



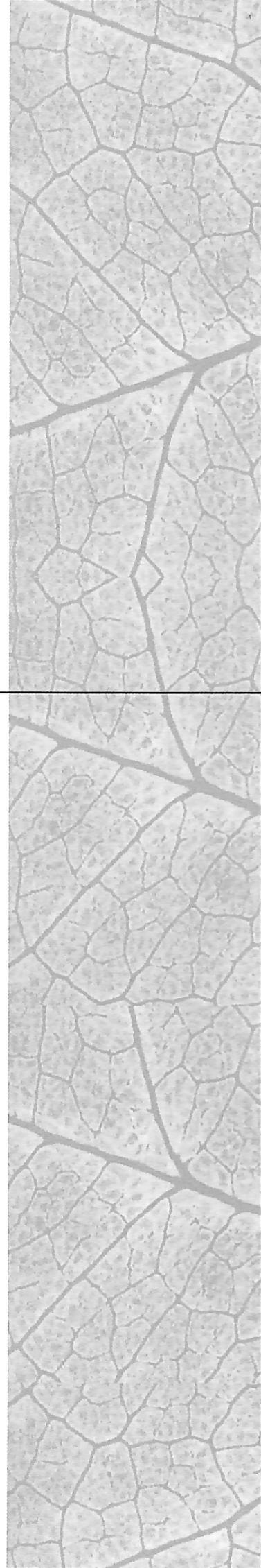
CSIRO
Operational
Plan 2000–2001



CSIRO

Operational

Plan 2000–2001



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Available from:

CSIRO Strategic Planning and Evaluation
PO Box 225
Dickson ACT 2602
AUSTRALIA
Phone: +61 2 6276 6684
Fax: +61 2 6276 6335
E-mail: spe@exec.csiro.au

CSIRO ENQUIRIES

The CSIRO Information Network provides a free point of access to CSIRO for scientific and technical enquiries.
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Foreword

This Operational Plan sees the commencement of our recently developed Strategic Plan for the 2000–01 to 2002–03 triennium. The planned activities and outputs for each Sector are recorded in the Divisional entries to the Plan. They make it clear that CSIRO research is about delivering results that are of benefit to the nation and to our customers.

February this year marked the untimely death of Malcolm McIntosh, our previous Chief Executive.

Malcolm inspired us all with his remarkable insights into human nature, the role of science for the prosperity of the nation and the welfare of its people, as well as the politics of government and its bureaucracy. His legacy will remain with us for a long time. He profoundly affected the lives of the many people he came in contact with. He was widely respected and deeply loved.

We have taken up the challenge that he set us last December to look out not just three years ahead as we have done for our Strategic Plan, but to begin to frame, and to begin to transform, towards the longer term future for CSIRO in 2010 and beyond.

The issues we need to face can be encapsulated under three headings.

People, Culture and Leadership

Looking ahead to 2010, CSIRO will have an entirely different leadership team. CSIRO has a reservoir of young talent and we must ensure that we retain their interest and provide adequate career opportunities. Career development and succession planning strategies will actively develop the range of experience and attitudes required by leaders so they can face the uncertainties of the future with confidence. CSIRO needs to attract and retain people with the right mix of science, business and risk-taking skills.

Finance and Capital

The process of securing a strong financial base for CSIRO from public funds is likely to continue to be difficult, especially in the face of competition from other science and technology stakeholders, and growing competition from other sectors such as health and regional Australia. In the face of globalisation CSIRO risks becoming vulnerable if we are not engaged in the global economy.

Responsiveness and Connectivity

Given the wide range of industries represented through CSIRO Divisions, and the nature of change facing all organisations in Australia, it is vital that CSIRO respond to any external issues as quickly and strategically as possible. This requires better mechanisms for sharing information about best practice and benchmarking between Divisions and across Sectors, and experimenting with new ways of responding corporately to issues quickly and effectively.

We cannot afford to stand still. We must continue to evolve and we must do so with a sense of urgency.



Colin Adam
Acting Chief Executive
June 2000

Organisational Chart*

CSIRO BOARD				
Mr D Charles K Allen (Chairman)				
Dr CM Adam Mr J Gandel Prof VR Sara	Mr DP Mercer Mr RA Higgins Mr DFJ McDonald	Mr AE de N Rogers Prof MJ O'Kane		
CSIRO EXECUTIVE				
Dr Colin Adam A/g Chief Executive	Dr Bruce Hobbs Deputy Chief Executive	Dr Ron Sandland Deputy Chief Executive	Dr Chris Mallett Deputy Chief Executive	Dr Paul Wellings Deputy Chief Executive
CSIRO DIVISIONS AND CORPORATE UNITS				
Corporate Executive Office <i>Corporate Secretary:</i> <i>Dr Ted Cain</i>	Building Construction and Engineering <i>Chief: Mr Larry Little</i>	Australia Telescope National Facility <i>Director: Prof Ron Ekers</i>	Animal Health <i>Chief: Dr Mike Rickard</i>	Atmospheric Research <i>Chief: Dr Graeme Pearman</i>
Risk Assessment and Audit <i>General Manager:</i> <i>Mr Peter O'Callaghan</i>	Energy Technology <i>Chief: Dr John Wright</i>	Health Sciences and Nutrition <i>Chief: Prof Richard Head</i>	Animal Production <i>Chief: Dr Oliver Mayo</i>	Entomology <i>Chief: Dr Jim Cullen</i>
General Counsel <i>Mr Terry Healy</i>	Exploration and Mining <i>A/g Chief: Dr John Read</i>	Manufacturing Science and Technology <i>Chief: Dr Ian Sare</i>	Food Science Australia <i>Chief Executive: Dr Michael Eyles</i>	Forestry and Forest Products <i>Chief: Dr Glen Kile</i>
	Minerals <i>Chief: Dr Rod Hill</i>	Mathematical and Information Sciences <i>Chief: Dr Murray Cameron</i>	Plant Industry <i>Chief: Dr Jim Peacock</i>	Land and Water <i>Chief: Dr Graham Harris</i>
	Petroleum Resources <i>Chief: Dr Adrian Williams</i>	Molecular Science <i>Chief: Dr Annabelle Duncan</i>	Tropical Agriculture <i>Chief: Dr Elizabeth Heij</i>	Marine Research <i>Chief: Dr Nan Bray</i>
		Telecommunications and Industrial Physics <i>A/g Chief: Dr Gerry Haddad</i>	Textile and Fibre Technology <i>Chief: Dr Brett Bateup</i>	Wildlife and Ecology <i>Chief: Dr Steve Morton</i>
Alliance Responsibility:	Minerals and Energy	Information, Manufacturing and Service Industries	Agribusiness	Environment and Natural Resources
Corporate Responsibility: Legal Network <i>Chair: Mr Terry Healy</i>	CSIRO Publishing <i>General Manager: Mr Paul Reekie</i>	Information Technology Services <i>General Manager: Mr Jonathan Potter</i>	Corporate Human Resources <i>General Manager: Mr Peter O'Keefe</i>	Corporate Finance <i>General Manager: Mr Bob Garrett</i>
	Commercial Network <i>Chair: Mr Larry Little</i>	Corporate Property <i>General Manager: Mr George Harley</i>	Leadership, Career and Team Development <i>General Manager: Mr Bob Marshall</i>	Strategic Planning and Evaluation <i>General Manager: Dr Andrew Pik</i>

* As at 15 June 2000. Divisions and Corporate Units are shown below the Executive member responsible for oversight of their performance.

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The structure shown in this Plan reflects the situation as at 15 June 2000.

Effective 1 July 2000, the Divisions of Animal Health, Animal Production and parts of Tropical Agriculture were merged to form a new Division of Livestock Industries with Acting Chief Mr Shaun Coffey.

As from 1 September the crop improvement groups of the Division of Tropical Agriculture will formally transfer to the Division of Plant Industry.

The remaining half of Tropical Agriculture, the integrated agricultural systems work, will be merged with the Division of Wildlife and Ecology to form a new Division focussing on research to underpin the sustainable development of rural and regional Australia.

Purpose, Vision, Values and Operating Principles

OUR PURPOSE

CSIRO serves the Australian community through outcomes which provide

- benefit to Australia's industry and economy
- environmental benefit to Australia
- social benefit to Australians
- support to Australia's national and international objectives through excellence in science and technology, and in the provision of advice and services.

OUR VISION: To be a world class research organisation vital to Australia's future

VALUES CRITICAL TO OUR SUCCESS

Satisfied customers and supportive stakeholders through application of our research

CSIRO—Unity of purpose, diversity of means

Top people, top performance, integrity, trust and respect

First class science—because it helps Australia

OPERATING PRINCIPLES

- We determine our research and commercialisation priorities by assessing the needs of, and potential benefit to, our customers, based on an understanding of their business and the world markets in which they operate.
- We contribute our expertise to the development of science and technology policy and priorities in Australia.
- We commit ourselves to excellence in technology transfer to ensure timely exploitation of research results.
- We provide quality advice and service.
- We deliver our research and services on time, within budget and in accordance with legal contractual and ethical obligations.

- We determine priorities and implementation strategies at all levels of the corporation by a systematic process.
- We apply the highest standards of management practice in all our operations. We pay particular attention to excellence in project management. We foster a culture of teamwork.
- We evaluate all of our activities, working towards the world's best practice in quality and productivity.
- We accept accountability for our decisions on the use of CSIRO's resources and take pride in our achievements for Australia.
- We use lessons from our own and others' practices and experience to improve our performance continually

We work together to create an organisation that:

- Seeks to recruit the best and the brightest, provides a stimulating environment to encourage individuals to develop their full potential and provides career opportunities which make CSIRO an attractive development base for future industry leaders.
- Fosters adaptability and recognises exceptional performance with appropriate rewards.
- Cares for the safety and well being of all employees with employment policies to support corporate goals.
- Fosters creativity which underpins our performance and delivery.
- Draws upon the breadth and depth of our skills to assemble excellent teams to tackle major challenges, and uses networks of special skills inside and outside CSIRO.
- Respects the unique skills, professionalism and knowledge of all our employees, and recognises that we are responsible for creating and maintaining our reputation.
- We maintain a world standard of scientific and engineering excellence in order to deliver agreed outcomes to our customers in industry, government and the community, on time and within budget.
- The quality of our scientific research enhances Australia's international standing.
- We work with Australia's education and training organisations to increase awareness of science and technology, and to enhance the supply of excellent graduates into the scientific and technical workforce.

Strategic Overview

The recently completed triennial sector planning process has highlighted clearly the demand for CSIRO's contribution to wealth creation and environmental sustainability for Australia. This clear and exciting demand is far beyond our capacity to deliver given our current level of resources.

While we will continue to have a strong emphasis on user-inspired strategic research and scope for some purely curiosity-driven research, the growth that we are seeking is in response to a strong demand for our services—a demand-led growth. It would enable us to grow in partnership with industry, government and the community for the benefit of all.

Two clear trends are evident from the process we have been through.

First, the move to sector-based planning has resulted in substantial changes to Divisional and inter-Divisional research programs, with improvement in focus and strategic direction of the research effort for the various Sectors. Many improvements to Sector research portfolios have already been made and others are in train. We are convinced that the benefits of the detailed review and planning process clearly outweigh the undoubted costs in terms of time and effort for those involved.

Second, it is also abundantly clear that CSIRO is working with a more diverse range of clients and research collaborators than ever before. This has resulted in the use of a wide range of commercialisation vehicles being used to suit the particular circumstances. Our research collaboration enables CSIRO to achieve the benefits of scale so necessary for conducting excellent and relevant science, and to provide the appropriate scientific leadership as suggested by many Sector Advisory Committees (SACs).

Both of these trends are welcome. These are the sorts of responses we expected when we devolved greater responsibilities to Divisions and Sector Coordinators as part of our restructuring in 1996.

The challenge now is to continue the process of improvement. There is still room for better targeting of scarce human and other resources, for more far-sighted collaboration and redeployment of skills into areas of higher pay-off. There are some large-scale issues still to be addressed to maximise the returns from CSIRO's research effort. The level and deployment of biotechnology skills across the Organisation is one such issue which is being addressed on several fronts.

Scientific and engineering R&D of the highest quality underpins CSIRO's reputation and capacity to deliver research results that contribute most effectively to Australia's well being. This was readily apparent in the material prepared for the Executive during the triennial planning process and subsequently in the Executive-SAC/Sector meetings. Everyone in CSIRO must continue to build on this commitment to excellence and to maintain the strategic research effort necessary for us to be able to meet the needs of Australian industry and the community in five years, ten years and beyond.

The Investment Decisions

The decisions on Sector investments and the resulting Divisional budgets are the culmination of an intensive process which involved considerable effort by a great number of people across CSIRO and externally, in Sector Advisory Committees for example. In responding to this analysis, the Executive adopted a portfolio investment approach in judging the relative merits of research for different Sectors against past performance and prospective value.

We looked particularly for cases where there are good feedback loops between market demand and the

opportunities offered by science and technology. Where these were strong, we decided to increase effort or maintain effort at a high level; where they were absent or weak, we have reduced resources.

Thus we have sought to judge where the highest return on CSIRO's investment dollar would arise, allowing for the fact that such return can be realised through support for wealth creation and/or public good research underpinning Australia's future welfare.

In setting the Divisional budgets based on Sector Plans for the triennium, we have also resolved to institute continued review of these Plans by requiring that changes contemplated by Divisions be introduced following discussions with the relevant Sector Coordinators and subject to the agreement of the relevant Executive member for major changes.

Routes to market; achieving outcomes by ensuring the adoption of our research outputs

In nearly all Sectors, it was evident that relations with our customers and stakeholders are changing and becoming more complex. They are changing because our customer mix is changing and our customers are operating in a fast-changing world. Factors changing the business environment include:

- the globalisation of markets and development of international supply chains
- globalisation of R&D and global sourcing of technology
- market reform and deregulation in a number of industries
- changes in requirements for particular research skills
- impact of international agreements, many with environmental requirements

These and other changes are forcing our customers to operate differently. So, the way that we do business with them has to change. We have done this to some extent, but must go further still.

It is quite clear that in all Sectors encompassing rural production an effective feedback loop connecting producers and consumers, or those acting on direct feedback from consumers (retailers for example), is essential for the long-term health of these Sectors and for capturing value from research. Consequently, the existence of an effective feedback loop of this kind must be a pre-condition for CSIRO's continued investment in the Sector.

The routes to market for our research are many and varied. They can now include equity as well as royalty approaches and joint ventures and alliances with industry, Government agencies and Universities, sometimes via CRCs and sometimes directly. Each needs to be tailored to the specific customer and their specific markets. The SACs are helping us to do this with their valuable inputs. They have indicated a willingness to do more and we are pleased to accept their offer.

Marketing, Delivery and Managing Client Relationships

There is a growing professionalism within the Organisation on commercial matters. But we still need to improve considerably in our marketing, client relationships and outputs delivery. These activities are intimately linked to priority setting and finding the appropriate routes to market. This need for increased attention to outcomes via better marketing and technology transfer was expressed by many of the SACs during meetings with the Executive. This will require increased coordination, particularly at a commercial level, between Divisions contributing to the work of Sectors.

Structures

The delineation of the Sectors and Divisions, whilst not perfect, has served us remarkably well over the previous triennium. The Sectors could be defined differently, and conceivably some could be merged, but there does not appear to be any strong demand to do so. Some overlap of interests will always occur, no matter how we segment our response to our customer base. We have however decided to relocate our cotton research from the Field Crops Sector to the Textiles, Clothing and Footwear Sector in line with our desire to ensure effective feedback loops between cotton producers and the industry that uses cotton.

We also need to move beyond the general sector issues to specific company or agency needs and develop more targeted relationships with specific customers.

