NATURE CONSERVATION OUTPUT

SOUTH WEST REGION

DRAFT STRATEGIC PLAN

2006-2009

ENDORSEMENT (SIGNATURE) BY THE FOLLOWING:

MANAGER SW REGION:
Date:

REGIONAL LEADER:
Date:

MANAGER ENVIRONMENTAL MANAGEMENT BRANCH:
Date:

MANAGER, SPECIES AND COMMUNITIES BRANCH:
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Date:

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1.0 ACKNOWLEDGMENTS

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2.0 PREFACE

The Nature Conservation Output comprises around 46% ($72m) of the Department of Conservation and Land Management's total 2005/06 budget, and is principally aimed at achieving the goal of conserving Western Australia's biodiversity. The South West Region Plan is one of nine Nature Conservation Output plans that will provide the basis for the delivery of the Output at a regional scale over the next three years for the Divisions of Nature Conservation, Science and Regional Services.

If fully implemented it will represent a major movement within the Department towards outcome-based management. It will also provide recognition of the place of active adaptive management, where research is integrated with and helps inform operational aspects of conservation management together with the undertaking of monitoring and evaluation of biodiversity status and condition to determine effectiveness of activities in achieving desired outcomes. Consequently, there will need to be a significant recognition and increase in regional activity aimed at the design and establishment of suitable condition monitoring and evaluation programs, rather than a continuation in implementing management prescriptions in the absence of an experimental management framework and without knowing whether outcomes are being achieved, or if management intervention is successful.

This paradigm shift will require active leadership and an improvement in technical capacity across all three Divisions. To be successful, an active adaptive management approach will also require a high level of co-operation between Divisions.

While there has been an attempt at describing three year outcome-targets for landscape, ecosystem (inc. wetlands) and protected area assets, to be effective these will need to be refined and made more specific in future plans once sufficient knowledge and information has been gained from monitoring systems and benchmark biological survey work has been undertaken. For the most part, condition trends are currently unknown and are unlikely to be detected over the next three years and hence regional outcome targets may not be achievable. Nevertheless, it is critical that monitoring systems are developed and implemented during this plan so that the Department is better positioned to predict likely changes and threats to biodiversity, rather than to react to situations or problems some years, or even decades, after an observational trend has been detected. Future plans should also be expanded to include performance measures and management (output) targets to provide an indication on progress of candidate actions.

As a set, these plans also provide the basis for greater integration of Departmental activities and functions and a better focusing of effort to address major biophysical and social threats to biodiversity, as well as a basis for pursuing opportunities. They will help in the development of State wide priorities for the delivery of conservation activities, particularly knowledge-building requirements, Threatened taxa and Threatened Ecological Communities listing priorities, and assist in identifying gaps in administration processes and planning framework to aid effective and consistent delivery of the Output at a high professional standard.

The draft of this Plan was written at an expert-based workshop held in Bunbury on 23-25 August 2005, and informed by data and information from *The Forest Management Plan 2004, A biodiversity audit of Western Australia's biogeographical subregions in 2002* (May and McKenzie 2002), *Technical appendices to the South West Catchment Council Regional NRM Strategy*, then circulated to relevant district and region program staff for comment and further input for the final plan.

3.0 SYNOPSIS

Introduction

The Nature Conservation Output South West Region Plan provides a summary of key biodiversity values within the South West Region and major threats to those values. It outlines 20 priority three year outcome targets for the Nature Conservation Output, and 60 associated candidate actions for the Divisions of Science (see Appendix 2), Nature Conservation, Sustainable Forest Management, Parks and Visitor Services and Regional Services at a range of scales for the 2005-2008 period.

For the purposes of the Plan, nine management zones/landscapes (Coastal Plain, Blackwood Plateau, Leeuwin-Naturaliste Ridge, Scott Plain, Jarrah Forest, Riparian/Wetlands, Islands, Marine and the Woolbelt) were derived from the four IBRA sub-regions (Swan Coastal Plain, Jarrah Forest 1 & 2 and Warren) that comprise (in part or full) the South West Region. The candidate actions in the Nature Conservation Output South West Region Plan were developed on the basis of including only those actions that would make a direct and measurable improvement in meeting the three year Nature Conservation Output target-outcomes. Regional target outcomes were identified for those biodiversity assets and values that need to be actively managed if the Nature Conservation Output Aspirational Outcomes are to be achieved. Current management responses being delivered under the Nature Conservation Output that do not directly contribute to meeting the regional targets or the Output's aspirational outcome of reducing the rate of decline in biodiversity and ecosystem condition were not included.

Analysis of major threats against biophysical values and existing management responses revealed a general absence of active conservation management in the Marine, Scott Plain, Woolbelt, Riparian/Wetland and Island zones despite the occurrence of significant conservation values and reserves and the acknowledged presence of active threats such as: altered fire regimes, introduced plants and animals, disease, salinity and changing and unsympathetic land uses.

A clear revelation from this process was the confirmation that only approximately 40% of the regional NC budget is directed to onground actions on the conservation estate. The demands of a large permanent population base and 10 + years of rapid and sustained development (urban and industrial), insufficient staff numbers and an increasing devolution of responsibilities from the centralized specialist branches to regional/district operations staff has seen the works program become driven by external reactive demands at the expense of strategic on-reserve progress.

The department's rapid move towards incorporating biodiversity outcomes additional to protection outcomes in the regional fire management program is resulting in a disproportionate and unsustainable demand on NC staff resources. Conservation staff are required for the pre-planning, field survey, implementation and post burn monitoring and evaluation phases of the program. Their involvement is principally dealing with threatened species and poorly conserved vegetation issues, though these are often of low to medium priority in comparison to other objectives in the seasonal works program. The dependence of the FMS program on a few (1-2) NC staff in each district to achieve these goals highlights the considerable competency gap in basic biodiversity knowledge and field skills present within the current district/region staffing structure. The developments of formal and structured biodiversity training programs are required for all operational staff and competencies need to be embedded in the IDAPES process.

Basic biodiversity information on most conservation reserves is lacking, and with the exception of the Science Division's "Forest Check" program no systematic biological inventory has been undertaken in any of the management zones. Thus an assessment of threats to biodiversity at the reserve level and bioregional /management zone scale is absent.

Benchmark quantitative data on introduced animal populations that would provide the basis for monitoring the success of control programs is absent for all management zones.

Though previous attempts have partly addressed the issue (RFA and Forest Mgt Plan) there has been no comprehensive, whole of region assessment and analysis undertaken to determine landscapes suitable for cost-effective investment and targeting of conservation effort. This process has been hampered by a lack of detailed information. A gap analysis to determine priority ecosystems for reservation requires up-dating, and a refinement of the design of the conservation reserve system to incorporate regional scale ecological linkages is a priority. Land acquisition approaches, informed by the preceding action, need to be consolidated and better integrated with statutory planning processes led by other agencies.

Similarly, data on Priority taxa and potentially threatened ecological communities to resolve conservation status is deficient, and a risk assessment is required to focus effort.

Although the operational efficiency of the weed control program has been improved in recent times, the prioritization and funding framework is fundamentally flawed, being driven by parochialism of the funding source and the overriding regional need / requirement to supplement an inadequate budget with recoup revenue. Consequently there are few examples of significant achievements in strategic weed control within the region.

In summary, there is a considerable gap in the scale and composition of current management responses aimed at biodiversity conservation, research requirements for management decision making and level of resources needed (both in terms of level of funding and technical capabilities) to be able to meet this Plan's proposed outcome-targets and address candidate actions.

The south west region is essentially a place of conservation contradictions and juxtapositions between the infinitely fine scale yet high public expectations associated with the fragmented coastal plain and the landscape scale, ecosystem process maintenance required in the forest zone. Two different approaches and skill sets, often diametrically opposed, are required to achieve these outcomes. This "bi-polar" requirement has been poorly recognised by the region and the department. As a consequence the structure and composition of the regional NC program has been in "make do" mode for over 10 years, failing to make headway in any strategic direction. The ultimate irony is that the NC program in SWR is severely hampered by inadequate numbers and skills of staff in a region perceived (by some) as being over endowed with staff. In reality less that 10 % (17 of 200) are either available or capable of functionally contributing to the NC program.

A review of the candidate actions proposed in the South West Region Plan highlights the need for the following priority strategic changes to be made, including some that will require an integrated management and partnerships with other organizations.

Landscapes and Protected Area System

The Jarrah Forest and Blackwood Plateau Zones are mainly uncleared, contained within the CALM estate and represent a significant conservation asset at the landscape scale. They will remain secure from most catastrophic threatening processes for the life of this plan and the foreseeable future. A primary maintenance regime (weed control, ferals, disease) and a "watching brief" to comprehensively monitor levels of biodiversity / species richness needs to be established and "trigger points" defined to guide managers as to what and when to commence intervention.

Within the life of this plan trigger points will be required for Jarrah Forest and Blackwood Plateau Zones if;
a) salinity incursions resulting in mass deaths of vegetation on the eastern forest fringe,
b) there is a rapid and unexplained expansion of Pc.
c) a demonstrable increase in feral pig numbers.

There is limited opportunity to improve management of landscape scale processes in the largely cleared Coastal Plain Zone, and to a lesser extent the Scott Plain and Woolbelt. There are more pressing issues associated with preventing the extinction of species and communities within them and significantly reducing the threatening processes acting. The most strategic and productive achievements will be made by modifying the statutory land use planning processes leading to a reduction in the rate and extent of land clearing being approved in these zones supported by a targeted conservation land acquisition program to secure the last remaining quality remnants. And while it is unlikely landscape scale conservation outcomes will be achieved in these zones, their functionality can be markedly improved but will require a sizeable, highly targeted and long term commitment to off-reserve conservation for the community at large to accept these zones as having conservation value as well as a economic/development values. There is an immediate need to integrate the Department's centralised off reserve and covenanting programs with the regional services delivery of the NC output program.

The Marine and Island Zones are essentially in pristine condition with few identifiable threatening processes. The establishment of a marine park, creation of sanctuary zones and base lining of biodiversity values and condition together with developing community acceptance and recognition of the need for such actions are the priority tasks required over the course of this plan.

For the next three years within the Leeuwin Naturaliste Ridge zone it is unlikely there will be a significant increase in the rate or scale of developments. These aspects are being controlled by the provisions of the Statement of Planning Policy for the Leeuwin Naturaliste Ridge and a sustained and ongoing commitment to reviewing

individual development applications and improving relationships with local authorities and agencies. There are however two pressing conservation issues which need to be addressed with this period;

a) an improvement in the understanding of hydrological and hydrogeological processes upon which most of the endemic threatened species/communities values are associated. This will necessitate enhanced working relationships with other agencies such as Dept of Environment/Dept of Water and a closer alignment of multiple agency goals to understand and protect the role of water in this landscape.

b) defining the "recreation carrying capacity and the rates of acceptable change" within the coastal parks such that recreational use does not negatively impact on the underlying biodiversity values of the land.

Altered fire regimes are major threats to biodiversity in all South West Management Zones, but of particular concern in the Coastal Plain, Scott Plain and Woolbelt Zones. For instance, the zones with highest levels of fragmentation. A departmental shift in emphasis is required for the fire management program, from one of mainly broad area strategic protection to one where the primary goal is conservation and protection of biodiversity. The principle tenet should be we apply fire where and when it is a required part of ecosystem processes to maintain or enhance biodiversity values. Currently within the SWR the departmental burn prioritization process works against this principle with reserves of small size and outside the main forest belt receiving low or nil priority. There is an urgent need to look at developing fire management plans for larger eastern reserves and undertaking burns in areas (Coastal plain, Woolbelt) where fire has not occurred for 30+ years. To guide this process there is a need to implement monitoring systems that will give appropriate feedback to managers on the application of fire for biodiversity conservation. This should be jointly undertaken with Science Division.

