Science and Information
Division

STRATEGIC PLAN
1995 - 1999

Department of Conservation and Land Management

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

CALM's mission is to conserve and manage Western Australia's wildlife and the lands, waters and resources entrusted to the Department for the benefit of present and future generations. CALM has the following major objectives:

Conservation: To conserve indigenous plants, animals and ecological processes in natural habitats throughout the State.

Value and Use of Resources: To optimise the value and economic return to the community of wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

Tourism and Recreation: To identify, provide and maintain opportunities and services to the community which allow them to enjoy the wildlife, lands, waters and resources entrusted to the Department without compromising conservation and other management objectives.

Knowledge: To seek and provide an up-to-date and sound scientific and information basis for the Department's conservation and land management activities.

Community Support: To promote community awareness and appreciation of the values of the wildlife, lands, waters and resources entrusted to the Department, and to develop community understanding and support for the Department's conservation and land management activities.

VISION

Apart from commercially valuable taxa (eg. jarrah, karri and sandalwood) and charismatic taxa (eg. birds, mammals, butterflies) the native biota of Western Australia remains poorly known. Science and Information Division's vision is to develop the operational framework to enable this biota to be utilized sustainably. This will generate wealth for the Western Australian community and provide much of the finance to enable land to be managed more effectively and ensure that the State's biodiversity is conserved. The economic value conferred by this program on the remaining native vegetation will also act as a powerful incentive for land clearing to virtually cease in Western Australia.

Commercial returns from sustainably utilized natural products will provide the substantial funding needed to conserve and manage the biodiversity of the State. Science and Information Division envisages a small proportion of these funds being used to improve science infrastructure so that the biota of Western Australia is fully discriminated and documented, threatening processes are overcome or mitigated,

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and the natural resources are used in an ecologically sustainable manner with the least possible disturbance to the environment.

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 conservation and land management.

3 To advise CALM on sustainable resource development opportunities and to promote 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 and gain the endorsement of CALM's Corporate Executive.

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, District and other 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, eg through criteria progression and workplace agreements.

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, industries, other 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 - mostly 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, eg. by the formation of project teams.

Staff numbers in each Group are (as at 1 July 1994) as follows:

	Professional	*Other*
Directorate	1.0	3.0
Bio-Resources	10.5	15.8
Bio-Conservation	17.5	22.5
Sustainable Resources	20.0	32.9
Science Services	6.0	5.0
TOTAL	55.0	79.2

The focus of each scientist in the Division (excluding those temporary or externally funded) 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.

The major modes of interaction are shown schematically in Figure 1. The four Groups within Science and Information Division interact very extensively, followed by equally important networking with staff in other parts of CALM - Divisions, Branches, Regions, Districts and Business Units. There is also considerable interaction with scientists in CSIRO and universities (both Western Australian and interstate) and scientists in other Western Australian government departments and statutory authorities. Interaction with scientists based outside Australia also takes place from time to time.

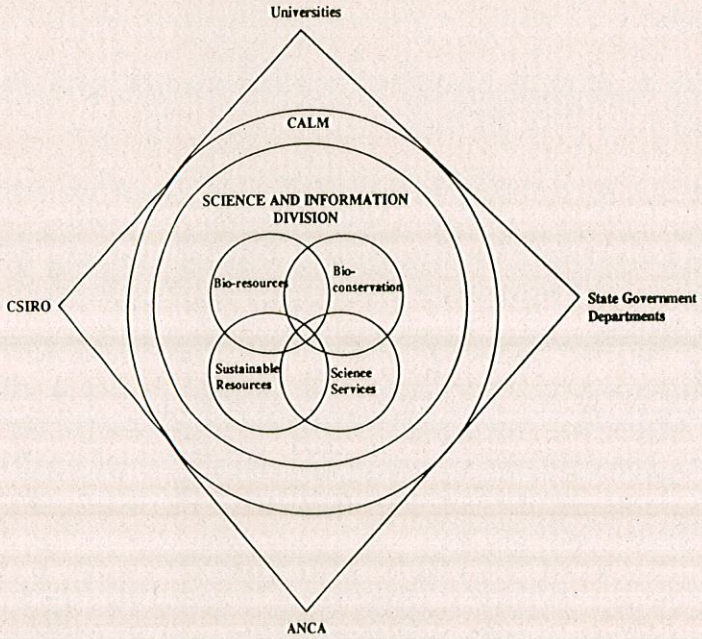


Figure 1 Interactions involving staff in Science and Information Division

MECHANISM OF PRIORITY SETTING

Priority setting is done by Management Teams, which consist of the Head of Science Group and the two Section Managers in that Group. Scientists can bid for funding from any Group by submitting a detailed Science Project Plan (SPP). The structure of an SPP is set out in SID Staff Guideline No. 7.

