DRAFT OF 12.8.93

SCIENCE AND INFORMATION DIVISION

STRATEGIC PLAN

Purpose of this Plan

This Strategic Plan sets out the role of the Science and Information Division by providing an overview of the mission, objectives and strategies of the Division, its structure and responsibilities of key staff.

Introduction

Being part of the Department of Conservation and Land Management, the Science and Information Division necessarily has a mission which supports that of the Department. CALM's purpose is to conserve and manage Western Australia's lands, waters and wildlife for the benefit of present and future generations. Underlying this is the principle of ecologically sustainable management involving maintenance of the productive capacity and ecological diversity of ecosystems. CALM is responsible for the conservation of all flora and fauna in the State through legislation, not just the biota in the public lands and waters entrusted to it.

The major functions of CALM are:

- *Conservation of Nature* To conserve the indigenous biota and ecological processes in natural habitats throughout the State.
- *Value and Sustainable Usage of Resources* To optimise the value and financial return to the State of the biota and ecosystems entrusted to the Department.
- *Recreation and Tourism* To optimise provision of opportunities and services so as to allow enjoyment of the biota and ecosystems entrusted to the Department.
- *Knowledge* To ensure that these three functions are underpinned by up-to-date and reliable science-based knowledge.
- *Community Education and Support* To promote community awareness, understanding and appreciation of the biota and ecosystems entrusted to the Department.

Mission

The Science and Information Division of CALM is committed to providing up-to-date and scientifically-sound information to uphold effective conservation and land management in Western Australia.

Objectives

To achieve its Mission, Science and Information Division has six objectives:

1 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

2 To ensure that Science and Information Division is responsive to the needs of policy makers and managers in CALM by bringing science to bear on the solution of the State's most pressing problems relating to land management and conservation.

3 To advise CALM on sustainable resource development opportunities and ensure the conservation of biological resources through their sustainable utilization

4 To communicate to managers in CALM the knowledge, information and other insights obtained through scientific investigation in Western Australia and elsewhere.

5 To attain for CALM a world-wide reputation for excellence in science by publishing knowledge obtained through scientific research in the premier national and international scientific journals.

6 To show that the Division, as an integrated part of CALM, contributes 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 and Information Division has formulated the following broad strategies:

1 Publicize within CALM the contribution of Science and Information Division to attaining CALM's Mission.

2 Develop and project the Science and Information Division's reputation as a credible and dependable source of sound knowledge about conservation, land management and sustainable utilization matters.

3 Collaborate with Regional and District staff in developing and implementing practical solutions to high priority problems.

4 Increase CALM's commitment to obtaining scientifically sound information through improved resourcing of Science and Information Division.

5 Continue to seek the most cost-efficient means of carrying out research by employing contract consultant staff where possible.

6 Maximize the acquisition of external funds in order to enhance the knowledge-base of CALM's operations.

7 Carry out a balanced program of short-term and long-term research consisting of

- projects initiated by the Division to address very high priority issues ('task force' approach)
- projects directly related to high-profile management issues that are more informally initiated by scientists or managers
- projects initiated by scientists to provide a basis for future management decisions

8 Maintain support services such as high standards of herbarium curation, computer support and library support.

9 Reward staff, on the basis of performance and experience, through criteria progression.

10 Provide staff with opportunities to reach higher levels of self-development.

11 Develop project co-ordination and people management skills of staff

12 Collaborate with other Government agencies, universities, interest groups or the public to conduct or co-ordinate research when such interaction will benefit CALM's objectives.

13 Avoid any unnecessary or counter-productive competitiveness with kindred institutions.

Profile of Science and Information Division

The structure of the Division has been developed to meet several needs

- The need for leadership and policy direction
- The need to document the biota, ecological processes and biological resources of the State
- The need to conserve threatened species and ecological communities by ameliorating inimical processes
- The need to ensure that land and biological resources are used sustainably
- The need to ensure that essential financial, computing, biometrical, publishing and other technical services are provided to support the Mission of the Division.

The recent restructuring of the Division has demonstrably improved integration. The focus until recently was fragmented, in that the structure of science groups was centred on forest, plant science and wildlife science. This reflected the forest and wildlife research groups which were amalgamated in 1985 and the Herbarium which was incorporated into CALM in 1988.

Science and Information Division consists of four Groups (see Appendix 1). Three of these groups - Bio-Resources, Bio-Conservation, and Sustainable Resources - are actively science-based. The fourth - Science Services - delivers corporate services. Each Group is led by a Head, who in turn is responsible to the Director of the Division. The Director and the four Group Heads comprise the Science and Information Management Council (SIMC) which determines policy in the Division. Each Science Group consists of two Sections, each administered by a Manager. Each Section Manager is responsible for the integration of priorities within the Science Section, the effectiveness of the research done, and fostering interaction within the Section and with other relevant staff. Group Heads are responsible for

ensuring that relevant scientific expertise in the Group is integrated and co-ordinated, e.g. by the formation of project teams.