Plant diseases, particularly that caused by *Phytophthora cinnamomi*, is widely distributed and ubiquitous across 6 of the regions management zones (Coastal Plain, Jarrah Forest, Blackwood Plateau, Scott Plain, LN ridge and Woolbelt) and is likely to be present in the Wetlands/Riparian zone. Long standing hygiene management protocols need to be expanded to encompass zones and species compositions other than the jarrah forest and blackwood plateau vegetation complexes. Disease mapping and modelling techniques need to be developed for small sized remnants in highly fragmented landscapes, basic research effort into developing viable operational control techniques for these diseases in regard to threatened taxa and ecological communities needs to be supported as a priority, investigations into the impact of Pc on a range of faunal assemblages needs to be initiated. The scope of Forest Management Branches' disease management services needs to be significantly broadened to include high conservation value assets as core business.

Understanding of feral pig distribution and densities, and impacts on biodiversity values, is urgently required for all management zones (excluding Islands) to develop an effective control program. Similarly, an understanding of fox and cat population data/dynamics and impacts, and the effectiveness of control measures is required for the small and fragmented remnants on the Coastal Plain, LN Ridge and Woolbelt zones. Pilot investigations to commence documenting and mapping the distribution and impact of feral bees are required. Basic knowledge of the distribution and impacts of other pest animal species, including marine, estuarine and freshwater pests is lacking. A strategy to control / minimise the impact of pest bird species (corellas, galahs and eventual invasion of rainbow lorikeets) needs to implemented.

Declared and environmental weeds are having a high impact on biodiversity values in the South West Region. Specifications for cost efficient and effective control techniques and post control rehabilitation are required for the reserves of the Coastal Plain, LN Ridge, Riparian/Wetlands, Scott Plain and Woolbelt zones. Initial emphasis should be on reserves and remnants with the highest nature conservation values.

Minimising the impacts of mining and exploration activities on biodiversity is required for the Coastal Plain, Scott Plain, Jarrah Forest and Blackwood Plateau zones. The development of biologically relevant completion criteria is required for all mining and extraction activities on CALM lands within the region.

The escalating demands upon the program for involvement in the land use planning and Environmental Impact Assessment , (with increasing levels of complexity) and subsequent monitoring and auditing processes needs to be recognised at corporate and regional levels and addressed with an improvement in staff resources and skills.

Biodiversity inventory, analysis and monitoring on conservation status and ecosystem condition is required for all zones, with particular emphasis on the Woolbelt and Coastal Plain.

Wetlands & significant Riparian Habitat

Significant Wetlands/ Riparian assets are found in all of the SWR's terrestrial zones (Appendix 3) however relatively few are in good condition or free from major threatening processes.

Comprehensive biological inventory and condition benchmarking is required for the Busselton Wetland system including the Ramsar listed Vasse-Wonnerup Wetlands and six wetlands listed in the *Directory of Important Wetlands of Australia*, along with the development of appropriate management responses to address threats. An initial biological inventory and condition assessment is also required for three other categories of important wetlands in the Region, (1) the DOE listed conservation category wetlands, (2) the EPP-listed wetlands, (3) other wetlands of probable high regional conservation significance.

Coastal Plain wetlands are often highly disturbed and in close proximity to urban developments. Adaptive management processes need to be implemented to develop rehabilitation and ecosystem restoration techniques, in association with Science Division and supported by NRM groups and the community.

Most wetlands in the Woolbelt zone are being affected by or at risk from rising ground water and/or salinity. Many of these fall outside of the recently completed biological survey of the agricultural zone and there is an absence of baseline information. For these and all other significant wetlands within the region the understanding of the localised processes and impacts of hydrological change is poor. A strategic monitoring and condition assessment program, in cooperation with DOE (including a review of currently available data) needs to be developed and implemented. Feasibility assessments in a manner similar to SIF phase 2 need to be undertaken prior to committing to recovery/restoration actions.

Ecosystems at Risk

There are many water and wetland dependant endemic species and communities in the Region potentially at risk as a result from climate change. A Science Division led risk assessment process needs to be developed to assist with the prioritization and conservation viability assessment of these species and communities.

Recovery work is required for all 22 listed Threatened Ecological Communities including condition benchmarking and the development of departmental standards for monitoring. The highly fragmented Critically Endangered communities esp. Busselton Ironstones and Coastal Plain heavy soils (SCP3c) require detailed recruitment and genetic viability studies to progress further recovery.

A comprehensive hydrological and hydrogeological investigation program is required for the karst system on the LN Ridge to detail fundamental processes and threats. Considerable inventory and taxonomic work is required to clarify karst conservation values and taxon distribution.

An improved understanding of hydrological and hydrogeological processes and water quality issues for all threatened communities and ecosystems at risk is required. Focus for the next 3 years should be on the Busselton and Scott Ironstones, Augusta Microbial, and Coastal Plain heavy soil communities. Ie those types where there is a potential for adverse consequences as a result of changed hydrology brought about by industrial and agricultural water use. Ecological Water Requirements for threatened ecosystems within the SWR need to be determined.

A program of investigation and analysis to identify regionally significant ecological communities/ecosystems, and those under threat, is required for the Jarrah Forest, Blackwood Plateau and Woolbelt Zones.

Recognition at the corporate level, that to achieve substantial recovery progress requires dedicated and often specialist staff (Project officers assigned to each community or group of taxa) with access to appropriate budgets funded from core funds and not subject to the vagaries of external funding is required.

Species at Risk

For the life of this plan and the foreseeable future, the recovery of threatened species and communities will remain the highest priority for the nature conservation program in the South West region.

Implementation of species recovery plans, including basic benchmarking surveys and monitoring; and a concerted effort to commence rehabilitation / restoration works in partnership with Science Division is required.

An increase in the resources allocated to basic survey will be needed to resolve the conservation status of 191 priority flora taxa and vulnerable listed fauna.

In conjunction with Science Division the findings and management implications of the rapid assessment quokka surveys need to be completed and circulated to provide a practical guide to managers. Development of a species wide monitoring strategy across the three forested regions is required.

A program of research into recruitment processes and population dynamics for all Critically Endangered species needs to be initiated.

As with ecosystems at risk an improved understanding of hydrological processes and formal monitoring of water quality and quantity for CR species is required esp.: Engaewa sp, Geocrinia sp, Cherax sp,

The Climate Change Risk Assessment identified for ecosystems needs to be applied to species.

Funding and staffing

1. Progress the evolution of the Harvey Bait Factory into a self-sustaining independently staffed business enterprise with a research and development emphasis, separate from the operational aspects of the regional NC program is required.
2. The creation of Planning Officer positions in each district is required to systematically and adequately respond to the large work load created by development applications. An estate planning officer is required within the region to commence the development of calm estate planning documents such as area management plans, interim management guidelines and issue plans.
3. Regional ecologist. The need for an ecologist in this region has long been identified.
4. The funding arrangements for the temporary Marine community liaison officer position need to be ceased until the minister progresses with approvals to release the plan. Funds to be returned to the operational NC budget. A new and additional allocation for a full time Marine Park Officer proactively linked to public consultation release of the Geographe Marine plan is required.

4.0 INTRODUCTION AND SCOPE

4.1 SCOPE AND PURPOSE OF PLAN

- To describe three year regional scale Nature Conservation Output outcome targets, priorities, and actions integrated across bioregions and Divisions that will contribute towards the Nature Conservation Output Aspirational Outcome (see Section 3 below);

- To provide a framework for Nature Conservation Output investment, with a view to maximising resource use and sharing and to integrate delivery where practical and is recognised and embedded in the Service Provision Agreements; and

- To clarify roles and responsibilities for Nature Conservation Output actions for Regional Services, Director, Science Division and Nature Conservation Division.

4.2 NATURE CONSERVATION OUTPUT DESCRIPTION

"*The development and implementation of programs for flora and fauna conservation for threatened species and ecological communities and for commercially exploited species according to the principles of ecological sustainability; the acquisition, conservation and protection of representative ecosystems; and encouraging public awareness, understanding and support for nature conservation.*"

4.3 NATURE CONSERVATION OUTPUT ASPIRATIONAL OUTCOME

Within 25 years (2005-2030) the rate of human-induced extinction of local populations of species will be reduced to near zero, and deterioration in the condition of ecosystems resulting from human activity will be reversed through management intervention by:

- A network of conservation reserves to protect and manage biodiversity in-situ surrounded by sympathetically managed lands/waters where conservation is incorporated into integrated land/resource use and ecological linkages to maximise conservation of biodiversity;

- Identification and management for biodiversity of intact, functional landscapes and habitat;

- Better decision-making for biodiversity conservation based on improved knowledge of biodiversity patterns and status, trends and threatening processes; and

Increased awareness and understanding of biodiversity and conservation requirements in order to gain long-term support and change in behaviour.

4.4 REGIONAL DESCRIPTION AND BIODIVERSITY ASSETS/VALUES

Although the South West Region is relatively small in area (1,713,000 ha) or approx 0.65 % of Western Australia, it is biogeographically diverse and includes portions of four IBRA subregions. (See Figure 1.) and 2 National Biodiversity Hotspot regions (Busselton – Augusta, part of Avon Wheatbelt).

Approx 45 % of the region's area (768,900 ha) is contained in CALM managed estate ranging from very small and highly fragmented nature reserves on the Coastal Plain and Woolbelt through to large and continuous belts of state forest in the Jarrah zone. This results in approx 8400 km of CALM estate perimeter with a proportionally high number of neighbour interactions. Coastal national parks such as the Leeuwin Naturaliste have the highest levels of public visitation in the state.

Rainfall grades from 1200– 600mm across a west – east transect which when combined with a variability in both geology and landform has given rise to a rich diversity in the natural landscape and vegetation patterns. This in turn provides opportunities for a diversity of landuses including intensive horticulture, viticulture and speciality crops (floriculture, nut & oil crops, truffles, deer farms) through to tree plantations and forest timber industry, beef

and diary production through to traditional broad acre agriculture (cereal & wool). Expanding urban areas and peri-urban areas, a high value tourism industry and numerous mining operations (bauxite, mineral sands, coal, tin, gas, basic raw materials and water harvesting) all of which generate interaction and demand on resources and staff.

The Region is botanically rich, with 15 Beard vegetation mapping units and 54 RFA vegetation complexes having been described. The LN Ridge interzone (intersection of the Coastal Plain, Warren and Jarrah Forest Ibra regions) have had some 1600 flora sp recorded. High levels of diversity and endemism area present on the Coastal Plain and Blackwood Plateau. Many of the region's critically endangered species (flora and fauna) exhibit the characteristics of short range endemics. Over 3300 plant species are recorded from the region and this number is likely to increase with further survey effort and taxonomic revision.

Other biodiversity values include the following:

- Threatened and Priority flora taxa currently recognised: 51 Declared Rare Flora (17 critically endangered) excluding two nominations for DRF currently under consideration the listing process. This may increase with additional nominations being considered. There are 20 Priority One, 39 Priority Two, 68 Priority Three and 50 Priority Four although these numbers continually change in light of new knowledge from botanical survey;

- More than 400 terrestrial vertebrate taxa are known for the South West Region that represents 40% of known taxa for WA and 22% of Australian taxa. Numbers of invertebrate species are unknown.

