- 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.

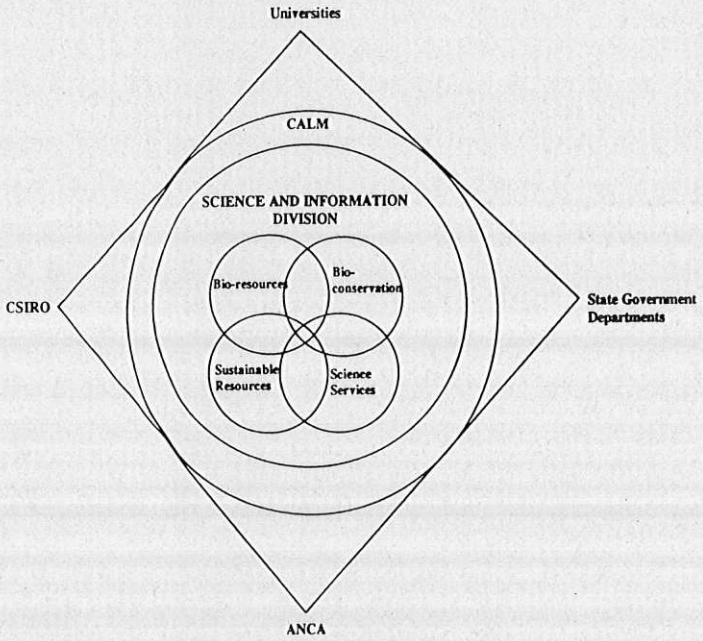

Figure 1 Interactions involving staff in Science and Information Division

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

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.

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.

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						●		

Science and Information
Division

STRATEGIC PLAN
1995 - 1999

Department of Conservation and Land Management