Staff numbers in each Group are (as at 1 August 1993) as follows:

Bio-Resources	13.5 scientists and 18.5 support staff
Bio-Conservation	17.5 scientists and 23.3 support staff
Sustainable Resources	21.0 scientists and 33.5 support staff
Science Services	5.0 scientists and 8.5 support staff

The focus of each scientist* in the Division and the extensive cross-links so far developed are shown schematically in Appendix 2. The physical resources of the Division are considered in Appendix 3.

BIO-RESOURCES

Scope

CALM is concerned with conservation and land management in an area recognized on a world scale for its diverse biota. Available information on species numbers and habitat diversity indicates that Western Australia has a very rich flora and fauna with a wide array of habitats. Conservation issues such as feral predators, introduced fungal pathogens, widescale impacts of agriculture, development and the pastoral industry and management and sustainable utilization of indigenous species can best be studied with reliable and easily retrieved data.

The Bio-resources Group is concerned with the inventory of systematic, biological and ecological information on the biota and documentation of the landscape characteristics and ecological communities of the State. The data on biota and habitats is computer stored and will contribute directly to the determination of conservation values, development of land management techniques as well as provide biological data on those taxa with conservation or economic value.

The Group is comprised of two Sections: the *Community Resources Section* which is concerned with the documentation of ecological communities across the State and the *Species Resources Section* which deals with inventory of information on all biota in the State.

Objectives

- To establish a State resource centre for conservation and economic information on the flora and, in collaboration with other institutes, the fauna of the State.

- To develop and co-ordinate the inventory of geographic, systematic and ecological data concerning the biota and ecosystems of Western Australia.

Strategies

- Establish priorities for research and develop co-operation to ensure that projects and field studies are co-ordinated.

* excluding temporary or externally funded staff

- Develop relational databases for information on taxonomy and distribution of biota, their economic values, conservation values, ecological preferences and landscapes to ensure that the results of research are practical and contribute directly to the solution of conservation problems.

- Gather and store data in a manner which conforms to Australian and international standards.

- Establish protocols for review and implementing executive decisions.

- Maintain a high standard of international publications, reports and advice.

- Communicate outcomes of survey and research so that they contribute directly and effectively to conservation, land management and sustainable utilization.

Community Resources Section

Objectives

- To discriminate and document plant and animal communities so as to design a representative, adequate and comprehensive conservation reserve system.

- To identify those communities with conservation significance such as those that are rare or sensitive to consequences of human activity and therefore threatened.

- To implement a basis for measuring change in ecosystems across the State so that the determination of management priorities is explicit.

Strategies

- Assess and refine existing environmental maps by field surveys or using existing information.

- Continue to establish the system of permanent benchmark quadrats.

- Collect and database benchmark quadrat attributes appropriate for quantitative analysis of patterns in the species composition of assemblages.

- Further develop and continue to apply quantitative methods for modelling patterns of occurrence of plant and animal assemblages.

Outcomes

- Advice to Government on:

  - the distribution and conservation status of communities;
  - the occurrence of exotic species and other sources of disturbance in indigenous communities;
  - gaps in the reserve system using available data; and
    ecological survey design standards

- An adequate inventory of the State's biota and functional assemblages.
- Predictive models identifying boundaries of communities and of other ecological or biogeographic entities.
- Refined ecosystem maps.
- Quantitative assessment of the adequacy of existing nature conservation reserve systems in each district with identification of any gaps.
- Optimal locations for any additional reserves needed to attain a representative, adequate and comprehensive reserve system.
- A quantitative context for assessing the conservation status of taxa and communities.
- A basis for the quantitative appraisal of change in ecosystem elements.

Species Resources Section

Objectives

- To undertake systematic research to discriminate, describe and classify Western Australian taxa with particular reference to those with:
  - conservation value;
  - economic importance and which can be sustainably utilized.
- To develop and maintain appropriate interconnected database systems for the capture and manipulation of taxonomic and biological data.

Strategies

- Establish appropriate systems for effective capture and manipulation of descriptive taxonomic data.
- Produce descriptive accounts of the biota focusing on taxa, communities and geographic areas of conservation significance.
- Adopt relevant techniques to produce predictive systems that indicate taxonomic relationships and geographic patterns of occurrence, especially for taxa of conservation or economic significance.
- Participate in development and maintenance of dynamic information systems for biota of conservation and economic significance.

Outcomes

- Review of databases to plan integration of WAHERB, WACENSUS, WALIB, "DELTA" and other relevant databases, including Geographic Information Systems.