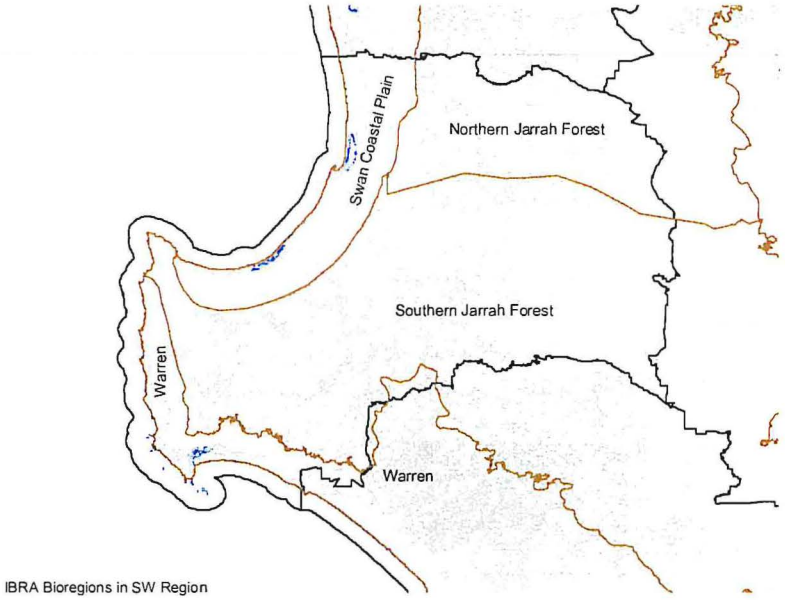
- Currently there are 36 fauna species that are considered threatened (3 critically endangered) and 4 species that are specially protected. A further 34 fauna species are listed under priority categories.

- LN Ridge karst system is of national and international significance being the most extensive and thickest development of an Aeolian limestone formation containing karst features in Australia- Nomination for World Heritage Listing should be considered; The karst system support unique cave and aquifer faunas

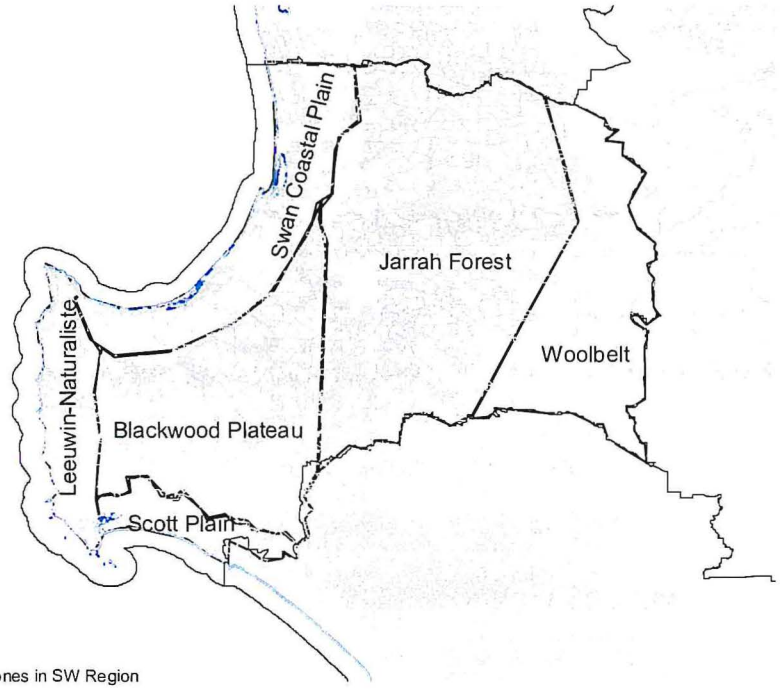
- The South West Region is currently responsible for the management of 768,900 ha of conservation reserves/CALM estate. Planning for a marine park of 1,245,000 ha is well progressed for the Geographe Bay-Leeuwin Naturaliste -Hardy Inlet area.

- The marine parks lies in a transition zone subsequently its biodiversity is comprised of elements of tropical, sub-temperate and temperate species suites. The park will encompass the most extensive temperate seagrass meadows in the state. The region is recognised as a hotspot for seagrass biodiversity.

Within the region there are centres of vascular plant endemism on the southern Swan Coastal Plain, Whicher Scarp, Scott Plain and the Darkan-Boyup Brook area. Endemism for non-vascular flora and terrestrial and aquatic invertebrates is largely unknown. The region does contain a high proportion of the aquatic vertebrate fauna of southern Western Australia. Further survey and taxonomic work will likely lead to a significant increase in the numbers of endemics recognized for the region.



IBRA Bioregions in SW Region



Management zones in SW Region

Figure 1. Maps of South West Region showing the conservation management zones, IBRA sub-regional boundaries, lands managed by the Department of Conservation and Land Management and other Crown lands.

4.5 MAJOR THREATS TO BIODIVERSITY AND BARRIERS TO CONSERVATION

The matrix at Appendix 1 shows the relativity of major biophysical threats against broad biodiversity conservation values of landscape, ecosystem, species, protected area system and wetlands/riparian across the South West Region's conservation management zones.

Major processes that threaten biodiversity and which could cause a failure in meeting CALM's 25 year Nature Conservation Aspirational Outcome include the following issues.

- Absence of local scale understanding of hydrological processes including climate change impacts and management options to maintain the high value conservation assets dependent upon them. Includes falling groundwater levels and reduced surface water runoff in the coastal areas and rapidly rising groundwater and salinity on the margins of the eastern Jarrah Forest and in the Woolbelt zones.

- Acceleration of land clearing and intensification of land use particularly on the Coastal Plain resulting in habitat loss, habitat fragmentation and habitat modification.

- The continuing spread of Pc and the absence of effective control techniques particularly in relation the threatened taxa. No landscape scale assessment or modelling of the biodiversity impacts of Pc across the region.

- Inappropriate fire regimes. This includes areas where fire intervals are too short to allow sufficient recovery of plant regeneration capacity and specialised fauna habitat (where long fire-intervals are required). In other areas, particularly Woolbelt reserves, there are currently very long interfire intervals, putting at risk plant species that are short-lived, and do not regenerate interfire.

- Weeds and Introduced animals

- Lack of community understanding of environmental issues and conservation values and in most cases lack of community support for conservation initiatives poses a barrier to biodiversity conservation. This includes other Government agencies at both the Local and State level that control or are involved in land and resource management and approvals and frequently support practices and uses that are in direct conflict with conservation values.

- Resources. Budgets, staff and skills not keeping pace with the increasing demands and expectations in regard to nature conservation output and outcomes.

4.6 REGIONAL NATURE CONSERVATION THREE YEAR OUTCOME TARGETS

T1	The condition of landscapes on those portions of the Coastal Plain and Woolbelt within the CALM South West Region will be maintained or improved by an xxha increase in the formal protection of regionally significant vegetation.
T2	The establishment of a biodiversity recovery catchment in the south east Collie area centred on Haddleton and Wild Horse Swamp Reserves.)
T3	The condition of remnant vegetation on the Scott Plain, Leeuwin-Naturaliste Ridge, Jarrah Forest and Islands and Wetlands/Ripraian zones within the CALM South West Region will be maintained.
T4	The condition of the existing and proposed conservation reserve system with an effective area of greater than 1000 ha will be maintained. Develop and implement a system of monitoring to report on this target.
T5	The decline in the overall condition of the existing and proposed conservation reserve system with an area of more than 150 ha will be reduced; with improved condition of selected/targeted significant reserves. Develop and implement a system of monitoring to report on this target.
T6	The condition of the existing and proposed marine parks and islands will be maintained with specific emphasis on sanctuary zones. Develop and implement a system of monitoring to report on this target.
T7	The decline in the condition of the parts of the Vasse-Wonnerup System Ramsar wetland managed by CALM in the South West region (Appendix 3 – List of significant wetlands in SW Region) will be reduced. Develop and implement a system of monitoring to report on this target.
T8	The condition of Cape-Leeuwin, Gingilup-Jasper, and Blackwood River (Lower Reaches) and Tributaries System(Directory of Important Wetlands of Australia) listed wetlands will be maintained. Develop and implement a system of monitoring to report on this target.
T9	The condition of eight Critically Endangered and five Endangered Threatened Ecological Communities (Appendix 4 – List of TECs) will be improved. Develop and implement a system of monitoring to report on this target.
T10	The condition of nine Vulnerable Threatened Ecological Communities (Appendix 4 – List of TECs) will be maintained. Develop and implement a system of monitoring to report on this target.
T11	Develop and implement a comprehensive system of monitoring to detect changes in health/condition of ecological communities and protected areas.
T12	Identify potential Threatened and Priority (Priority 1, 2 & 3) ecological communities within the CALM South West region (Appendix 5 – List of priority and data deficient ecological communities).
T13	The number of populations or population size or areal extent of the 17 Critically Endangered flora species will be increased.
T14	The number of populations or population size or areal extent of 16 Endangered flora species and 10 Vulnerable flora species (Appendix 6 – List of threatened flora) in the CALM South West Region will be maintained.
T15	The conservation status of 10% of P1 and P2 flora will be resolved and the conservation status of those P4 species that were former DRF in the CALM South West Region will be reviewed to ensure that they still meet P4 criteria.
T16	The number of populations or population size or areal extent of one Critically Endangered terrestrial fauna and one species of Endangered terrestrial fauna species with the CALM South West Region will be increased.
T17	Maintain the density or distribution of the populations of the six species of Vulnerable terrestrial fauna within the CALM South Region. (Appendix 7)
T18	The distribution and abundance of 33locally extinct and Threatened fauna species will be increased, and the conservation status of 158 Priority fauna found within the CALM South West Region (Appendix 7) will be resolved.
T19	Improve knowledge of the impact of threatening process (eg. *Phytophthora cinnamomi*, salinization, feral animals, weeds) on threatened species and communities through a collaborative research program.
T20	Review the regional NC program structure to develop a model of resource allocation that identifies staffing numbers, skill sets and funding that builds and provides capacity to achieve the NC targets in the next 3-year output plan.

5.0 LIST OF REGIONAL THREE YEAR CANDIDATE ACTIONS

The following section lists priority actions that need to be undertaken to meet the three year expected outcomes of Section 4.7. These have been arranged according to major asset categories.

5.1 LANDSCAPES

Target Three Year Outcome - T1 **The condition of landscapes on those portions of the Coastal Plain and Woolbelt within the CALM South West Region will be maintained or improved by an increase in the formal protection of regionally significant vegetation.**

Target Three Year Outcome T2 **The establishment of a biodiversity recovery catchment in the south east Collie area centred on Haddleton and Wild Horse Swamp Reserves.)**

Target Three Year Outcome – T3 **The condition of remnant vegetation on the Scott Plain, Leeuwin-Naturaliste Ridge, Jarrah Forest and Islands and Wetlands/Ripraian zones within the CALM South West Region will be maintained.**

Target Three Year Outcome T4 **The condition of the existing and proposed conservation reserve system with an effective area of greater than 1000 ha will be maintained. Develop and implement a system of monitoring to report on this target.**

Candidate Actions:

5.1.1 Develop protocols and processes for the regular and systematic analysis (including Gap analysis) of CAR reserve adequacy for identifying areas for inclusion into the PAS[1].

Primary Responsibility: Nature Conservation Division,

Support: Regional Leaders Nature Conservation (all regions), Director, Science Division, Manager, Species and Communities Branch (a Departmental Working Group is required)

Status: New

Indicative Cost: $50,000

Completion date: December 2007.

