Department of Environment and Conservation
Science Division

A Strategic Plan for Biodiversity Conservation Research

2008 – 2017




ACT NOW FOR THE FUTURE

Department of Environment and Conservation
Our environment, our future

Introduction

The Science Division is the Department of Environment and Conservation's (DEC's) prime source of new knowledge and information based on scientific research. The work of this division reflects a significant investment by DEC in multi-disciplinary biodiversity conservation research, monitoring and biogeography. In partnership with internal and external groups, the division strives to understand composition, patterns and processes of the Western Australian marine and terrestrial biota as a basis for its conservation and sustainable utilisation. Having a significant centralised and coordinated science capability is one of DEC's strengths, and recognises the vital role of science and information in underpinning its policies and practices to conserve and protect the State's biodiversity.

Strategic planning is an important process for ensuring that the Science Division efficiently and effectively delivers outcomes that are relevant to the present and also meet the future needs of DEC. This plan does not extend to science-based biodiversity conservation programs that may be initiated by other divisions within DEC, nor does it include astronomical research and other activities carried out by the Perth Observatory, a program within the Science Division. This plan summarises key strategic directions for the Science Division in biodiversity conservation research for the period 2008–2017. However, given the dynamic nature of the social, political and economic environment, the plan will need to be reviewed every two years.

The plan is consistent with the objectives and strategies elucidated in DEC's Corporate Plan 2007–2009 (DEC 2007), 'A 100-year Biodiversity Conservation Strategy for Western Australia (Draft); Phase One: Blueprint to the Bicentenary in 2029' (DEC 2006), the 'Forest Management Plan 2004–2013' (Conservation Commission of Western Australia 2004), and with the rolling five-year Regional Nature Conservation Service Plans (DEC 2006). It reviews the division's strengths and weaknesses as well as threats to and opportunities for the division, and presents statements relating to the division's vision, mission, goals and strategies.

The plan has been developed to identify key future directions and priorities. In doing so, planning has not been entirely constrained by what may be possible to achieve with existing resources. The plan is aspirational and identifies areas of greatest strategic importance and highest priority. The appendices indicate what can be achieved with existing resources and what actions require new resources. It will be the responsibility of the Science Director, with support from the Science Management Team, to work towards developing and implementing strategies to resource the implementation of the plan, including human and financial resources. Detailed Science Project Plans (SPPs) will be developed for approved priority research areas.

Vision

Sound science supporting the conservation of Western Australia's biodiversity.

Mission

The central purpose and role of the Science Division is to:

Provide up-to-date and scientifically sound information to uphold effective, evidence-based conservation of biodiversity and sustainable natural resource management in Western Australia.

SWOT Analysis

This strategic plan is developed in the context of the following key strengths, weaknesses, threats and opportunities, which apply to the division now and in the foreseeable future.

Strengths

- Critical mass of dedicated, motivated, skilled and experienced teams of people across several science disciplines.
- Clear focus on, and understanding of, the core business of DEC.
- Ability to work with DEC staff in other divisions in an adaptive management framework.
- Capacity to carry out a balance of short and long-term applied research, survey and monitoring.
- Adequate infrastructure and support facilities, and access to operational support and field research opportunities.
- An ability to operate across all DEC administrative regions and all of the State's bioregions.
- Readily accessible in-house specialists who can provide high level technical advice.

Weaknesses

- Unbalanced age structure with too few young officers.
- Lack of skills and critical mass in some new and emerging key science areas such as landscape ecology, restoration ecology and population and climate change modelling.
- High proportion of consolidated funds (CF) allocation is committed to fixed recurrent costs such as salaries and overheads, reducing flexibility.
- Inadequate effort in capacity building through external partnerships and funding opportunities.
- Inadequate communication of the breadth and scope of work being done by the division.
- Lack of collocation of scientists in the Perth metropolitan area, impeding collaboration.
- Limited capability to conduct social and economic research.

Threats

- Development and commercialism ideology could distract research effort away from 'public benefit' conservation biology research.
- Funding constraints to carry out necessary research.
- 'Brain drain' as skilled and experienced staff leave the workforce or are attracted to better opportunities outside the division.
- Lack of skilled and experienced natural resource scientist recruits in the State.
- Possibility that structural change could lead to fragmentation of science and scientists resulting in a reduction in the quality and quantity of scientific output.
- Trends to 'institutionalise' science, disconnecting science and scientists from end users.

Opportunities

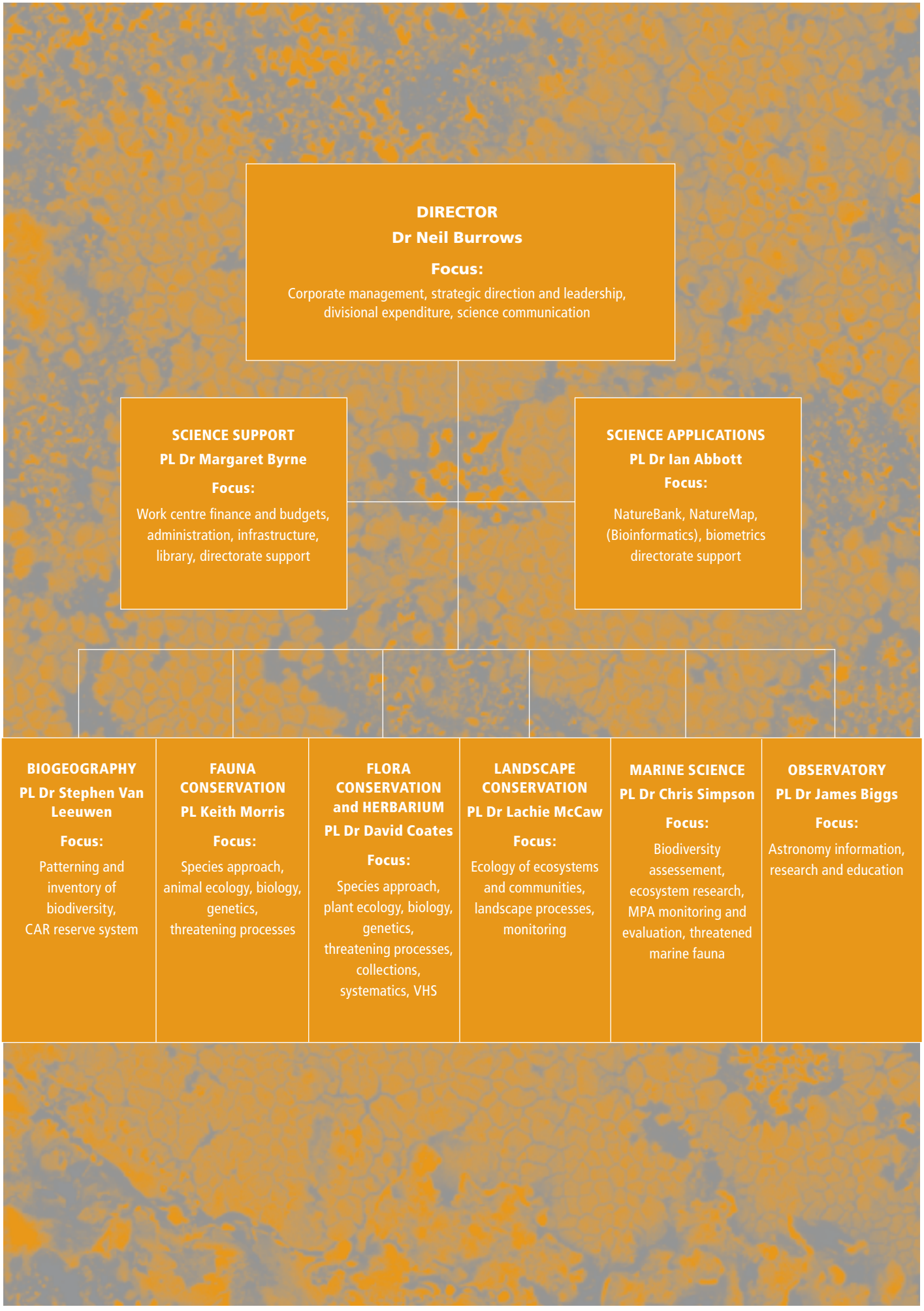
- Potential to expand capacity through partnerships and a more focused and strategic approach to external funding opportunities.
- Funding opportunities emerging to deal with climate change uncertainties.
- More informed community and growing awareness of environmental issues.
- Increasing recognition of the importance of science in decision making and risk management by policy makers, planners and practitioners.
- Increasing support for science by politicians who recognise the importance of science to sustainable development.
- Willingness of other research institutions such as CSIRO, Australian Institute of Marine Science and universities to engage with DEC.

