax	
Muehlenbeckia adpressa	Climbing Lignum
Myosotis discolor	
Myosurus australis	Mousetail
Myriophyllum aquaticum	Parrot's Feather Myriophyllum, Brazilian Water Milfoil
Narcissus papyraceus	
Narcissus pseudonarcissus	Daffodil
Narcissus tazetta	Jonquil
Navarretia squarrosa	Californian Stinkweed
Nemesia strumosa	
Nephrolepis cordifolia	Fishbone Fern
Nicandra physalodes	Apple of Peru
Nothoscordum gracile	False Onion Weed
Nymphaea odorata	Waterlily, Fragrant Waterlily
Oenothera affinis	Longflower Evening Primrose
Oenothera glazioviana	Tall Evening Primrose, Evening Primrose
Oenothera indecora subsp. bonariensis	Small-flower Evening Primrose
Oenothera jamesii	Evening Primrose
Oenothera laciniata	Evening Primrose

Oenothera mollissima	Evening Primrose
Oenothera speciosa	White Evening Primrose
Oenothera stricta	Common Evening Primrose, Evening Primrose
Oenothera stricta subsp. stricta	Common Evening Primrose
Olea europaea subsp. europaea	Olive
Onopordum acaulon	Stemless Thistle
Orbea variegata	
Ornithogalum longibracteatum	Pregnant Onion
Ornithogalum thyrsoides	Chinkerichee
Oxalis caprina	Small White Oxalis
Oxalis compressa	
Oxalis flava	Yellow Oxalis, Pinkbulb Soursob
Oxalis glabra	Fingerleaf Oxalis
Panicum capillare	Witchgrass
Panicum miliaceum	Common Millet, Millet Panic
Panicum schinzii	
Papaver hybridum	Rough Poppy
Papaver somniferum subsp. somniferum	Opium Poppy
Paspalum urvillei	Vasey Grass
Passiflora edulis	
Passiflora filamentosa	Passionflower
Pelargonium alchemilloides	
Pelargonium x domesticum	Pelargonium
Pennisetum macrourum	African Feathergrass, African Feather Grass
Pennisetum purpureum	Elephant Grass
Pennisetum setaceum	Fountain Grass
Pennisetum villosum	Feather Top, Feathertop
Pentaschistis pallida	Perennial False Hairgrass
Persicaria capitata	
Persicaria maculosa	Redshank
Persicaria orientalis	Oriental Persicaria
Phacelia tanacetifolia	
Phalaris canariensis	Canary Grass
Phalaris paradoxa	Paradoxical Canary Grass, Paradoxa Grass
Phleum arenarium	
Phleum pratense	Timothy Grass, Timothy
Phragmites australis	Reed, Common Reed
Phyla canescens	
Phyllopodium cordatum	Phyllopodium
Physalis peruviana	Cape Gooseberry
Physalis pubescens	
Pinus canariensis	
Pinus halepensis	Aleppo Pine
Piptatherum miliaceum	Rice Millet
Plantago cretica	
Plantago major	Greater Plantain
Poa pratensis	Kentucky Bluegrass
Polygonum arenastrum	Sand Wireweed
Polygonum aviculare	Wireweed
Polygonum bellardi	
Polypogon maritimus	Coastal Barbgrass, Coast Beardgrass
Polypogon viridis	
Pontederia cordata	Pickerel Weed
Populus nigra	Lombardy Poplar
Portulacaria afra	Jade Plant
Proboscidea louisianica	Purple-Flower Devil's Claw
Prosopis pallida	Mesquite
Prunus cerasifera	
Prunus dulcis	
Prunus x domestica	
Pteridium esculentum	Bracken
Ptilotus polystachyus	Bottlewashers, Green Mullamulla, Prince of Wales Feather