5.1.2 Extend the Mattiske-Havel type mapping to northern SCP and east to the borders of Swan and South West regions. The project should include a revision of the current mapping of the southern part of the Swan Coastal Plain and include detailed descriptions of "Site-Types" within each Vegetation Complex.

Primary Responsibility: Director, Science Division

Support: Regional Leaders Nature Conservation, Swan and South West, Manager, Species and Communities Branch

Status: New

Indicative Cost: $50,000

[1] Regular and structured CAR analysis process – tools used would depend on the types of information and quality of information available in terms of area of 'remnants', condition, veg type etc. [Do on IBRA sub-region basis]. Regionalisation of Off-reserve management processes. Need consistency of approach across Dept.

Completion date: December 2007.

5.1.3 Participate in the multi agency *Swan Bioplan* process to ensure that land use planning incorporates protection of areas significant for biodiversity conservation, including identification of additions to the protected area system for those areas of the Swan Coastal Plain outside of the Perth Metropolitan region.

Primary Responsibility: Regional Leader Nature Conservation to ensure that the protection of biodiversity values is adequately incorporated into the *Swan Bioplan* outcomes. [In cooperation with CALM Swan region]

Director, Science Division to provide data on the distribution and status of flora species on the Swan Coastal Plain.

Manager, Species and Communities Branch to confirm occurrences of TECs located during surveys by DoE and update of TEC database.

Department of Environment and Department of Planning and Infrastructure and relevant Local Government Authorities.

Status: New

Indicative Cost: $45,000 pa ($25,000 pa currently proposed to be provided by Department of Environment).

Completion date: December 2007.

5.1.4 Continue to provide input into land use planning processes in regard to the protection of high conservation value assets, including statutory planning, Environmental Impact Assessments, Applications for Clearing Permits (Area Permits) throughout the South West Region, and monitor conditions following approval and audit compliance with statutory obligations and managements plans to ensure biodiversity values are protected and maintained. .

Specific actions:

(a) Investigate development and incorporation of completion criteria into approvals for mining operations.
(b) Work cooperatively with other agencies to reduce the number of clearing approvals within the Coastal Plain, Scott and Woolbelt zones.

Primary Responsibility: Regional Planning Officer to coordinate input and provide advice.

Support: Regional Leader, Nature Conservation to provide advice in a regional context on biodiversity values and their protection.

Environmental Management Branch to provide advice on legislation and policy, and on cross-regional projects.

Status: Partly new

Indicative Funding: $200,000

Completion date: On-going with review in December 2008

5.1.5 Continue to apply Departmental environmental impact assessments processes for CALM managed lands, including fire management and sustainable use of resources (SFM and recreation). Update Departmental procedures for necessary operations and compatible operations on CALM lands to reflect 'best management practices. Monitor compliance with conditions and management plans to ensure biodiversity values are maintained.

Primary Responsibility: Regional Leader Nature Conservation to provide advice on regional biodiversity context and input into processes.

Support: Other Program Leaders (PVS, SFM, FMS)

Environmental Management Branch to update Departmental procedures for necessary operations and compatible operations; and provide advice on Departmental policy, standards and compliance.

Status: Ongoing and new.

Indicative Funding: $50,000

5.1.6 Acquire land, change land tenure or enter into perpetual nature conservation covenants or CALM Act 16 agreements to fill gaps in the conservation reserve system identified by the processes above (outlined in Candidate action 1) in the Coastal Plain, Leeuwin-Naturaliste Ridge, Scott Plain and Woolbelt Management Zones.

Primary Responsibility: Regional Planning officer to coordinate.

Support: Director, Nature Conservation to provide advice on State level priorities and advice on administration processes

Manager, Species and Communities Branch (covenants)

Park Policy and Services Branch to coordinate and carry out administrative tasks associated with acquisition and tenure changes.

Status: Ongoing

Indicative Cost: $50,000 to administer (excludes land purchases)

Completion date: On-going with review in December 2008

5.1.7 Create functional landscapes within the Woolbelt management zone and improve landscape functionality in the Coastal Plain, Scott Plain and Leeuwin-Naturaliste management zones by encouragement of sympathetic management of lands surrounding the conservation reserve system. Off-reserve measures to use appropriate tools in priority landscapes in cooperation with Regional and District NC staff.

Specific actions:

(a) Review and develop criteria for the identification of functional landscapes
(b) Coordinate and implement off-reserve program and develop suitable market-based instruments for targeted landscapes

Primary Responsibility: Managers, Species and Communities Branch and Natural Resources Branch, to coordinate and implement program and development of suitable market-based instruments for targeted landscapes.

Support: Regional Leader Nature Conservation to advise on regional biodiversity context and priorities.

District Nature Conservation Coordinators to assist with advice.

Status: Ongoing

Indicative Cost: $125,000 pa (cost of instruments unknown)

Completion date: On-going with review in December 2008

5.1.8 Work towards establishment of a biodiversity recovery catchment centred on the Haddleton and Wild Horse Swamp nature reserves.

Specific actions;

(a) Carry out hydrological investigations to establish threats and possible solutions to increased salinization within Haddleton Nature Reserve.
(b) Carry out full biological inventory of species and ecological communities within Wild Horse Swamp Nature Reserve (and other areas of remnant vegetation within the catchment) and threats to them. Propose listing of several ecological communities within the Haddleton and Wild Horse Swamp reserves as threatened.

Primary Responsibility:	Regional Leader Nature Conservation.
Support:	Director, Science Services, Director, Nature Conservation.
	District Nature Conservation Coordinators to assist with advice.
Status:	2008
Indicative Cost:	$130,000 pa
Completion date:	On-going with review in December 2008

5.2 NATIVE VEGETATION EXTENT AND CONDITION

Target Three Year Outcome T3 The condition of remnant vegetation on the Scott Plain, Leeuwin-Naturaliste Ridge, Jarrah Forest and Islands and Wetlands/Riparian zones within the CALM South West Region will be maintained

Candidate Actions:

5.2.1 Establish framework and methodology for determining ecosystem condition at IBRA sub-regional scale and within the protected area system, particularly in reserves of IUCN I-IV status.

Specific actions;
(a) From the above framework and methodology design and develop a regular monitoring program (including measures of success).
(b) Establish a network of monitoring sites
(c) Feed the results of the monitoring back into management interventions.

Primary Responsibility:	Director, Science Division and GIS section to take responsibility for the design and delivery of project.
Support:	Regional Flora Conservation Officer to provide input into project design and assist in field validation. [In cooperation with CALM Swan region which has a similar proposal]
Status:	New
Indicative Cost:	$50,000 one-off $100,000 per year for monitoring
Completion date:	December 2007

5.2.2 Complete first assessment of ecosystem condition of Management Zones within South West Region to establish a benchmark of current ecosystem condition [including both remote sensing and on-ground sampling]. This will assist in identifying geographic priorities in regard to threats for urgent conservation management in the Coastal Plain, Leeuwin-Naturaliste Ridge, Scott Plain, Riparian/Wetland and Woolbelt management zones within the CALM South West Region. This benchmark will enable future trends to be determined and priorities for urgent conservation management to be set.

Primary Responsibility: Regional Flora Conservation Officer to take lead in project at regional scale and develop project and methodology cognizant of State framework and undertake or arrange data collection and analysis.

Support: Director, Nature Conservation to take responsibility for the framework design and input into regional project.

Director, Science Division to provide input into project design, methodology and assist in data collection and analysis.

Status: New

Indicative Cost: $800,000 one-off (repeat on 5year cycle)

Completion date: June 2009.

5.3 PROTECTED AREA SYSTEM

Target Three Year Outcome T4 **The condition of the existing and proposed conservation reserve system with an effective area of greater than 1000 ha will be maintained. Develop and implement a system of monitoring to report on this target**

Target Three Year Outcome T5 **The decline in the overall condition of the existing and proposed conservation reserve system with an area of more than 150 ha will be reduced; with improved condition of selected/targeted significant reserves. Develop and implement a system of monitoring to report on this target**

Target Three Year Outcome T6 **The condition of the existing and proposed marine parks and islands will be maintained with specific emphasis on sanctuary zones. Develop and implement a system of monitoring to report on this target**

Candidate Actions:

5.3.1 Manage CALM lands within an adaptive experimental management framework. Identify 5 projects over the next three years where adaptive experimental management can be implemented, in partnership with Director, Science Division.

Specific actions; the following are the preferred projects;
(a) Fire regimes in small, fragmented reserves,
(b) Quokka habitat management (including rapid population and distribution assessment methods),
(c) Ecosystem rehabilitation processes, eg. Tuart forest.
(d) Develop improved recording systems and information dissemination to operational staff
(e) Project to be determined

Primary Responsibility: Regional Leader Nature Conservation to ensure that operations are conducted in an adaptive experimental management framework.

Support: Director, Science Division to provide science-based knowledge on bushland management.

Status: Some New

Indicative Cost: $250,000 per year.

5.3.2 Develop a prioritised list of reserves and other high nature conservation value areas requiring Interim Management Guidelines and management plans based on a value/threat analysis (with priority being given

to reserves/areas in wetlands and the Marine, Island, Scott and Woolbelt zones). Prepare a minimum of 6 Interim Management Guidelines by June 2008.

Primary Responsibility:	Regional Leader Nature Conservation
Support:	Regional Leader Estate Planning to supervise preparation of Interim Management Guidelines. District Nature Conservation Coordinators to assist Regional Leader in determining priorities. Management Planning Unit of Parks and Visitor Services Division to update and provide framework for IMGs and apply standards
Status:	New
Indicative Cost:	$60,000
Completion date:	June 2008.

5.3.3 Review and audit implementation of all existing management plans and Interim Management Guidelines. Prepare costed program for implementation of action listed in current Interim Management Guidelines and management plans by 2008.

Primary Responsibility:	Regional Planning Officer
Support:	Regional Leader Nature Conservation, District Nature Conservation Coordinators to assist in review. Management Planning Unit to provide guidance and support on methodology Director, Science Division to provide advice on priority of actions for implementation
Status:	New
Indicative Cost:	$20,000
Completion date:	December 2008

5.3.4 Describe the current fire regimes and practices on priority reserves in the Woolbelt and Swan Coastal Plain Management Zones (develop list of priority reserves) within the South West Region and assess the condition using monitoring systems developed under Candidate Action 5.2.2 so that management guidelines for the ecologically sustainable use of fire can be prepared by 2008.

Primary Responsibility:	Regional Leader Nature Conservation to develop and supervise project.
Support:	Regional Leader Fire to implement and report on outcomes. Director, Science Division to provide guiding principles and advice on ecologically appropriate fire regimes. Regional Leader Nature Conservation to provide guiding principles and advice on ecologically appropriate fire regimes.
Status:	New
Indicative Cost:	$50,000
Completion date:	June 2008

5.3.5 Document existing occurrence of feral pigs of reserves in the Scott Plain, Blackwood Plateau and Woolbelt management zones, complete a risk analysis of threat to biodiversity, develop an interim management strategy by June 2008.

Primary Responsibility: Regional Leader Nature Conservation

Support: District Nature Conservation Leaders to co-ordinate gathering of data and analysis.

Manager Environmental Management Branch to provide planning framework, standards and advice

Status: New

Indicative Cost: $50,000

Completion date: December 2009

5.3.6 Continue to implement Western Shield over current area of operations, including monitoring assets and threatening processes, fox control, and relevant fauna reconstruction activities.

Specific action;
(a) Continue to implement over current area of operations
(b) Bring large currently unbaited areas into the program (eg. Operation Foxglove control areas)

Primary Responsibility: Manager, Environmental Management Branch (Manager, Species and Communities Branch?) to coordinate and implement Western Shield.