Having said that, the Executive has identified areas where current individual Sectoral responses to common issues have not been well integrated and require further consultation and planning. In particular, the demand for services assisting the environmental sustainability of many industry sectors is recognised, together with the importance of the need for a widespread response to global and national greenhouse-related requirements. CSIRO can play a value-adding role by planning and conducting major integrative projects, in collaboration with a range of client groups and research partners.

Sustainability

The environmental sustainability of production systems, in agriculture, mining, mineral processing, manufacturing and the built environment, is a recurring theme. It is expressed in various ways by different industries, and impacts those industries in different ways. For the mining industry it manifests itself as maintaining a 'licence to operate'; in the fishing industry as a concern about depletion of stocks through overfishing; in the agricultural industries as a concern about the pressures on the natural resource base and its ability to continue to support current levels of production, and to retain access to markets for clean and green products.

Environmental sustainability however is intimately linked to economic and social imperatives and hence solutions to this issue need to be framed in a holistic manner. We have decided to be pragmatic about how we deal with our research effort for sustainability. Our prime imperatives are that the issues are dealt with in a holistic manner and at an appropriate scale, and that the research conducted for it is guided by the appropriate drivers and market signals.

This approach has a large impact on our effort in the Land and Water Sector. We have decided that much of the land and water type issues affecting the sustainability of agriculture, mining, mineral processing, manufacturing and the built environment can best be dealt with via large scale integrated work within the Land and Water Sector. This work is to be clearly identified in the Land and Water Sector Plan and with appropriate advisory and management mechanisms in place to ensure that customer groups in the production-based Sectors can exert appropriate influence on those projects. The objective is that work will be undertaken so as to meet the sustainability needs of customers in production Sectors while addressing the environmental issues through a systems approach to broad-scale land and water management.

Biotechnology and Bioengineering

Use of biotechnology and bioengineering is becoming pervasive in CSIRO and has a growing role in a number of agribusiness, manufacturing, and minerals sectors. This mirrors the changes, often profound, occurring in these industries and a step change in how biotechnology is conducted.

CSIRO must have access to a full set of capabilities in proteomics (protein characterisation), functional genomics, screens and molecular recognition, structural biology, microbial technologies and bioinformatics if it is to be a leader in biotechnology research and application. Access across CSIRO to such capabilities will be critical.

There are gaps and differential levels in CSIRO's biotechnology skill-base, facilities and equipment. These are best filled by groups, either internal or external, which serve as a resource for the Organisation as a whole. Coordination, leadership and management of the effort across CSIRO will be a significant issue as will consumer acceptance of genetically modified organisms (GMOs).

Another important issue is the lack of risk assessment studies, particularly those at an ecological system level. CSIRO needs to play a significant part in ensuring a balanced approach to the implementation of biotechnology research and in addressing all implications of its use. A major project on an assessment of potential risks to the environment posed by GMOs will begin this year.

Public Good Research and Support for Policy Development

The Executive's discussions with the SACs revealed support for the increasing role CSIRO plays in public good issues and the provision of scientific input for government policy development. Whilst this has been a major part of the role for environment and agribusiness sectors in the past, it has clearly extended to most other sectors over the past triennium, in a manner supported by governments and industry representatives alike.

Given the competing demands for its research, CSIRO cannot do all of this work without additional funding. Although we will draw on our research experience and expertise developed in other endeavours, we expect government and industry to provide financial support when it comes to specific studies needed to provide the particular advice to inform policy development and its implementation. Links to relevant government agencies need to be developed or enhanced by all sectors.

Summary of the Investment Decisions

Relative to the 1997-2000 Sector Investment Profile, we are making evolutionary changes to CSIRO's Sector investments in the new millennium. Some of these changes have their origins in trends already underway in CSIRO in response to changing industry circumstances. Our decisions for the coming triennium will position us for the next decade and beyond.

The major sector shifts are:

- increases to the Land and Water, Mineral Exploration and Mining, Marine, Food Processing, Radio Astronomy Sectors; and
- decreases to Meat Dairy and Aquaculture, Forestry Wood and Paper Industries, and Built Environment Sectors.

The sectoral changes have been made with a careful eye on divisional implications.

Relative to forward projections on a "steady state", direct appropriation income to divisions for the next triennium involve some major divisional changes:

- increases for the Marine, Exploration and Mining, Australia Telescope National Facility, Minerals, and Molecular Science with Food Science Australia and Health Sciences and Nutrition Divisions receiving a non-recurrent increase, and
- decreases for the Forestry and Forest Products, Textile and Fibre Technology, Telecommunication and Industrial Physics, Tropical Agriculture, and Animal Production Divisions.

Financial Resources and Staff Numbers by Division*

DIVISION	REVENUE					OPERATING RESULT \$M	CASH BALANCE ² \$M	CAPITAL EXPENDITURE \$M	RESEARCH STAFF ³ EFT	TOTAL STAFF ⁴ EFT
	TOTAL \$M	DIRECT APPROP \$M	RESEARCH & SERVICES ¹ \$M	OTHER \$M						
Animal Health ⁵	22.023	11.844	9.204	0.975	0.246	0.820	0.600	111	214	
Animal Production	20.883	14.988	5.505	0.390	0.017	-0.964	0.600	140	190	
Atmospheric Research	14.911	9.700	5.210	0.000	-0.101	1.006	0.500	88	121	
Australia Telescope National Facility ⁶	14.726	12.362	2.064	0.300	-3.308	3.606	2.525	62	124	
Building Construction and Engineering	30.257	20.030	10.227	0.000	0.080	0.489	1.900	176	237	
Energy Technology	22.003	14.503	7.500	0.000	0.575	3.297	1.450	119	169	
Entomology	30.183	15.301	14.588	0.293	-1.876	-1.036	0.933	220	285	
Exploration and Mining	33.185	18.095	14.990	0.100	0.666	-0.202	2.500	172	257	
Food Science Australia ⁷	15.492	15.492	0.000	0.000	0.000	3.762	0.000	129	180	
Forestry and Forest Products	25.472	16.872	8.600	0.000	0.000	2.647	1.190	150	215	
Health Sciences and Nutrition	21.127	15.021	6.076	0.030	-0.376	0.740	0.750	130	166	
Land and Water	46.886	30.640	15.700	0.546	-0.371	7.058	2.500	311	455	
Manufacturing Science and Technology	42.851	27.295	15.545	0.010	-0.500	3.543	3.550	215	284	
Marine Research	34.475	22.612	11.763	0.100	-0.237	2.781	1.189	202	301	
Mathematical and Information Sciences	33.493	22.773	10.520	0.200	-1.745	2.579	0.890	193	263	
Minerals	32.723	20.835	11.800	0.088	0.050	0.100	2.500	193	272	
Molecular Science	31.859	19.225	12.634	0.000	0.117	1.668	3.800	185	230	
Petroleum Resources	16.448	9.396	7.010	0.042	0.108	1.040	0.847	67	85	
Plant Industry	55.649	30.991	23.789	0.870	-0.876	5.942	1.842	483	612	
Research Vessel Franklin ⁶	4.523	4.343	0.150	0.030	-0.971	0.524	0.107	0	9	
Telecommunications and Industrial Physics ⁸	53.729	38.215	15.514	0.000	-2.973	2.380	3.000	310	414	
Textile & Fibre Technology	19.885	11.785	7.900	0.200	0.377	6.800	0.700	109	189	
Tropical Agriculture	32.676	21.159	10.500	1.017	-0.093	2.587	0.900	191	265	
Wildlife and Ecology	22.145	15.420	6.575	0.150	-0.665	4.199	1.066	141	216	
Centre for Mediterranean Agric Research ⁹	0.692	0.682	0.000	0.010	-0.058	0.282	0.000	1	8	
Divisional Total	678.295	439.579	233.364	5.351	-11.910	55.648	35.839	4,097	5,763	
Corporate Groups ¹⁰	52.145	39.791	6.172	6.183	-1.190	2.372	0.217	15	319	
Discovery Centre	0.360	0.000	0.000	0.360	-0.657	-0.194	0.050	1	5	
Corporate Funds	17.516	14.493	0.000	3.023	7.432	-27.473	3.800			
Capital Program	12.078	0.044	10.122	1.912	3.566	-0.605	141.326			
Capital Use Revenue ¹¹	116.125	116.125	0.000	0.000	116.125	0.000	0.000			
Operational Total	876.519	610.032	249.658	16.828	113.365	29.747	181.232	4,113	6,087	

* The footnotes to this table should also be read in conjunction with the resources summary at the end of each divisional entry. Financial estimates are for 2000–2001 as at 23 May 2000. Staff numbers are equivalent full-time (EFT) as at 26 May 2000 and include indefinite and term CSIRO Officers only.

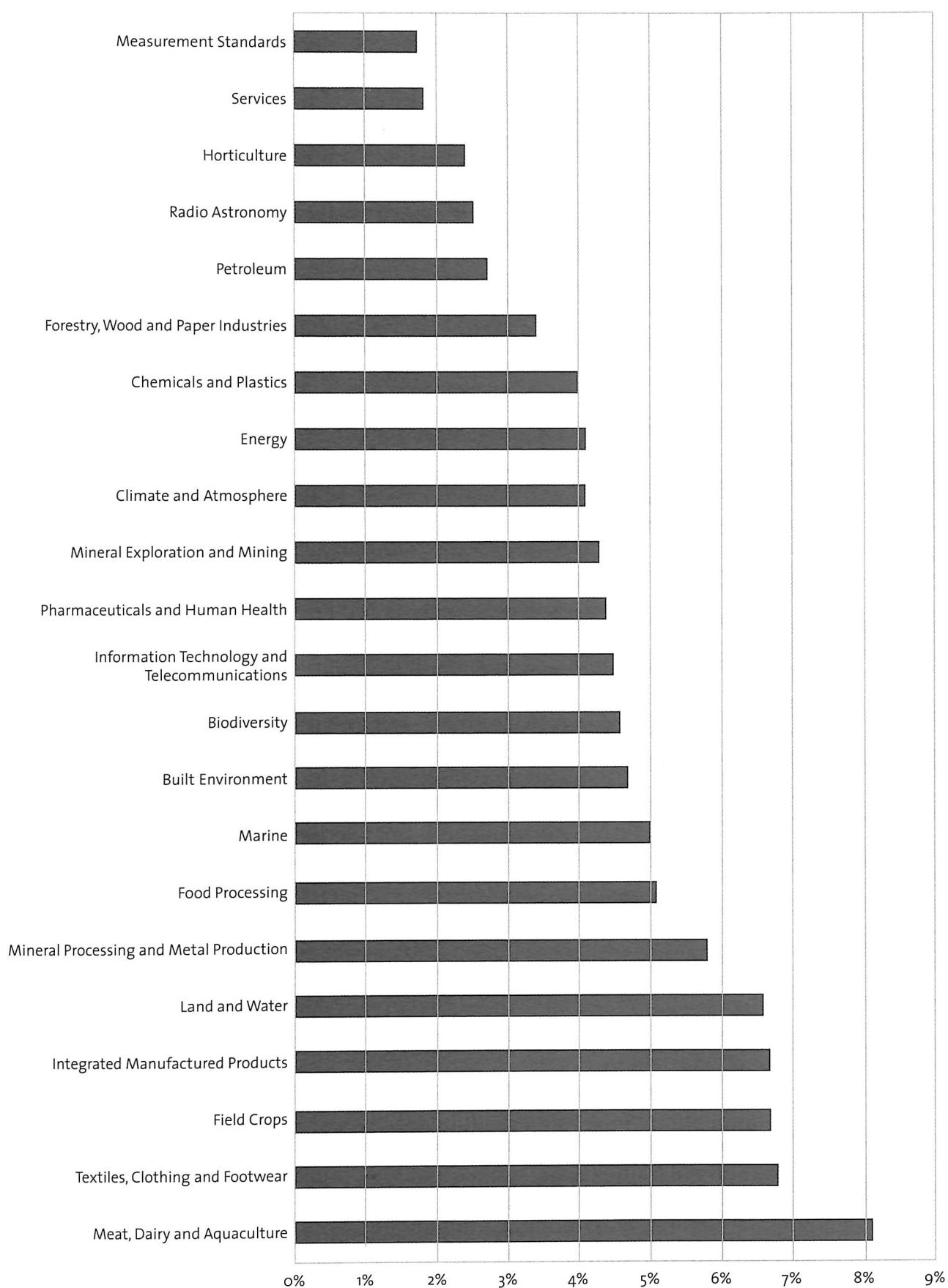
Financial Resources and Staff Numbers by Division

Notes

1. Revenue for Research and Services as defined for CSIRO's external earnings performance indicator (PI). After adjusting for the Capital Use Charge (see note 11), CSIRO's estimated external earnings PI ratio for 2000–2001 is 33.4%. The PI definition excludes 'Other' revenue from both numerator and denominator.
2. Estimated 30 June 2001 cash balance.
3. Includes Research Scientist/Engineer, Research Projects and Research Management functional classifications.
4. Includes Research Staff plus Technical Services, Communications and Information, Administrative Services, General Services, Corporate Management and Senior Specialist functional classifications.
5. Includes the Australian Animal Health Laboratory—a National Facility managed by CSIRO on behalf of the government.
6. A National Facility managed by CSIRO on behalf of the government.
7. Through the Division of Food Science and Technology, CSIRO has entered a joint venture (Food Science Australia) with the Australian Food Industry Science Centre (Afisc). CSIRO's direct contribution to the joint venture is \$15.5m for 2000–2001. The joint venture has planned total revenues of \$35.596m, an operating result of -\$865K and closing cash balance of \$6.116m. Figures in this table represent an estimate of CSIRO's operational activities in the joint venture which differ from the legal interest.
8. Includes the Australian National Measurement Laboratory—a National Facility managed by CSIRO on behalf of the government.
9. Six CSIRO Divisions support the Centre for Mediterranean Agricultural Research.
10. Corporate Groups includes all the Corporate Units, CSIRO Publishing, CSIRO Executive, the LIPI Project and the Magnesium Project.
11. A Capital Use Charge (CUC) is part of the Government's new accrual framework. It is funded by increasing the Organisation's appropriation by 12% of the opening net asset position. This is received as part of the Organisation's appropriation during the year, and paid to the Commonwealth as a dividend in June. This causes the Organisation's operating result to appear inflated by the amount of the CUC.

CSIRO's Planned Investment Profile by Sector, 2000–2001

(Direct Appropriation Income plus external earnings totals \$760 million excluding the Capital Use Revenue)



CSIRO Operations and Reporting

Acting Chief Executive—Dr Colin Adam



	ALLIANCES AND SECTORS																					
	Agribusiness			Environment & Natural Resources		Information, Manufacturing & Service Industries			Minerals & Energy													
	Field Crops	Food Processing	Forestry, Wood & Paper Industries	Horticulture	Meat, Dairy & Aquaculture	Textiles, Clothing & Footwear	Biodiversity	Climate & Atmosphere	Land & Water	Marine	Built Environment	Chemicals & Plastics	Information Technology & Telecommunications	Integrated Manufactured Products	Measurement Standards	Pharmaceuticals & Human Health	Radio Astronomy	Services	Energy	Mineral Exploration & Mining	Mineral Processing & Metal Production	Petroleum
Deputy Chief Executives																						
DIVISIONS																						
Dr Chris Mallett																						
Animal Health	●				●	●																
Animal Production					●	●	○	●		○								○				
Food Science Australia	●	●	●	●	●	●																
Plant Industry	●	●	●	●	●	●		●	●													
Textile & Fibre Technology						●																
Tropical Agriculture	●				●																	
Dr Paul Wellingtons																						
Atmospheric Research							●											○				
Entomology	●		●	●	●	●	●	●	○			●	●				●					
Forestry & Forest Products			●				●	●	●	●								●				
Land & Water	●			●	●		●	●	●	●		●						●	●	●	○	
Marine Research							●	●	●	●	●	●					●		○	○	○	
Wildlife & Ecology	●		●		●	●	●	●	●	●	●	●	○				○	○	○	○		
Dr Ron Sandland																						
Australian Telescope National Facility																	●					
Health Sciences & Nutrition	●	●				●											●					
Manufacturing Science & Technology																	●	●	●	●	●	
Mathematical & Information Sciences	○	●	●	●	○	●	○	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●
Molecular Science																	●			●	●	●
Telecommunications & Industrial Physics							●			●		●	●	●	●	●	●	●	●	●	●	●
Dr Bruce Hobbs												○	●	○			●	●	●		●	●
Building, Construction & Engineering								○	●	○			●	●						●	●	●
Energy Technology								●	●	●	●							●	○	●	●	
Exploration & Mining																		●	●	●	●	
Minerals																		●			●	○
Petroleum Resources																		●				●

● and ○ indicate Sectors to which a Division plans to contribute in 2000–01. An open circle indicates a contribution of less than \$300,000.