Ranunculus muricatus	Sharp Buttercup
Ranunculus trilobus	Buttercup
Rapistrum rugosum	Turnip Weed
Reseda lutea	Wild Mignonette, Cutleaf Mingonette
Reseda luteola	Weld, Wild Mingonette
Rhamnus alaternus	Buckthorn
Rhaponticum repens	Creeping Knapweed
Richardia brasiliensis	White Eye
Robinia pseudoacacia	Black Locust
Romneya trichocalyx	
Romulea flava	Guildford Grass
Romulea minutiflora	
Rorippa palustris	Marsh Watercress
Rosa chinensis x moschata	Manetti Rose, Noisette Rose
Rosa laevigata	
Rosa rubiginosa	Sweet Briar
Rosa x rehderiana	Rose
Rubus laudatus	Blackberry
Rubus loganobaccus	Loganberry, Boysenberry
Rubus parviflorus	Blackberry
Rubus rugosus	
Rubus ulmifolius	Blackberry
Rubus ulmifolius var. anoplothyrsus	Blackberry
Rumex pulcher subsp. woodsii	Fiddle Dock
Rumex x schultzei	
Sagina maritima	Sea Pearlwort
Sagina procumbens	Spreading Pearlwort
Sagittaria platyphylla	Sagittaria
Salix babylonica	Weeping Willow
Salsola tragus subsp. tragus	Prickly Saltwort
Salvinia molesta	Salvinia
Samolus valerandi	Brookweed, Water Pimpernel
Sanguisorba minor	Sheep's Burnet
Scabiosa atropurpurea	Purple Pincushion
Schismus arabicus	Araby Grass
Scleroblitum atriplicinum	
Senecio diaschides	
Senecio jacobaea	Ragwort
Senecio pinnatifolius	
Senecio vulgaris	Common Groundsel
Sequoia sempervirens	Coast Redwood
Setaria italica	Italian Millet
Setaria palmifolia	Palm Grass
Setaria parviflora	Slender Pigeon Grass
Setaria pumila	Pale Pigeon Grass
Setaria sphacelata	South African Pigeon Grass
Setaria verticillata	Whorled Pigeon Grass
Silene vulgaris	Bladder Campion
Silybum marianum	Variegated Thistle
Sinapis alba	White Mustard
Sinapis arvensis	Charlock
Sisymbrium officinale	Hedge Mustard
Sisymbrium runcinatum	
Sisyrinchium sp. (A. Hart sn)	Sisyrinchium
Solanum arviculare	Kangaroo Apple
Solanum elaeagnifolium	Silverleaf Nightshade, White Horse Nettle
Solanum hoplopetalum	Afghan Thistle
Solanum hystrix	Afghan Thistle
Solanum linnaeanum	Apple of Sodom
Solanum rostratum	Buffalo Burr
Solanum sisymbriifolium	Viscid Nightshade
Solanum triflorum	Threeflower Nightshade