Support: Director, Science Division to carry out research and provide direction on appropriate baiting regimes, non-target affects, meso-predator interactions and ecosystem processes.

Manager, Species and Communities Branch to provide advice on fauna reconstruction sites

Status: On-going

Indicative Cost: $110,000 p.a.

Completion date: On going with review in December 2008.

5.3.7 Progress the evolution of the Harvey bait factory into a self-sustaining business enterprise with a research and development emphasis.

Primary Responsibility: Manager, Environmental Management Branch (Manager, Species and Communities Branch?) to coordinate and implement Western Shield.

Support: Director, Science Division to carry out research and provide direction on appropriate baiting regimes, non-target affects, meso-predator interactions and ecosystem processes.

Status: On-going

Indicative Cost: $100,000 (first year grading to $50,000 in the second year)

Completion date: On going with review in December 2008.

5.3.8 Implement the actions prescribed in the Geographe Bay-Capes-Hardy Inlet marine reserve plan (when and if approved by the Minister). These include the gazettal and establishment of sanctuary zones implementation of a communication/education plan, compliance plan, and mooring control plan.

Primary Responsibility:	District Manager, Blackwood District to direct and coordinate actions.
Support:	Marine Conservation Branch to facilitate gazettal of sanctuary zone
Status:	New
Indicative Cost:	$0
Completion date:	December 2008.

5.3.9 Define recreation carrying capacity & acceptable change in national parks and conservation parks to achieve a balance between conserving the ecological functionality of the surrounding area and public use. Develop monitoring methods for assessing levels of change in regard to nature conservation values and social attitudes.

Primary Responsibility:	Regional Leader PVS.
Support:	Regional Leader, Nature Conservation
Status:	New
Indicative Cost:	$50,000
Completion date:	December 2008.

5.3.10 Continue implementation of strategic weed control measures with specific emphasis on: preventing establishment of new weed species, reducing the contribution of weeds as a threatening process to species and ecosystems at risk, meeting the Departments statutory obligations including commitments under the Good Neighbour Policy. Continue to raise awareness, within the general community, of environmental weeds and their impacts.

Primary Responsibility:	Regional Leader NC.
Support:	District Manager Blackwood, Wellington Regional Leader SFM/ PVS
Status:	Ongoing
Indicative Cost:	$500,000
Completion date:	December 2008.

5.4 WETLANDS/RIPARIAN

Target Three Year Outcome – T7 The decline in the condition of the parts of the Vasse-Wonnerup System Ramsar wetland managed by CALM in the South West region (Appendix 3) will be reduced. Develop and implement a system of monitoring to report on this project.

Target Three Year Outcome – T8 The condition of Cape-Leeuwin, Gingilup-Jasper and Blackwood River (Lower Reaches) and Tributaries System (Directory of Important Wetlands of Australia) listed wetlands will be maintained.

Candidate Actions:

5.4.1 Develop a management plan for the Vasse-Wonnerup System of wetlands.

Primary Responsibility:	Regional Planning Officer
Supported by:	District staff
	CALM South West Region – Regional Leader Nature Conservation
	Management Planning Unit
	Other State and Local government agencies
Status:	New
Indicative budget:	$100,000 per year for 2 years
Completion date:	December 2009.

5.4.2 Develop and implement condition monitoring programs (with regard to those elements for which each wetland is included on the national list) for the wetlands and identify future monitoring requirements and responsibilities. Analyse condition trends and update adaptive management targets on the basis of these trends.

Primary Responsibility:	Regional Leader Nature Conservation [in cooperation with CALM Warren region for Jasper-Gingilup]
Support:	District Nature Conservation Co-ordinators
	Director, Science Division to provide expertise in developing monitoring program.
Status:	New
Indicative Cost:	$100,000 over 3 years
Completion date:	December 2009.

5.4.3 Undertake a value/threat analysis of the listed wetlands (Appendix 3) and existing level of threat management. Develop a priority list of wetlands for the Swan Coastal Plain, Leeuwin Ridge, Scott Plain and Woolbelt requiring management actions or Interim Management Guidelines with regard to management of highest risk (probability and consequence) threatening processes including water quality, weeds, inappropriate fire regimes, wildfire and groundwater decline.

Primary Responsibility:	Regional Leader, Nature Conservation
Supported by:	District Nature Conservation Co-ordinators to review priority ranking.
	Regional Flora Conservation Officer to undertake threat and values analysis and produce priority ranking.
	Manager, Species and Communities Branch (Wetland Coordinator) to assist with off reserve wetlands.
Status:	New

Indicative budget: $20,000 each year

Completion date: December 2008.

5.4.4 Implement identified management actions or Interim Management Guidelines as outlined in candidate action 5.4.3

Primary Responsibility: Regional Leader, Nature Conservation

Supported by: District Nature Conservation Co-ordinators to develop works program

District staff to implement management actions

Manager, Species and Communities Branch (Wetland Coordinator) to assist with off reserve wetlands.

Status: New

Indicative budget: $50,000/year for implementation

Completion date: December 2008.

5.5 ECOSYSTEMS AT RISK

Target Three Year Outcome – T9 The condition of eight Critically Endangered and five Endangered Threatened Ecological Communities (Appendix 4 – List of TECs) will be improved. Develop and implement a system of monitoring to report on this target.

Target Three Year Outcome - T10 The condition of nine Vulnerable Threatened Ecological Communities (Appendix 4 – List of TECs) will be improved. Develop and implement a system of monitoring to report on this target.

Target Three Year Outcome T11 Develop and implement a comprehensive system of monitoring to detect changes in health/condition of ecological communities and protected areas.

Target Three Year Outcome - T12 Identify potential Threatened and Priority (Priority 1, 2 & 3) ecological communities within the CALM South West region (Appendix 5 – List of proposed threatened and data deficient ecological communities).

Candidate Actions:

5.5.1 Develop more open and accountable criteria for the assessment and approvals process for Departmental management actions (eg prescribed burning, fencing, trend monitoring) to be undertaken on Threatened Ecological Communities to audit and streamline the approvals process.

Primary Responsibility: Manager, Species and Communities Branch to coordinate the process for developing criteria in conjunction with Regional Services and Science representatives.

Supported by: Regional Leader Nature Conservation to provide a review for South West Region Threatened Ecological Communities.

Director, Nature Conservation to provide protocols.

Status: New

Indicative budget: $20,000

Completion date: December 2006.

5.5.2 Complete urgent actions identified in the interim recovery plans (and any urgent other actions identified by the Recovery Team) for 10 Critically Endangered Threatened Ecological Communities within the South West Region with a result of meeting the success criteria of each IRP.

Primary Responsibility: Manager, Species and Communities Branch to undertake review of conservation status.

Supported by: Regional Leader Nature Conservation to coordinate and arrange actions.

Blackwood and Wellington District Nature Conservation Coordinators to develop works programs.

Status: Ongoing

Indicative budget: $350,000 pa

Completion date: December 2008.

5.5.3 Conduct a review of the potential effects of climate change on the viability of threatened species and threatened ecological communities to inform future planning for translocations and other recovery actions.

Primary Responsibility: Director, Science Division

Supported by: Regional Flora Conservation Officer, Regional Leader Nature Conservation and Manager, Species and Communities Branch, to provide input to development.

Status: new

Indicative budget: $50,000 (one year)

5.5.4 Develop a framework for monitoring and evaluation of condition and health of threatened species and ecological communities (with prime focus on Critical Tecs) to allow regions to develop standardised monitoring procedures and ensure the long-term condition of Critically Endangered TECs.

Primary Responsibility: Manager, Species and Communities Branch to develop frameworks and methodologies to be applied across State.

Supported by: Regional Flora Conservation Officer, Regional Leader Nature Conservation and Director, Science Division to provide input (specify what is needed) to development. [State wide Departmental project]

Director Nature Conservation to provide protocols.

Status: New

Indicative budget: $50,000

5.5.5 Review Threatened Ecological Communities within the South West Region without existing IRPs and determine priorities for writing of new plans. Produce IRPs in accordance with SMART success criteria and monitoring procedures.

Primary Responsibility: Manager, Species and Communities Branch to undertake review of conservation status.

Supported by: Regional Leader Nature Conservation to coordinate and arrange actions

Regional Flora Conservation Officer, Blackwood and Wellington District Nature Conservation Coordinators to provide advice.

Status: New

Indicative budget: $70,000

Completion date: December 2006.

5.5.6 Identify and record further occurrences of Vulnerable Threatened Ecological Communities within the South West Region to determine which occurrences require the most urgent actions (eg priorities for possible acquisition, protection, management action).

Primary Responsibility: Regional Flora Conservation Officer, Regional Leader Nature Conservation, and Blackwood and Wellington District Nature Conservation Coordinators to provide advice.

Supported by: Manager, Species and Communities Branch to undertake analysis across full distribution of each TEC.

Status: New

Indicative Funding: $50,000 one off (may need repeat after 5 year interval?).

Completion date: June 2006.

5.5.7 Undertake hydrological change risk assessment for water-dependent TECs and high value reserves (particularly those in the Woolbelt Zone, at risk from salinization) leading to the development of a monitoring and mitigation program.

Primary Responsibility: Regional Leader Nature Conservation

Supported by: DOE

Status: New

Indicative Funding: $100,000 one off (may need repeat after 5 year interval?).

Completion date: June 2006.

5.5.8 Undertake hydrological change risk assessment for cave and karst features on the Leeuwin Ridge leading to the development of a monitoring and mitigation program and implementation.

Primary Responsibility: Regional Leader Nature Conservation

Supported by: DOE

Status: New

Indicative Funding: $500,000 one off

Completion date: June 2006.

5.5.9 Protect occurrences on CALM managed and other estate of the nine Vulnerable Threatened Ecological Communities within the South West Region to ensure that they are not degraded, and that the presence of these occurrences is included in planning processes.

Primary Responsibility:	Regional Leader Nature Conservation to coordinate and arrange actions.
Supported by:	Blackwood and Wellington District Nature Conservation Coordinators to implement monitoring and management actions.
Status:	Partly New
Indicative budget:	$20,000
Completion date:	December 2006.

5.5.10 Survey, and map occurrences of potential Threatened and Priority ecological communities within the South West Region to enable the conservation status of these communities to be established. The emphasis over the next 3 years will be on the Woolbelt, Jarrah Forest and Swan Coastal Plain.

Primary Responsibility:	Regional Flora Conservation Officer
Supported by:	Regional Leader Nature Conservation to coordinate and arrange actions
	Blackwood and Wellington District Nature Conservation Coordinators to coordinate surveys.
	Species and Communities Unit and Director, Science Division for advice and data
Status:	New
Indicative budget:	$20,000/ year over 3 years
Completion date:	December 2008.

5.5.11 Undertake research into methods for improved rehabilitation and restoration of threatened ecological communities in association with Science Services Division.

Primary Responsibility:	Regional Leader, Nature Conservation
Support:	Director, Science Division to provide input into methodology and assist in data collection and analysis.
	Regional Flora Conservation Officer
Status:	Ongoing
Indicative Cost:	$100,000 (per annum)

5.6 SPECIES AT RISK

Target Three Year Outcome T13 The number of populations or population size or areal extent of the 17 Critically Endangered flora species will be increased.

Target Three Year Outcome T14 The number of populations or population size or areal extent of 16 Endangered flora species and 10 Vulnerable flora species (Appendix 6 – List of threatened flora) in the CALM South West Region will be maintained.