CSIRO Participation in Cooperative Research Centres

Cooperative Research Centres (CRCs) bring together researchers and research groups from universities, state government agencies, business enterprises and commonwealth research organisations such as CSIRO.

CRCs undertake collaborative research and education programs in the fields of natural sciences and engineering, with a strong focus on commercial and other applications. The Commonwealth Government provides up to fifty per cent of the cost of establishing and operating a centre. The participating organisations contribute the balance of required resources in cash or kind. CSIRO accounts for approximately 20 per cent of resources committed to centres by participating organisations over the contract period (\$3.75B).

The CRC Program was launched in May 1990 and successful applicants in the sixth round of funding were announced in April 1999. CSIRO is taking part in the seventh round of applications which closes on 5 July 2000. At 30 June 2000 CSIRO is a core participant in the centres listed below.

Further information on the CRC Program and individual Centres can be found at the following internet address:
www.dsr.gov.au/crc.

Manufacturing Technology

- CRC for Bioproducts
- CRC for CAST Metals Manufacturing
- CRC for Intelligent Manufacturing Systems and Technologies
- CRC for International Food Manufacture and Packaging Science
- CRC for Microtechnology
- CRC for Polymers
- CRC for Welded Structures

Information and Communication Technology

- CRC for Advanced Computational Systems
- CRC for Enterprise Distributed Systems Technology
- CRC for Satellite Systems Applications
- Australian Telecommunications CRC

Mining and Energy

- A J Parker CRC for Hydrometallurgy
- Australian Geodynamics CRC
- CRC for Australian Mineral Exploration Technologies
- Australian Petroleum CRC
- CRC for Black Coal Utilisation
- CRC for Clean Power from Lignite
- G K Williams CRC for Extractive Metallurgy
- CRC for Landscape Evolution and Mineral Exploration

Agriculture and Rural Based Manufacturing

- CRC for Aquaculture
- Australian Cotton CRC
- CRC for Cattle and Beef Quality
- CRC for Food Industry Innovation
- CRC for Legumes in Mediterranean Agriculture
- CRC for Premium Quality Wool
- CRC for Quality Wheat Products and Processes
- CRC for Sustainable Production Forestry
- CRC for Sustainable Rice Production
- CRC for Sustainable Sugar Production
- CRC for Tropical Plant Protection
- CRC for Viticulture

Environment

- CRC for Antarctica and the Southern Ocean
- CRC for Biological Control of Pest Animals
- CRC for Catchment Hydrology
- CRC for Coastal Zone, Estuary and Waterway Management
- CRC for Freshwater Ecology
- CRC for Southern Hemisphere Meteorology
- CRC for Sustainable Development of Tropical Savannas
- CRC for Greenhouse Accounting
- CRC for Tropical Rainforest Ecology and Management
- CRC for Waste Management and Pollution Control
- CRC for Water Quality and Treatment
- CRC for Weed Management Systems

Medical Science and Technology

- CRC for Cellular Growth Factors
- CRC for Diagnostic Technologies
- CRC for Eye Research and Technology
- CRC for Tissue Growth and Repair
- CRC for Vaccine Technology

CSIRO Executive

FOCUS

The Chief Executive and four Deputy Chief Executives, collectively CSIRO's Executive Committee, provide high level strategic leadership, business development, performance review and management of the Organisation. The Chief Executive is accountable to the Minister and the CSIRO Board for the total performance of the Organisation. The Deputy Chief Executives are accountable to the Chief Executive for the performance of groups of Sectors, Chiefs and their Divisions. They are also responsible for the oversight of areas of corporate support, for major sites and their development, for fostering cross-Divisional collaboration and for promoting CSIRO through internal and external interactions.

Outlook and Strategies

CSIRO has continued to benefit from the external advice of our Sector Advisory Committees (SACs). Guided by the sector process, the Executive is confident that the organisation's resources have been invested in a manner that maximises their scientific, economic and social impact. A number of outcomes have already been noted.

- Driven by the recommendations of a comprehensive review, a number of divisions have been involved in mergers. The new Division of Livestock Industry for example is expected to reap the benefits of research and stakeholder synergies.
- In response to globalisation and related movements, CSIRO will divert its research efforts away from areas subject to world-wide over-investment to ones which can be appropriated for Australian exploitation. Additionally CSIRO will investigate new operating structures to promote greater entrepreneurial activity by selected staff whilst ensuring the preservation of CSIRO's core values of intellectual rigour, objectivity and impartiality in the provision of scientific advice and assistance to industry and government.

The Executive will now seek to leverage these undertakings by further developing mechanisms to strengthen, in particular:

- A stronger emphasis on the alignment of organisational goals with staff career development.
- Performance improvement and accountability. Oversee the development of a comprehensive framework and reporting schedule to measure and improve performance.

The Executive will maintain its focus on developing high level strategic relationships with senior representatives of key customer, collaborator and stakeholder groups in order to:

- Ensure that CSIRO has access to the best advice and can make effective contributions to government and industry decision making, particularly through the input of its SACs.
- Identify, assess and implement appropriate strategic responses to significant national and international issues and changes as they occur.
- Secure appropriate terms for funding of CSIRO research by government agencies and R&D corporations.

Planned Activities and Achievements

- The Organisation remains committed to the Cooperative Research Centre (CRC) program with a proposed total commitment of \$750M. Its investments in new CRC applications have been reviewed by the Executive to ensure that these are consistent with sector priorities.
- The Innovation Summit held earlier this year produced a number of recommendations to which CSIRO is committed. The Organisation has several working examples which have demonstrated the broader principles of connectivity with several external groups and the processes of cultural change within a knowledge based enterprise. Availability of external capital is producing new research opportunities for CSIRO staff and technology transfer.
- A number of promising technical developments during the past decade have been positioned within companies started by CSIRO, eg. The Preston Group, GroPep and Ceramic Fuel Cells. These have provided early commercial models for the internal incubation of Australian start-up companies within the Organisation. Divisions have identified external sources of capital to create new technologically based companies with the appropriate private sector interests.
- Monitor progress against Sector Plans for the funding triennium 2000–01 to 2002–03 in accord with decisions on sector priorities and investments announced in May 1999.
- Decide, after full consultation and discussion with staff, on revised mechanisms for CSIRO's current performance appraisal and remuneration systems.
- Monitor performance of CSIRO's multi-million dollar, World Bank funded contract with LIPI, the Indonesian national R&D agency.

RESOURCE SUMMARY 2000–2001

Estimates for the CSIRO Executive are incorporated in the resource summary for the Corporate Units.

CSIRO Animal Health is a national centre of excellence in disease diagnosis, research and policy advice in animal health. The Division has a high level of expertise in disease diagnosis and the development of diagnostic tests; virology; development of vaccines; veterinary skills; immunology; molecular biology; bacteriology and organic chemistry, particularly as it relates to natural toxins. It is this combination of special skills in the diseases of livestock that gives the Division its national stature in providing advice to the Commonwealth and States and in research on effective products for disease treatment and prevention. The Australian Animal Health Laboratory facility is recognised internationally as one of the best biocontainment facilities in the world for the safe handling and containment of micro-organisms.

Outlook and Strategies

As global free trade increases, the Office International des Epizooties is developing new international standards for disease surveillance leading to an increased requirement for import and export disease testing and certification.

It is anticipated that AAHL will also play a key role in the development and implementation of a national strategy by the National Office of Animal and Plant Health for the coordinated and strategic delivery of terrestrial and aquatic animal health programs in the region.

Implementation of the CSIRO responses to the recommendations of the Livestock Research Infrastructure Review will be the major non-scientific task for the year.

Planned Activities and Achievements

Meat, Dairy and Aquaculture

- Swift diagnosis and investigation of exotic diseases and efficient and rapid participation in the management of animal and fish disease outbreaks of national significance.
- Develop and evaluate diagnostic tests for the fin-fish diseases, spring viraemia of carp and infectious salmon anaemia.
- Characterise strains of Newcastle disease (ND) virus isolated during the disease outbreak and the Australia-wide survey, as part of a national program to better understand the ND situation in Australia and protect the national poultry flock.
- License prototype vaccines for cattle and pigs to manufacturing partners for evaluation.
- Negotiate new research contracts for vaccine and therapeutic development for the benefit of the intensive livestock industries.
- Evaluate recombinant antigens from *Mycobacterium paratuberculosis* in the gamma interferon assay to provide a more specific test for Johne's disease.

- Assess the specificity of recombinant chicken monoclonal antibodies against very virulent infectious bursal disease virus to develop a diagnostic test to discriminate between classical and very virulent viral strains.
- Demonstrate the therapeutic effect of peptide therapeutics in chickens and pigs with the aim of reducing chemical and antibiotic usage in disease control.
- Characterise the cellular immune responses to antigen/iscom complexes using the lymphatic cannulation model to improve the adjuvanticity of vaccines.

Textiles, Clothing and Footwear

- Swift diagnosis and investigation of exotic diseases of sheep and efficient and rapid participation in the management of disease outbreaks of national significance.

Food Processing

- Conduct preliminary toxicity studies for tunicamycin to determine the no observable effects limits for corynetoxin toxicity.
- Assess corynetoxin levels in grain and fodder samples to provide manufacturers with information on toxin levels in their products.

Venture Capital

In order to broaden the sources of external funding and to develop longer-term co-investment in our research, the Division will seek access to venture capital through the licensing of a package of selected technology to a start-up company.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Meat, Dairy & Aquaculture	87.2
Textiles, Clothing & Footwear	10.0
Food Processing	2.7

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	22023
– Direct Appropriation (\$'000)	11844
– Research & Services (\$'000)	9204
– Other (\$'000)	975
Earnings Performance Indicator (%)	41.8
Operating Result (\$'000)	246
End of Year Cash Balance (\$'000)	820
Research Staff (EFT)	111
Total Staff (EFT)	214

CSIRO Animal Production supports the sustainability and international competitiveness of Australia's livestock industries in the temperate climatic zones. The major contribution is to the Textiles, Clothing and Footwear Sector, with a large contribution to Meat, Dairy and Aquaculture Sector and a growing contribution to Climate and Atmosphere Sector, with small but potentially significant contributions to Marine and Biodiversity Sectors.

Outlook and Strategies

There are a number of significant issues facing the Division this year. New CRC proposals to ensure wide external collaboration will be developed to replace those terminating.

New industries provide special opportunities for the application of existing knowledge and the exercise of existing disciplines. Such opportunities are being actively sought, and work has begun with industry support on small herbivores and freshwater crustaceans.

New challenges include the increasing importance of animal welfare as a research driver and the increased use of gene technology, with heightened need for increased public engagement.

Implementation of the recommendations of the Livestock Research Infrastructure Review will be the major non-scientific task for the year.

Planned Activities and Achievements

Textiles, Clothing and Footwear

- Develop project to determine the profitability of animal production from saline soils, with an emphasis on the role of new pasture plants (*also Meat, Dairy and Aquaculture*).
- Seek a commercial collaborator to test the response in cattle and sheep to supply of a fungal specific stimulant (*also Meat, Dairy and Aquaculture*).
- Commercialise the shear test for determination of the quality of export hay.
- Finalise contracts with breeders and processors on "Towards 13 microns" wool project and first crop of lambs from nucleus born on partners' properties.
- Stage major Fine Wool Symposium to disseminate the results of the Finewool project and launch SelectGene software to assist Merino ram breeders design their selection programs.
- Commercially test DNA pedigree markers for British breeds and goats.
- Test long-term effectiveness of novel procedure to prevent breech strike in sheep.
- Bid submitted for Sheep Industry CRC (*also Meat, Dairy and Aquaculture*).
- Commercial evaluation of a novel technique for formulation and delivery of bioactives to livestock (*also Meat, Dairy and Aquaculture*).
- Field test technology for biological control of free-living stages of parasitic worms on pasture (*also Meat, Dairy and Aquaculture*).
- Field test nutritional enhancement of immunocompetence against worms in sheep (*also Meat, Dairy and Aquaculture*).

- Evaluate novel methods for diagnosis of nematode parasitism in sheep.
- Establish basis for sensitive DNA assay for ivermectin resistance in important sheep nematodes (*also Meat, Dairy and Aquaculture*).

Meat, Dairy and Aquaculture

- Complete validation of remote sensing technology to measure pasture biomass and growth rate, and conduct pilot trials with on farms in WA (*also Textile, Clothing and Footwear*).
- Complete beta-version of AUSPIG for Microsoft Windows platform.
- First set of genetic parameters estimated for traits of importance in Australia's commercial meat rabbit population.
- Analysis of the profitability and business opportunities for Australia's freshwater crustacean industry.
- Transfer to a commercial partner technology for novel delivery system for porcine growth hormone.
- Validation under commercial conditions of a gene-based test for immune response to stress in pigs.
- Transfer immune competence tests to beef feedlot industry.
- Characterise immunological responses to novel topical immunisation technology in sheep and cattle.

Climate and Atmosphere

- Field-test in sheep a putative vaccine against methanogenic organisms (*also Meat, Dairy and Aquaculture*).

Marine

- Conduct a trial with a commercial collaborator to test the effect of Omega3 enrichment of milk on pasteurisation, product development and shelf life (*also Meat, Dairy and Aquaculture*).

Pharmaceuticals and Human Health

- Establish proof of concept of therapy through vectored delivery of genes to cancer cells.

Biodiversity

- Develop a risk assessment methodology for genetically modified rumen organisms.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Textiles, Clothing & Footwear	53.0
Meat, Dairy & Aquaculture	40.0
Climate & Atmosphere	4.3
Pharmaceuticals & Human Health	1.4
Marine	1.2
Biodiversity	0.2

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	20883
– Direct Appropriation (\$'000)	14988
– Research & Services (\$'000)	5505
– Other (\$'000)	390
Earnings Performance Indicator (%)	26.4
Operating Result (\$'000)	17
End of Year Cash Balance (\$'000)	-964
Research Staff (EFT)	140
Total Staff (EFT)	190

CSIRO Atmospheric Research conducts world-class research into our atmospheric environment and provides advice and applications for the benefit of Australia. In particular, the Division serves the community through outcomes that provide benefit to industry and the economy, environmental benefit, social benefit and support to national and international objectives. Specifically, the Division addresses issues such as urban and regional air pollution, the enhanced greenhouse effect, ozone depletion, climatic variability and severe weather. Research tools include computer-based climate and atmosphere models as well as remote sensing and other atmospheric monitoring instruments. Key stakeholders include commonwealth and state environment departments, and energy and mineral resource companies.

Outlook and Strategies

Nationally and internationally, there is great demand for data and information about changes to the atmospheric environment and for solutions to related environmental issues and problems.

Australia is facing increasing commitments associated with international protocols and agreements on topics such as climate change and ozone depletion. Air pollution and climate variability continue to affect our prosperity and welfare.