Soleirolia soleirolii	Baby's Tears, Babys Tears
Solidago canadensis	Goldenrod
Soliva sessilis	Bindii
Sorghastrum nutans	
Sorghum bicolor	Sudan Grass
Sorghum halepense	Johnson Grass
Spergula arvensis	Corn Spurrey, Corn Spurry
Spergularia marina	Salt Sand Spurrey
Spinifex sericeus	Eastern Hairy Spinifex
Sporobolus africanus	Parramatta Grass
Stachys arvensis	Stagger Weed, Staggerweed
Symphyotrichum squamatum	Bushy Starwort
Syringa vulgaris	
Tagetes minuta	Stinking Roger
Talinum paniculatum	Pink Baby-breath, Jewels of Opar
Tamarix aphylla	Athel Pine
Taraxacum officinale	Dandelion
Thunbergia alata	Thunbergia
Tolpis barbata	Tolpis, Yellow Hawkweed
Tragopogon porrifolius	Salsify
Tribolium echinatum	
Trifolium pilulare	Pill Clover
Triticum aestivum	Wheat
Tritonia crocata	Tritonia
Tritonia lineata	Tritonia, Lined Tritonia
Ulmus procera	Green English Elm
Urochloa mutica	Para Grass
Urochloa panicoides	
Urospermum picroides	False Hawkbit
Ursinia speciosa	
Vaccaria hispanica	Cowcockle
Vallisneria australis	Ribbon Weed
Verbascum creticum	
Verbascum thapsus	Aaron's Rod
Verbascum thapsus subsp. thapsus	Aaron's Rod
Verbascum virgatum	Green Mullein, Twiggy Mullein
Verbena bonariensis	Purple Top, Purple-top Verbena
Verbena rigida	Veined Verbena
Verbesina encelioides	Crownbeard
Veronica arvensis	Wall Speedwell
Veronica peregrina	Wandering Speedwell
Veronica persica	Creeping Speedwell
Veronica plebeia	Trailing Speedwell
Vicia benghalensis	Purple Vetch
Vicia hirsuta	Hairy Vetch
Vicia monantha	Spurred Vetch
Vicia monantha subsp. triflora	Spurred Vetch
Vicia sativa	Common Vetch
Vicia sativa subsp. cordata	Common Vetch
Vicia sativa subsp. nigra	Common Vetch
Vicia sativa subsp. sativa	Common Vetch
Vicia villosa	Russian Vetch
Vicia villosa var. eriocarpa	Russian Vetch
Watsonia marginata	Watsonia
Watsonia versfeldii	Watsonia
Xanthium spinosum	Bathurst Burr
Xanthium strumarium	Noogoora Burr
Yucca aloifolia	Yucca
Yucca filamentosa	Yucca, Adam's Needles
Zaluzianskya divaricata	Zedweed, Spreading Night Phlox

APPENDIX 4

Invasive Species Achievements

Appendix 4: Invasive Species Achievements

Project Dates	Project Title/Description	Funding	Key Partners	Project Positives	Species Targeted	Lessons learned
2005-2009	Managing Invasive Species	$851,000	DAFWA	An extremely good program manager (Tony Higgs) with multiple projects resourced, with excellent community engagement achieved as a result.	Feral Pigs, Gorse, Wild Dog, Foxes, Starlings, Love Grass, Sagittaria, Blackberry, Sydney Golden Wattle and Victorian Tea tree	With long term project succession planning is paramount in continuity of experience and knowledge.
2005-2009	Southern Incentive 3 – Community Environmental Weed Action (Managing Invasive Species subprogram)	$100,000	Internal	An effective way of enabling small landholders and groups to achieve smaller invasive species outcomes through a smaller devolved grant process	Blackberry Sydney Golden Wattle	Time consuming process
2007-2008	List of Priority Environmental Weeds for the South Coast NRM Region and Threat Abatement Plans	$483,000	DAFWA	A first for the region with a good process followed and outcomes that have helped guide future investments and best practice for the two top invasive weed species for the region.	Weeds of the South Coast NRM region	A effective process like this needs to be replicated to compensate for new emerging species and changes in the region ecology

2007-2008	Community surveillance and control of new environmental weed infestations	$54,000	DAFWA	A very effective means of getting community to report new sightings of target priority species	Eastern State wattles, Victorian Tea Tree, Lantana, Pyp grass, Boneseed, Boxthorn, Asparagus species, African Love Grass, Pine wildings, Agave, Sagittaria, Patterson's Curse, Pinus spp. and Artichoke Thistle.	The accuracy of the reports are a challenge as most of the community do not possess sufficient knowledge to be 100% accurate in there species identification
2007-ongoing	Post-fire environmental weed control surrounding the Porongurup's National Park	$1,930,000	OHCG/ Friends of the Porongurup's	The project has been extremely successful based on the enthusiasm and determination of Lisa and Klaus Braun	Eastern State Wattles, Blackberry, Dolichos Pea, Red Valerian, Forget me Not, Olives, Ink weed, Taylorina, Bridal Creeper, Broom Arum Lilly, Lantana, Watsonia, Gladiolas, Chasmanthe.	
2006	SCNRM Vehicle for Community surveillance and control of new environmental weed infestations	$47,000	Internal	An excellent resource that has been utilised by a number of community organisations, cultural team and the Gorse and Boxthorn Projects	Infrastructure/Plant	It's difficult to ensure that the same level of care is given to this asset by all that use it.
2007-2008	Local Government Environmental Weed Strategies (Plantagenet)	$35,000	Shire of Plantagenet	Has given the Shire good strategic direction and justification for future weed control from a modest investment	Planning	

