Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

# BUSINESS PLAN

## July 2004 – June 2006

## Science Division

**Discovering the nature of WA**

http://www.naturebase.net/science/science .html

## INTRODUCTION

Australia, along with other countries, is undergoing transition to a knowledge-based economy driven by scientific, engineering and technological advances. Science-based knowledge underpins Western Australia's future as a thriving, cultured and responsible community. Innovation, based on ideas, novel concepts, modern techniques and newly discovered facts, is a key factor in improving the State's economy and quality of life of its citizens, without compromising the sustainability of the environment. To be successful, public sector research must be both excellent and relevant. The operations of the Department of Conservation and Land Management (CALM) need to be underpinned by the incorporation of up-to-date knowledge and continuous improvement based on sound science and ecological risk principles. Science Division represents most of CALM's investment in generating the sound knowledge and technological advances required for successful environmental management and assessment of ecological risks.

An integrated approach and strong partnerships, both internally and externally, are essential if the Science Division is to continue to meet the demands of decision makers, managers and the broader community for scientific and technical information. To be effective, the Division must also develop effective information collation and delivery systems that enable ready access to the latest biological information.

## PURPOSE OF THIS PLAN

This Business Plan sets out the role of the Science Division as a service provider to purchasers within the Department of Conservation and Land Management (CALM). It enunciates how the Division will deliver services identified in the Service Provider Agreements (SPAs) by describing the aim, objectives, outcomes, adoption strategies and performance measures of the Division's programs. The plan also presents the organizational structure and marketing strategy needed to deliver these services throughout the duration of the plan – July 2004 to June 2006.

This plan is aligned with the CALM Corporate Plan. Detail about individual science projects is available in the WA Science Project Plans (WASPP) database on the Science website. This plan also provides a basis for management of risk in the Division.

This plan deals with the conservation and land management role of the Science Division. A separate Business Plan exists for the Perth Observatory, which is administered within the Science Division, but whose activities do not directly relate to conservation and land management.

# KEY RESULT AREAS, OUTPUT PROGRAMS and SCIENCE NEEDS

## KEY RESULT AREAS

The following six KRAs have been identified as major steps towards the Department's medium to long term goals, and hence the major focus for achieving the overall outcomes for the various Outputs. Each of these six KRAs has been further divided into areas of primary activity.

**KRA 1. Establishment of a comprehensive, adequate and representative (CAR) terrestrial and marine conservation reserve system**

1.1 Systematic biological inventory and assessment.
1.2 Acquisition and disposal of land.

**KRA 2. Maintenance of a terrestrial/marine protected area network (IUCN management categories I to VI)**

2.1 Management of conservation reserve system (IUCN I – IV).
2.2 Management of State forest.
2.3 Management of Indigenous Protected Areas.
2.4 Management of cultural heritage sites and other culturally significant areas.
2.5 Management of areas under formal binding nature conservation covenants and Section 16 agreements under the CALM Act.

**KRA 3. Conservation of landscape/seascape scale ecological systems and processes (integrating reserve and off-reserve conservation)**.

3.1 Provision of non-binding private land support and advice, such as Land for Wildlife.
3.2 Identification, protection and management (including rehabilitation) of regional significant areas to increase landscape connectivity and functionality especially at a macro scale.
3.3 Management of Ramsar sites.
3.4 Management of Biosphere reserves.
3.5 Management of World Heritage properties.
3.6 Recovery of natural diversity recovery catchments.
3.7 Development and establishment of native vegetation services, and spatial integration of those activities with nature conservation activities to bring about increase in landscape functionality.
3.8 Promotion and encouragement of sustainable environmental management systems.
3.9 Reconciliation of competing/conflicting land uses.
3.10 Community-based natural resource management.
3.11 Amelioration of landscape/seascape threatening processes, such as disease.
3.12 Sustainable management of Unallocated Crown Land.

**KRA 4. Recovery of threatened species and ecological communities and conservation and sustainable use of other significant species**

4.1 Recovery of threatened species and ecological communities.
4.2 Management of marine fauna.
4.3 Sustainable use of terrestrial flora and fauna under approved management plans.
4.4 Habitat management for migratory birds.

**KRA 5. Providing for sustainable nature-based recreation and tourism and increased enjoyment and appreciation of protected areas**

5.1 Identification, assessment and planning of sustainable nature-based recreation opportunities.
5.2 Development of visitor facilities/infrastructure.

5.3 Maintenance of visitor facilities/infrastructure.
5.4 Construction of controlled public access (e.g. roads, tracks and trails).
5.5 Maintenance of controlled public access (e.g. roads, tracks and trails).
5.6 Identification and mitigation of visitor risks.

**KRA 6. Providing community involvement and encouraging understanding, and support of biodiversity conservation and other Departmental programs and activities**

6.1 Communicating with and providing information to the public.
6.2 School and experience-based education programs.
6.3 Public participation and involvement programs.
6.4 Management of volunteers.
6.5 Management of commercial interests.
6.6 Liaison, consultation and negotiation with Commonwealth and local government, and other state agencies.
6.7 Involvement of indigenous people and other key stakeholders in conservation and management.

## CALM OUTPUT 1 - NATURE CONSERVATION

**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 ecologically sustainability; the acquisition, conservation and protection of representative ecosystems; and encouraging public awareness, understanding and support for the nature conservation services and policies.

**Science and Information Services Required by Nature Conservation Output**

- High level policy advice.
- Understanding of the biology, conservation status and threats to the State's threatened flora and fauna taxa, and ecological communities.
- Assistance in preparation and implementation of recovery programs for threatened taxa and communities.
- Biological survey of the State to ensure a comprehensive, adequate and representative reserve system.
- Knowledge of ecological disturbances that threaten the conservation estate and important off-reserve conservation areas.
- Information about the functioning and conservation of aquatic ecosystems and their components.
- Access to data and information about plant biodiversity held at the Western Australian Herbarium.
- Provision of information to increase public awareness of nature conservation issues.

**Research Trends**

*Climate Change*

- Understanding of the implications of climate change on biodiversity and disturbance ecology and developing management responses.
- Establishment of monitoring programs in the wheatbelt.

*Restoration ecology*

- Ongoing development of plant-based solutions to dryland salinity.
- Reconstruction of degraded landscapes, especially in the wheatbelt and rangelands.

*Landscape-scale disturbance ecology*

- Reconstruction and protection of arid zone fauna assemblages.
- Development of appropriate fire management for the Kimberly, Pilbara and the arid interior.
- Ongoing development of ecologically appropriate fire regimes for south-west ecosystems.
- Investigation of the extent and causes of mammal decline in the Kimberley.
- Management of fire and introduced plants and animals (especially foxes, cats, wild dogs and feral goats) in the rangelands conservation estate.
- Adoption of landscape-scale perspective in control of environmental weeds.
- Establishment of monitoring sites.

*Species & communities conservation biology*

- Ongoing taxonomic assessments of various groups.
- Increased focus on invertebrate and fungal conservation.
- Increased activity on threatened flora.
- Increased focus on threatened communities.
- Increased activity on diseases (esp. *Phytophthora*) and environmental weeds.
- Ongoing activity on introduced predator control, especially feral cats.

*Knowledge management*

- Increased provision of user-friendly online access to biological information.
- Ongoing high level technical and scientific advice and diffusion of knowledge (internally & externally).

**CALM OUTPUT 2 - SUSTAINABLE FOREST MANAGEMENT**

**Description**

The activities of this Output are guided by the Forest Management Plan 2004-2013. This Output focus is on the sustainable management of State forest and timber reserves while maintaining or enhancing nature conservation, water, recreation and other values in the long term, and encouraging public awareness, understanding and support for sustainable forest management, services and policies.

**Science and Information Services Required by Sustainable Forest Management Output**

- As an action of the Forest Management Plan (2004-2013) (p. 29), undertake biological surveys of priority areas.
- As an action of the Forest Management Plan (2004-2013) (p. 30), continue to monitor effects of timber harvesting on flora and fauna in the Kingston study area.
- As an action of the Forest Management Plan (2004-2013) (p.30), implement FORESTCHECK .
- As an action of the Forest Management Plan (2004-2013) (p. 30), maintain a research program on ecologically sustainable forest management.
- Develop monitoring techniques to report against key performance indicator 20 of the Forest Management Plan (2004-2013) (p. 50) - percentage of water bodies with significant variance of biodiversity from the historic range of variability.
- As an action of the Forest Management Plan (2004-2013) (p. 62), in co-operation with Forest Products Commission, Water and Rivers Commission and the Water Corporation, conduct research in relation to the extent to which stream zones in informal reserves adequately protect biodiversity, water quality and water quantity in areas subject to timber harvesting.
- Evaluation and development of potential indicators for sustainable forest management, regeneration success, soil disturbance and soil nutrient status.
- Provision of information on the effects of forest management on insect pests and diseases.
- Advice on the management of impacts of prescribed and wild fire on forest ecology.
- Provision of a disease detection service for *Phytophthora* and other plant diseases.