Target Three Year Outcome T15 **The conservation status of 10% of P1 and P2 flora will be resolved and the conservation status of those P4 species that were former DRF in the CALM South West Region will be reviewed to ensure that they still meet P4 criteria.**

Target Three Year Outcome T16 **The number of populations or population size or areal extent of one Critically Endangered terrestrial fauna and one species of Endangered terrestrial fauna species with the CALM South West Region will be increased.**

Target Three Year Outcome T17 **Maintain the density or distribution of the populations of the six species of vulnerable terrestrial fauna within the CALM South West Region. (Appendix 7)**

Target Three Year Outcome T18 **The distribution and abundance of 33 locally extinct and Threatened fauna species will be increased, and the conservation status of 158 Priority fauna found within the CALM South West Region (Appendix 7) will be resolved.**

Target Three Year Outcome T19 **Improve knowledge of the impact of threatening process (eg. *Phytophthora cinnamomi*, salinization, feral animals, weeds) on threatened species and communities through a collaborative research programs.**

Candidate Actions:

5.6.1 Field survey, mapping and monitoring of known populations of 20 species of threatened flora within the South West Region identified in the South West Region Threatened Flora Recovery Plan, as the basis for the review of conservation status.

Primary Responsibility:	Regional Leader Nature Conservation to coordinate and arrange actions.
Supported by:	Regional Flora Conservation Officer, Wellington and Blackwood District Nature Conservation Coordinators, in collaboration with other Regional Leaders Nature Conservation as dictated by species distributions. Consultation with Kings Park and Botanic Gardens Manager, Species and Communities Branch to undertake review of conservation status
Status:	Ongoing
Indicative budget:	$50,000 pa
Completion date:	December 2008.

5.6.2 Seek to protect all known populations of threatened flora with priority given to DRF and P1within the South West Region identified in the South West Region Threatened Flora Recovery Plan.

Primary Responsibility:	Regional Leader Nature Conservation to coordinate and arrange actions.
Supported by:	Regional Flora Conservation Officer Wellington and Blackwood District Nature Conservation Coordinators to implement management actions.
Status:	Partly New
Indicative budget:	$150,000
Completion date:	December 2008.

5.6.3 Determine the life-history, population dynamics and vital habitat attributes of all Critically Endangered Flora and Fauna species within the South West as a basis for improving the recovery and management of theses species.

Primary Responsibility: Regional Leader Nature Conservation to coordinate and arrange actions

Supported by: Regional Flora Conservation Officer, Wellington and Blackwood District Nature Conservation Coordinators

Director, Science Division to provide advice and collaborate in adaptive management experiments.

Status: New

Indicative budget: $300,000 over 3 years

Completion date: December 2008.

5.6.4 Determine the requirements for land acquisition (or offset negotiation) in statutory land planning and environmental impact assessment processes to ensure no loss of populations of Critically Endangered taxa and communities within the South West Region

Primary Responsibility: Regional Leader Estate Planning to coordinate and arrange actions.

Director, Science Division to provide advice.

Regional Leader Nature Conservation to provide advice and regional priorities and context.

Supported by: Regional Flora Conservation Officer, Wellington and Blackwood District Nature Conservation Coordinators

Status: New

Indicative budget: $50,000 (excluding land purchase)

Completion date: December 2006.

5.6.5 Undertake a strategic threat analysis (Weeds, *Phytophthora cinnamomi*, native and introduced species grazing, and others) of 20 species of threatened flora within the South West Region, 5 threatened ecological communities and 5 threatened fauna as a basis for prioritising urgent management actions to ameliorate the threatening process(es). Interim management measures include monitoring threatening processes impacting populations and conducting urgent weed management action.

Primary Responsibility: Regional Leader Nature Conservation to coordinate and arrange actions in collaboration.

Supported by: Regional Flora Conservation Officer, Wellington and Blackwood District Nature Conservation Coordinators, Urban Nature Coordinator.

Director, Science Division to provide advice on threatening processes and ranking threats.

Status: New

Indicative budget: $100,000

Completion date: December 2008.

5.6.6 Field survey, mapping and monitoring of known populations of 11 Endangered and 22 vulnerable species within the South West Region identified in the South West Region Threatened Flora Recovery Plan, as the basis for the review of conservation status.

Primary Responsibility: Regional Leader Nature Conservation to coordinate and arrange actions.

Supported by: Regional Flora Conservation Officer, Wellington and Blackwood District Nature Conservation Coordinators, in collaboration with Regional Leaders Nature Conservation Southwest, Wheatbelt and Midwest.

Manager, Species and Communities Branch to undertake review of conservation status.

Consultation with Kings Park and Botanic Gardens

Status: New

Indicative budget: $250,000 p.a.

Completion date: December 2007.

5.6.7 Continue to provide input into land use planning processes, including statutory planning, Environmental Impact Assessments, Applications for Clearing Permits (Area Permits) throughout the South West Region, and monitor conditions following approval and audit compliance with statutory obligations and managements plans to ensure Endangered and Vulnerable flora species are protected and maintained.

Primary Responsibility: Regional Leader Estate Planning to coordinate input and provide advice.

Support: Regional Manager to ensure biodiversity values are adequately considered and addressed through these processes.

Regional Leader, Nature Conservation to provide advice in a regional context on biodiversity values and their protection.

Environmental Management Branch to provide advice on legislation and policy, and on cross-regional projects.

Status: Partly

Indicative Funding: $500,000 (currently Region allocates $350,000 pa).

Completion date: On-going with review in December 2008

5.6.8 Participate in a program of research into key threatening processes (eg. *Phytophthora cinnamomi* disease, salinization, feral animals, weeds) and their impacts on threatened species and communities.

Specific actions: (a) Investigate Fox & cat population dynamics and impacts in fragmented landscapes.
(b) Gather benchmark information on selected populations of introduced animals (eg. pigs in eastern reserves, cats in Noisy Scrub-bird habitat).

Primary Responsibility: Regional Leader Nature Conservation.

Support: Director, Science Services Division

Status: New

Indicative Funding: $100,000

Completion date: On-going with review in December 2008

5.7 Program management

Three Year Target Outcome – T20 Review the regional NC program structure to develop a model of resource allocation that identifies staffing numbers, skill sets and funding that builds and provides capacity to achieve the NC targets in the next 3-year output plan.

Candidate Actions:

5.7.1 Develop a draft 3-year works program for 2009-2012 and review the regional NC program structure to allow us to have the resources and processes to achieve the future targets.

Specific actions: (a) Carry out a functional review for all NC roles within the regional structure to align them to core NC business and maximise achievement of NC outputs.
(b) Recognize the value of dedicated project officers to achieve short- to medium-term tasks with high NC value assets.
(c) Appoint an estate planning officer to service internal regional planning requirements, such as interim management guidelines, transferring of tenure, area management plans.
(d) Create planning officer positions in each district to address statutory planning and development application workloads.
(e) Appoint Regional NRM co-ordinator
(f) Appoint Regional Ecologist

Primary Responsibility: Regional Manager, South West

Support: Regional Leader Nature Conservation

Status: New

Indicative Funding: $100,000

Completion date: *On-going with review in* December 2008

6.0 RESOURCE ANALYSIS

1. What is the actual or estimated cost (includes salaries, wages, plant, materials, contract and overheads) pa and over 3 years of each candidate action?

2. What is the total annual cost (includes salaries, wages, plant, materials, contract and overheads) from each of those candidate actions or part of a candidate action that are currently being implemented?

3. What are the actions and their estimated cost for those actions that are currently undertaken in the Region that do not contribute to the completion of a candidate action(s) or part thereof?

4. Comparing items 2 and 3 what actions (if any) and what total savings (includes salaries, wages, plant, materials, contract and overheads) arise from any actions that could be dropped out of the current Nature Conservation SPA?

5. What are the sources of funds (specify e.g. Western Shield, SAP, NRM, CALM Recurrent, Other Outputs etc) and the amounts used to implement the candidate actions?

7.0 MEASURING EFFECTIVENESS AND PROGRESS OF PLAN

Progress against each of the three year outcome targets listed in the table, Section 3, above will be used to indicate whether or not the management actions implemented have been effective.

Efficiency will be evaluated through the Service Provider Agreement process and will examine the levels of resources used to achieve each target outcome and outline performance measures.

Progress with implementation of the candidate actions will be reported biannually in conjunction with the Service Provider Agreement.

The plan will be reviewed annual to validate new and ongoing candidate actions, provide for emerging issues and inform the development of each annual Service Provider Agreement.

8.0 APPENDICES

Appendix 1 Matrix of values/assets and threats and relative importance for regional Scale Actions for CALM South West Region

'H' (high) equals major threats at the sub-regional scale that affect the decline in number & spatial extent of species & ecosystems & ecosystem condition Threats may be ranked, if desired, either within or between sub-regions *Significant wetlands* includes Ramsar sites, National Register and regionally important wetlands.

Appendix 1 continued

IBRA REGIONS		Lack of understanding	Hydrological change	Clearing and fragmentati	Post clearing land use	Fire	Phytophthora	People & their attitudes	Disease & Pests	Climate change	Weeds & Introduced animals	Integration in CALM	Totals
BIODIVERSITY Values	**Swan Coastal Plain**												
	High flora diversity			H			H						2
	Rem veg (veg comm's)		H	H			H	H					4
	Wetlands/riparian		H		H		H			H	H		5
	Species at risk	H	H		H		H				H	H	6
	Ecosystems at risk	H	H	H	H		H				H		6
	Range limits, disjunct taxa/complexes	H		H	H								3
	Protected area system	H		H	H	H	H	H			H	H	8
	Totals	**4**	**4**	**5**	**5**	**1**	**6**	**2**		**1**	**4**	**2**	**34**
													34
	Warren												
	High flora diversity(Scott, LN Ridge)		H	H		H	H						4
	Rem veg (veg comm's)			H									1
	Wetlands/riparian		H		H					H	H		3
	Species at risk	H			H	H	H			H	H		6

	Ecosystems at risk (eg: caves, LN ridge)	H	H		H		H						**4**
	Aquatic fauna – caves	H	H							H			**2**
	Range limits, disjunct taxa/complexes	H		H	H								**3**
	Protected area system				H							H	**2**
	Corridors			H	H			H					**3**
	Islands	H				H		H			H		**4**
	Totals	**4**	**3**	**4**	**6**	**3**	**3**	**2**		**3**	**3**	**1**	**32**
													32
	Jarrah 1 & 2												
	Blwd Plat forest	H					H						**2**
	Protected area system	H		H			H				H		**4**
	Wetlands/riparian					H	H			H	H		**4**
	Species at risk				H	H	H				H	H	**5**
	Ecosystems at risk (eg small east reserves, east rem veg)	H	H				H				H		**4**
	Other CALM Estate	H		H			H	H			H		**5**
	Totals	**4**	**1**	**2**	**1**	**2**	**6**	**1**		**1**	**5**	**1**	**24**
													24

Appendix 2 Potential Science Division partnerships in South West Region Candidate Actions