Once the annual financial allocation to Science and Information Division is known, the three Management Teams prioritize SPPs using the following criteria (based on Guideline No. 7):

1. Is the project relevant? If not, reject the SPP.
2. Rate the 7 characteristics relating to Benefits in Guideline No. 7, *viz.* Effectiveness, Demand for Results, Usefulness, Innovativeness, Regional Impact, Immediate Benefit, Integration with Research outside CALM.
3. Rate the 7 features of Feasibility in Guideline No. 7, *viz.* Impact on Departmental Operations, Budget, Time frame, Availability of Results, Performance, Team-work, Speculative/Theoretical Research.
4. Overall rating is then done by SIMC.

INTEGRATING THEMES

As part of the process of encouraging all staff to interact more widely than the Sections to which they align (Appendix 2), six themes have so far been established, as follows:

1. **Theme:** Landscape Reconstruction
   Key Issues: Swan-Avon catchment, native biota, degraded land, salinity, agroforestry, clearing of native vegetation, weeds, wetlands, new tree crops
   Co-ordinator: Grant Wardell-Johnson

2. **Theme:** Threatening Processes - Containment of Dieback Diseases
   Key Issues: *Phytophthora* spp, control, threatened taxa, threatened communities, impact, hazard
   Co-ordinator: Tony Start

3. **Theme:** Threatening Processes - Containment of Feral Animals
   Key Issues: herbivores (rabbit, goat), omnivores (rats, pig), predators (fox, cat, kookaburra), feral bees
   Co-ordinator: Matt Williams

4. **Theme:** Managing with Fire
   Key Issues: ecological communities, life form categories, patches, mosaics, disturbance, successions, landscape diversification, weeds
   Co-ordinator: Neil Burrows

5. **Theme:** Minimizing the Risk of Extinction
   Key Issues: Islands, translocations, minimum viable population size, threatened taxa, ethics, local populations
   Co-ordinator: Ian Abbott

6. **Theme:** Sustainable Utilization - Jarrah Forest
   Key Issues: jarrah forest, native biota, weeds, feral predators, timber harvesting, fuel reduction, soil compaction
   Co-ordinator: Gordon Friend

Staff interested in being involved in any theme have been asked to register their interest with the nominated Co-ordinator. The Co-ordinator has then convened meetings at which all aspects relevant to the theme were discussed, including existing knowledge, areas where research is needed, and opportunities to make strategic gains. Operations staff (eg Regional Ecologists) have also been involved in the process.

The thematic approach will provide SID with an opportunity to identify gaps in knowledge, facilitate the better application of knowledge through technology transfer and help the Department prioritize its most important land management issues. The outcome will be a number of succinct 'Project Proposal" documents submitted to Corporate Executive for endorsement and possible funding.

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 threatened taxa and taxa with 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.

- 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.

- 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 design a representative, adequate and comprehensive conservation reserve system based on properly discriminated and documented plant and animal communities.

- To identify those communities with high 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.

Immediate Benefits

- Floristic classification of the plant communities and assessment of the conservation status of plant taxa and communities of the Swan Coastal Plain.
- Floristic classification of the coastal plant communities and assessment of the conservation status of plant taxa and communities of the Warren botanical subdistrict.
- Evaluation of the representativeness and comprehensiveness of the conservation estate in the Perth metropolitan region, on the basis of distribution of native earthworm species.
- An explicit basis for setting priorities among conservation management options through much of the Goldfields and South Coast Regions.
- Improved management and monitoring of rainforest patches in the Kimberley.
- Assessment of the conservation values of the islands of the Buccaneer Archipelago.
- Increased usefulness of ecological surveys through better design.
- Increased sensitivity in ecological monitoring techniques used in WA.
- A world-class nature reserve representing the western margin of the Great Sandy Desert, including a RAMSAR wetland and environments associated with the mouth of a major palaeoriver.
- Development of guidelines for monitoring of Australia's Wetlands of International Importance will permit assessment of effectiveness of management and landcare measures in halting and reversing degradation.