Values

In addition to the corporate values espoused in DEC's 2007–2009 Corporate Plan, we value:

- learning and innovation;
- communicating what we do;
- objectivity - judgments based on evidence;
- scientific rigour;
- partnerships;
- excellence in what we do; and
- passion for what we do.

Structure


DIRECTOR
Dr Neil Burrows
Focus:
Corporate management, strategic direction and leadership, divisional expenditure, science communication
SCIENCE SUPPORT
PL Dr Margaret Byrne
Focus:
Work centre finance and budgets, administration, infrastructure, library, directorate support
SCIENCE APPLICATIONS
PL Dr Ian Abbott
Focus:
NatureBank, NatureMap, (Bioinformatics), biometrics directorate support
BIOGEOGRAPHY
PL Dr Stephen Van Leeuwen
Focus:
Patterning and inventory of biodiversity, CAR reserve system
FAUNA CONSERVATION
PL Keith Morris
Focus:
Species approach, animal ecology, biology, genetics, threatening processes
FLORA CONSERVATION and HERBARIUM
PL Dr David Coates
Focus:
Species approach, plant ecology, biology, genetics, threatening processes, collections, systematics, VHS
LANDSCAPE CONSERVATION
PL Dr Lachie McCaw
Focus:
Ecology of ecosystems and communities, landscape processes, monitoring
MARINE SCIENCE
PL Dr Chris Simpson
Focus:
Biodiversity assessement, ecosystem research, MPA monitoring and evaluation, threatened marine fauna
OBSERVATORY
PL Dr James Biggs
Focus:
Astronomy information, research and education

Key strategic goals

The following are the key long-term goals and associated actions for the Science Division (see Appendix 1 for resources, targets and milestones).

G1 Understand the composition of, and patterning in, terrestrial and marine biodiversity

Within five years

State scale

1.1 Develop 10-year plans for terrestrial and marine biological survey of WA.

1.2 Develop a consolidated biological survey information management system (BioSIS) that incorporates data collected from past surveys and which will incorporate data from future surveys.

1.3 Complete an electronic 'Flora of Western Australia', collating existing taxonomic information on plants, algae and fungi.

Bioregional scale

1.4 Complete the Pilbara regional survey.

1.5 Complete the South Coast and Kimberley regional marine biodiversity surveys.

1.6 Commence another bioregional terrestrial survey consistent with 1.1 above.

Sub-regional scale

1.7 Prepare a 10-year plan for sub-regional terrestrial and marine surveys including targeted ecosystems and conservation reserves.

1.8 Complete the Kimberley islands survey.

1.9 Complete the targeted south-west forests survey.

1.10 Complete the banded ironstone formations floristic surveys.

1.11 Complete the Ravensthorpe Range floristic and short-range endemic invertebrate survey.

1.12 Compile all existing biological data for the DEC conservation reserve estate into a readily accessible database.

Species/population scale

1.13 Prepare and implement a plan, with targets, for resolving the taxonomy of all undescribed terrestrial plants.

1.14 Describe marine plants collected in association with research, survey and monitoring.

1.15 Continue collections and descriptions of fungi and invertebrates in association with research, survey and monitoring.

1.16 Develop and implement a plan for molecular genetics research and surveys to address priorities in systematics, phylogeography, ecosystem processes (gene flow) and conservation genetics.

1.17 Develop and implement a plan for collecting and storing threatened flora and fauna tissue for DNA extraction and banking as a basis for characterising genetic diversity and for assisting with taxonomic studies and translocations.

Within 10 years

State and bioregional scale

1.18 Complete systematic regional biological survey of 50 per cent of WA's terrestrial and 20 per cent of marine areas.

1.19 Prepare ecosystem/vegetation maps at 1:100,000 scale for protected areas in WA.

Sub-regional scale

1.20 Complete three additional sub-regional/targeted surveys consistent with action 1.1 above.

1.21 Complete seven targeted surveys of existing/proposed marine protected areas consistent with action 1.1 above.

1.22 Complete floristic surveys of an additional 10 priority terrestrial conservation reserves as a basis for reserve gap analysis, vegetation mapping and reserve management.

Species/population scale

1.23 Describe 500 new terrestrial plant species and 100 new marine plant species.

1.24 Complete the development of a biodiversity information management system.

1.25 Collect and store flora and fauna (including invertebrates) tissue for DNA extraction of targeted/keystone species collected during biological surveys and other research activities as a basis for understanding genetic diversity and how well it is represented in the conservation reserve system.

1.26 Collect and store tissue of threatened taxa for DNA extraction as a basis for taxonomic studies and for conservation of genetic variability.

1.27 Establish a DNA bank based on targeted/keystone flora and fauna material collected during biological surveys and other research activities.

G 2 Understand the threats to biodiversity and develop evidence-based management options to ameliorate threats

Within five years

Threatened species and communities

2.1 Undertake the research needed to resolve the conservation status of threatened and priority species and ecological communities.

2.2 Develop and implement a research strategy, identifying priorities, for threatened fauna, flora and ecological communities as a basis for threat amelioration and the development and implementation of recovery plans/actions.

2.3 Undertake research to improve understanding of the conservation status and role of invertebrates and fungi in ecosystem function.

2.4 Continue to implement necessary research and recovery actions for Gilbert's potoroo (*Potorous gilbertii*), Australia's rarest mammal.

2.5 Maintain and expand seed conservation of WA's threatened taxa in the Threatened Flora Seed Centre in partnership with the Millenium Seed Bank project.

2.6 Assist with the revision of the strategic plan for the *Western Shield* fauna conservation program and undertake the necessary research to underpin the plan (links with 2.2).

2.7 Participate in active adaptive management programs that will lead to improved conservation status of threatened arid zone medium-size mammals (links with 2.2), a group that has declined significantly since European settlement.

2.8 Undertake a State-wide risk analysis of biodiversity threats and likely impacted species and communities to complement the biodiversity audit. Continue to develop the biodiversity audit for WA.

2.9 Continue to develop and implement an adaptive management approach to the translocation of threatened flora and establish a threatened flora translocation database.

Threatening processes

2.10 Develop an understanding of climate change impacts on potentially 'at risk' species, communities and ecosystems as a basis for developing management response options including adequacy of conservation reserve design. Collaborate with the South African National Biodiversity Institute (SANBI) in adopting best practice climate models.

2.11 Develop and implement a program to monitor climate change effects on biodiversity in targeted terrestrial and marine areas.

2.12 Develop risk assessment methods to anticipate and communicate long-term issues that are likely to threaten biodiversity over the next 10 years and longer (links with 2.7).

2.13 Complete research into interactions between fire and weeds in fragmented landscapes.

2.14 Develop an understanding of the influence of buffel grass (*Cenchrus ciliaris*) on rangelands ecosystems as a basis for risk assessment and management response options.

2.15 Continue research into the role of fire in ecosystems, including understanding ecological responses, carbon flux and greenhouse gas emissions of various fire regimes in the North Kimberley, Pilbara, Coolgardie and Desert bioregions.

2.16 Continue with long-term fire research in south-west ecosystems as a basis for developing ecologically appropriate fire management in a global biodiversity hotspot.

2.17 Develop an understanding of the influence of climate change on fire regimes and ecosystem response in south-west ecosystems as a basis for developing management response options.

2.18 Determine the distribution and abundance of feral camels, goats, pigs and invasive birds and investigate/document their impacts on biodiversity as a basis for improving control strategies.

2.19 Complete research into mesopredator interactions as a basis for the sustained recovery of native fauna.

2.20 Complete research into sustained, effective control of feral cats across a range of biomes.

2.21 Develop an understanding of the distribution and impacts of cane toads on native fauna as a basis for developing management response options.