**Trends**

- Decline in timber production due to the planned reduction in timber harvesting from native forests. Possible commensurate reduction in funding available for research.
- Increased public expectation that forest management and timber production are ecologically sustainable.
- Increased public sensitivity about the risks to biodiversity conservation and other forest values.
- Carbon cycles and forest management with respect to climate change.
- Managing forests for potable water.
- Forest health – pests and diseases.
- Forest soil conservation.
- Ongoing commitment to forest monitoring (FORESTCHECK).
- Biological survey of forests as a requirement in the Forest Management Plan.
- Ongoing research into the impacts of forest management including fire and timber harvesting on threatened and sensitive species and ecosystems.

**CALM OUTPUT 3 - PARKS AND VISITOR SERVICES**

**Description**
Dealing with public involvement, visitation and appreciation of the natural environment on lands and waters managed by CALM, including preparing and implementing management and recreation site development plans, providing, managing and maintaining appropriate access, recreation opportunities and visitor facilities, protecting natural areas, visitors and facilities from wildfire, training departmental staff and volunteers, working with local tourist bureaux and commercial tour operators; involving Aboriginal people in park management and the provision of visitor facilities and services; providing visitor information and designing and initiating educational and interpretive activity programs which enrich visitor experience and help develop greater community awareness and support for parks, natural areas, nature-based tourism and recreation services and policies.

**Science and Information Services Required by Parks and Visitor Services Output**
- Input to the preparation of area management plans.
- Knowledge about natural features, animals, plants and other biota in National Parks, Nature Reserves and Conservation Parks.
- Provision of information for nature-based tourism operations.

**Trends for Science Services**
- Increased provision of research information that is relevant to interpretive services.
- Development of the capacity to research the impact of visitation on biodiversity values.
- Development of the capacity to research interactions between people and the natural environment.

## OTHER POTENTIAL PURCHASERS

Services are also provided to other purchasers, including Forest Products Commission, Alcoa of Australia, Biogene, community groups, Co-operative Research Centre (CRC) for Greenhouse Accounting, CRC for Tropical Savannas, CRC for Pest Animal Control, CRC for Plant Based Management of Dryland Salinity, CRC for Bushfires, CRC for Desert Knowledge, environmental consultants, Forest and Wood Products Research and Development Corporation, Land and Water Australia, Natural Heritage Trust, privately operated sanctuaries, Rural Industries Research and Development Corporation, and Western Australian Police Service.

# SCIENCE DIVISION

Science Division will deliver services to the CALM Nature Conservation, Sustainable Forest Management, and Parks and Visitor Services Divisions through the mechanism of Service Provider Agreements and the implementation of this Business Plan.

## VISION

We envisage a society where scientific enquiry is highly respected and forms an objective basis for environmental decision making and policy development. We strive to provide excellence in science and technology based on internationally recognized best practice. We operate research centres that foster, promote and reward creativity and innovation.

## FOCUS AND PURPOSE

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

## ROLE

To achieve its Mission, Science Division has the following broad objectives:

- To provide a scientifically objective and independent source of reliable knowledge and understanding about conserving species and ecological communities in Western Australia, managing the public lands and waters entrusted to CALM, and carrying out CALM 's other legislative responsibilities.
- To ensure that Science Division is responsive to the needs of policy makers and output purchasers in CALM by bringing science to bear on the solution of the State's most pressing problems relating to conservation and land management.
- To advise CALM on sustainable resource development opportunities and to promote the conservation of biological resources through their sustainable utilization.
- To communicate, and transfer to managers in CALM, knowledge, information and other insights obtained through scientific investigation in Western Australia and elsewhere.
- To attain a worldwide reputation for excellence in science by publishing knowledge obtained through scientific research in the premier national and international scientific journals and through electronic means.
- To contribute, as an integrated part of CALM, to meeting the need for knowledge on conservation and land management matters by the public of Western Australia.

## STRATEGIES

To meet its Mission and Objectives, Science Division has adopted the following strategies:

- Work in partnership with CALM’s output accountable Divisions of Nature Conservation, Sustainable Forest Management, and Parks and Visitor Services to prioritize the important scientific and technical issues that need to be addressed in order to achieve CALM’s mission. CALM’s Executive Director and the Forest Products Commission may also be purchasers of Science Division’s services.
- Assemble outcome-based program teams to find scientifically sound and practical solutions for

conservation issues, and to develop new technologies within a specified time and budget.

- Identify relevant purchasers and secure the necessary resources to support the core functions and projects of the Division.
- Form partnerships with other Government agencies, universities, industries, other interest groups and the public to conduct or co-ordinate research when such interaction will be of benefit in meeting CALM's objectives.
- Carry out a balanced program of short-term and long-term research.
- Collaborate with CALM's Regional, District and other staff in adaptive management programs, technology transfer and timely implementation of practical solutions and new policies, prescriptions and technologies.
- Patent new technologies or innovations that have commercial potential.
- Keep abreast of worldwide scientific and technological advances via the literature and attendance at scientific meetings and seek opportunities to utilize or adapt these to suit CALM's needs.
- Communicate, promote and market the contribution of Science Division in attaining CALM's Mission.
- Develop and project Science Division's reputation as a credible and dependable source of sound knowledge about conservation, land management and ecologically sustainable utilization matters.
- Uphold CALM's commitment to obtaining scientifically sound information through improved resourcing of Science Division.
- Continue to apply the most cost-efficient means of carrying out research such as providing resources for post-graduates, collaborating with other agencies, and actively seeking external funds.
- Maintain science resources such as high standards of herbarium curation, computer and library facilities.
- Continue a commitment to individual performance management through CALM's Individual Development and Performance Enhancement System.
- Enhance project co-ordination and staff management skills.

## BUSINESS PROFILE

The Science Division is one of seven Divisions in the Department of Conservation and Land Management and is one of four service provider Divisions. The Division's activities are spread throughout Western Australia with major research centres, providing laboratory and other support facilities, located at Woodvale, Kensington and Manjimup. Other Divisional staff are located at CALM Regional and District offices at Dwellingup, Busselton, Albany and Karratha. Collocated at the Research Centre at Kensington is the CALM WA Herbarium, the principal State botanical collection. Regional herbaria are located at Karratha, Manjimup, and Albany; and library and information services are located at Kensington and Woodvale.

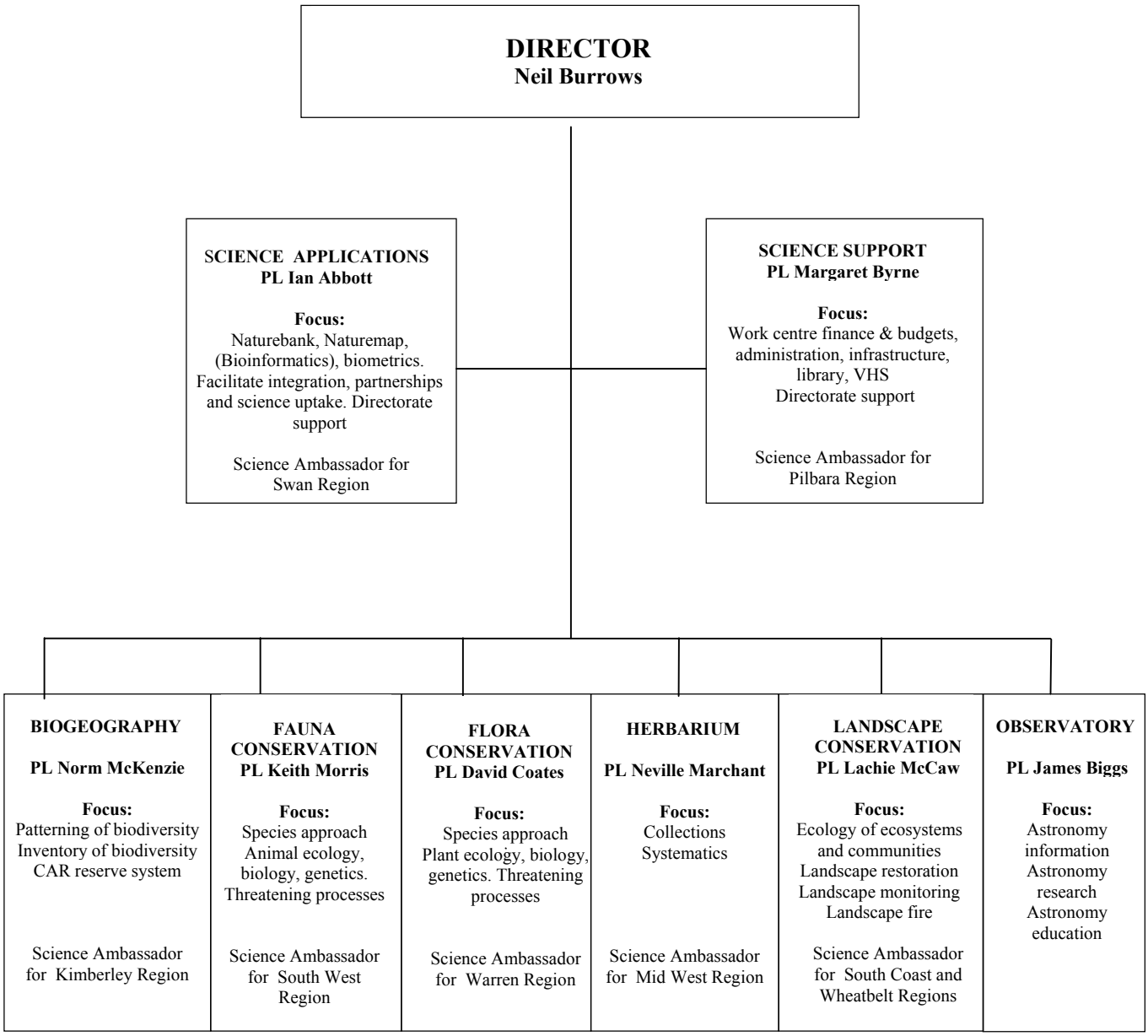
## DIVISIONAL CULTURE

The Division operates within a culture of:

- Open discussion.
- Diversity of thinking.
- Integration and co-operation of scientific endeavour.
- Scientific excellence.
- Creativity and innovation.

The Science Division is structured around eight Key Science Themes, or Programs:

**NEW STRUCTURE**
**CALM SCIENCE DIVISION**
**July 2004**




The Director and the Program Leaders comprise the Science Management Team (SMT), which develops business plans and service provider agreements, manages the delivery of outcomes specified in the Service Provider Agreements, reviews progress and determines policy and resource allocation within the Division. Program Leaders are responsible for ensuring that science services provided by the Division are delivered effectively, efficiently and at a high standard to end users, and for ensuring that relevant scientific expertise in each Program is integrated and co-ordinated within the Program and throughout the Division. Program Leaders are also responsible for the integration of priorities within a program, the effectiveness and quality of the research, and fostering interaction within the program and with other relevant staff. Program Leaders have a key role as ambassadors for science by fostering working relationships and collaborations with other Divisions, especially Regional Services Division.

## SWOT ANALYSIS

### Strengths

The Science Division has a number of advantages over other potential providers of conservation and land management science and technology. These include:

- Clear focus on our core business - knowledge (both theoretical and practical).
- Reputation as a credible and dependable source of sound knowledge about conservation, land management and sustainable utilization issues.
- A history of conducting high quality applied research underpinning CALM's innovative and internationally acclaimed management activities such as Western Shield, progress towards a CAR reserve system (through biological survey), fire management systems, FORESTCHECK, recovery plans and actions for threatened species, Salinity Action Plan, contribution to the National Biodiversity Audit, novel introduced predator control technologies, fauna and flora translocations, and information technology applications.
- Demonstrated capacity and willingness to work effectively with stakeholders in CALM (Regions, Districts and Output Purchaser Directorates) to identify the important scientific and technical issues that need to be addressed in order to achieve the mission of CALM.
- Ability to assemble outcome-based project teams to deliver scientifically sound and practical solutions within a specified time and at a competitive price.
- Dedicated, motivated teams of trained, skilled and experienced people across a variety of disciplines, thereby enabling a very broad range of scientific problems to be investigated.
- Well-developed strategic planning, operations planning, individual performance planning and reporting of outcomes.
- Effective communication and marketing strategies.
- Capacity to carry out a balanced program of short-term and long-term research.
- Technology transfer strategies and timely implementation of practical solutions and new policies, prescriptions and technologies.
- Demonstrated willingness to collaborate with operations staff to ensure ongoing training and effective uptake of new ideas and technologies.
- Patenting of new technologies or innovations that have commercial potential.
- High standard of professionalism, supported by explicit guidelines.
- Many scientists in the Division are nationally or internationally recognized as experts in conservation biology, ecology, forestry, pathology, fire science and molecular genetics.
- Commitment to keep abreast of worldwide scientific and technological advances via the literature and attendance at scientific meetings, and to seek opportunities to utilize or adapt these to suit end user needs.
- Collaboration with other Government agencies, universities, industry, other interest groups and the public to conduct or co-ordinate research when such interaction will benefit our clients.
- Cost-efficient means of carrying out research such as providing resources and opportunities for post-graduates, collaborating with other agencies, actively seeking external funds and employing contract or consultant staff where appropriate.
- Criteria progression career pathway for research scientists and technical officers.
- Staff recognize and accept change as necessary and ongoing.
- Support facilities, such as laboratories and research centres, throughout Western Australia and staff that are readily available to provide quality advice on a range of conservation and land management issues.
- Demonstrated capacity to secure necessary resources and support, including external grants and community participation.
- Readily accessible science resources such as high standards of herbarium curation, computing and library facilities (three collections).
- Useful and accessible biological information and Information Technology systems.

### Weaknesses

- The age structure is unbalanced, with few young officers in the Division. A workforce planning strategy has been developed to ensure future skills capacity.
- Most of the Divisional CF budget is allocated as salary to full time, permanent officers, or as overheads; this leads to inflexibility.
- Too risk-averse.
- No capability to conduct social research and limited capacity to conduct marine research.

- Good performance by staff is not adequately recognized and rewarded.
- Perceptions that some staff focus research in own area of interest.
- A few scientists are unproductive, particularly in terms of publication record.
- Some scientists have poor citation records in the scientific literature.
- Unproductive scientists require more management, which sometimes results in neglect of more productive scientists.

**Opportunities**
- Output Purchaser Provider business model and foreshadowed CALM structural review (Nature Conservation Division) will refine the focus of the Department and its science needs.
- Recognition by State Government and the community at large of science as fundamental to a knowledge-based economy.
- Increasing complexity of management and the essential role of science in providing solutions.
- Foreshadowed mixed model of outsourcing and permanent workforce.
- Improve linkages with universities through assistance with Postgraduate research.
- Expand partnerships with Regional Services Division and external agencies, including universities and CSIRO.
- Potential to attract sponsors of crucially important conservation research.

**Threats**
- Relativism – the view that there are no objective standards by which knowledge can be evaluated. Opinion, prejudice and personal belief are of equal status with science-based knowledge.
- Ageing workforce and loss of corporate knowledge with impending staff retirements.
- Perception of some managers in CALM that science is a luxury and not fundamental to the Department's mission.
- Perception that Science Division, at approximately 10% of the Department's resources (staff and CF allocation), is too large a component of CALM.
- Corporate Executive could decide to increase level of outsourcing of science activity.
- Misfocus on short-term research.
- Anti-science and anti-agency bias shown by the Federal Government, an important source of external funds.

One of the purposes of this plan is to provide direction to the Science Division in order to optimise the strengths and opportunities while managing the weaknesses and threats.

## STAFF RESOURCES

Details of staff resources in Science Division (as at June 2004) are as follows:

| | Research Scientists | Technical Officers | Administration Officers | Total |
|---|---|---|---|---|
| Full time permanent FTEs | 45.5 | 38.3 | 17.6 | 101.4 |
| Contract FTEs | 7 | 4 | 1.2 | 12.2 |
| Contract FTEs – externally funded | 5.4 | 7.3 | 0.9 | 13.6 |
| | | | | **127.2** |

## FINANCIAL INFORMATION

The value of services provided to internal and external purchasers as at June 2004 is as follows:

| NC Output | SFM Output | Executive Director | FPC | Total | External Purchasers |
|---|---|---|---|---|---|
| **6 163 612** | **2 072 971** | **2 850 225** | **581658** | **11 668 466** | **2 468 273** |

Figures *per annum*

# SCIENCE DIVISION MARKETING STRATEGY

**Marketing strategy**

Marketing involves the identification of products and services for which there is a demand and which can be provided, as well as effective promotion and communication of activities, outputs and outcomes. The Science Division is largely in the business of generating new science and innovative science solutions to underpin conservation and land management in Western Australia.

**Market demand - Purchaser needs**

The need or demand for the services provided by the Division is identified by a variety of formal and informal processes. The formal processes include futuring workshops and formal meetings with relevant output purchasers and operations (Regional Services) staff, the development of Service Provider Agreements (SPAs) in consultation with output purchasers through the Forward Estimates and Strategic Planning process, the requirement for output purchaser Directors to endorse any project that is initiated outside the SPA process, and annual review of programs and projects. The Division is responsive and flexible, and depending on the nature and importance of the request and the availability of resources, has a capacity to respond to short term issues and demands as they arise.

To ensure ongoing satisfaction of purchaser needs, Program Leaders and the Director will meet at least twice yearly to brief output Directors on the progress of the SPAs and on new and emerging scientific issues. They will also seek feedback on performance and issues or concerns held by output purchasers. Program Leaders will also develop a working relationship with key staff in Districts and Regions by making regular visits to Regional and District offices to understand local issues and priorities, to brief staff on progress, to seek input to new and emerging research issues, and to seek opportunities for collaborative research and monitoring programs within an adaptive management framework.