- Documentation of the nature conservation values of the Central Pilbara Uplands within the Karijini National Park and the Barlee Range Nature Reserve, providing a more explicit basis on which to manage these and other nature conservation areas in the Pilbara.

- Documentation of the nature conservation values of the Boonanarring Nature Reserve and an improved basis on which to develop planning and management objectives for this part of Swan Region.

- Documentation of the nature conservation values of Cape Arid National Park and an improved basis on which to develop planning and management objectives for this part of South Coast Region.

- Documentation of the nature conservation values of the northern Irwin and southern Carnarvon Phytogeographic Districts and an improved basis on which to prioritise efforts to improve and manage the conservation reserve system and to manage wildlife in the region between Kalbarri and Lake McLeod (an area of about 7.5 million hectares).

- Documentation of the nature conservation values of the Coolcalalaya area and an improved basis on which to make land use decisions for this part of Midwest Region.

- Quantitative data on the regional distribution of several hundred vascular plant taxa in the Kent, Hay, Bow and Denmark River catchments and the facility to relate distribution data of species to a range of field based data sets.

- Improvements in the application of geographic information and remote sensing technology to forest databases for land-use planning and conservation management.

- A regional classification of greenstone woodland communities and an assessment of their reservation status. Identification of regionally rare and/or threatened communities.

- An improved scientific basis for management of the Lesueur National Park and the basis for management of rare flora in the region.

Outcomes

- Advice to Government on:

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

- An adequate inventory of the State's biological communities.

- 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.

Immediate Benefits

- Implementation of an integrated system, based on the DELTA suite of programs, enabling the capture and management of descriptive taxonomic data.

- Completion of revisionary studies and the discrimination of new Western Australian plant taxa, especially in the families Asteraceae, Rhamnaceae, Rutaceae and Tiliaceae and the genera *Acacia, Actinodium, Chamelaucium, Chamaexeros, Darwinia, Hibbertia, Neurachne, Pultenaea, Stylidium, Thysanotus, Urodon* and *Wurmbea*.

- Elucidation of relationships, using cladistic methodology, of genera of Rutaceae and species of *Acacia* and the *Pultenaea* group.

- Descriptions of new WA plant taxa with high conservation significance occurring in the southern forest region, the Perth region and the Irwin-Carnarvon region.

- Provision of an interactive identification and descriptive information retrieval tool, and publication of hardcopy descriptions, for WA Declared Rare and Priority flora.

- Taxonomic clarification and discrimination of undescribed and poorly circumscribed species included on the Declared Rare and Priority Flora lists.

- Descriptions of new species of Ostracoda and Calocera and definition of their ecological tolerances in order to better understand the impact of land management practices on wetlands.

- Description of a new species of *Giardia* and assessment of its impact on Straw-necked Ibis populations in south-west WA .

- Publication of distributions and phylogenetic relationships of Australian terrestrial amphipods.

- Publication and maintenance of a Census of Western Australian plant names (hardcopy and electronic version) in order to provide a stable nomenclatural basis for the WA flora.

- Development of a database of biological information pertaining to the biota of the State.

- Electronic prototype of the generic Flora of Western Australia providing keys and descriptions of these plant taxa.

- Production of a user-friendly handbook Flora and associated publications pertaining to the lower south-west forest region of the State.

- Completed contributions to the national Flora of Australia project for the genera *Acacia, Amphipogon, Crowea, Eriostemon, Neobyrnesia, Olearia* and *Stipa*.

- Provision of significantly better curated Herbarium collections through the use of external experts, eg. family Cyperaceae.

- Provision of corporate access to important DELTA databases containing descriptive information on the biota of Western Australia, for example, "Angiosperm families of the world" and "Grass genera of the world".

- Assessment of potential usefulness of *Acacia* species in the dry subtropical region of the state.