2.22 Determine the distribution of *Phytophthora cinnamomi*, undertake a risk analysis of the threat it poses to biodiversity and continue to develop techniques for managing the threat.

2.23 Undertake risk analysis of biodiversity threats posed by environmental weeds at the species and ecosystem levels and prepare a strategic plan for priority weed control and restoration research.

2.24 Commence investigations into the impacts of recreation and tourism on high priority conservation values and threatened species.

2.25 Undertake an analysis of the critical research issues associated with the potential impacts of water extraction from major aquifers on biodiversity values.

2.26 Assist with the development and implementation of an ecological restoration framework for the Gnangara water mound.

Within 10 years

Threatened species and communities

2.27 Conduct priority research on threatened communities as a basis for understanding and managing threatening processes (consistent with 2.2).

2.28 Understand key ecological processes of small threatened plant populations as a basis for their conservation management.

2.29 Conduct necessary research to improve the conservation status of listed threatened fauna especially taxa that were once widespread on the mainland but are now restricted to islands (consistent with 2.2).

2.30 Conduct research to improve the conservation status of species of listed threatened flora, especially Critically Endangered taxa (consistent with 2.2).

2.31 Double the population of Gilbert's potoroo relative to the 2007 baseline.

2.32 Collect and store seed and genetic diversity of 50 per cent of threatened taxa.

2.33 In an adaptive management framework, establish translocations for 66 per cent of Critically Endangered flora and finalise procedures for assessing translocation success for all threatened flora translocations.

Threatening processes

2.34 Develop safe and effective control technologies for feral cats, camels, goats and pigs on DEC-managed lands.

2.35 Develop management response options for species and ecosystems 'at risk' from climate change.

2.36 Develop technologies for the containment of *Phytophthora cinnamomi* outbreaks in high priority (high conservation value) areas, e.g. Fitzgerald River National Park.

2.37 Understand the cause(s) of decline of Kimberley mammal fauna as a basis for appropriate management actions to reverse declines.

2.38 Develop an understanding of fire ecology, including carbon fluxes and greenhouse gas emissions, of fire regimes in Mallee, Geraldton Sandplains and Esperance bioregions as a basis for ecologically sustainable fire management.

2.39 Understand the impacts of water extraction from the major aquifers on key species and ecosystems as a basis for advising on sustainable extraction levels.

2.40 Understand ecosystem dynamics at landscape scales, including interactions between threatening and other ecological processes (such as fire and weeds), especially in highly fragmented landscapes.

G 3 Monitor and evaluate the condition and trends of species, populations and communities in terrestrial and marine ecosystems

Within five years

3.1 Provide the scientific basis for, and assist with, the development of cost-effective protocols for monitoring resource condition at various scales (landscape, ecosystem, protected area and species).

3.2 Establish climate change monitoring protocols and priorities for 'at risk' species, communities and ecosystems.

3.3 Implement targeted monitoring to assess the impacts of cane toads on native fauna.

3.4 Develop and assist with the implementation of protocols for monitoring the density, distribution and the effectiveness of control programs of large feral herbivores especially feral goats and camels.

3.5 Develop and assist with the implementation of protocols for monitoring the response of species and ecosystems to managed fire regimes.

3.6 Complete and publish a five-year review of the FORESTCHECK forest monitoring protocol.

Within 10 years

3.7 Assist with the development and implementation of a framework and cost effective protocols for monitoring resource condition at various scales (landscape, ecosystem, protected area and species) (links with 3.1).

3.8 Establish scientifically sound protocols and assist with the implementation of marine resource condition monitoring for all marine parks and reserves including sanctuary zones, threatened marine fauna, significant marine ecosystems and other benchmark areas.

3.9 Assist with the development of corporate monitoring data and information systems.

G 4 Provide scientific concepts and tools for best-practice management of biodiversity as an integral part of natural resource management

Within five years

4.1 Assist with the development of a framework for designing a comprehensive, adequate and representative (CAR) terrestrial reserve system.

4.2 Develop and design tools and protocols for the establishment and management of a CAR network of marine protected areas (including marine sanctuary zones).

4.3 Complete investigations into the effects of timber harvesting activities on forest ecosystems and ecosystem processes consistent with the Forest Management Plan 2004–2013.

4.4. Devise, establish and implement a Forest Health Surveillance system for Western Australian forests consistent with the Forest Management Plan 2004–2013.

4.5 Assist in the development of a conservation reserve biological database to support reserve management.

4.6 Assist with refining technical protocols for listing and de-listing priority taxa and threatened ecological communities.

4.7 Continue the development of the WA biodiversity audit.

4.8 Develop tools and protocols for implementing active adaptive management programs.

4.9 Continue to contribute to the development of policies, prescriptions, management plans and management guidelines.

4.10 Continue to provide scientific advice to other DEC divisions, government agencies and relevant authorities on natural resource management and environmental impact assessment.

G 5 Improve knowledge of how people respond to, and interact with, the natural environment including protected areas and threatened species

Within five years

5.1 Integrate social and biological sciences in investigations into visitor usage and impacts in collaboration with Parks and Visitor Services Division.

5.2 Collaborate with Parks and Visitor Services Division and external research providers in the delivery of research programs that relate to the interaction of people with the natural environment including protected areas and threatened species.

Within 10 years

5.3 Implement research programs on the biology and behaviour of key species and communities that are subjected to recreation and tourism interaction as a basis for minimising adverse impacts.

5.4 Implement research programs to understand visitor use patterns, levels of visitor satisfaction, visitor expectations and behaviours in the natural environment.

5.5 Develop environmental indicators for sustainable tourism.

5.6 Understand community attitudes and perceptions, including those of Indigenous communities, about the environment, biodiversity conservation and DEC's policies and operations, as a basis for developing policies and programs aimed at gaining community support for conservation management actions on and off protected areas.

5.7 Develop models for community engagement in conservation management and recreation and tourism planning.

5.8 Undertake research to better understand the social, environmental and economic aspirations of traditional owners connected with, or who have an association with, particular protected areas.

G 6 Promote and facilitate the uptake of research findings and communicate the contribution of science to biodiversity conservation and natural resource management

Within five years

6.1 Appoint a Science Communications Officer and prepare and implement a science communications plan.

6.2 Develop a departmental science policy.

6.3 Increase the output of high quality scientific papers, management guidelines and popular articles, and take part in and initiate seminars, conferences and field days.

6.4 Develop tools and technical protocols for implementing active adaptive management programs as a mechanism for corporate learning. Implement at least nine active adaptive management programs in partnership with other DEC divisions (links with 4.8).

6.5 Continue to provide high-level technical advice and input to international, national and state committees.

Within 10 years

6.6 Ensure that key scientific findings are incorporated into policies and practices.

6.7 Ensure that all science done by the division, and other science relevant to the Department's charter, is successfully communicated to appropriate audiences by a variety of mechanisms.

6.8 Participate in 20 large-scale active adaptive management programs delivering conservation outcomes and advances in knowledge.

Key supporting strategies

The extent to which this plan is implemented will depend upon how existing resources are allocated and the opportunities to increase capacity through increasing the division's funding base, and recruiting and retaining skilled people and through partnerships. The following key operational strategies will be pursued to support the attainment of the above goals (see Appendix 2 for resources, targets and milestones).

S 1 Build integrated and multi-disciplinary teams of skilled people to address key complex biodiversity issues

1.1 Identify and prioritise key complex biodiversity issues consistent with the goals and actions above, develop plans and determine the staffing expertise required to address these issues.

1.2 Identify relevant partners with expertise (internal and external to DEC), identify adaptive management opportunities and develop funding strategies including pursuing external funding sources.

1.3 Develop and implement science project plans including objectives, outcomes, milestones, roles, agreed targets and uptake and communication strategies.

S 2 Improve the quality and relevance of scientific output by using best practice methodology, reporting, publishing and communication

2.1 Review and improve current quality control processes within the division and ensure that all staff are familiar with guidelines relating to best practice.

2.2 Regularly review current projects to identify those that are no longer relevant, inactive or unlikely to deliver outcomes.