**Partnerships**

The Division will continue to seek opportunities to collaborate with universities, CSIRO and other kindred institutions where these align with CALM's mission. Partnerships with non-government institutions and the public will be fostered through activities such as the regional herbaria network, CALM 's volunteer program and FORESTCHECK. In an adaptive management framework, the Division will foster partnerships with other Divisions, especially Regional Services, to learn by doing.

**Communications plan**

It is crucial that sound, applied science is communicated effectively. The Science communications plan is flexible and responsive to the changing needs of the Division and the Department, and provides the Division with a focused and co-ordinated approach to both internal and external communication. The plan identifies key communications issues, objectives, target audiences, strategies, key messages, and measures for evaluation.

The key communications issues are:

- Internal reputation and integration between Science and other Divisions of CALM.
- Strategic approach to co-ordinated communication.
- Taking credit for Divisional initiatives and achievements.
- Identifying the Division's media potential and publicizing scientific advances.
- Focusing on science to reinforce that CALM is a science-driven organization and that progress depends on innovation and knowledge.

The objectives are:

- Increased Departmental and external awareness, understanding and support for the Science Division and its work.
- Reinforcement that CALM is a scientific organization and that sound science underpins Departmental policies and actions.
- Alerting other sections of CALM to the science-based research and information that is available to them through the Division.

The target audiences are all CALM staff (including Corporate Executive), other research organizations (e.g. CSIRO, universities), Federal, State and local government agencies, non-government organizations, and the people of Western Australia.

**Performance Indicators**

- Level of utilization and uptake of Science Division expertise and findings.
- Feedback from CALM staff (including Corporate Executive and Science Division)
- Amount and tone of coverage in the media and on the Internet, Intranet and in CALM publications including *Landscope*.
- Amount and quality of scientific publications.
- Number of partnerships/collaborations formed.
- Number of post-graduate programs supported.
- Number of seminars, workshops, field days and speaking engagements.
- Number of volunteers involved in Science Division activities.
- Number of visits to research centres, including the WA Herbarium.

## SCIENCE SERVICE DELIVERY PLAN

During the period July 2004 – June 2006 the Science Division will implement the following plan to provide agreed services to underpin conservation and land management in an efficient and effective manner. This plan will also be used to track the delivery of services and to serve as a mechanism for reporting performance.

# PROGRAM - BIOGEOGRAPHY

**RELEVANT CORPORATE OBJECTIVES**

- To protect, conserve and, where possible, restore Western Australia's natural biodiversity.
- To develop community awareness and appreciation of the biological and physical diversity natural to Western Australia and promote community involvement in and support for its protection, conservation and restoration.

**RELEVANT CORPORATE STRATEGIES**

- Expand and improve the marine and terrestrial conservation reserve system to achieve world's best standards.
- Promote off-reserve conservation that complements the reserve system.
- Improve community knowledge of biodiversity conservation issues and awareness, understanding and support for CALM's activities, services and policies.
- Be responsive to the community.
- Partner with agencies and groups with similar interests.

**RELEVANT KEY RESULT AREAS**

- KRA 1.1: Systematic biological inventory and assessment.
- KRA 1.2: Acquisition and disposal of land.
- KRA 3.2: Identification, protection and management (including rehabilitation) of regional significant areas to increase landscape connectivity and functionality especially at a macro scale.
- KRA 3.3: Management of Ramsar sites.
- KRA 3.4: Management of Biosphere reserves.
- KRA 3.6: Recovery of natural diversity recovery catchments.
- KRA 6.1: Communicating with and providing information to the public.
- KRA 6.6: Liaison, consultation and negotiation with Commonwealth and local government, and other state agencies.

**PURCHASERS REQUIRING SERVICE**

- Nature Conservation.

**Focus**

This program contributes to the Nature Conservation Output objectives of '*An understanding of our State's natural biodiversity and biodiversity conservation needs*', and '*A comprehensive, adequate and representative reserve system managed by CALM that conserves as much as possible of our natural biodiversity*'.

The program focuses on systematic, point-based, zoological and botanical surveys of the bioregions of

WA. It provides quantitative data on patterns in the species composition of native plant and animal communities in relation to environmental attributes (climate, soil or water chemistry) and broad landscape changes such as salinization. An array of smaller projects are undertaken to complement the regional surveys, including surveys of localized areas, communities and taxa of particular conservation interest (on and off-reserve), and investigations of biological survey strategies, sampling methods and data analysis techniques.

**Objectives**

- Identification of gaps in the current formal and informal reserve network to achieve a CAR reserve system.
- Provision of information about environmental and ecological patterns to underpin strategic land-use planning.
- Improved understanding of the factors that affect the composition, distribution and persistence of indigenous species and ecological communities.

**Strategies**

- Carry out systematic regional, local and taxa-specific surveys as required by CALM for nature conservation planning.
- Develop project teams with expertise in field sampling and species-level identification of a wide array of phylogenetic groups, and in the databasing, analysis and interpretation of survey data.
- Provide databases on the species composition and environmental attributes of sites.
- Develop and maintain collaborations with external agencies, students and industry that extend CALM's capability to do surveys and implement their necessary nature conservation actions.
- Encourage publication of refereed journal papers and books on all aspects of survey design, sampling methods, analysis, interpretation and the integration of their results into ecological and natural resource management literature.
- Encourage the transfer of survey results to conservation planners through presentations and written contributions to management plans, policy documents etc.

**Significance and Benefits**

The data on biodiversity patterns, ecological relationships, and conservation status provide the scientific basis for many conservation decisions. For instance, these data are required for planning a reserve system that is optimised to sample and retain WA's biodiversity. Point-based sampling allows the results of different surveys to be combined with the objective of gradually accumulating coverage of the entire State. This yields a stratified network of long term monitoring sites across WA's bioregions, for evaluating trends in species and ecological community status, including weeds and ferals. The ongoing development of survey strategies, sampling methods and data analysis ensures that the surveys remain cost-effective, and their publication in refereed journals ensures that they are scientifically rigorous.

**Results Expected**

- Data matrices compiled and archived on species composition and environmental attributes at a representative set of sites throughout the State.
- Recommendations for strategic acquisition of land for a CAR reserve system.

**Performance Indicators**

- Number of advisory communications to Nature Conservation Division recommending additions to the CAR reserve system (KRA 1.2).
- Number of Commonwealth policy documents produced in which biodiversity conservation priorities and Nation Reserve System directions take account of the Western Australian context (KRA 6.6).
- Number of refereed publications produced, contributions to strategy documents, media statements and presentations made related to State conservation priorities (KRAs 1.1, 6.1, 6.6).

**Anticipated Outcome**

The CAR initiative is supported by the formal reservation of large areas of uncleared land, based on biological survey, so that all elements of local and regional biodiversity are represented and persist in the long-term. The Salinity Action Plan is supported by the selection of biodiversity recovery catchments, which are intended to minimise losses in biodiversity due to salination by focussing management activities on a representative sample of the regions biota. The Pilbara stygofauna and surface biota survey will provide an explicit biological context for assessing mine clearances, status and trends in species and ecological communities, and reserve system gaps to improve nature conservation planning throughout the

region. The Biodiversity Audit contributes to state nature conservation planning by providing a standardized summary of the nature conservation issues and values for each of the State's IBRA sub-regions, a basis for setting priorities between sub-regions and nature conservation activities.

**Adoption Strategy**
Recommendations provided to Nature Conservation Division. Research findings published as reports or in journals and presented at seminars, workshops and conferences within twelve months of data collection.

# PROGRAM – FAUNA CONSERVATION

**RELEVANT CORPORATE OBJECTIVES**

- To protect, conserve and, where possible, restore Western Australia's natural biodiversity.
- To develop community awareness and appreciation of the biological and physical diversity natural to Western Australia and promote community involvement in and support for its protection, conservation and restoration.

**RELEVANT CORPORATE STRATEGIES**

- Expand and improve the marine and terrestrial conservation reserve system to achieve world's best standards.
- Promote off-reserve conservation that complements the reserve system.
- Recover threatened flora, fauna and ecological communities.
- Protect biodiversity from threatening processes, agents and activities, including feral animals, weeds, dieback, and other exotic diseases, salinity and inappropriate fire regimes.
- Improve community knowledge of biodiversity conservation issues and awareness, understanding and support for CALM's activities, services and policies.
- Be responsive to the community.
- Partner with agencies and groups with similar interests.