Candidate action	Description	Primary responsibility	Support/advice
5.11	Develop protocols and processes for the regular and systematic analysis of CAR reserve adequacy for identifying areas for inclusion into the Protected Area System		[
5.1.2	Extend the Mattiske-Havel type mapping to northern SCP and east to the borders of Swan and South West regions. The project should include a revision of the current mapping of the southern part of the Swan Coastal Plain and include detailed descriptions of "Site-Types" within each Vegetation Complex.	[	
5.1.3	Participate in the multi agency *Swan Bioplan* process to ensure that land use planning incorporates protection of areas significant for biodiversity conservation, including identification of additions to the protected area system for those areas of the Swan Coastal Plain outside of the Perth Metropolitan region.		[
5.1.8	Work towards establishment of a biodiversity recovery catchment centred on the Haddleton and Wild Horse Swamp nature reserves. Carry out hydrological investigations to establish threats and possible solutions to increased salinization within Haddleton Nature Reserve. Carry out full biological inventory of species and ecological communities within Wild Horse Swamp Nature Reserve and threats to them. Propose listing of several ecological communities within the Haddleton and Wild horse Swamp reserves as threatened.		[
5.2.1	Establish framework and methodology for determining ecosystem condition at IBRA sub-regional scale and within the protected area system, particularly in reserves of IUCN I-IV status. This will provide the basis for regular monitoring, which will allow more considered management interventions and allow for measure of success in an adaptive management framework	[2	
5.2.2	Complete first assessment of ecosystem condition of Management Zones within South West Region to establish a benchmark of current ecosystem condition This will assist in identifying geographic priorities in regard to threats for urgent conservation and enable future trends to be determined and priorities for urgent conservation management to be set for the region.		[
5.2.3	Establish a network of monitoring sites, drawing on information provided by the two previous actions, throughout the region that will enable the detection of changes in ecosystem condition.		[
5.3.1	Manage CALM lands within an adaptive experimental management framework. Identify 5 projects over the next three years where adaptive experimental management can be implemented, in partnership with Director, Science Division. The following are the preferred projects; Fire regimes in small, fragmented reserves, quokka habitat management (including rapid population and distribution assessment methods), ecosystem rehabilitation processes, eg. Tuart forest.		[
5.3.3	Review and audit implementation of all existing management plans and Interim Management Guidelines. Prepare costed program for implementation of action listed in current Interim Management Guidelines and management plans by 2008.		[
5.3.4	Describe the current fire regimes and practices on priority reserves in the Woolbelt and Swan Coastal Plain Management Zones (develop list of priority reserves) within the South West Region and assess the impacts on condition so that management guidelines for the ecologically sustainable use of fire can be prepared by 2008.		[

[2] Together with GIS section of IMB.

5.3.6	Continue to implement Western Shield over the current area, including monitoring assets and threatening processes, fox control, and relevant fauna reconstruction activities		[
5.3.7	Progress the evolution of the Harvey bait factory into a self-sustaining business enterprise with a research and development emphasis.		[
5.4.2	Develop and implement condition monitoring programs (with regard to those elements for which each wetland is included on the national list) for the wetlands and identify future monitoring requirements and responsibilities. Analyse condition trends and update adaptive management targets on the basis of these trends.		[
5.5.3	Conduct a review of the potential effects of climate change on the viability of threatened species and threatened ecological communities to inform future planning for translocations and other recovery actions.		[
5.5.10	Survey, and map occurrences of potential Threatened and Priority ecological communities within the South West Region to enable the conservation status of these communities to be established. The emphasis over the next 3 years will be on the Woolbelt, Jarrah Forest and Swan Coastal Plain.		[
5.5.11	Establish a network of monitoring sites, drawing on information provided by the two previous actions, throughout the region that will enable the detection of changes in ecosystem condition.		[
5.5.12	Undertake research into methods for improved rehabilitation and restoration of threatened ecological communities in association with Science Services Division.		[
5.6.3	Determine the life-history, population dynamics and vital attributes of all Critically Endangered Flora and Fauna species within the South West as a basis for improving the recovery and management of theses species.		[
5.6.4	Determine the requirements for land acquisition (or offset negotiation) in statutory land planning and environmental impact assessment processes to ensure no loss of populations of Critically Endangered taxa and communities within the South West Region		[
5.6.5	Undertake a strategic threat analysis (Weeds, *Phytophthora cinnamomi*, native and introduced species grazing, and others) of 20 species of threatened flora within the South West Region and 5 threatened ecological communities as a basis for prioritising urgent management actions to ameliorate the threatening process(es). Interim management measures include monitoring threatening processes impacting populations and conducting urgent weed management action.		[
5.6.8	Participate in a program of research into key threatening processes (eg. *Phytophthora cinnamomi* disease, salinization, feral animals, weeds) and their impacts on threatened species and communities. Specific actions: (a) Investigate Fox & cat population dynamics and impacts in fragmented landscapes. (b) Gather benchmark information on selected populations of introduced animals (eg. pigs in eastern reserves, cats in Noisy Scrub-bird habitat)		[

Appendix 3. Significant wetland systems in the South West Region

Internationally recognized
Vasse-Wonnerup System (Ramsar wetland)

In Directory of Nationally Important Wetlands
McCarley's Swamp (Ludlow Swamp)
Yalgorup Lakes System
Cape Leeuwin System
Gingilup – Jasper Wetland System
Blackwood River (Lower Reaches) and Tributaries System

Regionally important
Lake Towerrinning
Leschenault Inlet and Estuary
Ludlow River
Margaret River
St John Brook
McLeod Creek
Chapman Brook
Spearwood Creek
Adelaide Creek
Scott River
Lake Quitjup
Collie River, Cox's Pool
Lake Yourdamung
Dingo Swamp
Lake Ngartaminny
Black Point Swamp

Appendix 4. Threatened Ecological Communities in the CALM South West Region

Community Identifier	Community Name	Category of Threat
SCP19	Sedgelands in Holocene dune swales of the southern Swan Coastal Plain	CR B ii
SCP10b	Shrublands on southern Swan Coastal Plain Ironstones (Busselton area)	CR B ii
CAVES LEEUWIN01	Aquatic Root Mat Community Number 1 of Caves of the Leeuwin Naturaliste Ridge	CR B i, ii
CAVES LEEUWIN02	Aquatic Root Mat Community Number 2 of Caves of the Leeuwin Naturaliste Ridge	CR B i, ii
CAVES LEEUWIN03	Aquatic Root Mat Community Number 3 of Caves of the Leeuwin Naturaliste Ridge	CR B i, ii
CAVES LEEUWIN04	Aquatic Root Mat Community Number 4 of Caves of the Leeuwin Naturaliste Ridge	CR B i, ii
SCP3c	Eucalyptus calophylla – Xanthorrhoea preissii woodlands and shrublands, Swan Coastal Plain	CR B ii
CAVES SCP01	Aquatic Root Mat Communities of Caves of the Swan Coastal Plain	CR B i, ii
SCOTT IRONSTONE	Scott River Ironstone Association	EN B i, ii
SCP20b	Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain	EN B i, ii
Augusta-microbial	Rimstone Pools and Cave Structures Formed by Microbial Activity on Marine Shorelines	EN B ii
SCP02	Southern wet shrublands, Swan Coastal Plain	EN B ii
SCP10a	Shrublands on dry clay flats	EN B ii
SCP18	Shrublands on calcareous silts of the Swan Coastal Plain	VN B
SCP1b	Eucalyptus calophylla woodlands on heavy soils of the southern Swan Coastal Plain	VN B
SCP3b	Eucalyptus calophylla – Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain	VN B
MEELUP GRANITES	Calothamnus graniticus heaths on south west coastal granites	VN B
SCP07	Herb rich saline shrublands in clay pans	VN B
SCP08	Herb rich shrublands in clay pans	VN B
SCP09	Dense shrublands on clay flats	VN B
SCP15	Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain	VN C
Muchea	Shrublands and Woodlands on Muchea Limestone	

Appendix 5. Priority and data deficient ecological communities of the South West Region.

Ecological community	Comment
Low shrublands on grey-brown sands associated with granite gneiss outcrop of the Willyabrup soil-landscape system (near Gracetown).	Being nominated as a threatened ecological community
Herbfields of the eastern Jarrah Forest bioregion	One occurrence known – in Wildhorse Swamp Nature Reserve – needs further survey
Woodlands and shrublands of the alluvial soils of the upper Blackwood River (Condinup and Darkan 5f soil-landscape sub-systems)	Nominated as a threatened ecological community
Freshwater wetlands of the eastern Jarrah Forest Bioregion (Eulin Uplands and Dwellingup soil-landscape systems) (Camballan Swamp, Dingo Swamp, Lake Ngartiminy and others).	Further investigated required - possibly nominated as a threatened ecological community/ (ies)
Augusta Ironstone community (A. Brown pers. comm.)	Priority 1
Relictual mangrove community (Bunbury)	Priority 1
Agonis linearifolia, Acacia pulchella thicket (Rosa Glen variant). South of Margaret River. Lotus reeds invading. (A. Weston pers comm.)	Priority 2
Melaleuca lanceolata forests, Leeuwin Naturaliste Ridge (A. Weston, N. Gibson pers comm.)	Priority 2. Survey carried out, and report in preparation
Basalt association (Black Point - near Augusta) (R. Hearn pers. comm.)	Priority 2
Deeper seasonal wetlands on sandy soils (Swan Coastal Plain) (Community 14, Gibson et al. (1994))	Priority 2
Banksia ilicifolia woodlands (Community 22, Gibson et al. (1994))	Priority 2
Estuarine samphire flats (Priority Landscape).Includes areas of Vasse-Wonnerup wetland system, Bennett Brook, areas of Peel Inlet and Harvey Estuary, areas of Leschenault Inlet, Garrett Rd Ascot, Alfred Cove, Broke Inlet, Oyster Harbour, Surrey Rd Rivervale occurrences; insufficient information to distinguish discrete community type/s) (J. Lane and L. Pen pers. comm.)	Priority 3. Some identified associations to be nominated as threatened ecological communities.
Eucalyptus haemotoxylon - Eucalyptus marginata woodlands on Whicher foothills (Community 1a, Gibson et al. (1994))	Priority 3
Quindalup *Eucalyptus gomphocephala* and / or *Agonis flexuosa* woodlands (Community 30b, Gibson et al. (1994))	Priority 3
Southern *Banksia attenuata* woodlands (Community 21b, Gibson et al. (1994))	Priority 3
Low lying *Banksia attenuata* woodlands or shrublands (Community 21c, Gibson et al. (1994))	Priority 3

Appendix 6. Threatened and Priority Flora in the CALM South West Region.