2.3 Keep abreast of the global scientific literature and other knowledge sources and participate in scientific meetings where justifiable.

2.4 Satisfy professional expectation of publishing regularly in reputable, peer-reviewed scientific journals.

2.5 Increase effort in promoting the uptake and application of new knowledge (technology transfer) using a variety of mechanisms including recovery plans, operational guidelines, the electronic medium and field days and workshops.

2.6 Increase effort in promoting the division's activities in a diverse range of media and formats.

2.7 Appoint a Science Communications Officer to develop and implement a communications plan (see G6.1).

S 3 Expand research capability by building strategic partnerships

3.1 Lead the development of a WA strategic plan for biodiversity conservation research to underpin actions in 'A 100-year Biodiversity Conservation Strategy for Western Australia (Draft); Phase One: Blueprint to the Bicentenary in 2029' (DEC 2006).

3.2 Appoint a Business Development Officer and revise the division's business plan (links with 3.3-3.5).

3.3 Develop a funding model with new revenue sources that ensures the maintenance of short and long-term research capability.

3.4 Review and strengthen current partnerships and implement a formal process for strategically engaging other research institutions and potential partners.

3.5 Determine priority and core research areas for partnerships and collaborations consistent with this plan and with 3.1.

3.6 In collaboration with Parks and Visitor Services Division, seek opportunities to integrate social science and biological sciences in investigations into visitor usage.

3.7 Establish the DEC Biodiversity Conservation Science Centre at Kensington, incorporating a new herbarium, and collocate all metro-based Science Division staff there.

3.8 Build and maintain staff capability to meet future key challenges in biodiversity conservation and natural resource management in WA (see S5).

S 4 Improve management and integration of corporate biological data and information

4.1 Develop a metadatabase of all datasets held by Science Division and of relevant databases held by other divisions.

4.2 Develop a consolidated database of all regional and sub-regional biological survey data and information (BioSIS – see G1.2).

4.3 Establish protocols for data capture, storage and access and develop tools to analyse complex datasets.

4.4 Continue to develop expertise in biometrics, keeping abreast of contemporary experimental design and modeling and data analysis techniques.

4.5 Continue the development of applied information management systems, including FloraBase and NatureMap.

4.6 Integrate relevant research datasets into a corporate (widely accessible) database.

S 5 Recruit and retain versatile, skilled, experienced and motivated staff

5.1 Review the current staff skills base and training needs to ensure recruitment of staff with appropriate expertise in relevant disciplines.

5.2 Make staff and potential recruits aware of career opportunities within the division.

5.3 Continue to explore joint staff appointments with local universities and foster and support the development of students (including post-graduate degrees) in conservation biology.

5.4 Promote opportunities for learning, career and professional development.

5.5 Provide a stimulating, supportive and safe work environment.

5.6 Develop focus groups for different staff profiles.

5.7 Offer flexible work arrangements of mutual benefit and within the parameters of the WA Public Service Award.

Implementing the plan

The Director of Science, with the support of the Science Management Team, will be responsible for implementing the plan. Progress with respect to actions and timelines will be reviewed annually. Given the rapidly changing environment in which we operate, the plan will be formally reviewed at least every two years, with the next revision due in 2010.

Appendix 1: Key strategic goals and actions

Goal 1 Understand the composition of, and patterning in, terrestrial and marine biodiversity

Key actions	Estimated resources (annual operating and FTEs; existing and/or new resources)	Measures/targets (outcomes, deliverables)	Program leader responsible	By when
1.1 Develop 10-year plans for terrestrial and marine biological surveys, describing rationale for priorities and timelines, milestones, and targets.	$20k and 0.5 FTE per year (existing)	Plans prepared and endorsed.	Biogeography and Marine Science	December 2008
1.2 Develop a consolidated biological survey information management system (BioSIS) that incorporates data collected from past surveys and will include data collected during future surveys (links with 1.12).	$20k and 1.0 FTE (new)	Biological Survey Information System (BioSIS) up-to-date and operational.	Science Applications	Clear backlog by January 2011, then ongoing
1.3 Complete an electronic Flora of Western Australia, collating existing taxonomic information on plants, algae and fungi.	$50k and 1.0 FTE per year (new and existing)	Electronic Flora for WA completed.	Flora Conservation and Herbarium	December 2012
1.4 Complete the Pilbara region biological survey.	$350k and 9.0 FTEs for one year (existing)	Survey completed, published and management recommendations made.	Biogeography	July 2008
1.5 Complete two regional marine surveys to include distribution of major marine communities, dominant flora and fauna and threatened large marine fauna: • South Coast (two IMCRA) • Kimberley (three IMCRA)	$2M and 12.0 FTEs per year (existing)	Candidate marine protected areas identified. Biodiversity layer for regional marine planning prepared Identification of monitoring sites. Published reports Species lists. Hot spots of marine biodiversity identified.	Marine Science	South Coast IMCRAs by December 2008 Kimberley IMCRAs by December 2010
1.6 Commence another priority bioregional terrestrial survey consistent with 1.1.	$2.5M and 15.0 FTEs for five years (new and existing)	Bioregion to be surveyed identified according to 1.1, budget identified, sampling protocols determined, site selection and survey teams determined.	Biogeography	January 2009
1.7 Prepare a 10-year plan for sub-regional terrestrial and marine surveys including targeted ecosystems and conservation reserves.	$10k and 0.5 FTE (existing)	Plan prepared and endorsed.	Biogeography and Marine Science	January 2009
1.8 Complete the Kimberley islands biological survey.	$1.35M and 6.0 FTEs for four years (new and existing)	Field work completed, data analysed, reports published, management recommendations made, data accessible.	Biogeography	June 2010
1.9 Complete targeted biological survey of south-west forest region.	$300k and 3.0 FTEs for four years (new and existing)	Survey designed and implemented, report prepared, management recommendations made, data accessible.	Landscape Conservation and Biogeography	December 2013
1.10 Complete banded ironstone formations floristic surveys.	$375k and 4.0 FTEs for one year (existing)	Field work completed, data analysed, reports published, management recommendations made.	Biogeography	July 2008
1.11 Complete Ravensthorpe Range floristic and short range endemic invertebrate survey.	$500k and 0.1 FTE for one year (existing)	Field work completed, data analysed and accessible, reports prepared, management recommendations made.	Biogeography	July 2008
1.12 Compile all existing biological data for the DEC conservation reserve estate.	See 1.2 above	Conservation Reserve Biological Information System up-to-date and operational.	Science Applications	Backlog cleared by July 2012, then ongoing
1.13 Prepare and implement a plan, with targets, for resolving the taxonomy of undescribed terrestrial plants.	$20k and 3.0 FTEs per year (new)	Plan prepared, at least 50 taxa per year described.	Flora Conservation and Herbarium	January 2008
1.14 Collect and describe marine plants in association with research, survey and monitoring.	$50k and 0.5 FTE per year for five years (existing)	At least 10 taxa per year described.	Marine Science and Flora Conservation and Herbarium	Ongoing