Research advances are underpinned by the rapid growth in computing and information technology. This is allowing development and application of climatic and air quality models of increasing realism, allowing for better accuracy and greater detail of predictions.

The Division is a major user of the joint supercomputing facility, shared by CSIRO and the Bureau of Meteorology. The facility supports the Division's climatic and air quality modelling.

The Division receives significant external support from the National Greenhouse Research Program of Environment Australia. The Australian Greenhouse Office is the Division's foremost client and there is increasing support from resource industries.

The Division makes scientific contributions to development of government policy through briefings, submissions and environmental reports.

Over 95 per cent of the Division's activities contribute to the CSIRO Climate and Atmosphere Sector and represent about half of the total Sector effort.

Planned Activities and Achievements

Climate and Atmosphere

Significant interactions with commonwealth and state environment agencies on air quality characterisation, modelling and health risk assessment. Application of an air quality model produced in collaboration with the Victorian Environment Protection Authority and the Bureau of Meteorology to provide daily air pollution forecasts. An increasing emphasis on aerosol monitoring and characterisation and linking aerosol exposure with health risks.

National and overseas consultancies including a project to characterise haze in Malaysia.

Research on the changing composition of the atmosphere using the Cape Grim Baseline Air Pollution Station, in Tasmania. The Bureau of Meteorology and CSIRO jointly manage the Station.

Research on greenhouse gases, ozone-depleting substances and other trace gases, making a major contribution to national and international assessments of global atmospheric change, its causes, and the opportunities for remedial action.

Three-dimensional carbon transport modelling of the atmosphere and oceans, global and regional inverse modelling and multi-decadal modelling, of relevance to policy advice on issues relating to the Kyoto Protocol, to the Australian National Greenhouse Inventory, to interpretation of data on changing global greenhouse gas concentrations, and to design of measurement strategies.

Field experiments to provide Australia-wide validation of satellite-based measurements of atmospheric radiation and aerosol.

Continued development and use of sophisticated climate models to assess likely future regional changes to climate, and testing of model-based multi-seasonal predictions. Outputs will be supplied to agencies such as the Bureau of Meteorology and the Queensland Department of Natural Resources, commercial companies and international institutions.

Preparation and dissemination of new scenarios of climate change for the Australian region. Assessment of likely regional impacts of climate change for a number of State Governments. Studies of rainfall fluctuations in the southwest of Western Australian.

Assessments for the Gold Coast City Council of climate change and tropical cyclone risk.

Energy

Atmospheric modelling in support of site assessments for wind farms.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Climate & Atmosphere	98.9
Energy	1.1

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	14911
– Direct Appropriation (\$'000)	9700
– Research & Services (\$'000)	5210
– Other (\$'000)	0
Earnings Performance Indicator (%)	34.9
Operating Result (\$'000)	-101
End of Year Cash Balance (\$'000)	1006
Research Staff (EFT)	88
Total Staff (EFT)	121

Australia is ranked among the top five countries in ground-based optical and radio astronomy, and the CSIRO's Australia Telescope National Facility (ATNF) is Australia's pre-eminent radio astronomy institution. It is the only facility in the world which can make high-resolution images of the southern sky at radio wavelengths. The current major focus of the ATNF is on upgrading its observing facilities to maintain its operation as a prestigious world-class national research facility dedicated to the advancement of knowledge and providing a showpiece for Australian technology.

Outlook and Strategies

The critical overall objective of the ATNF is to remain at the forefront of world radio astronomy. As a National Research Facility, the ATNF currently provides facilities which enable its users to carry out leading edge radio astronomy.

The ATNF is undertaking a major upgrade of ATNF observing facilities; for 2000–2001 this will be supported by the Commonwealth Government's Major National Research Facility (MNRF) funding program.

The ATNF and CSIRO Telecommunications & Industrial Physics (CTIP) are continuing a joint project on *Advanced Millimetre-Wave Integrated Circuits for Radio Astronomy and Telecommunications* with the support of the CSIRO Executive's Special Projects Fund.

The ATNF will continue to participate in planning future international research facilities.

In particular Australia is well positioned to play a key role in the development of the Square Kilometre Array. Strong participation in the project will increase the possibility of Australia hosting the instrument.

Planned Activities

- Operate the Parkes, Narrabri and Mopra Observatories, the Long Baseline Array network, and the Marsfield facilities, as National Research Facilities.
- Continue with the upgrading of the Narrabri Compact Array supported by MNRF funding, with emphasis on the antennas, new 12-mm/3.5-mm receiving systems and local oscillator distribution system.
- Continue the joint ATNF/CTIP advanced mm-wave integrated circuit project.
- Support a new MOU between ATNF and Onsala Space Observatory to enable access by Australian astronomers to 5% of the observing time on the Swedish–ESO Submillimetre Telescope.
- Participate in planning of international next-generation major radio astronomy facilities.
- Collaborate with the Academia Sinica Institute of Astronomy and Astrophysics, Taiwan, in the design and development of mm-wave receiving systems for its Array for Microwave Background Anisotropy Facility.
- Continue the involvement in national and international activities related to radio-spectrum management.
- Promote CSIRO and ATNF activities through information and educational resources.

Planned Achievements

- Provide access to ATNF's facilities that satisfies the Australian and overseas community of users.
- Provide at least 70% of the available time for astronomy on the Compact Array and Parkes radio telescope, keeping time lost during scheduled observing periods to below 5%.
- Develop further the real-time data processing system for the Compact Array.
- Optimise the performance of the optics and reflecting panels of the 22-m diameter Narrabri and Mopra antennas for operation at 3.5-mm wavelength, using holographic measuring techniques.
- Install the first ATNF-produced 12-mm/3.5-mm receiver system on the Compact Array.
- Upgrade of the Compact Array local oscillator system by installing fibre-optics cable to all stations.
- Complete the final designs for the electronics devices developed in the joint ATNF/CTIP advanced mm-wave integrated circuit project. Bond, package, test and evaluate the individual chips when they are returned from the US foundry.
- Continue the Parkes multi-beam survey of atomic hydrogen gas in the 'Zone of Avoidance' (the optically obscured region along the centre of the Milky Way).
- Complete the multi-beam survey to detect new southern millisecond pulsars.
- Support the Japanese VSOP Space–VLBI (Very Long Baseline Interferometry) mission by allocating observing times of up to 5% at Narrabri and Parkes, and up to 25% on the Mopra antenna.
- ATNF staff make significant contributions to planning of the Square Kilometre Array, and participate in working-group meetings for the Atacama Large Millimetre Array.
- ATNF staff make significant contributions to OECD and ITU (International Telecommunication Union) meetings on spectrum planning for radio astronomy, and in the formation of an Asia-Pacific group for regional planning discussions.
- Participate in the commissioning of the new Astronomical Image Processing System (AIPS++).
- Have at least 50 scientific papers published in refereed journals.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
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Radio Astronomy	100.0
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RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	14726
– Direct Appropriation (\$'000)	12362
– Research & Services (\$'000)	2064
– Other (\$'000)	0300
Earnings Performance Indicator (%)	14.0
Operating Result (\$'000)	-3308
End of Year Cash Balance (\$'000)	3606
Research Staff (EFT)	62
Total Staff (EFT)	124

CSIRO Building, Construction and Engineering operates to support, advance and improve the operation of industries relating to the Built Environment and other related Sectors. Strategic research is focused in life cycle performance; intelligent construction systems; information and communication in construction, new materials production and process design, waste recycling and reactivation and infrastructure network optimisation. These key areas will provide substantial advantage to Australia in the next century.

Outlook and Strategies

The Division is responding to several key issues identified by industry and government as priorities for R&D. These include: development of new industry processes and new design technologies to reduce energy consumption and greenhouse gas emissions; application of IT in construction; research to underpin intelligent transport systems; an expanded CEO initiative to reduce the economic and environmental cost managing urban water, wastewater and stormwater; new material products and processes developed for Australian companies operating in a global market; and redesigning indoor environments.

A new management structure has been implemented based around the Division's three core science capabilities (Thermal and Fluids Engineering, Sustainable Materials Engineering and Infrastructure Systems Engineering). The business development activities of the Division will be aligned to the marketing of each of the three core capabilities across the full spectrum of Built Environment applications.

Facilities are being upgraded and expanded in Sydney with the construction of a new Fire Laboratory and offices as well as increased staff presence in Brisbane via a partnership with QUT. The Structural Laboratory in Melbourne has been extended to enable testing and research on large structures linked to development and validation of whole building models subject to a range of environmental loads. Significant capital expenditure has also been made on the Materials Engineering Laboratories to support research in surface engineering, smart coatings and new composite materials.

Planned Activities and Achievements

Built Environment

- New energy appraisal models developed for design of dwellings, commercial and industrial buildings linked to emerging new national energy codes and standards (ABC-B).
- Integrated research on indoor environments that incorporates new window and façade technologies, ventilation and thermal performance with acoustics performance.
- 2001 State of Environment Reporting on Human Settlements for Environment Australia.
- Expanded project on Urban Water in response to national priorities identified by WSAA.
- Continued leadership in the development of performance-based Fire Code for the Building Code of Australia, including significant new research on materials flammability, fire suppression technologies and fire spread modelling.
- Provide national technical leadership in the International Alliance for Interoperability—a revolutionary system for

building element representation and modelling that will integrate information flow in construction projects.

- Research on low energy accelerated processing is advancing with development of microwave curing of cementitious composites and new kiln technologies.
- Condition monitoring and service life prediction research is underpinning a shift to increased innovation under performance-based approaches to design and construction.
- Solid waste reactivation technology will minimise construction waste by reactivating solid wastes for use as alternative materials and products for construction.

Chemicals and Plastics

- The Division has developed a novel process for surface treatment to improve adhesion to plastics which has been commercialised with major motor vehicle and building products manufacturers with emerging applications in bottling and packaging industries.

Mineral Processing and Metal Production

- Research on optimisation of the mixing process continues with new swirling flow technologies for application initially in the alumina refining industry. Studies on multi-phase flows in pipelines and pumps are being applied to hoisting, transport, crushing and pumping activities in the minerals industry. Behaviour of dry granular materials is being modelled with particular application to bulk handling in rotary kilns. Extension of the technology platform is currently occurring in bio-medical and food processing areas.

Integrated Manufactured Products

- Research centres on developing innovative treatments to protect metallic surfaces (aluminium and magnesium) in transport and aerospace.

Climate and Atmosphere

- Research is focussed into two areas: urban air quality (landuse-transport-emissions models linked to airshed models to estimate population exposure to air pollution; indoor air quality and indoor/outdoor interfaces) and climate variability—infrastructure impacts.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Built Environment	74.6
Mineral Processing & Metal Production	11.2
Chemicals & Plastics	6.4
Climate & Atmosphere	4.1
Integrated Manufactured Products	1.9
Petroleum	1.1
Biodiversity	0.6
Land & Water	0.1

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	30257
– Direct Appropriation (\$'000)	20030
– Research & Services (\$'000)	10227
– Other (\$'000)	0
Earnings Performance Indicator (%)	33.8
Operating Result (\$'000)	80
End of Year Cash Balance (\$'000)	489
Research Staff (EFT)	176
Total Staff (EFT)	237

CSIRO Energy Technology contributes to the sustainability of Australia's energy industry and its energy exports. The main activities are coal preparation, clean coal power, distributed energy using advanced gas technologies, renewable energy and energy storage, other greenhouse gas reducing technologies and the mitigation of other environmental impacts of energy. The Division also contributes to CSIRO's broader environmental capability through its expertise in air and water quality, solid residues and sludge treatment.

Outlook and Strategies

Management of the move of the Division's headquarters to Newcastle (with a commitment to have 100 staff located there) involves activities for 2000/01:

- Site preparation and building commenced.
- Progress on human resources implications.
- Risk management program in place.
- Advanced energy supply options (linked to R&D programs) for the building identified.

The Division will continue its efforts in shifting appropriation investment into newer areas while maintaining a commitment to established areas:

- Assist industry and government in technologies for greenhouse gas mitigation—partly via Australian Greenhouse Office programs.
- Recruit to new positions in distributed energy (gas), renewable energy (biomass), energy modelling and energy end-use efficiency.
- Enhance association with the coal industry and its research program (ACARP) to ensure investment for the industry is well-targeted and will deliver outcomes in terms of productivity, increased safety and environmental acceptance.

Planned Activities and Achievements:

Energy

Energy Modelling

- Develop capability to evaluate the impacts of new technologies on energy systems and greenhouse impacts.

Coal Preparation

- Optimise the performance of the large-scale (600m³/h) TurboFlotation™ unit to maximise the potential for successful transfer to the coal and minerals industry.
- Determine the potential for improving the dewatering of coarse coal using an air-purged chute, in the context of export coal quality.

Clean Coal Power

- Increase capability and business development in co-firing of biomass and coal, to deliver renewable credits and reduced greenhouse gas emissions to coal-fired generators.
- Integrate and extend capability to address National Pollution Inventory (NPI) requirements (re reduced trace elements and air toxics) from both industry and regulator's perspectives.
- Deliver outputs to industry on coal performance data in advanced coal utilisation technologies.

Distributed Energy (Gas)

- Lead bid for CRC in Distributed Energy and Power Generation.
- Develop capability through initiation of gas-utilisation projects and securing key personnel.

Energy Storage

- Development of battery/supercapacitor technology for use in remote area power supply and hybrid car.
- Undertake major feasibility study for 0.5 -1 MWh battery energy storage system to provide a state-of-the-art

demonstration of load-levelling, power quality and power security for the Newcastle headquarters.

Renewable Energy

- Fully integrated operation of solar/fossil fuel hybrid facility by July 2001, demonstrating concepts for high energy efficiency, zero greenhouse gas prospects, and distributed power.
- Detailed market/technology assessments and strategic projects on low temperature solar energy, biomass and renewable energy prospecting.

Direct Mitigation of Greenhouse Gas Emissions

- Feasibility study on major CO₂ capture (from power stations) and geo-sequestration.
- Improve estimates of the rates of emission of fugitive methane from open cut coal mines in NSW and Queensland by developing a new methodology based on field measurements.

Energy End Use Efficiency

- To commence in 2001 following appointment of component manager.

Land and Water

- Canvass potential commercial partners to undertake a full-scale trial on electrodewatering as a means of substantially improving the dewatering of municipal sewage sludges using belt press filters.
- Assist ecological risk assessment of the downstream impact of mining discharges and other industrial activities on aquatic systems through application of environmental geochemistry and ecotoxicology.

Marine

- Provide reliable assessment of bioavailability and toxicity—underpinning new regulatory guidelines—by new methods and understanding of metal speciation in coastal rivers and estuarine waters and sediments.

Climate and Atmosphere

- Contribute to understanding and management of urban air pollution, through study of the fate of selected air toxics produced from photochemical smog.
- Develop and use passive samplers for volatile organic compounds to measure personal exposure.

Mineral Processing and Metal Production

- Feasibility study on cheaper, cleaner cokemaking process.
- Model for predicting coke behaviour to aid conventional cokemaking.
- Design criteria for dewatering technologies for mineral suspensions.
- Initial application of turboflotation process to mineral systems.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Energy	73.9
Land & Water	9.3
Climate & Atmosphere	7.9
Marine	4.5
Mineral Processing & Metal Production	4.1
Mineral Exploration & Mining	0.3

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	22003
– Direct Appropriation (\$'000)	14503
– Research & Services (\$'000)	7500
– Other (\$'000)	0
Earnings Performance Indicator (%)	34.1
Operating Result (\$'000)	575
End of Year Cash Balance (\$'000)	3297
Research Staff (EFT)	119
Total Staff (EFT)	169

CSIRO Entomology's research is focused on three key areas: supporting Australian rural industries, working with manufacturing industry to develop innovative chemical and pharmaceutical products, and understanding and managing environmental issues.