Species	Pr_code	Threat
Brachyscias verecundus	R	CR
Caladenia busselliana	R	CR
Caladenia caesarea subsp. *maritima*	R	CR
Caladenia huegelii	R	CR
Caladenia procera	R	CR
Caladenia viridescens	R	CR
Darwinia sp. Williamson (GJ Keighery 12717) [aff. *apiculata*]	R	CR
Drakaea confluens ms	R	CR
Eucalyptus phylacis x	R	CR
Gastrolobium papilio	R	CR
Grevillea brachystylis subsp. *grandis* ms	R	CR
Grevillea maccutcheonii	R	CR
Lambertia echinata subsp. *occidentalis*	R	CR
Petrophile latericola ms	R	CR
Rulingia sp. Trigwell Bridge (R Smith s.n. 20/6/89)	R	CR
Verticordia plumosa var. ananeotes	R	CR
Caladenia bryceana subsp. *bryceana*	R	CR
Boronia exilis	R	E
Caladenia dorrienii	R	E
Caladenia excelsa	R	E
Darwinia ferricola ms	R	E
Diuris purdiei	R	E
Drakaea elastica	R	E
Drakaea micrantha ms	R	E
Dryandra nivea subsp. *uliginosa*	R	E
Dryandra squarrosa subsp. *argillacea*	R	E
Grevillea brachystylis subsp. *australis*	R	E
Grevillea elongata	R	E
Grevillea rara	R	E
Jacksonia velveta ms	R	E
Kennedia macrophylla	R	E
Lambertia orbifolia subsp. Scott River Plains (LW Sage 684)	R	E
Verticordia densiflora var. *pedunculata*	R	E
Verticordia plumosa var. *vassensis*	R	E
Caladenia harringtoniae	R	V
Chamelaucium roycei ms	R	V
Daviesia elongata subsp. *elongata*	R	V
Diuris micrantha	R	V
Dryandra aurantia	R	V
Dryandra mimica	R	V
Eleocharis keigheryi	R	V
Gastrolobium modestum	R	V
Laxmannia jamesii	R	V
Meziella trifida	R	V
Tetraria australiensis	R	V
Wurmbea calcicola	R	V
Leptomeria dielsiana	X	X
Andersonia ferricola ms	1	
Boronia humifusa	1	
Boronia juncea subsp. *juncea*	1	
Caladenia uliginosa subsp. *patulens*	1	
Carex tereticaulis	1	
Caustis sp. Boyanup (GS McCutcheon 1706)	1	
Conospermum caeruleum subsp. *contortum*	1	
Eucalyptus mundijongensis x	1	
Gastrolobium sp. Dardanup (S Dilkes s.n. 1/9/1969)	1	
Pericalymma megaphyllum	1	
Philydrella pygmaea subsp. *minima*	1	
Scaevola ballajupensis	1	
Schoenus indutus	1	
Schoenus sp. Jindong (RD Royce 2485)	1	
Sphaerolobium benetectum	1	
Stylidium tylosum	1	
Synaphea decumbens	1	
Synaphea macrophylla	1	
Synaphea nexosa	1	
Synaphea odocoileops	1	
Thomasia laxiflora	1	
Thysanotus formosus	1	
Acacia oncinophylla subsp. *patulifolia*	2	
Acacia subracemosa	2	
Actinotus whicheranus	2	
Amperea micrantha	2	
Apodasmia ceramophila ms	2	
Boronia capitata subsp. *gracilis*	2	

Caladenia abbreviata	2
Caladenia caesarea subsp. *transiens*	2
Caladenia lodgeana	2
Calothamnus sp. Scott River (RD Royce 84) [aff. crassus]	2
Calytrix sp. Tutunup (GJ Keighery & N Gibson 2953)	2
Cardamine paucijuga	2
Chordifex jacksonii ms	2
Conospermum quadripetalum	2
Craspedia argillicola	2
Diuris heberlei	2
Dryandra subpinnatifida var. *imberbis*	2
Eucalyptus relictua ms	2
Fabronia hampeana	2
Grevillea manglesioides subsp. *ferricola*	2
Haloragis aculeolata	2
Hybanthus volubilis	2
Hydrocotyle hamelinensis ms	2
Leptomeria furtiva ms	2
Melaleuca incana subsp. Gingilup (N Gibson & M Lyons 593)	2
Millotia tenuifolia var. *laevis*	2
Mitreola minima	2
Schoenus capillifolius	2
Schoenus loliaceus	2
Synaphea petiolaris subsp. *simplex*	2
Trichocline sp. Treeton (BJ Keighery & N Gibson 564)	2
Xyris maxima	2
Acacia inops	3
Acacia lateriticola glabrous variant (BR Maslin 6765)	3
Acacia semitrullata	3
Actinotus sp. Walpole (JR Wheeler 3786)	3
Adenanthos cygnorum subsp. *chamaephyton*	3
Amperea protensa	3
Andersonia amabile ms	3
Aotus cordifolia	3
Astroloma microcalyx	3
Blennospora doliiformis	3
Boronia anceps	3
Boronia tetragona	3
Bossiaea disticha	3
Calytrix pulchella	3
Chamaescilla gibsonii	3
Chordifex gracilior	3
Chorizema carinatum	3
Conospermum paniculatum	3
Cyathochaeta stipoides	3
Dampiera heteroptera	3
Eryngium ferox ms	3
Eryngium subdecumbens ms	3
Gahnia sclerioides	3
Galium migrans	3
Gonocarpus pusillus	3
Grevillea brachystylis subsp. *brachystylis*	3
Grevillea papillosa	3
Grevillea prominens	3
Hakea oldfieldii	3
Hakea tuberculata	3
Haloragis tenuifolia	3
Hemigenia microphylla	3
Hibbertia spicata subsp. *leptotheca*	3
Isopogon formosus subsp. *dasylepis*	3
Jansonia Formosa	3
Johnsonia inconspicua	3
Lasiopetalum membranaceum	3
Lepyrodia heleocharoides	3
Loxocarya magna	3
Meeboldina thysanantha ms	3
Myriophyllum echinatum	3
Pimelea ciliata subsp. *longituba*	3
Platysace ramosissima	3
Pultenaea pinifolia	3
Rhodanthe pyrethrum	3
Schoenus benthamii	3
Schoenus sp. Waroona (GJ Keighery 12235)	3
Sphenotoma parviflorum	3
Stylidium barleei	3
Stylidium leeuwinense	3
Stylidium longitubum	3
Stylidium rhipidium	3
Synaphea hians	3

Synaphea otiostigma	3
Tetratheca parvifolia	3
Thomasia triloba	3
Thysanotus gageoides	3
Verticordia attenuata	3
Xanthoparmelia hypoleia	3
Acacia cuneifolia	4
Acacia flagelliformis	4
Acacia tayloriana	4
Adenanthos detmoldii	4
Adenanthos pamela x	4
Anthotium junciforme	4
Aotus carinata	4
Aponogeton hexatepalus	4
Astartea sp. Scott River (D Backshall 88233)	4
Banksia meisneri subsp. *ascendens*	4
Boronia tenuis	4
Caladenia arrecta	4
Caladenia longicauda subsp. *clivicola*	4
Caladenia plicata	4
Caladenia speciosa	4
Caladenia triangularis x	4
Calothamnus graniticus subsp. *graniticus*	4
Calothamnus sp. Whicher (BJ Keighery & N Gibson 230)	4
Chamelaucium erythrochlorum ms	4
Chordifex isomorphus	4
Conostylis pauciflora subsp. *pauciflora*	4
Drosera occidentalis subsp. *occidentalis*	4
Dryandra preissii	4
Dryandra sessilis var. *cordata*	4
Eucalyptus calcicola subsp. *calcicola*	4
Eucalyptus marginata x *megacarpa*	4
Eucalyptus rudis subsp. *cratyantha*	4
Franklandia triaristata	4
Grevillea ripicola	4
Hakea sp. Yalgorup (B Keighery and N Gibson 897)	4
Hypocalymma cordifolium subsp. *minus* ms	4
Jacksonia sparsa ms	4
Lambertia rariflora subsp. *rariflora*	4
Lasiopetalum cardiophyllum	4
Melaleuca basicephala	4
Microtis media subsp. *quadrata*	4
Pultenaea skinneri	4
Reedia spathacea	4
Schoenus natans	4
Senecio leucoglossus	4
Stylidium ireneae	4
Tripterococcus brachylobus ms	4
Tyrbastes glaucescens	4
Verticordia lehmannii	4
Villarsia submersa	4

Appendix 7. Threatened and Priority Fauna in the CALM South West Region

Threatened fauna

Species	Ranking
Geocrinia alba, White-bellied Frog	CR
Engaewa pseudoreducta	CR
Cherax tenuimanus Margaret River subsp., Margaret River Marron	CR
Calyptorhynchus latirostris, Carnaby's Black-Cockatoo	EN
Engaewa reducta	EN
Macronectes giganteus Southern Giant Petrel	EN
Balaenoptera musculus musculus, Blue Whale ('true' subspecies)	EN
Pseudocheirus occidentalis, Nguara, Western Ringtail Possum	VU
Dasyurus geoffroii, Chuditch, Western Quoll	VU
Geocrinia vitellina, Orange-bellied Frog	VU
Myrmecobius fasciatus, Numbat, Walpurti	VU
Setonix brachyurus, Quokka	VU
Eubalaena australis, Southern Right Whale	VU
Megaptera novaeangliae, Humpback Whale	VU
Procellaria aequinoctalis, White-chinned Petrel	VU
Diomedea epomophora, Southern Royal Albatross	VU
Diomedea exulans, Wandering Albatross	VU
Diomedea gibsoni, Gibson's Albatross	VU
Phoebetria fusca, Sooty Albatross	VU
Phoebetria palpebrata, Light-mantled Albatross	VU
Thalassarche carteri, Indian Yellow-nosed Albatross	VU
Thalassarche cauta, Shy Albatross	VU
Thalassarche chlororhynchos, Atlantic Yellow-nosed Albatross	VU
Thalassarche chrysostoma, Grey-headed Albatross	VU
Morus capensis, Cape Gannet	VU
Botaurus poiciloptilus, Australasian Bittern	VU
Rostratula benghalensis australis, Australian Painted Snipe	VU
Catharacta lonnbergi lonnbergi, Subantarctic Skua (southern)	VU
Calyptorhynchus baudinii, Baudin's Black-Cockatoo	VU
Atrichornis clamosus, Tjimiluk, Noisy Scrub-bird	VU
Carcharias taurus, Grey Nurse Shark	VU
Carcharodon carcharias, Great White Shark	VU
Austroassiminea letha, Cape Leeuwin Freshwater Snail	VU
Calyptorhynchus banksii naso, Forest Red-tailed Black-Cockatoo	??

Priority fauna

MAMMALIA

Phascogale tapoatafa, Brush-tailed Phascogale
Isoodon obesulus fusciventer, Quenda, Southern Brown Bandicoot
Bettongia penicillata ogilbyi, Woylie
Macropus eugenii derbianus, Tammar Wallaby
Macropus irma, Kwoora, Western Brush Wallaby
Falistrellus mackenziei, Western False Pipistrelle
Hydromys chrysogaster, Rakali or Water Rat
Stenella longirostris, Spinner Dolphin

AVES

Thalassarche melanophrys, Black-browed Albatross
Ixobrychus flavicollis, Black Bittern (SW population)
Ixobrychus minutus, Little Bittern
Numenius madagascariensis, Eastern Curlew
Charadrius rubricollis rubricollis, Hooded Plover (western subspecies)
Burhinus grallarius, Bush Stonecurlew
Calyptorhynchus banksii naso, Forest Red-tailed Black-Cockatoo
Numenius madagascariensis, Eastern Curlew
Charadrius rubricollis rubricollis, Hooded Plover (western subspecies)
Burhinus grallarius, Bush Stonecurlew
Ninox connivens connivens, Barking Owl (southwest population)
Tyto novaehollandiae novaehollandiae, Masked Owl
Falcunculus frontatus leucogaster, Crested Shrike-tit (south-western subsp.)

REPTILIA

Morelia spilota imbricata, Carpet Python (south-west)
Ctenotus delli, Dell's Skink
Glaphyromorphus 'koontoolasi'

CEPHALASPIDOMORPHI (Lampreys and hag fish)

Geotria australis, Pouched Lamprey

ACTINOPERYGII (Bony fishes)

Phycodurus eques, Leafy Sea Dragon
Galaxiella munda, Mud Minnow
Galaxiella nigrostriata, Black-stripe Minnow
Nannatherina balstoni, Balston's Pygmy Perch

INSECTA

CRICKETS
Kawaniphila pachomai
Pachysaga munggai
Pachysaga strobila

ARACHNIDA (Spiders, ticks, mites, etc.)
Arbanitis inornatus,
GASTROPODA (Marine, freshwater and terrestrial snails)
Bothriembryon irvineanus
BIVALVIA (Bivalves)
Westralunio carteri