**RELEVANT KEY RESULT AREAS**

- KRA 1.1: Systematic biological inventory and assessment.
- KRA 2.1: Management of conservation reserve system (IUCN I – IV).
- KRA 3.5: Management of World Heritage properties.
- KRA 3.6: Recovery of natural diversity recovery catchments.
- KRA 3.11: Amelioration of landscape/seascape threatening processes, such as disease.
- KRA 3.12: Sustainable management of Unallocated Crown Land.
- KRA 4.1: Recovery of threatened species and ecological communities.
- KRA 6.1: Communicating with and providing information to the public.
- KRA 6.3: Public participation and involvement programs.
- KRA 6.4: Management of volunteers.
- KRA 6.6: Liaison, consultation and negotiation with Commonwealth and local government, and other state agencies.

**PURCHASERS REQUIRING SERVICE**

- Nature Conservation.
- Sustainable Forest Management.

**Focus**
This program contributes to the Nature Conservation Output Description of '*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'.*

Many species of vertebrate and invertebrate fauna have declined or become extinct in Australia. Western Australia has about 50 percent of Australia's threatened mammals, as well as many threatened bird, reptile, frog, fish, and invertebrate species. This program provides the scientific basis for management prescriptions relating to the conservation of threatened fauna. It also identifies and develops protocols for the management of the major threatening processes impacting on terrestrial vertebrate fauna conservation such as fox and feral cat predation, and impacts of feral pigs and cane toads. It also undertakes research into processes impacting on threatened marine fauna such as turtles and dugong. The ongoing success of the Western Shield fauna recovery program in the south-west, and its expansion into the arid zone of WA will require an understanding of the interactions of fox, cats and dingos, the successful control of these, and translocations of locally extinct fauna.

**Objectives**

- Provision of the knowledge required to underpin the conservation of threatened fauna (terrestrial and marine) in Western Australia.
- Development of more efficient and cost effective methods for controlling foxes and feral cats in Western Australia.
- Understanding of the interaction of introduced predators and their impacts on native fauna.
- Development of the protocols necessary for the successful translocation of fauna to the arid zone.
- Identification of and amelioration of the impacts of feral pigs and cane toads on biodiversity.
- Development of a state-wide marine turtle recovery program.

**Strategies**

- Focus research effort on the most threatened taxa.
- Develop project teams that examine impacts of introduced fauna at the landscape level.
- Establish an intra agency working group to prepare a draft WA marine turtle recovery plan.
- Develop partnerships with students and external agencies where appropriate.
- Participate in the development of monitoring strategies for threatened fauna taxa that provide the information required for their adaptive management.
- Contribute to species distributional corporate databases.

**Significance and Benefits**

Medium-sized mammal and ground-dwelling bird species in particular are threatened by fox and feral cat predation. In order to recover such species, cost-effective means of reducing the abundance of these exotic predators are required. The intensity and frequency of baiting therefore needs to be optimised, and the interactions of the introduced predators needs to be understood. Once predators can be effectively controlled in the arid zone, the reconstruction of the native fauna can proceed. Knowledge about marine megafauna assists in their management and the reservation of marine conservation areas. In particular the development of a marine turtle recovery plan is urgently required. Appropriate turtle monitoring protocols are also necessary to assess the abundance of nesting populations and to detect the impacts of management strategies on their conservation. Increasing attention is now being paid to invertebrate conservation in WA and their role in maintenance of ecosystem processes. Several taxa have now been listed as threatened. Research in the fauna program will provide information on the distribution, ecology and conservation status of several taxa including gondwanan relics, butterflies and native invertebrates.

**Results Expected**

- Assessment of the conservation status of Chuditch against IUCN criteria.
- Development of an effective protocol for monitoring rock-wallabies at low densities.
- The downlisting and/or removal of species from the threatened fauna lists.
- Improved success at captive breeding Gilbert's Potoroo.
- Better knowledge of the distribution and conservation status of native earthworms, butterflies and gondwanan relic invertebrates.
- Improved transfer of knowledge into the recovery planning process.
- Completion of the research required to obtain national accreditation for use of Probait fox baits and cat baits.
- Implementation of an effective baiting strategy for feral cat control.
- Initiation of monitoring programs for assessing impacts of feral pigs and cane toads.

- Understanding of the interaction between foxes and feral cats in the south west and arid zone.
- Production of a draft marine turtle recovery plan and better integration of marine turtle research into management.

**Performance Indicators**
- Ability of CALM to maintain the Western Shield wildlife recovery program and to extend this into the arid zone (KRAs 3.11, 4.1).
- Enhancing the conservation of threatened species and increasing the number of taxa downgraded or removed from the State's threatened fauna list (KRA 4.1).
- Better management of fauna on CALM estate (KRA 2.1).
- Better understanding by the community of fauna conservation issues and the programs required for management (KRAs 6.1, 6.3, 6.4).

**Anticipated Outcome**
The conservation of biodiversity, in particular, that fauna recovery is enhanced through reliable knowledge about protection of existing populations of threatened species, recovery of critically endangered and other threatened species, and reversal of processes threatening the long-term persistence of these species and faunal communities.

**Adoption Strategy**
Seminars and workshops with Nature Conservation Division and Regional Services staff; participation in recovery team meetings; training of Regional Services Staff to conduct fauna monitoring; seminars, workshops and conferences; interaction with NRM groups; research findings published as reports or in journals within twelve months of data collection.

# PROGRAM – FLORA CONSERVATION

**RELEVANT CORPORATE OBJECTIVES**

- To protect, conserve and, where possible, restore Western Australia's natural biodiversity.
- To develop community awareness and appreciation of the biological and physical diversity natural to Western Australia and promote community involvement in and support for its protection, conservation and restoration.

**RELEVANT CORPORATE STRATEGIES**

- Expand and improve the marine and terrestrial conservation reserve system to achieve world's best standards.
- Promote off-reserve conservation that complements the reserve system.
- Recover threatened flora, fauna and ecological communities.
- Protect biodiversity from threatening processes, agents and activities, including feral animals, weeds, dieback, and other exotic diseases, salinity and inappropriate fire regimes.
- Improve community knowledge of biodiversity conservation issues and awareness, understanding and support for CALM's activities, services and policies.
- Be responsive to the community.
- Partner with agencies and groups with similar interests.

**RELEVANT KEY RESULT AREAS**

- KRA 1.1: Systematic biological inventory and assessment.
- KRA 2.1: Management of conservation reserve system (IUCN I – IV).
- KRA 2.2: Management of State forest.
- KRA 3.2: Identification, protection and management (including rehabilitation) of regional significant areas to increase landscape connectivity and functionality especially at a macro scale.

- KRA 3.5: Management of World Heritage properties.
- KRA 3.6: Recovery of natural diversity recovery catchments.
- KRA 3.7: Development and establishment of native vegetation services, and spatial integration of those activities with nature conservation activities to bring about increase in landscape functionality.
- KRA 3.8: Promotion and encouragement of sustainable environmental management systems.
- KRA 3.11: Amelioration of landscape/seascape threatening processes, such as disease.
- KRA 3.12: Sustainable management of Unallocated Crown Land.
- KRA 4.1: Recovery of threatened species and ecological communities.
- KRA 6.1: Communicating with and providing information to the public.
- KRA 6.3: Public participation and involvement programs.
- KRA 6.4: Management of volunteers.
- KRA 6.6: Liaison, consultation and negotiation with Commonwealth and local government, and other state agencies.

**PURCHASERS REQUIRING SERVICE**

- Nature Conservation.
- Sustainable Forest Management.

**Focus**

This program contributes to the 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".*

The program focuses on the conservation and management of the Western Australian flora through strategic research initiatives aimed at significantly reducing the likelihood of extinction of individual plant species and loss of plant communities. A key direction is developing an improved understanding of ecological and genetic processes in contemporary landscapes such as small population effects, fire regimes, and weed invasion in plant populations, species and communities. This information is considered pivotal in developing strategies for the recovery of Western Australia's 337 threatened flora, including 120 critically endangered taxa, and threatened ecological communities, and management of vegetation remnants and rangeland plant communities. In addition, with some 3 200 taxa considered to be susceptible to *Phytophthora* root rot (Dieback) work is also focused on the amelioration and control of this major threat to the flora in the State's south-west. With 2 086 rare and poorly known flora, other key activities include the assessment of conservation status of these taxa and the application of molecular DNA techniques to the resolution of conservation units in taxonomically intractable groups.

**Objectives**

- Provision of reliable knowledge to underpin the conservation of threatened/rare flora, remnant vegetation and other significant plant communities.
- Maintenance and improvement of an *ex situ* germplasm storage facility for threatened/rare flora and flora from threatened ecological communities.
- Development of appropriate flora recovery/restoration techniques, including translocation techniques, for threatened flora.
- Improved understanding of processes threatening flora and ecological communities so that the impacts of these processes can be minimized.
- Provision of phylogenetic and molecular systematic knowledge to facilitate understanding of the WA flora.

**Strategies**

- To utilise survey techniques, mensurative and manipulative experiments, demographic monitoring, population viability modelling, population genetic techniques, and molecular systematic techniques.
- To collaborate with Universities, CSIRO, other government research organisations, the mining industry and other organisations such as WWF, Land and Water Australia, NRM groups and Royal Botanic Gardens Kew, UK.