Outlook and Strategies

Rural: Management and ecology of pests and weeds in field crops and pastures, reducing high dependence on harmful synthetic insecticides, and developing and improving technologies for the storage, handling and transport of grains.

Chemicals and pharmaceuticals: Using insect pathogens (bacteria, fungi, nematodes and viruses) as environmentally safe and specific new pesticides, and using insects as a source of new chemicals for cleaning up pesticide residues and for novel pharmaceuticals.

Environment: Developing the knowledge essential for the preservation and management of Australia's biodiversity, the preparation of conservation plans, weed control and sustaining agricultural practice.

Planned Activities and Achievements

Evaluate strategically timed viral insecticide applications and parasite releases as a means of managing *Helicoverpa* on a regional basis within the Riverina region.

Engage in application process to establish new Weeds CRC, and establish and coordinate major new \$4m, 3 year multidivisional activity on ecological implications of GMOs.

Undertake major field trials on aeration of bunkers of canola, on a prototype in-bin heat disinfector, commence a survey of mites of stored products in Australia, and complete laboratory set up for oil quality work. (*Field Crops*)

Work with commercial partners, United Phosphorus Ltd and CYTEC, on the release of key grain storage technologies onto the world market. Secure a commercial partner for commercialising carbonyl sulfide.

Transfer fungal and nematode biopesticides to commercial partners, and collaborate with Orica Ltd to field trial first generation pesticide bioremediation enzymes in the cotton industry. (*Chemicals & Plastics*)

Continue importing and testing natural enemies of mimosa, release new biocontrol agents against bridal creeper and bitou bush.

Participate in the implementation of the Global Biodiversity Information Facility (GBIF). Lead the formulation of an Australian bid for the GBIF Secretariat to be hosted in Canberra, Australia.

Publish butterfly volume of the Zoological Catalogue of Australia, complete bee catalogue, commence catalogue on Australian Bethylidae and complete several other important manuscripts. (*Biodiversity*)

Ensure the sustainability of the Australian cotton harvest through research, including: linkage mapping on DNA extracts from two existing resistant strains of *Helicoverpa armigera*, the investigation of the conditions under which parasitoids will become abundant in cotton and parasitise *Helicoverpa* spp, and the evaluation of the potential of a range of *Helicoverpa* trap crops for "in-situ" virus production in Australian cotton cropping systems. (*T.C.F.*)

Further develop and market the Timerite® package for control of redlegged earth mite, *Halotydeus destructor*, to increase the rate of uptake by farmers.

Identify the mechanisms of resistance to sap sucking pests, particularly in regard to aphids and lupins, and communicate results to plant breeders.

Perform a trial using mass-reared and irradiated Old World screw-worm fly, (*Chrysomya bezziana*) to assess the potential for this methodology to eradicate a field population of these flies.

Commence or continue prospecting for natural enemies against serrated tussock, blue heliotrope, *Jatropha gossypifolia* (belly-ache bush) and *Argemone ochroleuca* (Mexican poppy) and Cape Tulip. (*Meat, Dairy & Aquaculture*)

Measure degradation patterns of methyl isothiocyanate in a suite of soil types from horticultural areas around Australia and study for signs of enhanced biodegradation.

Conduct a proof-of-concept trial to evaluate the auto-dissemination technique for control of diamondback moth (*Plutella xylostella*).

Extend research on systematics of whitefly parasitoids to include native whiteflies, both pest and non-pest species and commence study of generic classification of Australian aphelinid wasps. (*Horticulture*)

Sign up at least one major pharmaceutical company to screen CSIRO's insect extract library. (*P&HH*)

Undertake a number of studies on the shoot borer, *Hypsipyla robusta*, including surveying damage in field sites in Australia and SE Asia, assessing the role of provenance variation in oviposition choice, and completing the revision of the Oriental/Australian *Hypsipyla* species. (*Forestry Wood & Paper Industries*)

Survey invertebrate diversity in farm forestry plantations and nearby natural vegetation (south west Australia) to assess the contribution of vegetational diversity to population regulation of herbivorous invertebrates. (*Land & Water*)

Advise government, the industry and community on the safe use of fumigants used in grain storage and other applications. (*Climate & Atmosphere*)

Find a commercial partner for the termite-feeding stimulant. (*Built Environment*)

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Biodiversity	23.2
Chemicals & Plastics	22.2
Field Crops	20.7
Meat, Dairy & Aquaculture	8.4
Textiles, Clothing & Footwear	8.4
Horticulture	8.0
Forestry, Wood & Paper Industries	3.2
Other Sectors	5.9

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	30183
– Direct Appropriation (\$'000)	15301
– Research & Services (\$'000)	14588
– Other (\$'000)	293
Earnings Performance Indicator (%)	48.3
Operating Result (\$'000)	-1876
End of Year Cash Balance (\$'000)	-1036
Research Staff (EFT)	220
Total Staff (EFT)	285

CSIRO Exploration and Mining's research supports the Australian mining industry's need to maintain its international position among the lowest cost mineral suppliers, simultaneously combining safe production with high community acceptability. The Division spans the full spectrum of mining activities from primary exploration through to mine safety and site rehabilitation. Core science areas include: processes governing mineralisation, rock alteration and landscape evolution; advanced instrumentation systems and interpretation of data for exploration, mining and environmental engineering; mechanics of geological excavation, extraction and materials handling processes; and control and optimisation of mining equipment and its interaction with the mining process.

Outlook and Strategies

Although mineral prices are still low, there are now some indications of an upturn in the market. Spending on exploration for base metals has begun to increase again; gold exploration however, is still depressed.

The mining industry continues to be a strong user of technology and the decision by some major companies to outsource R&D has provided additional opportunities for CSIRO. The continuing pressure to increase output and lower costs puts pressure on R&D providers to produce packaged or turnkey solutions to ensure industry uptake. Extensive strategic analysis resulted in the "Glass Earth" concept, which has strong support from industry and has received additional appropriation funding for the triennium. Glass Earth projects are designed to make the top kilometre of the Australian continent, and the processes operating within it transparent, with the aim of aiding the discovery of the next generation of giant ore deposits. In parallel, the Division will be developing the science and technology needed for safe, economic and sustainable access to these new resources.

Commissioning of the Australian Resources Research Centre in Perth and Stage II of the Queensland Centre for Advanced Technologies will ensure the Division has access to state of the art research facilities in both Western Australia and Queensland.

The Division will significantly reduce its involvement in the CRC Program over the next 12 months and will be a core participant in the CRC for Landscape Evolution and Mineral Exploration only during 2000–2001.

Planned Activities and Achievements

Mineral Exploration and Mining

- In collaboration with State and Federal geological survey organisations and industry, initiate a Glass Earth project on the Curnamona Block to develop enhanced exploration models and strategies using new geochemical, geophysical, visualisation and predictive modelling capabilities.
- In collaboration with CSIRO Land and Water and industry, initiate a Glass Earth project to develop an isotope tracer technique to detect buried and blind mineral deposits.
- Deliver new area selection criteria to a globalised nickel exploration industry through integrated research projects involving studies of: modern and active volcanism in Iceland and Hawaii; and ancient mineralised volcanic terrain and known sulfide deposits in Australia and Finland.

- Prototype user friendly, fully coupled mechanical–fluid–thermal–chemical numerical models for application in industry sponsored projects.
- Application of fluid inclusion studies in hydrothermal ore forming systems to enhance the understanding of the chemical and physical processes involved in the creation of giant ore deposits.
- Develop new mine-scale spectroscopic methods for the mapping of alteration and host rock mineralogy from mine faces and drill material.
- Secure external funding support for ongoing development of an airborne gravity gradiometry system.
- Successful completion of AMIRA Project 504: Supergene mobilisation of gold in the Yilgarn Craton.
- Formal establishment of the Western Australian Interactive Virtual Environments Centre as a node of the Australian Partnership for Advanced Computing.
- Develop techniques to map the surface topography of open cut pits in 3D to determine mass block structure for slope stability analysis.
- Develop equipment automation techniques for new mining processes such as ground support installation and horadiam mining.
- Develop a cutting head for hard rock excavation and extraction using ultra-hard diamond composite materials.

Energy

- Implement advanced techniques for interactive interpretation of geological, geophysical and geotechnical data for accurate prediction and control of ground conditions, production and product quality in coalmines.
- Develop and introduce new technologies to enable more efficient recovery of coal resources including roadway development and thick seam technologies.
- Develop and demonstrate technologies to mitigate fugitive methane from coalmines by using waste methane together with waste coal for electricity generation.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Mineral Exploration & Mining	77.5
Energy	21.0
Petroleum	1.4

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	33185
– Direct Appropriation (\$'000)	18095
– Research & Services (\$'000)	14990
– Other (\$'000)	100
Earnings Performance Indicator (%)	45.2
Operating Result (\$'000)	666
End of Year Cash Balance (\$'000)	-202
Research Staff (EFT)	172
Total Staff (EFT)	257

Food Science Australia is an unincorporated joint venture between CSIRO and the Australian Food Industry Science Centre. Food Science Australia's multidisciplinary skill base and infrastructure are unique in Australia. It works closely with a wide range of industries, including the dairy, meat, milling, baking, snack, and fruit and vegetable processing industries, as well as with service providers to those industries, such as packaging, transport and storage companies. In association with CSIRO Divisions in the Food Processing Sector, Food Science Australia offers research and technical services which solve problems for the food industry at every stage of the processed food business system. Food Science Australia also contributes to other Sectors, particularly Meat, Dairy and Aquaculture; Chemicals and Plastics; Field Crops; and Horticulture.

Outlook and Strategies

Food Science Australia's project portfolio will be revised in accordance with the new Sector Plans. The key areas of science focus will be food safety, the molecular basis of food functionality, advanced product manufacture and delivery systems, and market understanding.

Food Science Australia will continue to work towards long-term relationships with companies in Australia through strategic alliances. We will also seek enhanced collaboration with Australian research agencies, particularly in Queensland, to ensure the most effective public investment in food research and development.

The development of international relationships that benefit Australia will be pursued. The existing relationships in Japan will be supplemented by alliances with food companies and research organisations in other parts of the world.

Considerable effort will be devoted to building programs. Construction will commence on a new building at North Ryde that will include laboratories, offices and process bays. Food Science Australia's existing buildings at Werribee are being extended and upgraded, permitting consolidation of our Melbourne operations on a single site.

Planned Activities and Achievements

Food Processing

- Development of enhanced process control technologies, including a bread-baking model and algorithms for cheese composition.
- Selection and characterisation of cheese starter and non-starter bacteria suitable for tailored cheese variety production in bulk production plants.
- An integrated process system for a multi-process factory, enabling management and operational decision support.
- Restructuring and tenderising technologies for production of value-added products from lower grade meats.
- Determination of optimal conditions for laboratory-scale production of high-value ingredients from plant cell cultures.
- Development and commercialisation of food ingredient technologies, including use of dairy proteins as functional food ingredients, preparation of hypo-allergenic dairy protein ingredients, and micro-encapsulation for oil-based ingredients.
- Development of understanding of the interactions between components of milk and grains that influence their behaviour in complex food systems.
- Continued commercialisation with industry partners of Zero2 oxygen scavenging packaging for foods.

- Design and optimisation of refrigeration, storage and transport systems and the development and validation of heat and mass transfer models.
- Strategies to minimise undesirable "grassy" or "oceanic" flavours in dairy products.
- Development of risk assessment frameworks for selected categories of foods.
- Development of analytical methods for chemical contaminants migrating from packaging materials.
- Evaluation of non-thermal (cold pasteurisation) processes for control of microbial contamination of food.

Meat, Dairy and Aquaculture

- Methods for studying genetic transfer of determinants of pathogenicity that can be applied to studies of emerging pathogens.
- Understanding of influences on meat quality, including protocols to measure myofibrillar and collagen turnover, determination of the amount of fat in lipid cells that is from de novo versus pre-formed sources, and reliable tests for animal stress.
- Characterisation of beef flavour using an electronic nose.
- A prototype automatic carcass splitting system to enhance product quality, hygiene and worker safety.
- Value-adding techniques for low-value meat, seafood and aquaculture products and by-products.

Horticulture

- Identification of the sources of ochratoxin A in selected foods and advice on control measures.
- Measurement of airflow within cool stores and distribution systems and formulation of models to predict fruit temperature.
- Development of edible coating and modified atmosphere packaging systems to improve the quality of fresh fruit and vegetables.

Field Crops

- Development of biological control agents for formation of aflatoxins in peanuts.

PLANNED INVESTMENT PROFILE BY SECTOR	%
Food Processing	75.2
Meat, Dairy & Aquaculture	16.5
Chemicals & Plastics	4.7
Horticulture	2.3
Field Crops	1.4

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	15492
– Direct Appropriation (\$'000)	15492
– Research & Services (\$'000)	0
– Other (\$'000)	0
Earnings Performance Indicator (%)	0
Operating Result (\$'000)	0
End of Year Cash Balance (\$'000)	3762
Research Staff (EFT)	129
Total Staff (EFT)	180

Note: These are estimates for the Joint Venture rather than estimates of CSIRO's operational or legal interest in it. Total Revenue includes CSIRO's contribution of \$15.492 million from Direct Appropriation Income.

CSIRO Forestry and Forest Product's mission is to increase economic and environmental benefit to Australia by improving the management and productivity of the nation's forests, and the quality and value of forest products. The Division delivers research outcomes across the industry value chain and assists policy makers, development assistance agencies, and the community. Research also addresses environmental aspects of forestry and forest products, waste management and utilisation, amelioration of degraded land, conservation of biological diversity, and carbon sequestration. Skills encompass genetics, silviculture, ecophysiology, soil science, physical and biological modeling, wood and other materials sciences, and chemical and process engineering.

Outlook and Strategies

Key drivers of the Australian forestry and forest products industry include:

- Expansion of forest plantations driven by strong demand growth for wood and paper products, taxation incentives for investors and demand for environmental services including carbon sequestration, amelioration of degraded land, improved water quality and bio-energy.
- Sustainable forest management, environmental accreditation of products and future market access.
- Industry globalisation, company restructuring, private ownership of forest resources, rise of plantation investment companies, foreign investment in forest products processing facilities.
- Increasing supply of plantation timbers and forest residues, and demand for profitable utilisation of wood residues.
- Prospects for greenhouse gas emissions trading and other environmental credits schemes and markets.
- Australia's 2% renewable energy target.
- Implementation of the Action Agenda for the Forest and Wood Products Industry and the Australian Forestry Standard.

Key internal issues include:

- Implementation of Division's strategic plan for 2000–2003 triennium.
- Improved resource allocation processes to align with sector goals.
- Rebuilding capacity in primary and secondary wood products.

Planned Activities and Achievements

Forestry, Wood and Paper Industries

Maximising product options from blue gum (*E. globulus*) plantations:

- Assessment of suitability of *E. globulus* for use in sawn timber, composites and other products.
- Rapid, non-destructive and representative sampling method for assessing growth stresses and tension wood in standing trees.

Forestry and sustainable land use in the Murray-Darling Basin – Heartlands:

- Obtain resources, conduct catchment inventories, develop plans for operational and experimental plantings and monitor impacts on catchment processes.

Silvicultural strategies for plantation and farm forestry:

- Tools to assist site selection, species-site matching, and prediction of forest growth.

Enhanced capacity to predict carbon storage and change in forest systems:

- A strategy for estimating continental biomass carbon.
- Methods for predicting soil carbon change.
- Models to predict future carbon sequestration in forests usable at local (project) and regional scales (also for Climate and Atmosphere).

Potential value of 'precision forestry' for Australia:

- Research plan developed in consultation with industry and assessment of priorities for initial work.

Forest planning and assessment of forest productivity, structure and health:

- GPS system to evaluate economic and environmental trade-offs of alternative forest harvesting strategies (also for Land and Water).
- Remote sensing to assess forest structure, evaluate crown condition for forest health (also Biodiversity).