- Implementation of appropriate database systems for capture and manipulation of information on the State's biota.
- Dissemination of current information on the names of WA biota.
- Provision of accessible information on the identification and circumscription of taxa of WA biota, especially those of conservation and economic significance.
- Reduction of the number of taxa classified as poorly known.
- Development of a comprehensive database of biological information which aids land management.
- Provision of taxonomic, biological, and geographic data for the assessment of the conservation status of taxa.
- Extension of geographic and taxonomic coverage of the specimen databases of WA.
- Publications contributing to taxonomic and biological knowledge of the State's biota.

BIO-CONSERVATION

Scope

The Bio-Conservation Group focuses on which of the bio-resources of the State are being diminished or degraded and by what processes, and how these processes can be managed effectively and the resources be best conserved.

The Group provides the scientifically rigorous information that empowers those parts of CALM charged with operational conservation and land management to achieve their mission. It also provides the scientifically rigorous information that supports CALM policy pertaining to conservation. In that sense those parts of CALM which effect conservation through policy and management are the principal clients of the Group.

However at a wider community level, the Group is a major centre of practical expertise in species and community conservation. This provides an unequalled opportunity to foster community understanding and support for conservation, persistence of biodiversity and maintenance of our natural heritage.

Objectives

- To concentrate effort and resources on the most important (not necessarily the most topical) problems of biological conservation facing CALM.
- To review scientific knowledge of topics that are relevant to biological conservation and pertinent to CALM.
- To deliver information and support to other sectors of CALM which require or will benefit from specialist advice and scientific data.

- To contribute to scientific knowledge and community appreciation of conservation biology and CALM's mission and achievements.

Strategies

- Rigorously and regularly review priorities (when appropriate, with other Science Groups and/or Branches) and allocate human and financial resources accordingly.
- Develop an effective and stimulating Centre of Expertise in Conservation Biology.
- Recognize and emphasize within the Group the importance of pro-active and responsible communication.
- Through professional and popular channels, disseminate the values of biological conservation, CALM's commitment to it and the Department's achievements in this area.

Community Conservation Section

Objectives

- To understand the processes determining the structure and stability of terrestrial and aquatic biological communities and their resilience to change.
- To determine the impact of threatening processes and human-induced disturbances on the structure and function of biological communities, and define the technology and management practices required to ameliorate the effects of these agents.
- To identify the ramifications of ecological impacts at the landscape and ecosystem level and develop the scientific basis for the conservation and rehabilitation of integrated landscape systems.

Strategies

- Assemble data on the past and present distributions, disturbance regimes and conservation status of the major animal and plant communities in Western Australia and implement monitoring programs to assess their long-term stability.
- Undertake experimentally-based research and monitoring to acquire an understanding of the processes determining the resilience and vulnerability of biological communities to disturbance.
- Develop integrated systems for the predictive modelling of response patterns and community sensitivity to disturbance.
- Research the biology and ecology of pathogens and weeds and develop the technology for their control or eradication.
- Undertake experimentally-based research and monitoring on various rehabilitation strategies to identify and develop the most cost-effective protocols.

- Using community resource information and GIS systems, highlight processes and procedures that will enable conservation and rehabilitation at the landscape and ecosystem level.

- Through regionally-based units and regular workshops, advise operations personnel on the likely impacts of proposed operations, advise on monitoring procedures and assist in the analysis of outcomes (experimental management).

Outcomes

- A knowledge of the changes that are occurring in the various biological communities in Western Australia and an understanding of the processes or factors that are causing change. This will assist the Group to focus research on the most pressing issues in community conservation and will enable CALM to prioritize allocation of resources to community management.

- An understanding of the processes determining the resilience and vulnerability of biological communities to disturbance and prediction of response patterns. This will enable the improvement of present management prescriptions and the development of better ones.

- CALM will be better able to control or eradicate pathogens and weeds.

- CALM will be able to apply the most cost-effective methods available for rehabilitation of degraded communities.

- CALM will be able to apply the most effective methods available to conservation at the landscape and ecosystem levels.

- CALM will improve management operations by applying the lessons learned from experimental management.

Species Conservation Section

Objectives

- To develop the protocols required for the conservation of threatened and other priority conservation taxa in W.A.

- To identify the processes that detrimentally impact on the native biota and develop strategies for the control of these processes.

Strategies

- Undertake the population biology research required to determine the conservation status of indigenous taxa.

- Participate with other relevant CALM sections, units and branches in the development of methodologies for threatened taxa ranking, preparation and revision of threatened and priority taxa lists and in the setting of departmental priorities for species conservation research.

- Assist in the preparation of recovery plans, interim management guidelines or area-based wildlife management programs for threatened taxa.

- Develop and undertake field trials of survey, monitoring and other techniques relevant to the management of native taxa, and develop operational guidelines for their implementation. Participate in training programs where appropriate.

- Undertake research into the biology of exotic species of predators and competitors, and determine their impact on threatened and priority conservation taxa.

- Participate in the research required to determine the impact of management activities on the native biota and develop operational prescriptions relevant to the conservation of threatened and priority taxa.