- Documentation of butterflies of conservation significance in WA National Parks and Nature Reserves.

- Maintenance of a database of information on breeding records of seabirds on islands of WA.

- Maintenance and analysis of the database of terrestrial mammals and breeding seals on Australian islands to assess the conservation value of these islands.

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 with high 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 those bio-resources of the State which are being diminished or degraded and by what processes, and how these processes can be managed effectively and the resources 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).

Immediate Benefits

- Definitive assessment of the efficacy of phosphonate to control the disease caused by *Phytophthora megasperma*.
- Resolution of the taxonomic affinity of WA isolates of *P. megasperma*.

- Information on the microdistribution of phosphonate will help in establishing the mechanism of action of phosphonate.

- Improved information base available to CALM and the Stirling Range Planning Advisory Group for prescribing fire regimes within the park, in conjunction with the development of a draft management plan.

- Preparation of preliminary fire management options for consideration by Goldfields Region staff.

- Published paper on direct seeding research which should provide farmers and CALM staff with more information on direct seeding than previously available so as to minimize the risk of establishment failure.

- Provision to CALM staff and members of community groups of up-to-date information about the ecology and control of *Watsonia* spp. and related weeds in Family Iridaceae.

- Determination of factors governing local endemism in four species of forest eucalypts from near Walpole.

- Design of a user interface to provide a tool for people untrained in the operation of Arc/Info to making data on Phytophthora disease accessible to managers.

- Results of a study of the role of the Vasse-Wonnerup floodplain in maintaining waterbird populations will assist in land-use planning and land management decisions and the preparation of a conservation strategy for the Busselton wetlands.

- Guidelines for design of effective buffers for wetlands on the Swan Coastal Plain will provide guidance for land-use planners and wetland managers on design and management of buffers to protect wetlands.

- Establishment of pilot monitoring projects in 3-4 districts.

- Empirical data regarding the effects of fire and various management practices on terrestrial animal and plant communities throughout Western Australia.

- Model for predicting fuel dynamics and fire spread in heathlands and mallee shrublands and examination of the application of fuel modification techniques such as scrub rolling and burning.

- Fire behaviour and fuel models for hummock grasslands and appropriate techniques for prescribing patch burns in desert reserves and national parks.

- Model to predict the impact of disturbance on small vertebrates, based on life-history criteria.

- Database on the responses of vascular plants and small vertebrates to disturbance.

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 conservation of biological communities and will enable CALM to prioritize allocation of resources to management of biological communities.

- 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 WA.

- 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.

Immediate Benefits

- Participation with WATSCU in the development of a ranking system for threatened flora and fauna in WA.

- Completion of Wildlife Management Programs for all DRF and priority flora taxa in CALM's southern regions.

- Preparation and implementation of Recovery Plans or Interim Wildlife Management Guidelines for all Critical fauna taxa.

- Continuation in the development of, and implementation of research components in Wildlife Management Programs for at least 40 percent of the State's threatened fauna.

- Completion of, or significant progress on distribution and population biology studies of threatened *Lambertia, Stylidium, Dryandra, Banksia, Eremophila* and orchid species.

- Development of the most effective baiting regime for control of foxes over large areas.

- Development of an effective feral cat control method.

- Development of an effective method to eradicate the black rat on semi arid islands.

- Involvement of District staff in the implementation of Wildlife Management Programs for threatened taxa.

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 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 is responsible for the management of a wide range of natural resources 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 (ie. 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.

Immediate Benefits

- Prescriptions for thinning and fertilizer regimes for karri regrowth which will optimize wood production from these stands.

- Fuel and fire behaviour studies to protect karri regrowth stands from damage by wildfire.

- Jarrah forest regeneration and silviculture prescriptions which will provide for ongoing timber production while maintaining biodiversity.

- Fire regimes for jarrah forests which provide protection from wildfires and injurious pests such as Jarrah Leafminer whilst maintaining the biodiversity of the jarrah forest ecosystem.

- Evaluation of the effectiveness of phosphonate in improving the health and growth of jarrah in the presence of *Phytophthora cinnamomi.*

- A system for assessing the impact of the disease caused by *Phytophthora cinnamomi* in relation to operations in jarrah forests.