**Significance and Benefits**
Accurate assessment of the conservation status of threatened (Declared Rare Flora) and Priority Flora is essential to their recovery. Maintenance of an *ex situ* germplasm storage facility underpins translocation and restoration programs. Amelioration and control of threatening processes such as weeds and *Phytophthora* root rot are fundamental to *in situ* management of threatened flora populations and threatened ecological communities. Development of guidelines for the appropriate management of vegetation remnants and rangeland plant communities in degraded and fragmented landscapes is fundamental to ensuring the long term persistence of native flora in areas such as the wheatbelt and semi-arid and arid rangelands.

**Results Expected**
- Removal of plant taxa from threatened species lists.
- Improved conservation status ranking of threatened flora and priority flora.
- Development of techniques to ameliorate and control threatening processes, particularly weeds and *Phytophthora cinnamomi.*
- Better management of remnant vegetation.

**Performance Indicators**
- Increase in the number of taxa downgraded or removed from the State's threatened flora lists (KRAs 4.1, 6.1, 6.3, 6.4, 6.6).
- Representative *ex situ* germplasm storage of threatened and high priority flora, particularly those nominated through the Salinity Action Plan and Millennium Seed Bank Project (KRAs 3.2,3.6,3.7,3.3.12,4.1, 6.1, 6.3, 6.6).
- Number of critically endangered flora populations successfully established through translocations (KRAs 4.1, 6.1, 6.3, 6.4, 6.6).
- Increase in the number of vegetation remnants and key plant communities not considered under threat (KRAs 2.1, 2.2, 3.2, 3.5, 3.6, 3.7, 3.8, 3.11, 3.12, 4.1, 6.6).
- Improved control of major threatening processes such as *Phytophthora* dieback and weeds (KRAs 2.1, 2.2, 3.2, 3.5, 3.6, 3.7, 3.11, 3.12, 4.1, 6.1, 6.3, 6.6).

**Anticipated Outcome**
The conservation and recovery of the Western Australian flora is supported by reliable knowledge about protection of existing populations of threatened species, management of remnant vegetation and plant communities in fragmented and/or degraded landscapes, recovery of critically endangered species, and reversal of processes threatening the long-term persistence of these species.

**Adoption Strategy**
Recommendations on conservation status and management of threatened flora, threatened ecological communities, remnant vegetation and degraded rangeland plant communities to Nature Conservation Division and Regional Services Division; recommendations on the control and amelioration of threats such as *Phytophthora* dieback and weeds to Nature Conservation Division and Regional Services Division; incorporation of information into recovery plans; training of Regional Services Staff to conduct flora monitoring and management; seminars, workshops and conferences; research findings published as reports or in journals within twelve months of data collection.

# PROGRAM - HERBARIUM

**RELEVANT CORPORATE OBJECTIVES**

- To protect, conserve and, where possible, restore Western Australia's natural biodiversity.
- To generate social, cultural and economic benefits through the provision of a range of services that are valued by the community and are consistent with the principles of ecological sustainability.
- To develop community awareness and appreciation of the biological and physical diversity

natural to Western Australia and promote community involvement in and support for its protection, conservation and restoration.

**RELEVANT CORPORATE STRATEGIES**

- Expand and improve the marine and terrestrial conservation reserve system to achieve world's best standards.
- Promote off-reserve conservation that complements the reserve system.
- Provide enriched visitor experiences through quality information, memorable interpretive activity programs and innovative visitor facilities and services.
- Improve community knowledge of biodiversity conservation issues and awareness, understanding and support for CALM's activities, services and policies.
- Be responsive to the community.
- Partner with agencies and groups with similar interests.

**RELEVANT KEY RESULT AREAS**

- KRA 1.1: Systematic biological inventory and assessment.
- KRA 1.2: Acquisition and disposal of land.
- KRA 6.1: Communicating with and providing information to the public.
- KRA 6.2: School and experience-based education programs.
- KRA 6.3: Public participation and involvement programs.
- KRA 6.4: Management of volunteers.
- KRA 6.5: Management of commercial interests.
- KRA 6.6: Involvement of indigenous people and other key stakeholders in conservation and management.

**PURCHASERS REQUIRING SERVICE**

- Nature Conservation.
- Sustainable Forest Management.
- Parks and Visitor Services.

**Focus**

This program serves the Departmental functions as specified in the Conservation and Land Management Act 1984, Section 33 (1) (db), '*To be responsible for the permanent preservation of the plant collections of the Western Australian Herbarium and to care for and extend those collections*' and Section 33 (1) (ca*)* '*To promote and encourage the use of flora for therapeutic, scientific or horticultural purposes for the good of people in this State or elsewhere, and to undertake any project or operation relating to the use of flora for such a purpose*'.

This program contributes to the Nature Conservation Output Description of 'An understanding of our State's natural biodiversity and biodiversity conservation needs', and 'A Department that works effectively with the wider community to achieve biodiversity conservation and a community that is knowledgeable about, interested in, supportive of, and involved in, biodiversity conservation'.

As a permanent, fully databased repository of plant specimens and information about them, the WA Herbarium collections underpin much of the scientific research and many of the environmental management activities of the Department and those of external organizations. The latter include the Forest Products Commission, Environmental Protection Authority, Agriculture WA, Department of Land Administration, other government agencies, universities, regional herbaria, and community interest groups concerned with land management.

Western Australia's terrestrial flowering plant flora is one of the most diverse in the world, yet many of the species are threatened. Knowledge of the flora is hampered by inadequately defined species, and poorly surveyed species. There is high public interest in the identification of vascular flora. Increasing attention is being paid to fungi, marine and other non-flowering plants.

The program develops, manages and extends CALM 's corporate information systems for the benefit of conservation. These systems include the comprehensive list of all current and obsolete plant names (WACensus), a record of all herbarium specimens (WAHERB), and E-flora, an online identification system that is an integral part of FloraBase. These information systems and their underlying databases provide comprehensive knowledge of the plant species of Western Australia, their distribution and their ecological attributes. In this way a wide range of conservation activities, research and field surveys are supported.

**Objectives**

- Care and extension of the State Collection, a Statutory Function under the CALM Act 1984 33 (1) db.
- Maintenance of herbarium corporate specimen, plant names and related databases.
- Extension and curation of the identification facility (Reference Herbarium).
- Incorporation and curation of herbarium specimen vouchers lodged by CALM staff and Scientific Licence holders as required under licence condition 7.1.
- WA Herbarium collaboration with Australia's Virtual Herbarium Project (AVH).
- Co-ordination of community Regional Herbaria, confirmation of identification of specimens.
- Support for the Weed Information Network (WIN): weed identification for CALM staff and WA Dept of Agriculture.
- Support for Bioprospecting, a Statutory Function under the CALM Act 1994, 33 (1) ca.
- Provision of native plant taxonomy, a Statutory Function under the CALM Act 1984 33 (1).
- Maintenance of a current, authoritative list of WA Declared Rare (DRF) and Priority plant taxa (DEFL).
- Plant specimen identification and vouchering for CALM Science, Nature Conservation (including WATSCU), Division of Parks and Visitor Services, Regional Services Division and CALM contractees.
- Plant specimen identification of critical specimens of economic value, weeds, toxic species or conservation taxa for other agencies or the public.
- Maintenance and delivery of the electronic flora of WA, FloraBase.
- Training of Nature Conservation and other CALM staff in plant identification, vouchering and accessing information in FloraBase.
- Provision of weed taxonomy, a Statutory Function under the CALM Act 1984 33 (1) e.
- Publication of the taxonomic journal *Nuytsia*, documentation of taxonomic research on WA flora.

**Strategies**

- Continue to actively seek collaboration from the scientific and general community to fill the extensive gaps in flora information that exist in the herbarium collections.
- Utilize nomenclaturally significant herbarium material of WA origin housed in overseas herbaria to advance taxonomy of the WA flora. Expand the specimen repatriation program to ensure that correct names of WA taxa are accessible to conservation.
- Progress the taxonomic and herbarium specimen content of FloraBase, the electronic flora of WA, to deliver more comprehensive on-line plant information relevant to conservation.
- Maintain outreach programs, offering regional training on field survey methods, plant collection, specimen documentation and identification training to serve a wider scientific and general community.

**Significance and Benefits**

The collection of accurately identified and well-curated specimens underpins conservation of the WA flora. The related electronic information systems provide authoritative, scientific data concerning the flora of the State. The Visitor Centre at the WA Herbarium, and its online information systems, promote greater appreciation of the WA flora by the community and provide an essential service to CALM staff and external consultants involved in conservation and land management. The Regional Herbarium and Weeds Information Network schemes serve to extend these benefits to rural WA, thus fostering local knowledge of the State's flora and of conservation issues among community-based organizations.