- Assess other processes which may affect threatened taxa and develop strategies which eliminate or minimize the threat.

Outcomes

- An improved knowledge of the conservation status of the State's biota.

- The development of rigorous methods for ranking threatened taxa and an ability to provide and update CALM and the community with a scientifically based listing of the threatened and priority conservation taxa of WA.

- A completed area-based threatened flora survey and population census for most of the State and publication of Wildlife Management Programs for rare and threatened flora in all of CALM's Regions/Districts.

- The publication of Wildlife Management Programs for threatened fauna for which recovery plans are being implemented.

- The completion of operational guidelines for the control of the fox, feral cat and black rat.

- A better understanding of the impact of CALM's management activities on threatened taxa and the development of prescriptions to enhance the conservation of threatened taxa in all of CALM's estate.

- The development of guidelines to maintain adequate control over human-induced processes shown to detrimentally impact threatened and other native taxa.

- The provision of the relevant information and protocols to all CALM staff necessary to ensure the competent management of the State's native biota, particularly threatened and priority taxa

SUSTAINABLE RESOURCES

Scope

CALM administers a wide range of natural resources which are utilized by the community for both profit and pleasure. CALM must ensure that these natural resources are used in a sustainable manner with the least possible disturbance and effect on the environment. This includes the growing of exotic plantation trees for wood and other products which supplement local products and alleviates the pressures on them.

The Sustainable Resources Group comprises two sections, Natural Products and Tree Crops. The role of the *Natural Products Section* is to undertake scientific research into the management and utilization of species from which natural products are derived and to provide advice to managers in these areas. Its role also includes exploring the possibilities for developing new products either independently or in collaboration with other organizations.

The work of the *Tree Crops Section* covers the range from plantations where the sole aim is wood production through to tree plantings where the aim is to either rehabilitate a degraded environment or prevent the degradation of an environment (i.e. landcare benefits). Between these extremes there will be plantings that produce both productive and landcare benefits.

Objectives

- To provide science-based information which will enable CALM to expedite its role in the sustainable utilization of resources in the most cost-effective manner with the least possible disturbance to the environment.

- To identify, evaluate and participate in the development of new products from natural resources of Western Australia.

Strategies

- Contribute to the identification and utilization of new resources.

- Devise methods that enable resources to be utilized sustainably and with a minimum of environmental disturbance.

- Improve the cost-effectiveness of resource utilization including the development and growing of tree crops.

Natural Products Section

Objectives

- To evaluate and initiate the development of existing and new natural products, industries and markets.

- To provide the scientific information and to develop techniques to optimise the production and sustainable utilization of natural products.

- To research the impacts of utilization on the resource and on the ecosystem in which it occurs.

- To develop the most effective and efficient management practices for utilizing the resource.

- To develop protocols for monitoring environmental impacts and sustainability of management practices.

Strategies

- Determine the distribution, abundance, ecology and genetic resource of species from which natural products are derived and develop methods to optimise their regeneration and growth.

- Research and monitor the long term environmental and social impacts of CALM's management of natural products and determine the sustainability of the resource under this management. Develop science-based management practices which optimise the environmental and social impacts of CALM's management of natural products and which ensure the sustainability of these products.

- Determine silvicultural or management practices to optimise the production of natural products. Optimise production by selection of superior breeding stock where this is economical.

- Explore the potential for commercial uses of plant and animal species that are presently not used. Develop and promote methods of optimising the use of natural products.

- Determine the potential losses due to damaging agents such as fire, pests and diseases, and develop efficient and effective methods to minimize these losses.

Outcomes

- Improved timber utilization by advanced timber drying schedules and installation of kiln drying controls and CALM developed timber dryers for local and interstate sawmillers.

- Technical support provided for licensees manufacturing VALWOOD® in Western Australia.

- Improved utilization of regrowth karri timber.

- Identification, evaluation and development of new natural products of economic and social benefit to Western Australia.

- Seed orchards and planting stock of *Phytophthora cinnamomi* resistant strains of jarrah.

- Improved forest fire danger rating and fire behaviour prediction systems.

- Silvicultural systems and management practices which:

- are cost effective, efficient and which maximize the sustainable yield and economic benefits derived from natural products;
- are ecologically sustainable, i.e. which ensure the long term maintenance of essential biological characteristics, processes, dynamics and productivity of forest ecosystems;
- minimize the impact of fungal and insect pests on wood quality and quantity.

- Process-based predictive model of the impacts of logging and fire on jarrah and karri forest ecosystems.

- *Phytophthora cinnamomi* hazard rating system for the northern jarrah forest.

- Ecologically sustainable harvest levels and appropriate management prescriptions for commercially important wildlife such as *Boronia megastigma*, kangaroos and crocodiles.

- Survey and monitoring procedures for assessing the sustainability of timber and wildlife utilization management practices.