- Production and field evaluation of strains of jarrah resistant to *Phytophthora cinnamomi.*

- An early warning system for outbreaks of the insect pest Gumleaf Skeletonizer.

- Improved production and utilization of wood.

- Sustainable quotas for harvesting wildlife which will ensure the conservation of commercial species and economic viability of the industry.

- Discovery and development of pharmaceutical products from native flora which will ensure the conservation of these species and of their habitat and provide economic benefits to the State.

- Drying of eucalypts using an experimental batch kiln and the development of efficient drying schedules for regrowth karri.

- Improvement of solar kiln drying from computer modelling.

- Improved penetration of CCA preservative in regrowth karri transmission poles.

- Assessment of stability of 30 mm regrowth jarrah Valwood® coated with different exterior finishes when exposed to outdoor conditions. (Valwood® has potential for external use in patio furniture which may have some exposure to weather).

- Relationship between branch size, success of occlusion and branch angle to recovery for regrowth karri grown under wide spacing.

- Assessment of chemical means of preventing sapstain and *Lyctus* attack in Tasmanian blue gum Valwood® boards.

- Impact of wood boring insects, brownwood, decay and tree growth patterns on wood quality in regrowth karri.

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, ie. 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 WA

- 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 (eg. 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 (eg. 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.

Immediate Benefits

- As a result of work on the selection, breeding, flowering cycles and propagation techniques, it is anticipated that by 1997 the *Eucalyptus*

globulus seedlings produced by CALM will have the potential to produce 40% more volume than the seedlings used to establish the early *E. globulus* plantations. The benefits of this program will begin to be incorporated into the program from 1994 onwards.

- Investigation of the performance of *E. globulus* now planted on a wide range of sites both in plantations and as integrated plantings on farmland will result in improved site selection criteria for *E. globulus*. This will result in improved tree growth and few problems with the establishment of trees on unsuitable sites.

- Seasonal variation of arthropods including beneficial arthropods and pest insect loads in three plantations of young *E. globulus* will be documented. This will show how the pest insect load and propensity for rapid increase in insect damage change over seasons and as the canopy enlarges. This research will show the optimum sampling time for assessing the load of insect pests on young *E. globulus*. This information will be used to investigate insect resistance of *E. globulus* cultivars.

- The development of radiata pine HAPSO (hedged artificially pollinated seed orchard) will dramatically improve the rate at which gains in tree growth rates, tree form and disease resistance are incorporated into the seedlings produced by CALM.

- The culmination of three decades of selection and breeding will result in the collection of over 80kg of high quality pinaster pine seed from the Manjimup seed orchard. This seed will be the highest genetic quality pinaster seed available anywhere in the world.

- Date on the growth and water use by radiata pine from low term experiments examining the response to fertilization and to fertilization and thinning will enable the development of strategies for thinning and fertilization that will increase wood yields. Maximizing wood yield is likely to be important given the projected increase in softwood demand in Western Australia.

- The funding by the Farm Forestry Program of the establishment of three large scale timberbelt demonstration areas at Dandaragan, Boyup Brook and Busselton will allow the development of a pine timberbelt package. This package will cover site assessment, farm planning, sharefarming contracts, promotion and training. The package will provide the basis for a commercial pine timberbelt scheme.

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 WA.

- Optimum thinning, pruning and fertilization strategies for sawlog and water production from *Pinus 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 (eg. 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, germplasm facilities, 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.

Information Science Section

Objectives

- To develop the methodology and provide the mechanisms for utilizing new technology and to adapt current technology to satisfy the specialized needs of the Division.
- To research and develop new approaches in integrating information and systems across hardware and software platforms as well as geographical locations.
- To collaborate with scientists on science projects requiring a high level of analytical sophistication.
- To raise and maintain standards of research, planning and analysis and to ensure efficient design, information management and analysis in the Division.
- To develop new and/or improved research methods appropriate to the Division's requirements.
- To provide an integrated environment for the capture, processing, analysis and dissemination of information at Centre, Divisional & Departmental levels.
- 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 other appropriate external organisations to allow for exchange of research findings, ideas, data, software and other products.
- To provide and maintain the necessary infrastructure to support the above.