1.15 Continue collections and descriptions of fungi and invertebrates in association with research, survey and monitoring.	$20k and 0.5 FTE per year (existing)	Collections associated with survey and research projects.	Flora Conservation and Herbarium and Fauna Conservation	Ongoing
1.16 Develop and implement a plan for molecular genetics (flora and fauna) surveys and research as a basis for characterising genetic diversity and for assisting with taxonomic studies.	$50k and 2.0 FTEs per year (new and existing)	Plan prepared and endorsed. Targeted material for DNA extraction and genetic characterisation collected as part of biological survey programs.	Flora Conservation and Herbarium	Plan prepared by July 2008. Ongoing collections.
1.17 Develop and implement a plan for collecting and storing threatened flora and fauna tissue for DNA extraction as a basis for characterising genetic diversity and for assisting with taxonomic studies.	$20k per year and 0.5 FTE (new and existing)	Plan prepared and endorsed. Material for DNA extraction and genetic characterisation collected as part of biological survey programs.	Flora Conservation and Herbarium and Fauna Conservation	Plan prepared by July 2008. Ongoing collections.
1.18 Complete systematic regional biological survey of 50 per cent of terrestrial WA and 20 per cent of marine areas.	Each survey ~ $3M and 15.0 FTEs per year (new and existing)	As defined by Action 1.1 above.	Biogeography and Marine Science	2017
1.19 Prepare ecosystem/vegetation maps at 1:100,000 scale for the protected areas in WA.	$1M and 4.0 FTEs per year for 10 years (new)	1:100,000 scale vegetation maps prepared for the protected areas managed by DEC.	Biogeography and Flora Conservation and Herbarium	2017
1.20 Complete three additional terrestrial sub-regional/targeted surveys.	$1.5M and 7.0 FTEs for 10 years (new and existing)	As defined by Action 1.1.	Biogeography	2017
1.21 Complete seven targeted surveys of existing/proposed marine protected areas (in order of priority): • Recherche MPA • Shark Bay MPAs • metro marine protected areas • Montebellos/Barrow Is MPAs • Dampier Archipelago/Cape • Preston MPAs • Capes MPA	$2.5M and 12.0 FTEs over 10 years (new and existing)	Knowledge, patterns and conservation status of biodiversity. Long-term monitoring sites identified. Published reports and papers. Species lists produced. Resource condition assessment made. Hot spots of marine biodiversity identified.	Marine Science	Progressively implemented. Completed by 2017
1.22 Complete floristic surveys of an additional 10 priority conservation reserves as a basis for reserve gap analysis, vegetation mapping and reserve management.	$50k and 1.0 FTEs for 10 years (new and existing)	Specimens and flora lists of an additional 10 priority conservation reserves.	Biogeography and Flora Conservation and Herbarium	2017
1.23 Describe 500 new terrestrial plants and 100 new marine plants.	See 1.13	500 new terrestrial plants, 100 new marine plants and described.	Flora Conservation and Herbarium	2017
1.24 Complete development of a biodiversity information management system.	See 1.2	Biodiversity information management systems in place.	Science Applications	2017
1.25 Collect and store flora and fauna (including invertebrates) tissue for DNA extraction of targeted/keystone species collected during biological surveys and other research activities as a basis for understanding genetic diversity and how well it is represented in the conservation reserve system.	See 1.16	Collections made, material stored, DNA extracted, taxonomy resolved, genetic diversity documented.	Cross-cutting theme – all programs	Progressively implemented
1.26 Collect and store material for DNA extraction for all threatened taxa (flora and fauna).	See 1.16	Collections made, material stored, DNA extracted, taxonomy resolved, genetic diversity documented.	Cross-cutting theme – all programs	2017
1.27 Establish a DNA bank based on targeted/keystone flora and fauna material collected during biological surveys and other research activities.	See 1.16	DNA bank established.	Cross-cutting theme – all programs	2017

Goal 2 Understand the threats to biodiversity and develop evidence-based actions to ameliorate threats

Key actions	Estimated resources (annual operating and FTEs; existing and/or new resources)	Measures/targets (outcomes, deliverables)	Program leader responsible	By when
2.1 Undertake the research needed to resolve the conservation status of listed threatened and priority species and ecological communities.	$100k and 2.0 FTEs for five years (new and existing)	Resolution of the taxonomy and status of listed species. Conservation status of 500 plant taxa resolved.	Flora Conservation and Herbarium and Fauna Conservation	December 2012
2. 2 Develop and implement a research strategy, including research priorities, for threatened fauna, flora and ecological communities as a basis for threat amelioration and development and implementation of recovery plans/actions.	$1M and 20.0 FTEs per year (new and existing)	Plan prepared and endorsed by DEC's Directors of Science and Nature Conservation. No species extinctions.	Flora Conservation and Herbarium and Fauna Conservation	Plan by July 2008, then ongoing
2.3 Undertake research to improve understanding of the conservation status and role of invertebrates and fungi in ecosystem function.	$150k and 4.0 FTEs (new and existing)	Literature review completed, research proposals prepared, research commenced.	Fauna Conservation	July 2011
2.4 Continue to implement recovery actions for Gilbert's potoroo.	$100k and 2.5 FTEs per year (new and existing)	Population increased by 50 per cent of 2007 baseline.	Fauna Conservation	July 2012
2.5 Maintain and expand seed conservation of WA's threatened taxa in the Threatened Flora Seed Centre in partnership with the Millenium Seed Bank project.	$100k and 1.5 FTEs per year (new)	New and existing storage and maintenance of viable collections of seed.	Flora Conservation and Herbarium and Fauna Conservation	Ongoing
2.6 Assist with the revision of the strategic plan for *Western Shield* fauna conservation program; undertake the necessary research to underpin the plan (links with 2.2).	$250k and 8.0 FTEs per year (new and existing)	Plan prepared and endorsed by DEC's Directors of Nature Conservation and Science, research projects implemented, improved conservation status of threatened fauna.	Fauna Conservation	Plan by July 2008, then ongoing
2.7 Participate in adaptive management programs that will lead to improved conservation status of threatened arid zone medium-size mammals (links with 2.4), a group that has declined significantly since European settlement.	$250k and 5.0 FTEs per year (new and existing)	Adaptive management plans prepared for Lorna Glen and Dirk Hartog Island. Threatening process ameliorated, fauna successfully reintroduced.	Fauna Conservation	December 2011, then review
2.8 Undertake a State-wide risk analysis of biodiversity threats and likely impacted species and communities to compliment the biodiversity audit. Continue to develop the biodiversity audit for WA.	$50k and 1.0 FTE per year (new and existing)	Risk analysis and biodiversity audit completed.	Cross-cutting theme – all programs	December 2010
2.9 Continue to develop and implement an adaptive management approach to the translocation of threatened flora and establish a threatened flora translocation database.	$50k and 1.5 FTEs (existing)	Framework established. Translocation database established.	Flora Conservation and Herbarium	July 2011
2.10 Develop an understanding of climate change impacts on potentially 'at risk' species, communities and ecosystems as a basis for developing management response options including adequacy of conservation reserve design. Collaborate with the South African National Biodiversity Institute (SANBI) in adopting best practice climate models.	$50k and 2.0 FTEs per year (new)	Commence development of models of impacts of climate change on 'at risk' terrestrial and marine ecosystems. Partnership with SANBI established.	Cross cutting theme – all program leaders	December 2012, then ongoing
2.11 Develop and implement a program to monitor climate change effects on biodiversity in targeted terrestrial and marine areas (links with 3.2).	$250k and 2.0 FTEs per year (new)	Protocols established, priorities set, sites located and benchmarked.	Cross-cutting theme – program leaders	January 2010
2.12 Develop risk assessment methods to anticipate and communicate long-term issues that will threaten biodiversity over the next 10 years and longer and regularly re-assess threats.	$20k and 0.1 FTE per year (existing)	A report on key emerging issues and research areas.	Cross-cutting theme – all program leaders	Biennially?