Tree Crops Section

Objectives

- To develop tree crops as integral, multiple purpose components of sustainable land management systems in the diverse environments found in southern W.A.

- To provide the scientific information necessary to optimize production, and maximize on-site and off-site environmental benefits from all tree crop plantings.

- To evaluate and initiate the development of new tree crop species, products industries and markets.

- To provide support for other programs within CALM (e.g. physical resource information, materials analysis) to aid planning and management in parks, forests, and plantations.

Strategies

- Predict the capability of sites to produce tree products and to determine how species differ in their growth and response to climatic and edaphic variation.

- Determine the optimum silvicultural regimes (establishment, pruning, thinning, fertilization, pest and disease control) for production and sustainability. Ensure that these regimes are compatible with other concurrent land use (e.g. water yield, honey production, recreation use, agricultural production).

- Develop practices for integrating tree crops into productive and sustainable land use systems. This will include the development of suitable site preparation, plant selection, revegetation techniques and on-going management practices for a wide range of sites including degraded land that requires rehabilitation.

- Optimize the quantity and quality of production and disease tolerance of all tree crop species by the selection, breeding and production of superior genotypes.

Outcomes

- Land capability assessment and growth prediction procedures for plantations and tree crops by relating climatic and edaphic factors to the survival and growth of tree species in southern W.A.

- Optimum thinning, pruning and fertilization strategies for sawlog and water production from *P. pinaster* stands on the coastal plain.

- Optimum fertilizer applications for *P. radiata* and *E. globulus* at all stages of the rotation on the range of sites on which they are grown, and understanding of the interaction between water supply plantation density and response to fertilization.

- Quantification of the production and landcare benefits of tree crops integrated with agriculture to ameliorate land and water degradation (e.g. salinization and eutrophication), and development of techniques to maximize these benefits.

- Establishment techniques and silvicultural management practices which optimize the economic returns for eucalypt pulpwood plantations and from oil eucalypt crops.

- Introduction, selection and breeding of *P. radiata* and *P. pinaster* so as to ensure that the genotypes used in pine plantations provide the best possible growth rates, wood quality and disease resistance.

- A diverse and robust breeding population from the complete natural distribution of *E. globulus*.

- Expanded range of species and improved genetic potential of planting stock available for revegetation and plantation tree crops.

- Seed orchard and vegetative propagation techniques to ensure the supply of improved genotypes for plantation and tree crop establishment.

SCIENCE SERVICES

Objective

To ensure that essential financial, computing, biometrical, publishing and vegetation health services are provided to support the Mission of Science and Information Division.

Strategies

- Review at the start of each fiscal year the effectiveness of the support given in the previous fiscal year, and plan the support required for the following fiscal year.

- Re-organize the existing Dieback Disease Detection Service and Plantation Health Service into a more integrated Vegetation Health Service, and formulate the objectives strategies and outcomes of this Service.

Biometrical Services

Objectives

- To raise and maintain standards of research planning and analyses.
- To ensure efficient experimental design.

Strategies

- Assess science project proposals in the design stage, detect errors, suggest improvements and amend as appropriate.
- Research new and improved biometrical methods relevant to the Division's requirements.
- Conduct biometrical courses and workshops for Divisional staff.
- Collaborate with scientists on research projects requiring a high level of analytical sophistication.

Outcomes

- Number of Science Project Plans (SPP) assessed and number requiring amendment to the design and statistical analysis proposed.
- Assessment of each SPP within 5 working days.
- Ratio of expert advice provided before SPP submission to that provided after data collected.
- Workshops or courses run for Divisional staff.
- Co-authorship of scientific papers as a result of contribution to analysis of complex data sets collected by other scientists in the Division.
- Preparation of a report on the above indicators by 1 July each year.

Financial Services

Objectives

- To design and maintain Revenue and Expenditure Account structures which are effective and efficient.

- To provide regular financial reports within five days of an accounting period, as required.
- To match expenditure within set budgetary targets for SID within CALM.
- To authorize and process accounts within three days of receipt.

Strategies

- Develop and streamline accounting systems to speed up response time in reporting procedures.
- Implement changes to meet the challenges and new priorities as set by the Director.
- Provide standards and training for administration staff within SID administration staff.
- Provide constant review of departmental accounting and administrative systems.

Outcomes

- Budgets are balanced within set targets.
- Financial reports are provided within five days of an accounting period.
- Historic financial information is retrievable at short notice.
- Full financial report on the year's accounts is provided by 16 July each year.

Research Techniques

Objectives

- To provide a comprehensive system for the capture, processing, analysis and dissemination of information at Centre, Divisional and Departmental levels.
- To raise and maintain standards of research, planning and analysis and to ensure efficient data collection and management.
- To collaborate with scientists on research projects requiring a high level of analytical sophistication.
- To develop new and/or improved research methods appropriate to the Division's requirements.
- To increase computer literacy and expertise amongst research staff and to introduce them to new products so that they benefit from new technology.
- To communicate and integrate with other groups within CALM and appropriate external organizations to allow for exchange of research findings, ideas, data software and other products.