Biosystematic knowledge is fundamental to effective conservation of a highly diverse south-west WA flora that has evolved in an ancient landscape devoid of pronounced geographical and climatic barriers. Since European settlement, weeds have invaded the State posing a significant threat to many native species. There is an ongoing need for an up-to-date understanding of the taxonomic status of these weeds in order to access information on their biology.

Corporate decision systems depend on timely delivery of integrated information. Computer based botanic

information systems facilitate the identification of species and the efficient retrieval of information about them.

**Results Expected**

- A total holding of 600 000 vascular plant specimens (approximately 40 specimens per taxon) will be attained. Historical (type) collections of species of 5 WA genera held in other herbaria will be represented.
- Representation of 90% of the currently accepted WA species in The Reference Herbarium Collection.
- Enhanced outreach to salinity, landcare, weed and nature-based tourism groups.
- Training of three parataxonomists to staff the volunteer identification unit.
- Increased proportion of the flora with accurately defined taxonomy.
- Improved resolution of taxonomic problems affecting taxa with conservation priority.
- Extension of inventories to lichens and fungi.
- Database of name, location, habitat and other label data for 600 000 vascular plant specimens (approximately 40 specimens per taxon).
- Identification of geographical gaps in collections.
- WACensus updated to incorporate non-vascular plants.
- Predicted distribution maps of all 12 000 WA vascular plant taxa produced and included in FloraBase.

**Performance Indicators**

- 10 000 specimens incorporated into the State Collection (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6).
- 500 specimens received from regional herbaria according to established protocols (KRAs 6.1, 6.2, 6.3, 6.4, 6.6).
- 400 regional volunteer collectors (KRAs 6.1, 6.2, 6.3, 6.4, 6.6).
- Known weed populations listed for 15 local government areas (KRAs 6.1, 6.2, 6.3).
- Revenue from bioprospecting (KRA 6.5).
- 50 new species described or taxonomically clarified (KRAs 1.1, 1.2, 1.3).
- Number of species downgraded on threatened flora list as a result of taxonomic resolution (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.6).
- Descriptions of species added to database (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6).
- Number of new identification keys for species groups posted on the FloraBase information system (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.6).
- Number of non-vascular species with newly published inventory (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6).
- Number of advisory communications to Wildlife Branch concerning identity, biology, and conservation status of individual species (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6).
- Taxonomic status of 200 weed species validated (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.6).
- Increased taxonomic and geographic coverage of the State in WAHERB (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6).
- Number of databased plant species names increased by 100 (KRAs 1.1, 1.2, 1.3, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6).
- Number of registered FloraBase users increased by 100 (KRAs 6.1, 6.2, 6.3, 6.4, 6.5, 6.6).
- Number of clients paying for FloraBase/Max services increased by 10 (KRAs 6.1, 6.2, 6.3, 6.4, 6.5, 6.6).

**Anticipated Outcome**

The WA Herbarium has a comprehensive, adequate and representative collection of specimens of the State's vascular and non-vascular flora, to support flora conservation. Reliable and stable taxonomy and nomenclature underpin the effective conservation of the State's flora and comprehensive databases facilitate the rapid retrieval of scientific information about the WA flora.

**Adoption Strategy**

Collaboration with CALM Regional, District and other staff to develop training programs in collecting techniques, extension of the volunteer specimen collecting programs (Regional Herbarium Network, Weed Information Network). Collaboration with taxonomists; dissemination of knowledge via FloraBase, contribution of information to flora recovery teams. Publicity for the databases to CALM staff, universities and the public; production of books, interactive CDs and web pages; lectures, seminars, workshops and

conferences; research findings published as reports or in journals within 12 months of data collection.

# PROGRAM – LANDSCAPE CONSERVATION

**RELEVANT CORPORATE OBJECTIVES**

- To protect, conserve and, where possible, restore Western Australia's natural biodiversity.
- To generate social, cultural and economic benefits through the provision of a range of services that are valued by the community and are consistent with the principles of ecological sustainability.
- To develop community awareness and appreciation of the biological and physical diversity natural to Western Australia and promote community involvement in, and support for, its protection, conservation and restoration.

**RELEVANT CORPORATE STRATEGIES**

- Protect biodiversity from threatening processes, agents and activities, including feral animals, weeds, dieback, and other exotic diseases, salinity and inappropriate fire regimes.
- Ensure that the use of wildlife is sustainable.
- Manage the forests and woodlands entrusted to us, and the resources they provide, on an ecologically sustainable basis.
- Improve community knowledge of biodiversity conservation issues and awareness, understanding and support for CALM's activities, services and policies.
- Be responsive to the community.
- Partner with agencies and groups with similar interests.

**RELEVANT KEY RESULT AREAS**

- KRA 2.1: Management of conservation reserve system (IUCN I-IV).
- KRA 2.2: Management of State forest.
- KRA 3.2: Identification, protection and management (including rehabilitation) of regionally significant areas to increase landscape connectivity and functionality especially at a macro scale.
- KRA 3.3: Management of RAMSAR sites.
- KRA 3.4: Management of Biosphere reserves.
- KRA 3.6: Recovery of natural diversity recovery catchments.
- KRA 3.7: Development and establishment of native vegetation services, and spatial integration of those activities with nature conservation activities to bring about increase in landscape functionality.
- KRA 3.8: Promotion and encouragement of sustainable environmental management systems.
- KRA 3.9: Reconciliation of competing/conflicting land uses.
- KRA 3.10: Community-based natural resource management.
- KRA 3.11: Amelioration of landscape/seascape threatening processes, such as disease.
- KRA 3.12: Sustainable management of Unallocated Crown Land.
- KRA 4.1: Recovery of threatened species and ecological communities.
- KRA 4.3: Sustainable use of terrestrial flora and fauna under approved management plans.
- KRA 4.4: Habitat management for migratory birds.
- KRA 6.1: Communicating with and providing information to the public.

**PURCHASERS REQUIRING SERVICE**

- Nature Conservation.
- Sustainable Forest Management.
- Forest Products Commission (FORESTCHECK monitoring).

**Focus**
The focus of this program is on processes that influence conservation and sustainable use of natural systems at a landscape scale. Research is undertaken to develop meaningful indicators of sustainable utilisation, to monitor the effectiveness of management in meeting conservation objectives, to restore landscapes affected by salinity and erosion, and to develop systems for using fire to maintain and enhance biodiversity at the landscape scale.

**Objectives**
- Monitoring of the condition of ecosystems to determine the effectiveness of management in maintaining biodiversity and restoring degraded ecosystems.
- Develop techniques to predict the ecological effects of processes that operate at landscape and regional scales such as fire, grazing, and climate variability.
- Understand the impact of timber harvesting, silvicultural treatment and other forest management activities on soil, water and biodiversity and use this information to address the key performance indicators established by the Forest Management Plan 2004-2013.
- Understanding of the long term ecological effects of fire regimes.

**Strategies**
- Conduct experimental studies with controls, replication and pre-treatment calibration to investigate important hypotheses about the effects of management activities.
- Monitor a strategic network of sites in a range of ecosystems, where possible building on existing knowledge gained from biological surveys and experiments.
- Develop adaptive management approaches will be utilised to compare alternative policies and practices.
- Initiate and foster linkages with other government agencies, universities, community organisations and Cooperative Research Centres.
- Liaise closely with staff from other sections of the Department to ensure that research outputs are relevant, timely, and based on good science.

**Significance and Benefits**
Sustainable land management requires the implementation of policies and practices that maintain ecological processes and biodiversity. The Montreal Protocol has established a series of criteria and indicators to guide the direction of ecologically sustainable management in temperate forests and provides a framework for reporting to meet national and international conventions. Complementary protocols are also likely to be applied to the management of other categories of land. These protocols need to be supported by research to develop meaningful and cost-effective and indicators, and by integrated monitoring programs that provide information about the condition of ecosystems and changes that may occur over time. Given the existence of serious threats to biodiversity and the absence of full knowledge about ecological processes, adaptive management is an important tool for maintaining and improving current ecosystem condition.

**Expected Results**
- Improved definition of the impact of land management practices on soil, water and biodiversity.
- Development and implementation of practical and reliable indicators of sustainable forest management.
- Implementation of effective and ecologically sustainable re-vegetation programs in recovery catchments.
- Effective uptake of research findings by managers.

**Performance Indicators**
- Number of advisory communications to Nature Conservation Division recommending improvements in management practices for recovery catchments and other departmental lands (KRAs 2.1, 3.2, 3.3, 3.4, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 4.1, 4.3, 4.4).
- Number of advisory communications to Sustainable Forest Management Division recommending improvements to forest management planning and harvesting guidelines (KRAs 2.2, 3.8, 3.9, 3.11, 4.1).
- Contribution to the development of the Department's fire and biodiversity planning system by provision of a vital attributes database for vascular plants and validation of a database of fire

exclusion reference areas for use as benchmarks in ecological studies (KRAs 3.8, 3.9, 3.10, 3.11, 4.1, 6.1).