Shortening the breeding cycle in eucalypts:

- Accelerate flowering and seed production of *E. grandis*.
- Confirm quantitative trait loci for disease resistance and wood properties and incorporation into breeding programs (also Biodiversity).

Impact of plantation forestry on water use:

- Assess effects of water use by plantation forests on the water table in the Green Triangle region of southern Australia.

Value-added products from juvenile wood and wood residues:

- Charcoal and renewable energy from wood biomass (also Energy).
- Wood/wood composites combining hardwood and softwood veneers to optimise strength.
- Improved resins for the wood composites industry.

Environmentally acceptable wood preservatives:

- Scale up new diffusion treatment process to prototype for preservative treatment of solid wood and composites.

Paper making systems:

- First phase development of laboratory paper making facilities.
- Proposal for CRC on functional paper surfaces.
- Paper coating technology for enhanced print responses.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Forestry, Wood & Paper Industries	83.0
Biodiversity	8.5
Climate & Atmosphere	2.9
Land & Water	2.2
Energy	2.1
Built Environment	1.3

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	25472
– Direct Appropriation (\$'000)	16872
– Research & Services (\$'000)	8600
– Other (\$'000)	0
Earnings Performance Indicator (%)	33.8
Operating Result (\$'000)	0
End of Year Cash Balance (\$'000)	2647
Research Staff (EFT)	150
Total Staff (EFT)	215

CSIRO Health Sciences and Nutrition provides a key role in CSIRO's involvement in life sciences research in the human health arena. The drivers of health related R&D include the globalisation of markets, urbanisation, changing health priorities as a consequence of an aging population, trends in national and international regulations—deregulation and the domination of new technologies and technology transfer. The Division works with the Australian food processing and pharmaceutical industries to promote nutritional strategies for good health as well as preclinical research in the area of novel therapeutics. The Division offers both nutritional clinical and preclinical laboratory based facilities including a sensory evaluation facility and research skills in nutrition, psychology, biotechnology, biochemistry, pharmacology and physiology. In the pharmaceutical research arena, the Division offers capabilities in protein chemistry, molecular and cellular biology, fermentation and, through its association with the Biomolecular Research Institute, structural biology.

Outlook and Strategies

The newly formed Division is currently responding to two key drivers. The first is the outcome of the recent CSIRO priority setting in preparation for funding for the next triennium in which attention was drawn to the need for careful consideration and restructuring of our activities in molecular biology and human health. The second relates to the dramatically changing external environment with respect to R&D in pharmaceuticals and food and nutrition. These interconnected issues form the basis of critical imperatives for the Division and its immediate focus and long term relationships with the key Sectors in Pharmaceuticals and Human Health and Food Processing.

The achievement of the broad goals of the Division will require a significant restructure of our activities in molecular biology, human health and the nutrition research areas relating to discovery and substantiation to ensure alignment and appropriate contribution to the sector planning process. Thus the year 2000–2001 has seen and will see the implementation of review group recommendations in almost all aspects of the Division's activities.

Although specific recommendations of some of the reviews have either not been fully analysed or are unknown at the time of preparing this plan, it is clear that there will be changes implemented in 2000 and 2001. These will include a specific focus of commercial activities in the Nutrition Clinic, a sharpening of the focus on approaches to diagnostic research through the creation of a program of diagnostic and therapeutic technologies and, where appropriate, capturing our investment in intellectual property positions in both the food and pharmaceutical areas using a range of commercial technology transfer processes.

The Consumer Science Program will follow its current directions building in particular on the recently established cognitive research function. The testing facilities will include sensory evaluation, an area of growing interest to industry.

Planned Activities and Achievements

Food Processing

As mentioned above, the Functional Food and Nutrition-linked Cancer and Bowel Health Programs are currently under review. The principal focus of that review will be two-fold; the first relates to details of the development of a CSIRO patented short chain fatty acid delivery system in food and the second, to a Virtual Centre for substantiation. Specific planned activities include:

- Commercial development of the CSIRO patented short chain fatty acid delivery system Starplus™ for enhancing large bowel health.
- Development of additional applications of Starplus™ in the field of nutraceuticals.
- Establishment of a centre for substantiation of health claims for food products.
- Identification of new biomarkers for validation of non-invasive methods to assess vascular risk and bowel health.
- Development of technologies to measure body free radical status.
- Identification of methodologies and strategies to assess the effect of dietary factors on cognition in children.
- Investigation of the ability of various combinations of macronutrients, especially protein, to aid weight loss, improve insulin-sensitivity and help maintain weight loss and improve glucose control in the long term.

Pharmaceuticals and Human Health

The Division is the major contributor to the Pharmaceuticals and Human Health Sector and is currently undergoing significant review with a subsequent refocus. Broadly speaking, the Division currently covers three areas: therapeutics/diagnostics, biomolecular discovery and growth factors and related areas. Specific planned activities include:

- Testing in animal models of recombinant cancer-targeting antibodies for imaging and therapy of carcinomas and other solid tumours together with development of an internationally acceptable scoring method to standardise the micronucleus assay for genome stability and of a rigorous protocol for the application of the assay for the assessment of breast cancer.
- Development of new proteins and mutation strategies of high affinity diagnostic reagents.
- Development and efficacy testing of pharmaceutical agents, based on the IGF-1 and EGF receptor structures, for modulating cell growth.
- Continuation of studies to determine the structure of the insulin receptor.
- Move one outcome of the bioactive discovery effort into early stage commercialisation, with a focus on the nutraceutical market.
- Develop and test novel bioactive agents isolated from natural products for their ability to enhance tissue growth and repair.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Pharmaceuticals & Human Health	73.1
Food Processing	18.8
Meat, Dairy & Aquaculture	5.1
Field Crops	3.0

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	21127
– Direct Appropriation (\$'000)	15021
– Research & Services (\$'000)	6076
– Other (\$'000)	30
Earnings Performance Indicator (%)	28.8
Operating Result (\$'000)	-376
End of Year Cash Balance (\$'000)	740
Research Staff (EFT)	130
Total Staff (EFT)	166

CSIRO Land and Water's research is focused on the ecological, economic and social issues that underpin sustainable regional development and long-term management of the Australian landscape. A unique interdisciplinary science capability that addresses key national land and water management issues makes the Division a key provider of strategic science and innovation. CSIRO Land and Water has positioned itself to provide integration across disciplines and systems understanding. To ensure adoption, the Division has developed strategic links to environmental policy bodies, local, state and commonwealth governments, agribusiness, mining and manufacturing industries, and community-based land management groups.

Outlook and Strategies

The Division will continue to provide timely advice to ensure the development of sound natural resource management policies nationally and regionally. This advice will be based on first rate science and will be achieved by improving the understanding of biophysical, social and economic processes of Australian landscapes and water resources and by engaging in a continuing dialogue with other CSIRO divisions, commonwealth and state/territory agencies with the mandate for natural resource management.

CSIRO Land and Water is refocusing its research to deliver outcomes described in the CSIRO Sector Plan 2000–03. This will be achieved by redirecting the research activities of some existing staff. The Division will also fund a number of new research positions and acquire additional skills in areas such as aquatic ecology, resource economics and process modelling.

The Division has partnerships in the CRC's for Australian Cotton, Catchment Hydrology, Coastal Zone, Estuary and Waterway Management, Freshwater Ecology, Greenhouse Accounting, Landscape Evolution and Mineral Exploration, Sustainable Sugar Production, Sustainable Rice Production, Sustainable Development of Tropical Savannas, Tropical Rainforest Ecology, Viticulture, and Waste Management and Pollution Control.

CSIRO Land and Water has rationalised its management overheads by reducing the number of research programs from six to five. The former Urban and Rural Water Management program and Environmental Processes and Resources program have been merged to form a new Waterway Management and Landscape Function program.

The Division will strengthen its existing capabilities in the area of R&D commercialisation. There will also be an increase in the utilisation of web based technologies to distribute national datasets and decision support tools that have been developed by the Division. The recent recommendations made by the Division's gender equity working group will be implemented during this year.

Planned Activities and Achievements

Heartlands Project

Initiate biophysical, social and economic analyses of planned large-scale revegetation in the Honeysuckle Creek (Goulburn Broken, Victoria) and Billabong Creek (Upper Murray, NSW) catchments. (*Land and Water; Biodiversity; Forestry, Wood and Paper Industries*)

Climatic Modelling

Develop an improved understanding of climate change and variability on water availability for south-west Western Australia and Murrumbidgee Catchment. (*Land and Water*)

Redesigning Agriculture for Australian Landscapes

Phase II of this program will be undertaken in conjunction with LWRRDC. The objective is to deliver capacity to analyse and design production systems which are benign to the environment, yet produce high-quality products and maintain farm incomes. (*Field Crops, Land and Water, Biodiversity*)

Ord-Bonaparte Project

Undertake a comprehensive regional assessment of biophysical, social and economic factors in the Ord-Bonaparte region of north-west Western Australia to provide the information that will underpin the future sustainable regional development of the region. This project will be conducted in collaboration with other CSIRO divisions (Tropical Agriculture, Marine Research, Wildlife and Ecology, Mathematical and Information Sciences), commonwealth and state government agencies and local community interests. The project will be supported by LWRRDC. (*Land and Water, Marine, Biodiversity, Field Crops*)

National Land and Water Resources Audit

Delivery of outputs to four of the seven National Land and Water Resources Audit themes (dryland salinity; land use productivity and sustainability; costs of land and water degradation; capacity for change in land use and river, estuarine, and catchment health). (*Land and Water*)

Microbial Pathogen Detection and Management

Develop methods that detect the movement and survival of microbial pathogens in groundwater and aquifers within urban water catchments. (*Land and Water*)

The Division will contribute outputs to the following national and regional environmental management initiatives:

- National Dryland Salinity Program Phase II
- National Irrigation Science Network
- National Rivers R&D Consortium
- Gippsland Lakes Study
- Adelaide Waters Study

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Land & Water	69.6
Field Crops	8.0
Built Environment	4.5
Mineral Exploration & Mining	4.4
Biodiversity	4.1
Climate & Atmosphere	2.4
Horticulture	2.2
Energy	1.8
Mineral Processing & Metal Production	1.5
Meat Dairy & Aquaculture	0.9
Petroleum	0.6

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	46886
– Direct Appropriation (\$'000)	30640
– Research & Services (\$'000)	15700
– Other (\$'000)	546
Earnings Performance Indicator (%)	-371
Operating Result (\$'000)	33.5
End of Year Cash Balance (\$'000)	7058
Research Staff (EFT)	311
Total Staff (EFT)	455

CSIRO Manufacturing Science and Technology supports Australian manufacturing industry through the development and utilisation of innovative materials, processes, products and services. Its science and technology foci range from materials development, processing and characterisation, electrochemical technologies, micromanufacturing, laser processing, joining and cutting technologies, and surface engineering through to pervasive technologies like automation and real time systems, photonics and intelligent manufacturing systems which are broadly important to many industry sectors. The Division aims for a balanced research portfolio enabling quality commercial outcomes for industry while maintaining a strong scientific base.

Outlook and Strategies

Following completion of a new strategic plan a significant restructuring of research and support services will take place. In conjunction with this, improved customer focus will be a high priority, supported by an increased business development effort in the R&D Programs.

Consolidation of welding related activities will provide an enhanced effort in advanced welding technology.

In the Casting and Alloys Program a new direction will give priority to high-yield magnesium diecasting. A project to focus and develop research in sustainable manufacturing will be initiated. The Refractories Centre Australia operation will cease and options for spinning off the activity commercially will be pursued. Ceramic processing skills will be consolidated into inorganic polymers and tailored materials fabrication. The Energy Systems polymer electrolyte membrane fuel cells and Plasma Processing projects will cease.

The CRC for International Food Manufacture & Packaging Science will have its five year review and a proposal for participation in a new CRC for Technical Fibres and Textiles is being developed.

Planned Activities and Achievements

Integrated Manufactured Products

- Development of new magnesium diecasting technology with improved casting yield and significant cost savings.
- Understanding and strategies to overcome blue water in domestic water reticulation.
- Delivery of a new airborne multispectral scanner to Integrated Spectronics Pty Ltd, which is capable of thermal infrared as well as solar reflectance spectroscopy.
- Development of an optimised system for cover gas use in magnesium diecasting furnaces to reduce both operating cost and environmental impact.
- More realistic simulation of the high pressure diecasting process using software based on smooth particle hydrodynamics.
- Development of a strong intellectual property position for the production of higher strength light-weight alloys.
- A methodology for migrating current centrally based manufacturing systems to distributed control.
- Soft lithography techniques for novel high resolution magnetic and conducting 'printing' on plastic and other "soft" substrates.

- High aspect ratio diffractive reflective and refractive greytone microstructures for anti-counterfeiting applications.
- Surface acoustic wave devices for high frequency filtering and sensing applications.

Chemicals & Plastics

- Applications development, with commercial partners, of a range of ultrafine powder additives for plastics and personal care products.
- Recovery of gold by a non-cyanide extraction process and its application to gold recovery from opto-electronic products.

Mineral Exploration and Mining

- Commercialisation of technology for autonomous operation of Load-Haul-Dump vehicles for the mining industry.

Mineral Processing and Metal Production

- Reactor synthesis and process technology that will enable low cost production of metallic titanium.
- Development of process solutions based on thermo-chemical modelling and materials design for improved operational efficiency of specific industrial processes.
- Enhanced asset utilisation for the mining industry through materials design and process modelling.

Research Support

- Implementation of streamlined research support services following their restructuring.
- The Clayton East Redevelopment Project is planned to commence in July 2000. It is expected that it will have a significant impact on the operations of the Division. Plans are in place to ensure that contractual obligations can be met and that any disruption to research activities are minimised.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Integrated Manufactured Products	76.4
Chemicals & Plastics	8.6
Mineral Processing & Metal Production	5.3
Energy	4.6
Built Environment	1.8
Mineral Exploration & Mining	1.7
Services	1.6

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	42851
– Direct Appropriation (\$'000)	27295
– Research & Services (\$'000)	15545
– Other (\$'000)	10
Earnings Performance Indicator (%)	36.3
Operating Result (\$'000)	-500
End of Year Cash Balance (\$'000)	3543
Research Staff (EFT)	215
Total Staff (EFT)	284

CSIRO Marine Research (CMR) programs provide a scientific basis for ecologically sustainable development of Australia's marine resources. CMR also investigates the ocean's role in predicting climate change and climate variability, and potential climate impacts on marine and terrestrial resource productivity.

An international-calibre science capability, together with a diverse skills base, allows CMR to play a key role in achieving the government's vision of "Healthy oceans cared for, understood and used wisely for the benefit of all, now and in the future" (Australia's Oceans Policy).

Outlook and Strategies

- Regional marine plans, based on ecologically sustainable development (ESD) and equity of access to resources, are a major component of Australia's Oceans Policy. Achieving agreement to a regional plan, across sectors, is as yet untested. CMR's focus is to provide resource assessments, analysis and decision-making tools to assist managers to make scientifically based resource use judgements.
- Ecosystem based approaches to managing fisheries are essential to meet Australia's policy goals and international obligations. CMR's research is based on a fundamental analysis of ecosystem function at the regional and ecosystem level.
- CMR will maintain and develop links to the aquaculture industry. We will seek new opportunities for collaborative research to improve production and profitability, and to mitigate environmental impacts.
- CMR's coastal environmental management R&D is delivered direct to clients. This is done through the new Coastal CRC and through partnerships such as the Ord-Bonaparte integrated catchment-estuarine study.
- Predicting climate change and variability continues to be a national priority. CMR is working with the Australian Greenhouse Office to identify future research needs. CMR R&D will increase the accuracy of seasonal and long-term predictions of climate and help to identify and predict impacts of interest to government and industry. CMR is also a core partner in the Antarctic CRC and a national leader in the southern ocean research. Our work in these areas provides knowledge required to achieve the government's vision for the Antarctic.
- A strategy to ensure CMR's skill base can deliver long-term objectives will be developed during this year. We will also review and improve the Division's current approach to evaluation of research effectiveness.