Strategies

- Identify and prioritize tasks and areas requiring attention. Maintain a pro-active approach. Keep abreast with modern technology.

- Recruit and maintain specialist staff with background in research, electronics, communications, biology, computing, physics, environmental sciences and other relevant research areas.

- Provide specialized training to increase computer literacy and expertise amongst research staff and introduce them to new methods and products so that they benefit from new technology.

- Perform ongoing evaluation of new technology and their applications in the Science and Information Division.

- Establish Local Area Networks (LANs) at all major Research Centres and establish Wide Area Network communications between the LANs.

- Provide for online access to data stored at different localities (i.e. distributed data).

- Incorporate graphics, audio and video features to provide an integrated environment for information management, analysis and dissemination (i.e. multimedia access).

- Provide and develop intelligent systems which are capable of performing analysis and integrate with multimedia systems so as to automate processes (for example, biological identifications): fast, efficient, professional and 'paperless'.

Outcomes

- Integration of all corporate databases maintained by the Division and online access to these databases.

- Local Area Networks established at all research centres and a Wide Area Network established between the major research centres.

- WINDOWS environment in general use.

- Multi-media applications within the Division - a strategy formulated and base facilities set up and technology in widespread use.

- All research centres provided with access to facilities for producing high quality publications (reports, graphs and other illustrations).

- Development and implementation of user friendly Geographical Information Systems to generate distribution maps and permit spatial analysis.

- Network for electronic communications within the Department and with other scientific organizations.

- The most appropriate cost-effective and up-to-date hardware and software is in use within the Division.

Science Publications

Objectives

- To increase awareness of CALM scientific research and technical investigations by publishing and disseminating that work in a clearly identifiable CALM journal.
- To enhance the status of CALM's scientific research and technical investigations by publishing and disseminating that work in a manner commensurate with international journal standards and principles.
- To publish and disseminate papers reporting CALM's scientific research and technical investigations in a cost-effective and market-oriented manner.

Strategies

- Publish *CALMScience* and *Nuytsia,* the Division's journals of scientific research.
- Maintain an Editorial Advisory Board to address pertinent issues of editorial policy, standards, and financial support.
- Employ relevant expertise to manage and administer publication of this journal.
- Develop cost-effective production and marketing measures.

Outcomes

- Editing and preparation for publishing of at least 2 issues of *CALMScience* and of *Nuytsia* per annum.
- Processing of all manuscripts at every stage, other than editing, within 10 working days.
- Delays with handling of manuscripts by referees and authors monitored and minimized as far as possible.
- Preparation of a report on the above indicators by 1 July each year.

Threatened Flora Seed Centre

Objectives

- To develop a comprehensive seed based germplasm collection for rare and threatened plant taxa in Western Australia with the initial aim of capturing 75-80% of all genetic variation within each taxon.

- To utilize appropriate protocols for the medium and long term storage of seed from rare threatened plant taxa in Western Australia and maintain an integrated database on seed provenance and seed biology for each taxon.

Strategies

- Prioritize rare and threatened plant taxa for seed collection based on the level of threat with particular reference to *Phytophthora*, weed invasion and small population size.
- Collect sufficient quantities of seed from each taxon, based on within and between population sampling strategies, to ensure the initial capture of 75-80% of the total genetic variation within each taxon.
- Develop population based sampling strategies based on genetic system studies on appropriate priority taxa.
- Develop seed storage protocols for medium (4-25 years) and long term storage (25-100+ years) and maintain collections under appropriate storage regimes.
- Carry out regular seed viability testing on all provenances and develop and maintain a database, integrated with WAHERB, on seed provenance and biology.

Outcomes

- Establishment and maintenance of a seed-based gene bank for rare and threatened flora in Western Australia.
- Storage of sufficient genetic resources (75-80%) of each taxon to ensure its successful re-introduction and establishment in the wild following extinction from natural populations.
- Provision of information on the seed biology of rare and threatened plant taxa.
- Provision of seed material for biochemical, physiological and molecular research on rare and threatened plant taxa.
- Provision of material for *ex situ* propagation as required in recovery programs or for educational purposes.