2007-2009	Environmental Weed Strategy for the Shire of Esperance	$35,000	Shire of Esperance	Has given the Shire good strategic direction and justification for future weed control from a modest investment	Planning	
2009	Shire of Denmark Weed Control	$19,500	DWAG/Shire of Denmark	Increased capacity and Shire involvement in weed control activities	Asparagus spp., Watsonia, Arum Lilly, Blackberry, Gorse, Pittosporum, Polygala, Blue gums, Lantana and education	
2009	Roadside reserves and verges	$19,000	City of Albany	A good start in the treatment of the problematic linear corridors in which wees utilise effectively to spread to other areas	Victorian Tea Tree and Sydney Golden Wattle	Needs significantly more resources to be truly effective
2009	Esperance weeds Action Group (Inc) Regional Calendar	$19,500	Shire of Esperance	A valuable educational resource for the average landholder/home owner to effectively identify priority weeds and take action.	Information and education	The demographics and opinions of a group producing such a document can be truly troublesome
2009	Purchase of Southern Weeds Book	$20,000	Internal	1000 copies of this highly used and valued resource was disseminated out to the South Coast NRM community where it has been well received	Information and education	There were not enough copies purchased in the end
2007	Stokes Inlet Cultural Site Weed Eradication Project	$14,520	Cultural connections	Provided valuable cultural aspects into the Stokes Inlet management Plan	Boxthorn	

2009	Kalgan Pines Project	$125,000	Internal	A well run project that connected the Kalgan river community and volunteers, while provided good education on the impacts of pine trees and the difficulty of removing them.	*Pinus radiata*	
2009	Sydney Golden Wattle removal Albany Hinterland	$120,000	City of Albany/Kalgan Stewards	A great project to inspire the City of Albany to continue weed control and maintain outcomes	Sydney Golden Wattle	
2009	Bremer Bay Vic Tea Tree Removal	$130,000	FBG	A huge are covered and an extensive amount of Victorian Tea Tree ecology learnt in regards to best practice in treating the species effectively	Victorian Tea Tree	
2009-ongoing	Feral Pig Program	$330,000	LMDCFPEG	Capacity and resources to a fundamental and iconic group in the community and feral pig control fraternity at large	Feral Pigs	
2009-2013	Wild Dog Program	$250,000	NNMDSG	Provided resourcing and capacity for farmers to address the wild dog issue and prevent horrific stock attacks	Wild dogs	Needs continuity to prevent a reoccurrence of the historic problem

2010-2011	Controlling Priority Invasive Species	$250,000	DEC, NMDSG, RDSG, LMDCFPEG, Tingledale LCDC, Cultural Connections, DWAG,EWAG, FBG & DAFWA	Another program that addressed multiple community concerns and delivered resources across the region and obtained great region wide outcomes	Blackberry, Gorse, Sydney Golden wattle, Apple of Sodom, Victorian Tea tree, Agave, Boxthorn, Fleabane, Castor Oil Plant, Bridal Creeper, Polygala, Lantana, Wild dogs, Feral Pigs, Foxes, Cats, Rabbits, Pepper Tree, Onion weed, Knotweed, Typha spp., interpretation and education	Short term investment with some of the investment ultimately being lost due to insufficient future resourcing
2011-2012	Controlling Priority Invasive Species Phase 2	$125,000	DEC, NMDSG, RDSG, LMDCFPEG, Tingledale LCDC, Cultural Connections, DWAG,EWAG, FBG & DAFWA	An investment that was well received by community to maintain the previous investments delivered an extraordinary amount of follow up and provided a lot of knowledge on control of species over multiple years. It also got infestation levels down to levels were community or agency could take over responsibility and deliver on the future treatments.	Blackberry, Gorse, Sydney Golden Wattle, Apple of Sodom, Victorian Tea tree, Agave, Boxthorn, Fleabane, Castor Oil Plant, Bridal Creeper, Polygala, Lantana, Wild dogs, Feral Pigs, Foxes, Cats, Rabbits, Pepper Tree, Onion weed, Knotweed, Typha spp., interpretation and education	Some work completed over the term of the two projects would be lost due to shortfall in future resourcing