Key actions	Estimated resources (annual operating and FTEs; existing and/or new resources)	Measures/targets (outcomes, deliverables)	Program leader responsible	By when
2.13 Complete research into interactions between fire and weeds in fragmented landscapes.	$50k and 1.0 FTE per year (existing)	Published findings including fire and weed management recommendations.	Flora Conservation and Herbarium	July 2009
2.14 Develop an understanding of the influence of buffel grass (*Cenchrus ciliaris*) on rangelands ecosystems as a basis for risk assessment and management response options.	$50k and 0.5 FTE per year (new)	Prepare proposal, commence research, provide management recommendations	Landscape Conservation	July 2012
2.15 Commence research into the role of fire in ecosystems, including understanding carbon fluxes and greenhouse gas emission, of various fire regimes in the north Kimberley, Pilbara, Coolgardie and Desert bioregions.	$100k and 2.0 FTEs per year (new and existing)	Proposals prepared, resources identified, research commenced.	Landscape Conservation	December 2012
2.16 Continue with long-term fire research in south-west ecosystems as a basis for developing ecologically appropriate fire management in a biodiversity hotspot.	$50k and 1.0 FTEs per year (new and existing)	Published reports including management recommendations.	Landscape Conservation	Kimberley by December 2012, other IBRAs by 2017
2.17 Develop an understanding of the influence of climate change on fire regimes and ecosystem response in south-west ecosystems (links with 2.11).	$50k and 1.0 FTE per year (existing)	Proposals prepared, resources identified, research commenced.	Landscape Conservation	December 2012
2.18 Determine the distribution and abundance of feral camels, goats, pigs and invasive birds, investigate and document their impacts on biodiversity as a basis for improving control strategies.	$100k and 1.0 FTE per year (new and existing)	Baseline surveys completed, impact studies commenced.	Fauna Conservation and Landscape Conservation	July 2012
2.19 Complete research into mesopredator interactions as a basis for the sustained recovery of native fauna.	$250k and 4.0 FTEs per year (existing)	Research completed, reports published, management recommendations made.	Fauna Conservation	July 2009
2.20 Complete research into sustained, effective control of feral cats across a range of biomes.	$120k and 3.0 FTEs per year (new and existing)	Research completed, reports published, operational feral cat control strategies developed, feral cat bait registered.	Fauna Conservation	July 2012
2.21 Develop an understanding of the distribution and impacts of cane toads on native fauna as a basis for developing management response options.	$100k and 1.0 FTE per year (new and existing)	Pre-arrival monitoring sites established, at risk species identified.	Fauna Conservation	July 2010
2.22 Determine the distribution of *Phytophthora cinnamomi* (P.c.), undertake a risk analysis of the threat it poses to biodiversity and continue to develop techniques for managing the threat.	$100k and 1.0 FTE per year (new and existing)	Distribution of P.c. mapped, risk analysis completed.	Flora Conservation and Herbarium	July 2012
2.23 Undertake a risk analysis of biodiversity threats posed by weeds at the species and ecosystem levels and prepare a strategic plan for priority weed control and restoration research.	$10k and 0.2 FTE per year (existing)	Risk analysis completed and strategic plan prepared.	Flora Conservation and Herbarium	July 2010
2.24 Commence investigations into the impacts of recreation and tourism on high priority conservation values.	$50k and 1.0 FTE per year (new)	Risk analysis identifying values at risk finalised. Research program initiated.	Landscape Conservation and Parks and Visitor Services Division	January 2011
2.25 Undertake an analysis of the critical research issues associated with water extraction from major aquifers on biodiversity values.	$50k and 1.0 FTE per year (new)	Risk analysis completed and recommendations made.	Landscape Conservation	July 2011
2.26 Assist with the development and implementation of an ecological restoration framework for the Gnangara water mound.	$300k and 2.0 FTEs per year (new and existing)	Restoration framework developed.	Flora Conservation and Herbarium and Landscape Conservation	Framework by December 2009

Key actions	Estimated resources (annual operating and FTEs; existing and/or new resources)	Measures/targets (outcomes, deliverables)	Program leader responsible	By when
2.27 Conduct priority research on threatened communities as a basis for understanding and managing threatening processes.	$100k and 2.0 FTEs per year (new and existing)	See 2.2	Fauna Conservation and Flora Conservation and Herbarium	Review 2017
2.28 Understand key ecological processes of small threatened plant populations as a basis for their conservation management.	$100k and 2.0 FTEs per year (new and existing)	Research completed, reports published, management guidelines prepared.	Flora Conservation and Herbarium	2015
2.29 Conduct necessary research to improve the conservation status of threatened fauna, especially those that were once widespread but are now restricted to islands.	$100k and 2.0 FTEs per year (existing)	Research completed, reports published, management guidelines prepared.	Fauna Conservation	2014
2.30 Conduct research to improve the conservation status of species of threatened flora, especially Critically Endangered taxa.	$100k and 2.0 FTEs per year (existing)	Research completed, reports published, management guidelines prepared.	Flora Conservation and Herbarium	2017
2.31 Double the population of Gilbert's potoroo relative to the 2007 baseline.	$100k and 2.0 FTEs per year (existing)	Population of Gilbert's potoroo doubled.	Fauna Conservation	2017
2.32 Collect and store seed and genetic diversity of 50 per cent of threatened taxa.	$250k and 4.5 FTEs per year (new and existing)	Seed and genetic materal collected for 80 per cent of threatened taxa	Fauna Conservation and Flora Conservation and Herbarium	2017
2.33 In an adaptive management framework, establish translocations for 66 per cent of Critically Endangered flora and finalise procedures for assessing translocation success for all threatened flora translocations.	$150k and 4.0 FTEs per year.	Translocations established for 66 per cent of Critically Endangered flora.	Flora Conservation and Herbarium	2017
2.34 Develop safe and effective control technologies for feral cats, camels, goats and pigs on DEC-managed lands.	$200k and 2.0 FTEs per year (new and existing)	Research completed, reports published, management strategies developed.	Fauna Conservation	2017
2.35 Develop management response options for species and ecosystems at risk from climate change.	$200k and 2.0 FTEs per year (new and existing)	Management guidelines prepared.	Cross-cutting theme – all program leaders	2015
2.36 Develop the technologies for the containment of *Phytophthora cinnamomi* outbreaks in high priority (high conservation value) areas, e.g. Fitzgerald River National Park	$100k and 2.0 FTEs per year (new and existing)	Management guidelines for containment prepared.	Flora Conservation	2014
2.37 Understand the cause(s) of decline of Kimberley mammal fauna as a basis for appropriate management actions.	$100k and 2.0 FTEs per year (existing).	Research completed, management guidelines prepared.	Fauna Conservation	2014
2.38 Understand fire ecology, including carbon fluxes and greenhouse gas emission of various fire regimes, in mallee, Geraldton sandplains and Esperance bioregions as a basis for ecologically sustainable fire management.	$100k and 2.0 FTEs per year (new and existing)	Research completed, interim fire management guidelines prepared.	Landscape Conservation	2017
2.39 Understand the impacts of water extraction from major aquifers on key species and ecosystems.	$100k and 2.0 FTEs per year (new and existing)	Research completed, models developed, management recommendations/guidelines prepared.	Landscape Conservation	2013
2.40 Understand ecosystem dynamics at the landscape scale, including interactions between threatening and other ecological processes and reasons for resilience of ecosystems.	$100k and 2.0 FTEs per year (new and existing)	Priorities determined, ecosystem dynamics project implemented.	Landscape Conservation	2017

Key actions	**Estimated resources** (annual operating and FTEs; existing and/or new resources)	**Measures/targets** (outcomes, deliverables)	**Program leader** responsible	By when
3.1 Provide the scientific basis for, and assist with, the development of cost-effective protocols for monitoring terrestrial and marine resource condition at various scales (landscape, ecosystem, protected area and threatened species with initial focus on sea turtles).	$20k and 2.0 FTEs per year (existing)	Agreed operations plan including objectives, protocols, resources, priorities.	Cross-cutting theme – all programs	Turtle monitoring plan by December 2008. Other protocols prepared by July 2010
3.2 Establish climate change monitoring protocols and priorities for 'at risk' species and ecosystems (links with 2.9).	$20k and 1.0 FTE per year (existing)	Protocols developed via a series of workshops.	Cross-cutting theme – all programs	See 2.9
3.3 Implement targeted pre-arrival monitoring to assess the impacts of cane toads on native fauna.	$50k and 1.0 FTE per year (existing).	Report on impacts of cane toads on select fauna groups. Management recommendations.	Fauna Conservation	December 2012
3.4 Develop protocols and assist with the implementation of monitoring/ surveying the density, distribution and the effectiveness of control programs of large feral herbivores including feral camels and goats (links with 2.17).	$50k and 2.0 FTEs per year (existing)	Protocols developed, programs implemented (with other divisions).	Fauna Conservation	July 2009
3.5 Develop and assist with the implementation of protocols for monitoring the response of species and ecosystems to managed fire regimes.	$50k and 2.0 FTEs per year (new and existing)	Protocols developed, programs implemented (with other divisions).	Landscape Conservation	July 2010
3.6 Publish five-year review of FORESTCHECK.	$20k and 5.0 FTEs per year (existing).	Review published, forest management recommendations made.	Landscape Conservation	December 2008
3.7 Assist with the development and implementation of a framework and cost effective protocols for monitoring resource condition at various scales (landscape, ecosystem, protected area and species) (links with 3.1).	$100k and 4.0 FTEs year (new and existing)	Framework and protocols developed and implemented. Reports prepared and management recommendations made (with other divisions).	Cross-cutting theme – all program leaders.	2017
3.8 Establish scientifically sound framework and protocols, and assist with the implementation of marine resource condition monitoring for all marine parks and reserves including sanctuary zones and other benchmark areas (links with 3.1).	$1M and 4.0 FTEs per year (existing).	Protocols developed and implemented. Reports prepared and management recommendations made (with other divisions).	Marine Science	2017
3.9 Assist with the development and implementation of corporate data and information systems for managing data gathered through monitoring.	$50k and 1.0 FTE per year (existing).	Corporate data and information management systems in place.	Science Applications	2017