Strategies

- Develop objectives, identify areas, set direction, establish medium and long term goals and develop a phased implementation schedule.
- Identify and prioritise tasks and areas requiring attention, maintain a pro-active approach, keep up-to-date with developments in technology.
- Provide an integrated networked environment for information management, analysis and dissemination.
- Develop and establish protocols for maintaining a uniform approach in each of the key areas (eg. a set of information technology and data custodianship guidelines in SID).
- Develop and provide intelligent systems which are capable of performing analysis or automating processes (eg. biological identifications).

- Develop the mechanisms for corporatizing SID data and providing access to corporate data across SID centres.

- Develop the mechanisms for providing access of data across the various hardware and software platforms as well as across centres.

- Increase skill levels of SID staff, level of usage of current technological tools, new products and methods and their understanding of the underlying concepts by providing consultation and training.

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

- Collaborate with scientists on specialized projects requiring a high degree of analytical sophistication.

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

- Establish and maintain Networks (LANs) and facilitate communications across all the major SID centres and extend these to other centres where possible (in co-operation with Information Services Branch).

Immediate Benefits

- Instant / intelligent electronic communications across the major SID centres as well as other CALM offices.

- Electronic access to other organizations (scientific institutions) through INTERNET.

- Higher level of collaboration with specialist staff to increase scope of research and level of efficiency within SID.

- Implementation of intelligent systems and development of interfaces to them (eg. interface to the DELTA system).

- Access to SID's corporate data across centres, providing a better framework for research and increasing our ability to respond to managerial needs.

- Improved productivity and efficiency associated with maintaining LAN and WAN connectivity throughout SID.

- Benefits associated with a total integrated environment with seamless communications across hardware and software platforms and the ability to have local intelligence in the field.

- Ability to take advantage and benefit from new developments in technology (ie. multi-media and other information technology areas).

Outcomes

- Establishment and continued upgrading of a network for electronic communications within SID, with other CALM Divisions, and with other scientific organizations.
- Introduction of multi-media technology.
- Arrange online access to key corporate data sets required by the Division.
- Integration of corporate databases maintained by the Division.
- Development and implementation of Geographical Information Systems to generate distribution maps, perform spatial analysis, and allow predictive modelling.
- Assessment of new products, ensuring that the most appropriate cost effective and up-to-date hardware & software is used in the Division.

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 staff.
- Collaborate with scientists on research projects requiring a high level of analytical sophistication.

Outcomes

- Number of Science Project Plans (SPP) assessed and decrease in the number requiring amendment to the design and statistical analysis proposed.
- Assessment of each SPP within 5 working days.
- Increased 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.

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, jointly managed with CALM's Corporate Relations Division.

- 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,* CALM'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 and CALM's declared rare flora database, on seed provenance and biology.

Immediate Benefits

- Establishment and maintenance of a seed-based gene bank for rare and threatened flora in Western Australia.

- Provision of information on the seed biology of rare and threatened plant taxa.

- The long-term cold storage of broad genetically based germplasm collections for critically endangered taxa.

- The availability of germplasm material for species recovery and reintroduction.

Outcomes

- 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 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

- To help maintain and protect the State's vegetation resource by providing accurate diagnosis of the cause of plant disorders and advice on cost-effective remedial measures.

Strategies

- Devise a better system for funding the various types of work done.
- Liaise with officers in CALM Districts, Regions, Environmental Protection Branch and Wildlife Branch to identify and prioritize plant health problems, and publicize to them the services available.
- Collaborate with research scientists in Science and Information Division in undertaking short-term research to improve diagnosis and understanding of plant health problems.
- Ensure that all plant pathogens that need to be identified with help from other research institutes are first vouchered through the WA Herbarium.

Immediate Benefits

- Completion of a comprehensive computerized database on the distribution and hosts of *Phytophthora* species.
- Production of maps at various scales showing distribution of *Phytophthora* species in CALM's estate.