2012	Weed Control and education Albany Senior High School	$70,000	ASHS	A very large amount of the region's worst declared weed was removed and coincidently DOW did the same above the school at the same time. The education of the students was another key outcome as the questions by the students came thick and fast after their school grounds were decimated.	Sydney Golden Wattle, Victorian Tea Tree and education	
2012	Weed Control and education Saint Joseph's College	$14,000	Saint Joseph's College	A long time coming as the school was aware of the problem and the City of Albany was concerned about their neighbouring A class reserve and a driver was needed. The students have also reaped the benefits as the area controlled and the project outcomes have provided an excellent education tool	Sydney Golden Wattle, Victorian Tea Tree, Dolichos, Gladiolus, Gorse and education	

2012	Weed Control and education at Flinders Park Primary School	$14,500	Flinders Park Primary School	A minor issue was addressed with a moderate budget and education on weeds and revegetation was advanced so student can actively participate in NRM work.	Sydney Golden Wattle, Silver Wattle, Victorian Tea Tree and education	Capacity at all schools to maintain momentum to deliver on the project milestones was lacking.
2006-ongoing	Gorse eradication Program	$450,000	DAFWA/ Cultural team	A very well run and coordinated program with a strategy developed in 2011 to maintain strategic direction	Gorse	Maintaining interest in the funding providers and management sector.
2011-2013	Beating the Boxthorn Project	$471,000	DAFWA, cultural team, DEC, Main Roads, Shire of Ravi, Shire of Esperance	A project that has provided the greatest learning opportunity for all those involved in the ecology and treatment of boxthorn. Increased networks and knowledge nation-wide was also achieved	Boxthorn and community engagement and awareness	The project has not been resourced long enough to maintain the excellent outcomes achieved to date.
2013	Wellstead Sydney Golden Wattle Control	$70,000	Wellstead CRC and Wellstead community	Still in the process of being delivered, but a result of good community drive and collaboration	Sydney Golden Wattle	
2013	Albany Race Course weed removal	$45,000	Albany Race Club	Still in the process of being delivered, but a result of good community drive and collaboration and it provides increased protection of the Torndirrup National Park	Sydney Golden Wattle and Victorian Tea Tree	

2009-ongoing	Esperance Weed Action Group	$150,000	EWAG	A extremely valuable part of the region with outcomes that have been achieved in weed control, education, capacity building and networking	Blackberry, Sydney Golden wattle, Victorian Tea tree, Agave, Boxthorn, Fleabane, Bridal Creeper, Lantana, Love Grass, Double Gees	
2009-ongoing	Denmark Weed Action Group	$150,000	DWAG	Same as above	Blackberry, Gorse, Sydney Golden Wattle, Victorian Tea tree, Agave, Boxthorn, Fleabane, Castor Oil Plant, Asparagus spp., Polygala, Lantana, Blue Gums, Dolichos Pea, Cotoneaster	
2009-ongoing	Red Card for Rabbit and Fox Program	$200,000	DEC, DAFWA, RCFRF committee, WICC, RAIN, NSPNR, Gillamii, OHCG, ERF, Great Southern Blue Gums and FBG	A highly successful program in engaging farmers and community to undertake control of 3 highly destructive feral pest in Australia which supports the Western Shield Program in WA	Rabbits, Cats, Foxes, Deer	Needs greater support from government as it is meeting there outcomes