- Implementation of the FORESTCHECK monitoring protocol in 2004 and 2005 with a comprehensive analysis and review during 2006 (KRAs 2.2, 3.8, 3.11, 4.3, 6.1).

**Anticipated Outcome**
Land management practices that are based on a sound understanding of the impacts of natural processes and human-induced disturbances and that contribute to biodiversity conservation and sustainable management.

**Adoption Strategy**
Recommendations to Nature Conservation and Sustainable Forest Management Divisions; incorporation of information into the Forest Management Plan, recovery catchment plans and area management plans; seminars, workshops and conferences; research findings published as reports or in journals within 12 months of data collection.

# PROGRAM - SCIENCE APPLICATIONS

**RELEVANT CORPORATE OBJECTIVES**

- To protect, conserve and, where necessary and possible, restore Western Australia's natural biodiversity.
- To develop community awareness and appreciation of the State's rich diversity of native plants, animals and natural ecosystems, and its unique landscapes, and promote community involvement in and support for their protection, conservation and restoration.
- To foster a positive work culture of trust, continuous improvement and anticipation of biodiversity conservation issues and customer needs, and deliver core business activities in the most effective and efficient manner.

**RELEVANT CORPORATE STRATEGIES**

- Expand and improve the marine and terrestrial conservation reserve system to achieve world's best standards.
- Improve community knowledge of biodiversity conservation issues and awareness, understanding and support for the Department's activities, services and policies.
- Partner with other agencies and groups with similar interests.
- Develop and maintain sound internal communications.
- Develop and improve knowledge and information sharing.
- Focus scientific research programs on high priority issues.
- Ensure management is based on good science.
- Focus the Department's resources on strategically important areas.

**RELEVANT KEY RESULT AREAS**

- KRA 1.1: Systematic biological inventory and assessment.
- KRA 3.8: Promotion and encouragement of sustainable management systems.
- KRA 6.1: Communicating with and providing information to the public.

**PURCHASERS REQUIRING SERVICE**

- Nature Conservation.
- Sustainable Forest Management.
- Parks and Visitor Services.

**Focus**
This program contributes to the reserve prioritization process through improved knowledge management, the effective management of environmental data and knowledge of the WA natural environment through Naturebank, the streamlined provision of biodiversity data for regional natural resource management planning, targeted public communication and education programs, bioregional planning, and area management planning.

This will be achieved through the development of a comprehensive knowledge management system that incorporates, integrates and maintains CALM's biological and biophysical datasets. This will enable Science Division to provide more useful corporate, regional and public information on issues such as biodiversity hotspots and species richness gradients. Interdisciplinary linkage of information needs to be disseminated to regional and public users in easy to use formats.

The program will also collaboratively focus on research into new and improved information techniques (e.g. spatial and climatic modelling) for producing biodiversity indicators and other derived products to assist in understanding of the biota and for Departmental conservation planning processes.

The program will focus on the strategic supervision and management of major Divisional corporate information systems infrastructure and the Divisional Wide Area Network, ensuring that infrastructure is maintained in the best interests of the Division and that expenditures are managed in a co-ordinated and informed manner.

**Objectives**
- Implementation of the Naturebank initiative, a knowledge management and information delivery system offering convenient public and agency access to information relevant to many aspects of WA biodiversity.
- Development of new and improved techniques for analysing and presenting biodiversity information.
- Maintenance of Division LAN and strategic supervision of major corporate information systems.
- Improvement in the uptake of research findings and other scientific knowledge by regional operations and corporate policy.
- Development of adaptive management/monitoring partnerships with staff of regions and districts.

**Strategies**
- Build information management capability and analytical capacity by obtaining funding for GIS analyst, systems analyst and programmer, and biological modeller, as well as provision for training.
- Improve collaboration with data custodians within Science Division, other CALM Divisions (particularly the Ecobase initiative of Corporate Services Division), and other agencies.
- Clarify the biodiversity information needs of policy makers and regional staff.
- Build a sustainable system by better co-ordinating the use of data in CALM and other agencies.
- Use data standards, such as the initiatives supported by the Global Biodiversity Information Facility (GBIF), to build a protocol for data sharing between existing and new systems.
- Explore with other Program Leaders effective cross-program ways of integrating and disseminating knowledge.
- Promote with regional staff the value of structuring operational activities so that learning is facilitated by means of adaptive management.
- Liaise between Corporate Services Division and Science Division in procurements relating to the Divisional WAN, provide advice and information and manage the Divisional WAN budget.

**Significance and Benefits**
All major planning decisions within the Department should be based on timely and accurate knowledge. Information systems are a primary mechanism for gathering, integrating, summarizing and disseminating that knowledge. Through the development of a knowledge management system, and through the acquisition of staff with relevant skills, CALM will be well positioned to locate relevant information, and integrate that information into a seamless environment where users, planners, and researchers can obtain the knowledge they require. This will benefit hypothesis-development, conservation planning, decision-making, and understanding of the natural environment.

**Results Expected**

- Integrated datasets of the distribution of animal and plant species in relation to land tenure, management activities, and vegetation units.
- Provision of spatial biological information at scales and in formats required by planners, educators, and the public.
- Online spatial querying of biodiversity data without the requirement for expensive desktop GIS capability.
- Biodiversity indicators, such as modelled distributions of species and vegetation types, in relation to environmental data and to broadscale threats, such as climate change and inappropriate management activities.
- Efficient access to biodiversity data, knowledge and information by a range of users.
- An effective and reliable Divisional Wide Area Network.
- Corporate information systems that function in an integrated manner and conform to Departmental standards.

**Performance Indicators**
- Data better integrated and more accessible to stakeholders (KRA 1.1, 6.1).
- Acceptance by land managers of the superiority of the Adaptive Management approach compared to the traditional Command and Control approach (KRA 3.8).

**Anticipated outcome**
Biodiversity planning for, management activities in, and public awareness of, forests, nature reserves and national parks are supported by the provision of integrated and relevant data and information.

**Adoption Strategy**
Collaboration with corporate decision-makers and external organizations about allocation of resources and appropriate funding; regular liaison with staff of Information Management Branch, CALM; database audit in Science Division in co-operation with Program Leaders; consultation with staff of the Western Australian Museum about access to faunal databases; meetings with policy and regional staff to identify requirements and prioritize development and delivery; seminars and workshops; training and guidance with metadata, databasing, biometric and web page standards; development of functional specifications; research findings published in a timely way in appropriate science journals

# PROGRAM - SCIENCE SUPPORT

**RELEVANT CORPORATE OBJECTIVES**

- To foster a positive work culture of trust, continuous improvement and anticipation of biodiversity conservation issues and customer needs, and deliver core business activities in the most effective and efficient manner.

**RELEVANT CORPORATE STRATEGIES**

- Develop and maintain sound internal communications.
- Manage and support employees effectively.
- Develop and improve knowledge and information sharing.
- Monitor our performance and identify areas where we can improve.

**PURCHASERS REQUIRING SERVICE**

- Nature Conservation.
- Sustainable Forest Management.
- Parks and Visitor Services.

**Focus**
This program contributes to the efficient delivery of Science Services to the Department through provision of administrative support to the Science Division. The Program covers four main areas of support for Science Division: administration, centre management, library and the Vegetation Health Service.

**Objectives**
- Provision of financial and administrative services to support the Science Division in delivery of Science Services to the Department.
- Provision of library services to Science Division, CALM and the public.
- Protection of the State's vegetation resource through accurate diagnosis of plant disease.

**Strategies**
- Delivery of administrative functions at the Divisional level where possible, and at centre level for activities relevant to specific locations.
- Delivery of financial administration through four cost centres that are related to funding under the Output Purchaser model.
- Collaboration with all science staff, particularly Program Leaders, and co-operation with staff in Corporate Services Division.

**Significance and Benefit**
The co-ordination of support services in this program will lead to integration of administrative functions within the division, development of consistent processes and procedures, standardisation of compliance, and effective divisional tracking of information. The Division will benefit from greater efficiencies in service delivery at divisional and program level. Scientific enquiry within the Department will be supported by quality library facilities. Effective disease detection will minimise the spread and impact of plant disease.

**Expected Results**
- Provision of efficient financial management to Science Division.
- Provision of efficient administrative support to Science Division.
- Effective management of Science Division infrastructure.
- Provision of library services to Science Division, CALM and the public.
- Provision of timely and accurate disease diagnosis of plant and soil samples.

**Performance Indicators**
- Balanced budget for Science Division.
- Compliance with Public Service regulations.
- Science Division buildings maintained in good working order.
- Compliance with OHS regulations.
- Security procedures in place.
- High level use of the Library.
- High level use of the Vegetation Health Service.

**Anticipated Outcome**
The activities of the Science Division are supported by excellent administrative services and financial management; staff work in safe, secure, well-managed facilities; the knowledge base of the Department is supported by quality library services.