Vegetation Health Service

Objectives

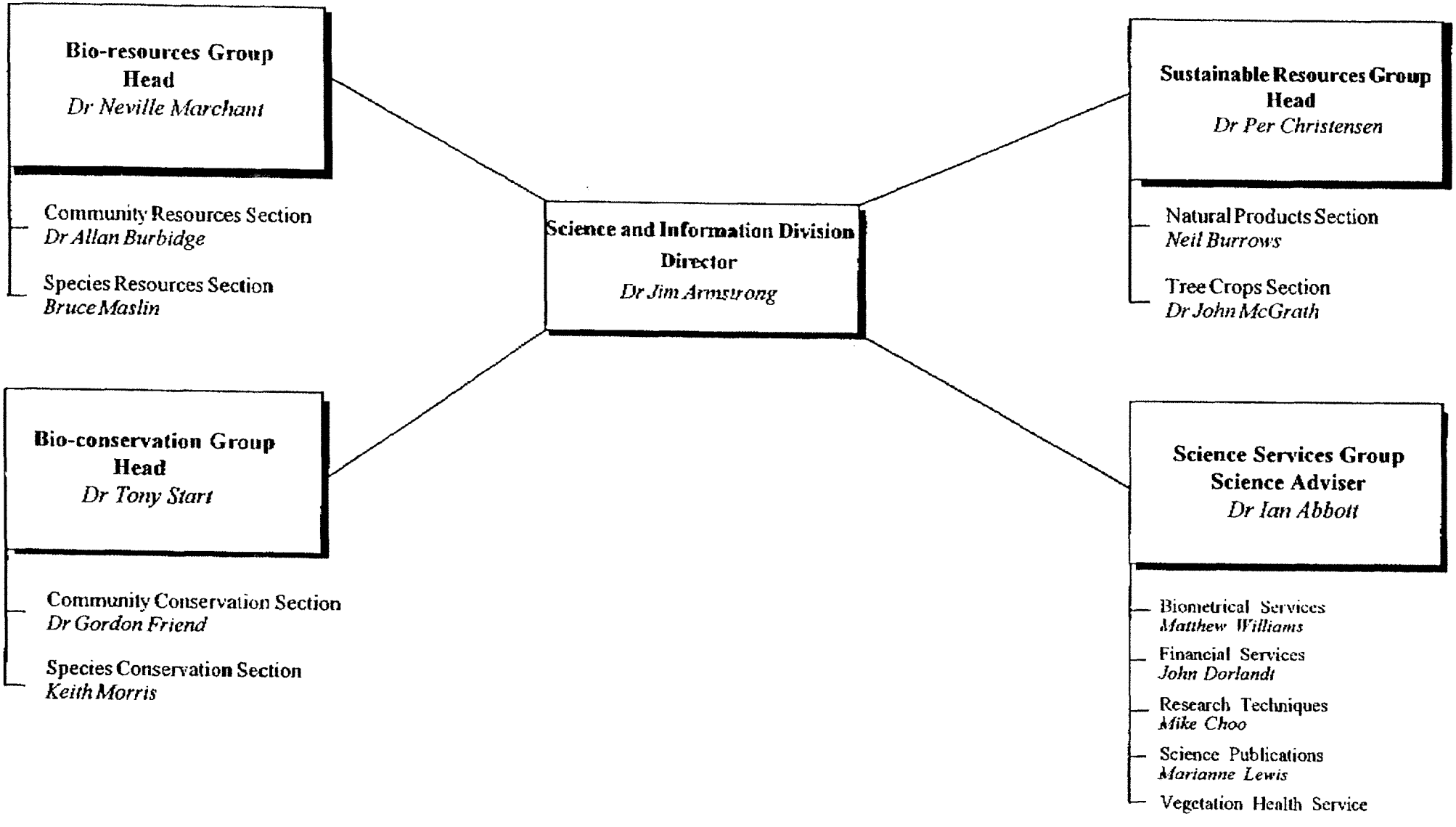
Strategies

Outcomes

APPENDIX 1

SCIENCE AND INFORMATION DIVISION

(Revised Science Group Functions)



APPENDIX 2

Current Allocation Of Science Projects To Sections

● = major involvement ○ = active involvement

Scientist	Bio-Resources Group		Bio-Conservation Group		Sustainable Resources Group		Science Services Group	
	Community Resources Section	Species Resources Section	Community Conservation Section	Species Conservation Section	Natural Products Section	Tree Crops Section	Research Techniques	Biometrical Services
Abbott, Ian	○				○	●		
Armstrong, Jim		○		○	●			
Bartle, John			○	○		●		
Brennan, Gary					●	○		
Burbidge, Andrew				●				
Burbidge, Allan	●		○	○				
Burrows, Neil		○	○	○	●			
Butcher, Trevor						●		
Chapman, Alex		○	○				●	
Choo, Mike							●	
Christensen, Per				●				
Coates, David		○		●	○			
Crombie, Stuart			○		●	○		
Davison, Elaine			○		●	○		
De Tores, Paul				●				
Farr, Janet		○	○	○	●			
Friend, Gordon	○		●	○	○			
Friend, Tony		○		●				
Gibson, Neil	●							
Gioia, Paul							●	
Glossop, Brett					●	○		
Halse, Stuart	●	○						
Harper, Richard	○		○			●		
Hopkins, Angas			●					
Keighery, Greg	●	○	○					
Kenneally, Kevin		●						
Kinnear, Jack				●				
Lander, Nicholas		●						
Lane, Jim	○	○	●		○			
Macfarlane, Terry		●						
Marchant, Neville	○	●			○			
Maslin, Bruce		●			○	○		
Mazanec, Richard				○	○	●		
McCaw, Lachlan			○		●			
McGrath, John						●		