2011-2013	Feral Pigs in the Walpole Wilderness Project	$176,000	DEC and LMDCFEG	A program that is trying to address feral pig control in the last real hot spot in the south of WA with some good results being achieved	Feral Pigs and Deer	Greater community involvement needs to be accommodated by DEC, restrictions are impacting on community perception DEC and their commitment to removing feral pigs
2010	Popular spp. control in Esperance	$25,000	ERF	A great community project with valuable lessons learnt about the species and its toughness	*Populus alba*	A lack of understanding of the species ecology has led to lack of resourcing to effectively finish the job. Community are still delivering follow up.
2009-2013	Bridal Creeper control	$150,000	RAIN, Gillamii, FBG, ERF and NSPNR	A project that has introduced the bridal creeper rust throughout the region which is delivering a degree of ongoing control	Bridal Creeper	
20010-ongoing	DEC cat bait program	$176,000	DEC	Working towards a effective control of feral cats that are proving to have significant impacts on native fauna	Feral Cats	It's going to be a long process with no real certainty of desired outcomes
2006 -2014	Starlings	$566,000	DAFWA	The first real successful eradication program of a vertebrate pest in Australia. A truly iconic program for WA biosecurity	Starlings, education and awareness	More stakeholders need to be engaged as they are reaping the rewards from a starlings free state at someone else's expense

2013-2016	Victorian Tea Tree control Leda Reserve (Esperance)	$150,000	DEC and Cultural Team	A project that is yet to be delivered but is addressing a major outlier infestation that poses a threat to the coastal macro-corridor	Victorian Tea Tree and Interpretation	
2012-2013	Southern Weeds 3rd Edition	$30,000	DAFWA	An update version of the old with current best practice and incorporation of new problematic species included. An improvement on an already well used resource	Information and education	
2011	Priority weed Control in the Lake Muir RAMSAR wetland	$20,000	DEC	A supporting project to assist DEC in removing problematic weeds from the Lake Muir RAMSAR wetland	Feral Pigs and Information and education	Monitoring the project through reporting was a nightmare
2011-2013	Integrated Feral Control Fitzgerald to Stirling's Fitzgerald Biosphere	$190,000	FBG	A dedicated invasive species fund for landholders to achieve effective outcomes in the forest to fitz corridor	Foxes, Cats and Rabbits	
Total Investment to date	**39 Programs 149 projects**	**$8,075,020**	**76 partnering Organisations and groups**		**71 species**	

APPENDIX 5

ASPIRATIONS, GOALS AND DESIRED OUTCOMES FOR INVASIVE SPECIES MANAGEMENT

APPENDIX 5: ASPIRATIONS, GOALS AND DESIRED OUTCOMES FOR INVASIVE SPECIES MANAGEMENT

From Southern Prospects (South Coast NRM, 2011).

LAND THEME	
Aspiration (25+ years)	Improved and protected land resources through sustainable land use, matched to land capability. Improved landscape resilience through ecological balance – reduced threats from invasive species and diseases.
LINKAGE TO OTHER THEMES	
Goals (10+Years)	Land Theme L2: Invasive species: strategic control and containment of invasive species, sufficient to ensure that they have minimal impacts on sustainable land use by 2020.
	Biodiversity Theme B1: Maintain and/or improve biodiversity values across the landscape for identified priority areas by 2030 using quantifiable targets.
	Biodiversity Theme B2: South Coast Significant Species and Communities: Maintain and/or improve extent and condition of threatened and other significant species, communities and habitats by 2030 using quantifiable targets.
	Land Theme L2: Invasive Species: Strategic control and/or containment of invasive species, sufficient to ensure that they have minimal impact on sustainable land use by 2020.
	Regional Capacity R9: Education and Training: Develop and implement an NRM education and training framework (integrated across themes) and develop biannually reviewed education and training strategies by 2020.
	Water Theme W1: Waterway Health (Low Impacted ('pristine') Rivers, Estuaries and Wetlands): Maintain and/or improve values and reduce threats to low impacted water resources by 2030 using quantifiable targets reviewed by 2012.
	Water Theme W2: Waterway Health (Impacted ('degraded') Rivers, Estuaries and Wetlands): Maintain and/or improve values and reduce threats to priority impacted rivers, estuaries and wetlands by 2030, using quantifiable targets reviewed by 2012.
	Heritage Theme H5: Protection of places of high cultural natural heritage significance - Identify and protect sites and locations of high cultural natural heritage significance at risk from degrading and threatening processes by 2020.