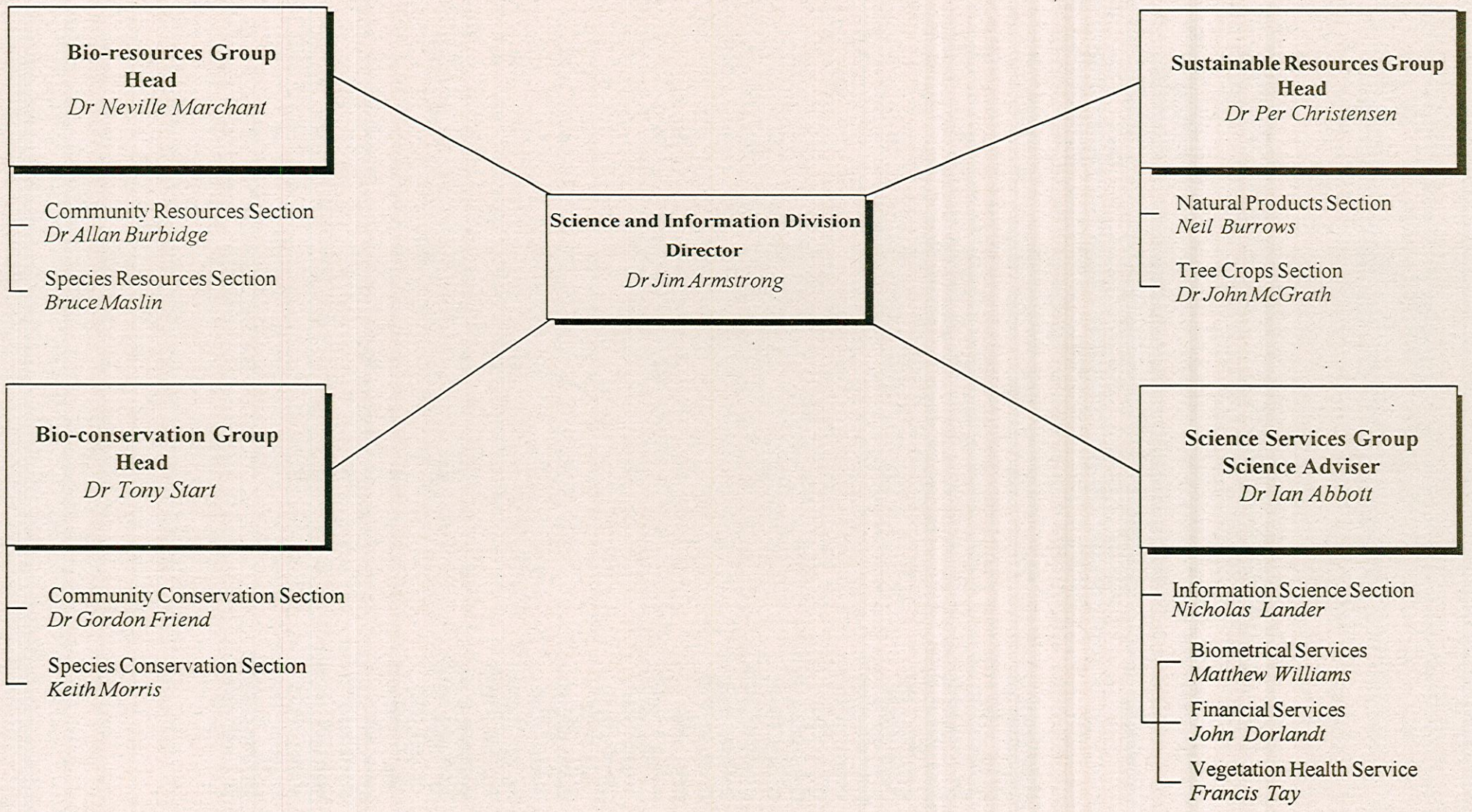
Outcomes

- Workshops in Regions at which latest information will be shared with field staff.
- A herbarium collection of diseased material and a fungal culture collection of causal organisms.
- A user-friendly manual of important plant diseases in WA for distribution to each CALM District office but saleable to the general public.

APPENDIX 1

SCIENCE AND INFORMATION DIVISION

(Revised Science Group Functions)



1 July 1994

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	Information Science Section	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						●		

Appendix 2 (*continued*)

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	Information Science Section	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 Utilization 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.

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, Wildlife Research Centre, Como Research Centre and Manjimup Research Centre. These four Centres are linked via a WAN with State Operations Headquarters at Como and Head Office at Crawley. 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. These links will integrate access to corporate databases and GIS facilities.