Goal 4 Provide scientific concepts and tools for best practice management of biodiversity as an integral part of natural resource management

Key actions	**Estimated resources** (annual operating and FTEs; existing and/or new resources)	**Measures/targets** (outcomes, deliverables)	**Program leader** responsible	By when
4.1 Assist with the development of a framework for designing a CAR reserve system.	$30k and 0.2 FTE for two years (existing)	A revised framework for designing a CAR system.	Biogeography	July 2010
4.2 Develop/design tools and protocols for the identification of a network of marine sanctuary zones.	$20k and 0.2 FTE (existing)	Protocols developed and agreed.	Marine Science	January 2010
4.3 Complete investigations into the effects of timber harvesting (silviculture and fire) on forest ecosystems and ecosystem processes consistent with the Forest Management Plan 2004–2013.	$60k and 2.0 FTEs (existing)	Findings published, management recommendations made.	Landscape Conservation	July 2013
4.4 Devise, establish and implement a Forest Health Surveillance system for Western Australian forests consistent with the Forest Management Plan 2004–2013.	$20k and 0.5 FTE (existing)	Forest Health Surveillance system developed and implemented.	Landscape Conservation	July 2013
4.5 Assist with the development of a conservation reserve biological database to support reserve management.	$20k and 0.3 FTE (new and existing)	A functional, accessible and current database rolled out to districts and regions.	Science Applications	January 2012
4.6 Assist with refining protocols for listing and de-listing priority taxa and threatened ecological communities.	$20k and 0.2 FTE (existing)	New protocols endorsed by DEC's Director of Nature Conservation.	Flora Conservation and Fauna Conservation	July 2009
4.7 Continue to contribute to the development of the WA biodiversity audit.	0.2 FTE (existing)	Revised and updated biodiversity audit.	Cross-cutting theme – all programs	Ongoing
4.8 Develop tools and protocols for implementing adaptive management programs.	$20k and 0.2 FTE (existing)	Tools and protocols devised and endorsed.	Cross-cutting theme – all programs	December 2008
4.9 Continue to contribute to the development of policies, prescriptions and guidelines and to planning processes.	As required (existing)	Number of written products, meetings, contacts.	Cross-cutting theme – all programs	Ongoing
4.10 Continue to provide scientific advice to other DEC divisions, government agencies and relevant authorities on natural resource management and impact assessment.	As required (existing)	Number of written products, meetings, contacts.	Cross-cutting theme – all programs	Ongoing

Goal 5 Improve knowledge of how people respond to, and interact with, the natural environment including protected areas

Key actions	**Estimated resources** (annual operating and FTEs; existing and/or new resources)	**Measures/targets** (outcomes, deliverables)	**Program leader** responsible	By when
5.1 Integrate social and biological sciences in investigations into visitor usage and impacts in collaboration with Parks and Visitor Services Division.	$80k and 0.5 FTE (new and existing)	Research projects designed in collaboration with Parks and Visitor Services Division, resources in place, research commenced.	Cross-cutting theme – all programs	July 2009
5.2 Collaborate with Parks and Visitor Services Division and external research providers in the delivery of research programs that relate to the interaction of people with the natural environment including protected areas and threatened species.	$100k and 1.0 FTE (new and existing)	Research projects designed in collaboration with Parks and Visitor Services Division, resources in place, research commenced.	Cross-cutting theme – all programs	December 2012
5.3 Implement research programs on the biology and behaviour of key species and communities that are subjected to recreation and tourism interaction as a basis for minimising adverse impacts.	$100k and 1.0 FTEs (new)	Research projects designed and implemented, management recommendations made.	New program – Social Science	2017
5.4 Implement research programs to understand visitor use patterns, levels of visitor satisfaction, visitor expectations and behaviours in the natural environment.	$50k and 0.5 FTE (new)	Research projects designed and implemented, management recommendations made.	New program – Social Science	2017
5.5 Develop environmental indicators for sustainable tourism.	$30k and 0.5 FTE (new)	Research projects designed and implemented, management recommendations made.	New program – Social Science	2017
5.6 Understand community attitudes and perceptions, including those of Indigenous communities, about the environment, biodiversity conservation and about DEC.	$20k and 0.5 FTE (new)	Policies and programs aimed at gaining community support for conservation management actions on and off protected areas developed.	New program – Social Science	2017
5.7 Develop models for community engagement in conservation management and recreation and tourism planning.	$30k and 0.5 FTE (new)	Models developed and implemented.	New program – Social Science	2017
5.8 Undertake research to better understand the social, environmental and economic aspirations of traditional owners connected with, or that have an association with particular protected areas.	$50k and 0.5 FTE (new)	Research designed, implemented, management recommendations made.	New program – Social Science	2017

Goal 6 Promote and facilitate the uptake of research findings and communicate the contribution of science to biodiversity conservation and natural resource management

Key actions	**Estimated resources** (annual operating and FTEs; existing and/or new resources)	**Measures/targets** (outcomes, deliverables)	**Program leader** responsible	By when
6.1 Appoint a Science Communications Officer and prepare and implement a science communications plan.	$10k and 0.5 FTE (new)	Science Communications Officer appointed, plan written.	Cross-cutting theme – all programs	December 2008
6.2 Develop a departmental science policy	0.1 FTE (existing)	Policy prepared and endorsed by DEC's Corporate Executive.	Cross-cutting theme – all programs	December 2008
6.3 Increase the output of high-quality scientific papers, management guidelines and popular articles, and participation in and initiation of seminars, conferences and field days.	Variable (existing)	Achieve a 20 per cent increase in the output of high quality scientific papers. Contribute to the preparation of management plans and guidelines. Prepare popular articles. Participate in local, national and international scientific forums. Convene conferences and field days. Prepare media releases and participate in media events.	Cross-cutting theme – all programs	July 2012 then ongoing
6.4 Develop and implement planning processes and guidelines for adaptive management programs as a mechanism for corporate learning (see 4.8).	See 4.8	Procedures/guidelines developed. At least one active adaptive management program operational in each region.	Cross-cutting theme – all Programs.	Ongoing
6.5 Continue to provide high-level advice and input to internal and external stakeholders and, where appropriate, represent DEC or the State on local, national and international committees and other forums.	Variable	Number of contacts, representations on committees.	Cross-cutting theme – all programs.	Ongoing
6.6 Ensure that key scientific findings are incorporated into policies and practices.	Variable	Extent of policy influence and guidelines, plans and prescriptions prepared.	Cross-cutting theme – all programs.	Ongoing
6.7 Ensure that all science done by the division, and other science relevant to the department's charter, is successfully communicated to appropriate audiences by a variety of formats.	Variable	See 6.3 above.	Cross-cutting theme – all programs.	Ongoing
6.8 Twenty large-scale adaptive management programs delivering conservation outcomes and advances in knowledge are established in DEC.	$100k and 5.0 FTEs (new and existing)	Staff involved with 20 large-scale adaptive management projects.	Cross-cutting theme – all programs.	2017

Appendix 2: Key supporting strategies

Strategy 1 **Build integrated and multi-disciplinary teams of skilled people to address key complex biodiversity issues (planning)**