Planned Activities and Achievements

Marine

- Data sets, maps and interpretation of marine systems and evaluation of mapping techniques for regional planning (SE shelf, NW shelf, GBR, Timor Box).
- Identification of conservation values, potential marine protected areas and performance measures. Draft national ESD indicators for reporting by fishery.
- Improved stock assessment, catch predictions and environmental performance in the Northern Prawn and Southern Bluefin Tuna fisheries. Improved methods for catch prediction and risk analyses.
- Management scenario models and strategies to minimise the environmental impacts of trawling on ecosystems (Northern Prawn and Macquarie Island).

- Assessment of the potential for reseeding brown tiger prawn in Exmouth Gulf (Western Australia) by developing high-density production systems and completing habitat surveys.
- A health audit of Australian estuaries, and integrated estuarine assessments in Victoria, Queensland and northern Australia.

Climate and Atmosphere

- Analysis of ocean-processes influencing Australian rainfall including newly discovered connections to the Southern and Indian Oceans, and development of applications for farm management, and incorporation in a climate prediction system at the Bureau of Meteorology Research Centre.
- Tools to track carbon and related parameters through the oceans.
- Improved projections of anthropogenic climate change and sea level rise using oceanographic data and theoretical analyses.

Meat, Dairy and Aquaculture

- Farm scale domestication and selective breeding of Kuruma prawn. Quasi-commercial trials of experimental diets for prawns.

Multi Sectoral

- A ballast water risk assessment framework, and a national database on marine pests and management options. Intellectual property secured for fertility control technology in feral marine pests and a plan for its application. (*Marine; Biodiversity*)
- Novel means to evaluate aquaculture feeding regimes and to minimise effluent loads. (*Marine; Meat, Dairy and Aquaculture*)
- Production and isolation of polyunsaturated fatty acids from microalgae and assessment for use in pharmaceuticals and nutraceuticals. (*Marine; Pharmaceuticals and Human Health*)
- Improved techniques for the reception and analysis of satellite data for application to regional oceanography, fisheries and climate impacts. (*Climate and Atmosphere; Marine*)

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Marine	76.0
Climate & Atmosphere	9.5
Meat Dairy & Aquaculture	9.0
Biodiversity	3.1
Pharmaceuticals & Human Health	1.0
Mineral Processing & Metal Production	0.7
Petroleum	0.6

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	34475
– Direct Appropriation (\$'000)	22612
– Research & Services (\$'000)	11763
– Other (\$'000)	100
Earnings Performance Indicator (%)	34.1
Operating Result (\$'000)	-237
End of Year Cash Balance (\$'000)	2781
Research Staff (EFT)	202
Total Staff (EFT)	301

CSIRO Mathematical and Information Sciences carries out and deploys research to generate world-class applications, for the benefit of Australia. This research is based on expertise in information technology, mathematical and statistical sciences that is integrated with a sound understanding of the business and scientific/technological context. The principal Sectors in which we work are Information Technology and Telecommunications and Services. We also work actively with the Integrated Manufactured Products, Mineral Processing and Metal Production, Marine, Land and Water and Petroleum Sectors and are responsive to the needs for our expertise that arise in other Sectors. COSSA, through its Earth Observation Centre, works with scientists in a number of Divisions to contribute generic research as input to applications in the Climate and Atmosphere, Land and Water, Marine, Minerals Exploration and Mining, Biodiversity and Forest, Wood and Paper Industries Sectors.

Outlook and Strategies

In the coming year the growth of the Internet and its role in business will continue to accelerate, promising fundamental changes to industry and to individuals' lifestyles. This growth will have a number of implications for the Division, including:

- Growth in interest in many of our research areas, including interfaces between people and e-commerce sites, the use of software agents, the easy accessibility of data across heterogeneous virtual corporations.
- An increase in the number of competitors in these research areas.
- A change in the funding environment, with a greater expectation that intellectual property will be packaged for commercialisation through licensing and creation of companies.

In response, the Division will:

- Create the Centre for Internet Solutions to improve our engagement with industry and to ensure that our research efforts are better focused on and responsive to industry needs.
- Identify intellectual property which is able to be commercialised immediately or after a defined additional R&D effort and seek investors for commercialising the intellectual property.

Another significant issue is the development of new technologies in functional genomics and proteomics which have produced order of magnitude changes in the rate at which functional genetics and proteomics data are generated. High technology SMEs, requiring access to effective techniques of data management and data mining, are emerging to service these needs. We will partner with leading molecular biology groups in Australia to help us define the focus of our work with biotechnology SMEs.

COSSA will continue to participate in consortia that bring international scientific benefits to CSIRO and provide national satellite data acquisition, reception and processing facilities.

In 1999/2000 the Division completed a new Strategic Plan that, in conjunction with the CSIRO Sector Process, will drive the Division's activities over the next 3–5 years. Key result areas for the Division are: high impact outcomes; high quality science; strategic external relationships; commercialisation strategies; people, performance and capabilities; and internal process improvement. Actions

required to achieve the desired outcomes in these areas are reflected in individual objectives for line managers and their staff.

Planned Activities and Achievements

IT&T

- Publish 10 commercially available Middleware Technology Evaluation reports; help 5 Australian organisations with middleware technology evaluation and selection; productise technology assessment methodology and develop supporting tools.
- An implementation of the VERS solution to electronic record keeping will be developed for the Victorian Department of Infrastructure. Development of proof of concept video synthesis technology which can build multi-media presentations automatically by extracting and re-assembling video elements from libraries of video sources.
- Develop and trial information systems using nomadic access, enabling higher productivity of maintenance crews in the water, power and telecommunications utilities.
- Secure wider adoption of CSIRO-originated architectures for large-scale, heterogeneous information systems, consolidating our presence in government administration and extending application to bioinformatics.

Services

- Improved tools and software for linking large databases, spatial analysis and health services experiments to study the utilisation and outcomes of health care.
- Completion of CSIRO work on a START Grant to Time and People Australia for a staff optimisation rostering toolbox.
- Completion of CSIRO work on a START Grant to Viator for development of an electronic travel planner with links to global airline reservation systems. Construction of software for pricing complex options and other financial derivatives.
- Construction of algorithms for customer segmentation.

Other Sectors

- Completion of the Land Monitor project, delivering regional scale risk assessments and trend/condition indices for dryland salinity across the West Australian wheat belt.
- Delivery of regional indicators of ecosystem health and trend for the South East Queensland Water Quality Strategy.
- Development of advanced technologies (including hyperspectral and Lidar sensing) for land surface resources mapping, land cover condition and optical assessment of water quality. (*Land & Water : Minerals Exploration & Mining*)
- Delivery of methods for continental scale evaluation of land use change, to the Australian Greenhouse Office. Delivery of change estimates for agreed test regions.
- Validation and demonstration of CSIRO best practice in software and methods for deriving information from data series obtained from environmental satellites. (*Climate & Atmosphere: Land & Water*)

- Adoption of new methods of functional genomics bioinformatics analysis by targeted SMEs in biotechnology. (*MDA: Field Crops, Services*)
- Stock assessment techniques for major national fisheries implemented in fishery management (in collaboration with CSIRO Marine).
- Use of bio-optical and remote sensing methods
 - to develop remote monitoring techniques to assess reef health
 - for advanced techniques for assimilating ocean colour data into marine monitoring systems. (*Marine*)
- Development of new Lagrangian methods for numerical modelling of diecasting processes using smoothed particle hydrodynamics.
- Computational models for manufacturing applications, including filtration, drying and stress analysis.
- Applications of production process improvement to manufacturing processes including mould filling. (*Integrated Manufactured Products*)
- Contribute to the creation of NSW Roads & Traffic Authority's state of the art traffic control system by providing robust, integrated traffic simulation software.
- Models for predicting service life performance of distribution systems with an emphasis on urban water pipelines. (*Built Environment*)
- Mathematical modelling and numerical simulation of comminution/liberation using discrete element methods. Specifically, formulation of models for particle breakage and simulations including presence of fluids. (*Mineral Processing & Meal Production*)
- Production process improvement (including control and quality methodology) applied to food manufacturing. (*Food Processing*)
- A generic strategic decision making software package for Petroleum Sector applications.
- Advanced mathematical tools/theories that underpin decision-making processes.
- Decision making frameworks to support appraisal of seal integrity and pore pressure. (*Petroleum*)
- Development of remote mapping and monitoring methods for forest and biodiversity assessment, including the use of video, hyperspectral, radar and Lidar airborne and spaceborne sensing technologies. (*Forestry, Wood & Paper Industries: Biodiversity*)

Research Support

- One of the key result areas for the Division is people, performance and capability. During 2000–01 actions will be implemented in capability development, performance improvement and alignment of rewards and recognition with divisional objectives.
- The Clayton East Redevelopment Project that will bring together staff currently located at Carlton and Clayton will proceed to the construction phase.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
IT&T	38.0
Services	18.6
Land & Water	9.9
Integrated Manufactured Products	5.5
Marine	5.1
Built Environment	4.9
Mineral Exploration & Mining	3.5
Petroleum	3.1
Other Sectors	11.4

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	33493
– Direct Appropriation (\$'000)	22773
– Research & Services (\$'000)	10520
– Other (\$'000)	200
Earnings Performance Indicator (%)	31.4
Operating Result (\$'000)	-1745
End of Year Cash Balance (\$'000)	2579
Research Staff (EFT)	193
Total Staff (EFT)	263

CSIRO Minerals provides critical research, development and commercialisation support for Australia's mineral processing and metal production, energy generation, and petroleum industries to assist them to remain globally competitive and to improve their environmental performance. It achieves this through the innovative application of mineral processing, pyrometallurgical, hydrometallurgical, mineralogical, chemical, physical, engineering and mathematical skills and experience, and its leading-edge facilities for mineral characterisation, reaction and process modelling, diagnosis and engineering, and pilot plant construction and operation. These skills and equipment are applied from the atomic to the plant level to address economic, environmental and social issues driving the industry's profitability and sustainability.

Outlook and Strategies

The minerals industry operates against a backdrop of rapid change, reorganisation and uncertainty characterised by increasing globalisation, erosion of technical capability, and the need to process ever more complex and often lower grade ore bodies in the face of declining commodity prices. At the same time, there is increasing public scrutiny of the environmental and social impact of mining and minerals processing and of the life cycle of metal-containing products.

These pressures impact on CSIRO Minerals as an imperative to provide a rapid response to short-term productivity issues while at the same time developing new technologies and strategies that will sustain the industry in the long-term. Increasing R&D costs coupled with an economic decline in the resources industry necessitate that CSIRO Minerals carefully targets its R & D project portfolio on issues which can add significant competitive advantage to the industry.

The strategic research base of the Division will be enhanced through new initiatives in biomimetic processing, on-line analysis and control technologies, titanium metal production, molecular simulation and expanded efforts in the development of strategies and technologies for sustainability. There will be an increased focus on commercialisation of existing and emerging technologies. Customer service will be improved through the facilitation of proposal and contract development, a planned program of interaction with senior industry personnel, further development of a multi-level key account management system and targeted extranets for critical clients, and establishment of Industry Technical Panels. Marshalling and utilisation of the Division's intangible assets will be improved through a knowledge assets management program. The iron ore processing activities will be consolidated at QCAT by late 2000 followed by closure of the North Ryde site.

Planned Activities and Achievements

Mineral Processing and Metal Production

- Continue development of life cycle assessment and social value methodologies and apply them to studying and improving the sustainability of mining and processing industries.

- Apply computational fluid dynamics expertise to improve reactor design and operation and reduce the OHSE impact of processing operations.
- Continue the development and commercialisation of a range of new-generation on-line instruments incorporating single and multi-sensor data and the use of artificial neural net and expert systems.
- Complete an assessment of the market opportunities for an Australian titanium metal industry and identify and embark on the development of appropriate production technologies.
- Expand mathematical modelling capabilities and their application to industrially important problems, including flowsheet modelling, mineral flotation and the simulation of interfacial phenomena.
- Provide a holistic approach to plant review, diagnosis and 'trouble-shooting' through a combination of site visits and laboratory and pilot plant development work.
- Provide timely and effective support to industry to achieve commercial production of magnesium.
- Improve understanding of the relationships between ore characteristics and the metallurgical behaviour of raw materials to predict and optimise downstream performance.
- Establish a collaborative research portfolio in biomimetic processing, including the collection, characterisation and assessment of naturally occurring "extremophile" organisms.
- Develop and apply understanding of particle technology to improve agglomeration and crystallisation processes.

Energy

Design and manage the construction of a high pressure fluidised bed reactor and use the reactor to optimise the efficiency of combustion and gasification of lignite and to minimise greenhouse impact.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Mineral Processing & Metal Production	94.9
Energy	4.7
Petroleum	0.4

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	32723
– Direct Appropriation (\$'000)	20835
– Research & Services (\$'000)	11800
– Other (\$'000)	88
Earnings Performance Indicator (%)	36.1
Operating Result (\$'000)	50
End of Year Cash Balance (\$'000)	100
Research Staff (EFT)	193
Total Staff (EFT)	272

CSIRO Molecular Science provides economic, environmental and social benefits to industry and the community by application of expertise in the chemical and biological sciences. Research is carried out in a number of strategic areas: life science technologies including biomaterials, pharmaceuticals and human health, agrochemicals and industrial microbiology; environmental technologies which includes water and waste water treatment, and cleaner chemical processing; engineered polymers; and functional fluids, security devices and nanotubes. The Division works with a broad range of local and multinational business and research collaborators to develop and exploit innovative materials, products, processes, and services.

Outlook and Strategies

The Division has undergone major change over the last twelve months as a direct result of CSIRO's commitment to continue to evolve to best serve industry. A newly appointed Chief presiding over a restructured, leaner Division will pursue the development of a customer focussed approach to our research and development activities.

Initiatives over the next year include: introduction of an annual project review process to ensure a balanced and relevant research portfolio; implementation of a new marketing strategy; development of a strategic Postdoctoral Research Program; introduction of Key Performance Indicators in the areas of research, finance, people, and customers; and identifying new ways to work with industry and to exploit our intellectual property.

The Division will also proactively support a challenging agenda proposed by the Chemicals and Plastics Sector Advisory Committee. This will include the development and implementation of a Communication Plan aimed at enhancing the image of the industry as responsible, dynamic and exciting. The Plan will also include the development of position papers on a number of industry issues leading to fora to determine related needs and directions.

Additional management challenges will include: investigating new ways to capitalise on our chemical and biological skills base and to ensure that they become more closely integrated; taking into account feedback from the recent Pharmaceutical and Human Health Sector Review when planning the forward direction of the research; and expediting the construction of the new joint facility to be occupied by CSIRO Molecular Science and Food Science Australia on the North Ryde site.

Planned Activities And Achievements

Chemicals and Plastics

- A technology transfer agreement with Dulux Australia (Orica Australia Pty Ltd) to exploit controlled free radical polymerisation technology in the development of architectural coatings.
- Assist Orica Australia Pty Ltd in commissioning a MIEX resins plant by conducting research into factors affecting the commercialisation of the product (e.g. performance characterisation, the effect of chlorine on the resin) and by providing support in the areas of trouble-shooting and the analysis of production samples.
- Development of applications of carbon nanotubes for flat screen displays and biological sensors.
- Development of security features for non-banknote applications in collaboration with UCB Films.
- Commercialisation of proprietary organoboron technologies for chemical synthesis.