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Scientist	Bio-Resources Group		Bio-Conservation Group		Sustainable Resources Group		Science Services Group	
	Community Resources Section	Species Resources Section	Community Conservation Section	Species Conservation Section	Natural Products Section	Tree Crops Section	Research Techniques	Biometrical Services
McKenzie, Norm	●	○	○					
Moore, Richard			○	○		●		
Morris, Keith			○	●	○			
Patrick, Sue		○	●					
Pearson, David			●	○	○			
Perry, Gillian		●						
Pigott, Patrick	○		●	○				
Prince, Bob				●	○			
Rye, Barbara		●						
Shearer, Bryan			●	○				
Siemon, Graeme					●	○		
Start, Tony			●	○				
Stoneman, Geoff			○	○	●	○		
Stukely, Mike			○	○	●			
van Leeuwen, Steve	○	○	●					
Ward, Dave				○	●	○		
Wardell-Johnson, Grant	○	○	●	○	○			
Wheeler, Judy		●						
Williams, Matt				○				●
Wills, Ray			●	○				
Yung, Michael							●	

APPENDIX 3

Resources of Science and Information Division

The Division has a number of resources which support the activities of its staff and which it therefore manages. They are of two types:

- **Collections**, the principal ones being the plant collections (housed in the Western Australian Herbarium) and the Library.
- **Facilities**, the principal ones being Research Centres.

COLLECTIONS have an indefinite size; their usefulness increases with their growth, provided additions are relevant to the purpose of the collection. To retain their relevance and value collections need to be housed and managed. Access also has to be controlled, in order to balance the requirements of research support and the need for protection of the material and, sometimes, components of the information it contains.

Botanical collections. The State collections of plants are housed in the Western Australian Herbarium. The collections include dry and spirit specimens of fungi, algae and cryptograms as well as higher plants. They include numerous Type specimens and vouchers for important biological studies as well as very extensive accumulations of reference material.

Subject to security controls the collections are available to CALM staff and botanists from around the world, either as visitors to the Western Australian Herbarium or through loans. Western Australian Herbarium staff are also able to provide a limited identification service, particularly for CALM staff.

Besides the routine activities of curation and accession, current work on the collection is focused on databasing the specimens. Much of this project is being undertaken by volunteers. There are also several smaller, affiliated regional collections.

Library. The library has three principal collections. One, focused on literature relating to silviculture and forest management, is housed at the Como Research Centre where there are many scientists working in those fields. Another, focused on botany, particularly floristics and plant taxonomy, is housed at the Western Australian Herbarium. The third, focusing on ecology and wildlife conservation, is housed at the Wildlife Research Centre.

The aim of having three collections is (as far as possible) to house pertinent literature close to the scientists who use it. This aim is furthered by management committees for each collection and allocation of a portion of the acquisition budget to each committee. Thus the principal users of each collection have control of its growth and relevance.

Nevertheless consistency in policy, particularly user access and cost recovery, is important. A co-ordinating committee chaired by a member of SIMC ensures that consistency is achieved. Each collection librarian prepares regular dossiers on recent acquisitions, circulates them widely in the Department and arranges loans or photocopies for staff.

The library at the Wildlife Research Centre houses the CALM publication archives. Copies of all CALM publications are lodged there.

FACILITIES

Research Centres managed by SID are:

** Manjimup Research Centre
** Western Australian Herbarium (Kensington)
** Wildlife Research Centre (Woodvale)
* Busselton Research Centre
* Como Research Centre
* Dwellingup Research Centre
* Wood Utilisation Research Centre (Harvey)

(** identifies Centres with resident SIMC members and Administrative Officers responsible for Group financial management; * identifies other Centres.)

SID staff are also located at CALM's State Headquarters at Crawley and at Regional Offices in Karratha and Albany.

Research Centres provide the laboratory and office requirements of Scientists in SID. Each Centre requires maintenance and management but the resources requirements vary with factors like affiliation to other branches of CALM at the same locations and management of the botanical collections housed at the Western Australian Herbarium or the management of the Nature Reserve in which the Wildlife Research Centre is located.

Other Facilities include the fleet of vehicles (most fitted with VHF and/or HF radios), scientific equipment for use in laboratories and in the field and pc computers. The latter are linked to LANs at the Western Australian Herbarium and the Wildlife Research Centre. SID aims to network each centre and have them linked to one another as well as other CALM facilities with a WAN as soon as practical. The links will integrate access to corporate databases and GIS facilities.