Key actions	**Estimated resources** (annual operating and FTEs; existing and/or new resources)	**Measures/targets** (outcomes, deliverables)	**Program leader** responsible	By when
1.1 Identify and prioritise key complex biodiversity issues; develop plans and determine the staffing required to address these issues.	2.0 FTEs (existing)	Scoping document and plans prepared.	Cross-cutting theme – all programs	Ongoing
1.2 Identify relevant partners with expertise (internal and external to DEC), identify active adaptive management opportunities and develop funding strategies.	2.0 FTEs (existing)	List of priority issues, number of partnerships.	Cross-cutting theme – all programs	Ongoing
1.3 Develop project plans including objectives, outcomes, milestones, roles, agreed targets and communication strategies.	2.0 FTEs (existing)	Project plans developed and approved.	Cross-cutting theme – all programs	July 2008

Strategy 2 **Improve the quality and relevance of scientific output by using best practice methodology, reporting, publishing and communication**

Key actions	**Estimated resources** (annual operating and FTEs; existing and/or new resources)	**Measures/targets** (outcomes, deliverables)	**Program leader** responsible	**By when**
2.1 Review and improve science quality control processes within the division and ensure that all staff are familiar with guidelines relating to best practice.	$10k and 0.1 FTE (existing)	Report delivered to Director Science Division.	Cross-cutting theme – all Programs	January 2009
2.2 Regularly review current research projects to identify those no longer relevant, inactive or unlikely to deliver outcomes.	0.1 FTE (existing)	Recommendations implemented.	Cross-cutting theme – all programs	Annually
2.3 Keep abreast of the global science literature and participate in scientific meetings where justifiable.	Variable	Reports to Director Science Division.	Cross-cutting theme – all programs	Ongoing
2.4 Satisfy professional expectation of publishing regularly in reputable, peer-reviewed scientific journals.	Variable	At least two papers in peer-reviewed scientific journals per scientist per year over a five-year period.	Cross-cutting theme – all programs	Ongoing
2.5 Increase effort in promoting the uptake and application of new knowledge (technology transfer) using a variety of mechanisms including recovery plans, operational guidelines, electronic media and field days and workshops.	Variable	At least two examples of the application of research findings/ activity contributing to conservation and land management outcomes per scientist per five-year period.	Cross-cutting theme – all programs	Ongoing
2.6 Increase effort in promoting the division's activities in a diverse range of media and formats.		At least two LANDSCOPE articles and two popular articles in other media per scientist per five-year period.	Cross-cutting theme – all programs	Ongoing
2.7 Appoint Science Communications Officer, develop and implement communications plan (see G6.1).	See G6.1	Journals accessed, books read, websites visited.	Cross-cutting theme – all programs.	Ongoing

Strategy 3 Expand research capability by building strategic partnerships

Key actions	**Estimated resources** (annual operating and FTEs; existing and/or new resources)	**Measures/targets** (outcomes, deliverables)	**Program leader** responsible	**By when**
3.1 Lead the development of a WA strategic plan for biodiversity conservation research to underpin actions in the final version of the '100 year Biodiversity Conservation Strategy for Western Australia' document.	0.2 FTE (existing)	Workshop convened, strategy developed and endorsed.	Cross-cutting theme – all programs	December 2009
3.2 Appoint a Business Development Officer, revise and implement the business plan.	$10k and 1.0 FTE (new)	Officer appointed, doubling of external funds and partnerships in 10 years from 2007 baseline; cost neutral by July 2009.	Cross-cutting theme – all programs	January 2009, plan by July 2009
3.3 Develop a funding model with new revenue sources that ensures the maintenance of short and long-term research capability.	See 3.2 above	Model and plan developed	Business Development Officer	July 2009
3.4 Review and strengthen current partnerships, implement formal processes including appointment of 'partnership ambassadors' and hold regular formal meetings with potential partners to identify strategic priorities. Form strategically important partnerships that provide access to diverse funding sources leading to growth to meet scientific challenges.	0.1 FTE (existing)	Ambassadors appointed to local universities, CSIRO divisions, relevant Federal and State Government departments etc. Number of partnerships, level of external funding.	Cross-cutting theme – all programs	January 2008, then ongoing
3.5 Determine priority research areas for partnerships and collaborations consistent with S3.1 above.	0.1 FTE (existing)	A list of priority research topics developed and discussed with potential partners.	Cross-cutting theme – all programs	July 2008, then ongoing
3.6 In collaboration with Parks and Visitor Services Division, seek opportunities to integrate social science and biological sciences in investigations into visitor usage.	$20k and 0.2 FTE	New protocols endorsed by DEC's Director of Nature Conservation.	Flora Conservation and Herbarium and Fauna Conservation	January 2008, then ongoing
3.7 DEC Biodiversity Conservation Science Centre, incorporating a new herbarium, established at Kensington and all metro-based Science Division staff collocated.		Building built, staff collocated.	Director	January 2012
3.8 Build and maintain staff capacity to meet future key challenges in biodiversity conservation and natural resource management in WA.		Multi-disciplinary, skilled and flexible workforce.	Director	Ongoing

Strategy 4 Improve management and integration of corporate data

Key actions	Estimated resources (annual operating and FTEs; existing and/or new resources)	Measures/targets (outcomes, deliverables)	Program leader responsible	By when
4.1 Develop a metadatabase of all datasets held by Science Division and of relevant databases held in other divisions.	$15k and 0.2 FTE (new)	Metadatabase developed and current.	Science Applications	January 2008, ongoing update
4.2 Develop a consolidated database of all regional and sub-regional biological survey data and information (BioSIS).	$50k and 0.4 FTE (new and existing))	Metadatabase developed and current.	Science Applications	July 2009
4.3 Establish protocols for data capture, storage and access and develop tools to analyse complex datasets.	$70k and 0.4 FTE (new and existing)	Protocols developed, databases centralised.	Science Applications	July 2010
4.4 Continue to develop expertise in biometrics, keeping abreast of contemporary experimental design and modeling and data analysis techniques.	$30k and 3.0 FTEs (new and existing)	Experimental design and, modeling and data analysis is contemporary. Staff trained in latest techniques.	Science Applications	Ongoing
4.5 Continue the development of applied information management systems, including FloraBase and NatureMap.	$30k and 0.5 FTE (new and existing)	Standards specified.	Science Applications and Flora Conservation and Herbarium	Ongoing
4.6 Integrate relevant research datasets into an accessible, corporate database.	$20k and 0.2 FTE (new)	Relevant datasets identified, migrated into corporate environment.		Ongoing

Strategy 5 Retain and recruit versatile, skilled, experienced and motivated staff

Key actions	Estimated resources (annual operating and FTEs; existing and/or new resources)	Measures/targets (outcomes, deliverables)	Program leader responsible	By when
5.1 Review the current staff skills base and training needs to ensure recruitment of staff with appropriate expertise in relevant disciplines.	0.1 FTE (existing)	Up-dated list of staff skills requirement. Staff training needs identified through IDAPES and met.	Cross-cutting theme – all programs	July 2007 then annually
5.2 Make staff and potential recruits aware of career opportunities within the division and mentor with respect to criteria progression.	0.1 FTE (existing)	Level of awareness increased.	Cross-cutting theme – all programs	Ongoing and as needed
5.3 Continue to explore joint staff appointments with local universities and foster and support the development of students (including post-graduate degrees) in conservation biology.	0.1 FTE (existing)	Mutually beneficial joint appointments, students sponsored.	Cross-cutting theme – all programs	Ongoing and as needed
5.4 Provide opportunities for learning, career and professional development e.g: • travel and conferences; • joint field trips; • study leave; • in-service training; • secondments to other branches and divisions; • formal and informal learning programs; and • exchanges.		Number of opportunities provided. Level of staff satisfaction.	Cross-cutting theme – all programs	Ongoing
5.5 Provide a stimulating, supportive and safe work environment. Maintain: • induction program; • DEC's employee management system; and • staff attitude surveys.		Annual employee management system reviews completed for all staff, staff attitudes, level of staff moral and well being.	Cross-cutting theme – all programs	IDAPES annually – ongoing and as needed
5.6 Develop focus groups for different staff profiles.		Focal groups established and functional.	Cross-cutting theme – all programs	Ongoing and as needed
5.7 Offer flexible work arrangements of mutual benefit and within the parameters of the WA Public Service Award.		Satisfied and productive staff.	Cross-cutting theme – all programs	Ongoing and as needed