DESIRED OUTCOMES (1-5 YEARS)
Planning and Policy Frameworks **Land Theme: L9:** Review Best Management Practices - Review NRM best management practices and support implementation for priority land assets by 2015.
Capacity Building **Land Theme Outcome L7:** Increase the NRM knowledge and skills of land managers and the associated services sector by 2015 (and ongoing). **Land Theme Outcome L8:** Improve Awareness and Recognition - Review and increase awareness of the value of land asset management, across the region in light of State, National and International frameworks by 2013. **Biodiversity Theme Outcome B13:** Increase ownership, knowledge and awareness of biodiversity values, threats, and engagement opportunities by 2015. **Water Theme Outcome W11:** Increase knowledge and appreciation of water asset values, enhanced and embraced by the development and implementation of a regional water asset education program, and training and knowledge retention initiatives, by 2012. **Coastal and Marine Theme Outcome C8:** Engage coastal users (e.g. 4WD, motorbike and off road vehicle users, youth, fishermen, surfers) to enhance knowledge and appreciation of coastal and marine asset values and promote behavioural change through the development and implementation of a regional coastal and marine education and awareness program by 2012.

DESIRED OUTCOMES (1-5 YEARS)

On Ground Actions

Land Theme: L6: Control Invasive Species - Identify, prioritise and control/reduce invasive species that impact land resources with quantifiable targets (set by 2013) for sub-regions by 2015.

Biodiversity Theme: B9: Management of Invasive Species - Manage the impacts of priority invasive species and diseases through information sharing, training and on-ground works by 2015.

Biodiversity Theme: B10: Prevention and eradication of emerging invasive species. Prevent the occurrence and spread of emerging invasive species through training, early identification, control and eradication by 2015.

Water Theme Outcome W6: Protect Wetlands: Maintain and/or improve the value, level of protection and condition of internationally, nationally and regionally significant wetlands by 2015, with quantifiable targets set based on management plans by 2012.

Water Theme: Outcomes: W8: Control invasive species – reduce the impacts of invasive species in priority riparian zones (including aquatic weeds, feral fish, invasive weeds, feral animals and disease) by the implementation of best management practices by 2015.

Coastal and Marine Theme Outcome C3: Control Marine Pests – Contribute to management of introduced coastal and marine pests and diseases at the local level through vigilance and monitoring by community and industry with implementation of effective risk management protocols and responses by 2015.

Cultural Heritage Theme Outcome H2: Protection of Heritage Places - Identification and protection of three significant cultural natural heritage places per year, as prioritised by the community.

Measures and Monitoring

Biodiversity Theme B1: Strong Information Base - Collect and map baseline data for identified gaps in knowledge and collate and improve accessibility and communication of existing data/information by 2012.

Biodiversity Theme B2: Evaluate Priorities - Set priority activities based on an evaluation of the existing prioritisation processes by 2011 (to be informed by review of existing data, community passion and knowledge and prior investments).

Biodiversity Theme: B3: Set Benchmarks and Measures - Identify reference condition sites for biodiversity values to guide the implementation and monitoring of revegetation and restoration of priorities sites (B1) by 2012.