- Establishment of a microbial bioprocessing facility at the Clayton site.
- Establishment of project with Soltec Research using surfactant self-assembly materials as drug delivery vehicles.
- Licensing a technology which will reduce "crazing" of aircraft windows.

Pharmaceuticals and Human Health

- Development of the novel antiviral agent MB3576 and related compounds to a stage where they form an attractive package for commercialisation.
- Selection of a pharmaceutical company to advance glycosidase inhibitors to preclinical development for the treatment of Hepatitis B and C.
- Commercialisation of Ovine Adenovirus technology in gene therapy.
- Commencement of a clinical survey to evaluate a new gene-based assay for the reliable detection of prostate cancer.
- Through evaluation of clinical performance data, finalise the selection of polymers that will be scaled up for regulatory studies relating to: (i) an artificial corneal onlay and (ii) an injectable polymer suitable for an intraocular lens.
- Development of materials suitable for a fully synthetic tri-leaflet heart valve.
- Evaluation of the TRIS drug delivery technology to facilitate further commercial opportunities.

Built Environment

- Determination, development and demonstration of alternative technologies and processes that may be applied in optimum configurations of urban water systems.
- Better characterisation of water and wastewater sludges leading to cost-effective handling and disposal practices.
- Development of a high rate process for particle removal from sewer overflows.
- Completion of pilot plant field trials of a novel hybrid membrane process for water treatment.

Petroleum

- Provisional patent application for a new range of water-based drilling fluids.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Chemicals & Plastics	45.9
Pharmaceuticals & Human Health	42.6
Built Environment	9.0
Petroleum	1.4
Mineral Processing & Metal Production	1.1

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	31859
– Direct Appropriation (\$'000)	19225
– Research & Services (\$'000)	12634
– Other (\$'000)	0
Earnings Performance Indicator (%)	39.7
Operating Result (\$'000)	117
End of Year Cash Balance (\$'000)	1668
Research Staff (EFT)	185
Total Staff (EFT)	230

CSIRO Petroleum Resources provides research capabilities and technology directed at maintaining an internationally competitive and sustainable Australian oil and gas industry. It focuses on exploration, field appraisal and production.

Multidisciplinary skills in geology, geophysics, mathematical modelling, geomechanics and petroleum/production engineering are applied to four underlying themes: improving exploration and appraisal performance, reducing costs with innovative technology, minimising the industry impact on marine environments, and maximising the value to Australia from its oil and gas resources. The results of our research are applied within the Petroleum and Energy Sectors.

Outlook and Strategies

The oil and gas industry delivers to Australia a competitive and secure supply of oil and gas and growing revenue from gas exports. It currently satisfies 54% of Australia's energy needs, including 80% of oil and 100% of gas. Gas is forecast to increase its share of Australia's energy mix to 28% by 2010, largely at the expense of coal for electricity generation.

Australia's demand for energy is increasing at 3.5% p.a. The outlook for oil in Australia suggests a declining self-sufficiency from a traditional 80% to about 52% by 2005, with an increased import requirement equating to \$4.1b p.a. This is driving an increased focus on oil exploration, especially in the northwest. The outlook for gas supply is strong, based on major developments like the North-West Shelf and Gorgon projects with an estimated resource equating to about 100 years at current consumption rates.

CSIRO has established itself as the major Australian R&D provider addressing Australian priorities, but operating on a global stage. The Division, together with its sector partners, maintains strategic relationships with the Australian Petroleum CRC, and other national and international research agencies, together with service and operating companies.

The Division is midway through a growth phase, planned over a period of 5 years. Expansion of the existing disciplinary base in geology, geochemistry, mathematical modelling and petroleum/production engineering is being complemented by the development of new capabilities in geophysics, decision-making, data management and heuristics, and gas processing.

The completion of the new Australian Resources Research Centre (ARRC) at Bentley in early 2001 will focus Australia's petroleum R&D capacity in Perth.

Eight strategic research objectives have been identified and endorsed as high priority issues by industry:

- Increasing reserves and exploration success rates.
- Increasing the quality of field appraisal and development.
- Improving drilling efficiency.
- Quantification of risk and uncertainty in decision making.
- Adding value to Australia's gas resources,
- Sequestration of CO₂.
- Sustainable disposal of drilling and production wastes.
- Enabling economic flow rates from "tight" reservoirs.

Planned Activities and Achievements

Petroleum

- Quantification of petroleum generation processes, including kinetics, to define source potential and thermal histories of Australian source rocks as a basis for more effective exploration.

- Improved prediction of petroleum migration and accumulation histories and improved reserve estimation through a better understanding of the evolution of reservoir fluids over geological time.
- Technology to improve appraisal of fault conductivity and its impact on seal integrity and reservoir compartmentalisation.
- Development of capability in numerical forward stratigraphic modelling as a complement to existing capability in conventional and chemo-stratigraphy.
- Creation of algorithms that use low-resolution 3D seismic to condition interpolation based on high resolution volume log data, extending to incorporating production data.
- Technology for pore pressure prediction in advance of drilling.
- Preparation of a set of guidelines for managing wellbore instability, to be made available to the industry in general.
- Development of drilling fluid technology to meet advanced drilling requirements, and marine disposal of drill cuttings.
- Further commercialisation of Genesis 2000.
- Development and application of software incorporating state of the art uncertainty and risk concepts.
- Evaluation and application of available technologies to enhance competitiveness of Australian gas reserves.
- Geochemical and geomechanical models together with numerical simulations of the CO₂-water/brine-rock system for sequestration of CO₂ in marine or sedimentary environments.
- Provision of advice to companies and regulatory authorities concerning ecologically sustainable drilling and production practices associated with marine environmental issues.
- Numerical ocean circulation model development and testing, including the need for additional measurement data under severe tropical cyclone forcing affecting offshore facilities.

Energy

- Methods to promote economic gas flows from low permeability coals and sandstones in eastern Australia.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Petroleum	96.7
Energy	3.3

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	16448
– Direct Appropriation (\$'000)	9396
– Research & Services (\$'000)	7010
– Other (\$'000)	42
Earnings Performance Indicator (%)	42.6
Operating Result (\$'000)	108
End of Year Cash Balance (\$'000)	1040
Research Staff (EFT)	67
Total Staff (EFT)	85

CSIRO Plant Industry carries out research in the plant sciences to make Australia's agri-food, fibre and horticultural industries more profitable and sustainable. A major focus is on improving production efficiency and reliability while maintaining the natural resource base. We are placing increasing emphasis on product quality related objectives for the processing and manufacturing sectors and the development of novel plant products. Our research also contributes to conservation of biodiversity in the Australian flora and the implications of global climate change for natural and agricultural ecosystems.

Outlook and Strategies

Plant Industry is better integrating its resources in fungal disease resistance and management. Currently there is major concern over Fusarium in our cotton production industry.

We are building on recent understanding of genetic control of plant development and function, and developing our gene technology programs for harnessing the power of genomics and applications to plant improvement. We are joining an international consortium to develop a genomics program in cotton.

The Graingene Joint Venture between CSIRO, AWB Limited and the GRDC is now in place, with prospects for a major multinational company to join the partnership.

The issue of public perceptions of GMOs in the food chain has been a cause for concern over the past year, but all indications are that they will be accepted as consumer and environmental benefits are seen and understood.

We have set in place a redirection of resources from within the Biodiversity Sector towards investigation of possible ecological implications of GMOs. There will also be downsizing of effort in pasture plant improvement in the Meat, Dairy and Aquaculture Sector in favour of research aimed at improving quality and productivity of hardwood plantations in the Forestry, Wood and Paper Industries Sector.

Our decision support research now has a major Australian agribusiness sponsorship. This, together with reemergence of support for on-farm research from the wool industry is anticipated to significantly enhance our new emphasis on integrated farming systems productivity and sustainability.

Planned Activities and Achievements

Field Crops

- Development of a significant biotechnology presence in Western Australia, concentrating on plant defence responses when confronted with biotic stresses such as disease and insect attack.
- Determination of genetic control for five newly identified scald resistance genes in barley.
- Development of plants that are beneficial to productive and sustainable agricultural systems through their ability to break cereal root disease cycles or to mobilise phosphorus from poorly available forms that accumulate in soil (*and pasture-based production Sectors*).

- Identification of yield limiting traits in Australian wheats and the development of molecular/physiological screening methods for these traits to use in breeding programs.
- Conduct a field trial to measure efficacy and yield of transgenic field peas expressing an anti weevil gene and undertake a poultry feeding trial to demonstrate safety of the seed in the diet of animals.

Horticulture

- Evaluation of first fruit from transgenic vines and citrus.
- Establishment of the inheritance of key grapevine and citrus traits, and application to breeding programs.
- Planting of macadamia gene banks at two sites in Qld and one in NSW, representing a significant biodiversity and industry resource.

Other Sectors

- Characterisation of the regulation of the FLC gene, a key determinant of the time of flowering (*all plant-based production Sectors*).
- Generation of transgenic Coker cotton plants expressing both tolerance to field rates of Liberty herbicide and CrylA(b) (Bt toxin) at levels sufficient to kill *Heliothis armigera* (*Textiles, Clothing and Footwear Sector*).
- Development of novel barley lines with strong human health potential containing unique starch and grain characteristics (*Food Processing Sector*).
- Quantification of the effects of invasive weeds and of genetic and demographic processes on the viability of native plant species (*Biodiversity Sector*).

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Field Crops	32.7
Horticulture	21.4
Textiles, Clothing & Footwear	17.2
Food Processing	10.6
Biodiversity	9.1
Meat, Dairy & Aquaculture	6.0
Climate & Atmosphere	1.6
Forestry, Wood & Paper Industries	1.3

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	55649
– Direct Appropriation (\$'000)	30991
– Research & Services (\$'000)	23789
– Other (\$'000)	870
Earnings Performance Indicator (%)	42.7
Operating Result (\$'000)	-876
End of Year Cash Balance (\$'000)	5942
Research Staff (EFT)	483
Total Staff (EFT)	612

Research Vessel Franklin (National Facility)

CHIEF → DR NAN BRAY

FOCUS

The *RV Franklin* is a world-class ocean-going research platform managed by CSIRO on behalf of the marine science community of Australia, and capable of supporting research in physical, chemical and biological oceanography and marine geosciences. Ship time is available to Australian marine researchers and agencies through a competitive proposal process, with the major costs of operation funded by the National Facility. An independent Steering Committee oversees the operation and strategic planning of the facility, and is supported by a Scientific Advisory Committee. Research relevant to the CSIRO's Marine, Climate and Atmosphere, Minerals, Energy and Mining Sectors is conducted from the *RV Franklin*. Specialised electronic, data processing, chemical analysis and other scientific and technical services are provided by staff from CSIRO Marine Research, as part of the National Facility.

Outlook and Strategies

Australia's Oceans Policy identifies the need for basic information about the Exclusive Economic Zone, in support of Regional Marine Plans as well as climate and weather services, defence and safety at sea. The *RV Franklin* provides a fully instrumented platform for conducting deep ocean surveys in support of Oceans Policy outcomes. That work will be shared with other appropriate research vessels, including the *RV Southern Surveyor*.

The independent Steering Committee includes members from industry, to foster greater marine industry involvement in the strategic management of the National Facility.

A Scientific Advisory Committee, composed of experienced marine researchers from major marine research agencies and universities with marine programs, provides technical and scientific advice to the Steering Committee, and reviews proposals for usage of the National Facility.

Marine geoscience is an area of increasing demand for the *Franklin*, with specialised equipment needs. The Steering Committee will consider possible mechanisms for increasing the overall effectiveness of the National Facility to meet this demand.

Equipment enhancements for 2000/2001 will be in accordance with a Strategic Acquisition and Replacement Plan for 2000/2001–2002/2003, currently under development by the Scientific Advisory Committee.

Planned Activities and Achievements

- *RV Franklin* will conduct ten cruises in support of the research objectives of three CSIRO Divisions (Marine Research, Exploration and Mining, Land and Water), AIMS, four Australian universities and collaborating scientists from four overseas research institutions in the USA, Germany and France.
- Ship operations are scheduled for the Western Pacific (Solomon Islands), Bismarck Sea, Gulf of Papua, Northwest Shelf, and the Eastern Indian Ocean.

Research conducted from *RV Franklin* will contribute to improved understanding and in some cases predictions about:

- The supply of nutrients to the equatorial region by the Sepik River (PNG) and the influence on coastal and oceanic primary production (TROPICS project).
- Sedimentation and benthic processes during the north west winds of the monsoon season in the Gulf of Papua (TROPICS project).
- Tidal mixing and the seasonal cycle of the Leeuwin Current.
- Decadal and longer time scale changes in the structure, basic processes and fluxes in the eastern Indian Ocean, with application to climate model validation.
- Summer circulation along the Western Australian continental shelf between Shark Bay and North West Cape.
- The processes controlling water exchange between Shark Bay and the continental shelf.

Marine geoscientific cruises in 2000/01 will examine:

- The seismic structure and sedimentary setting of coral reef systems on the Northwest Shelf.
- Microbes collected from actively forming seafloor hydrothermal deposits for CSIRO multidivisional research into biological applications in mining and mineral processing.
- Hydrothermally active submarine arc volcanoes in the New Ireland and Solomon Island Forearc Basins.
- The ocean-continent transition of the crust and mantle across the Northwest Shelf.
- The marine extent of the Canning Basin conductivity anomaly.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Marine	100.0

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	4523
– Direct Appropriation (\$'000)	4343
– Research & Services (\$'000)	150
– Other (\$'000)	30
Earnings Performance Indicator (%)	3.3
Operating Result (\$'000)	-971
End of Year Cash Balance (\$'000)	524
Research Staff (EFT)	0
Total Staff (EFT)	9

CSIRO Telecommunications and Industrial Physics (CTIP) provides innovative commercial solutions for industry in the information technology and telecommunications, security, health, manufacturing, mining and energy areas and provides national standards of measurement and traceability supporting product development, testing and trade. It continues to invest in a long-term, flexible strategic research base in telecommunications, imaging, industrial sensing, services and measurement. CTIP is responsible for the National Measurement Laboratory (NML)—a National Facility—and NASA Operations in Australia.

Outlook and Strategies

After more than 30 years of service to CSIRO, with 10 years as Chief, Dr Dennis Cooper retired from the Organisation on March 31st 2000. Dr Gerry Haddad is now Acting Chief and the search for a new Chief is underway.

All proposed research projects in each Sector have been reviewed and ranked as part of the final selection of funded activities.

A number of activities are being considered as candidates for spin-off companies. It is likely that at least one activity will be incubated this year.

A three-year strategic plan for NML has been developed following a major review of its calibration services and standards R & D.

A communications campaign in the IT&T area will raise awareness of both our past achievements and our current activities in this field. In addition, the importance of the Internet and personal communications will be recognised by new initiatives that demonstrate future possible applications of these technologies through the application of CSIRO's skills.

Planned Activities and Achievements

Information Technology and Telecommunications

To maximise benefits to Australia from industry opportunities CTIP has established linkages with multinationals and their Australian alliance partners and is applying its unique skills to broadband wireless networks, mobile communications, broadband telecommunications networking and defence subsystems.

- Transfer to industry of our patented high speed wireless LAN technology via a start-up company.
- Develop next generation Internet technologies for guaranteed quality of service provision.
- Develop lower cost approaches to broadband-wireless-access and commercialise through a start-up company.
- Complete the transfer to industry of our patented 2-way emergency mine communication system through Mine Site Technologies Ltd.
- Integrate and test the communications payload for a small satellite called FedSat (with CRC for Satellite Systems).
- Continue development of dual-use microwave and millimetre-wave satellite communications antennas and sub-systems.

Integrated Manufactured Products

CTIP's major goal is to generate a return to Australia by raising the capacity of local manufacturers to compete globally in the areas of instrument manufacture and process control and by transfer of technology through start-up ventures.

- New global optics contracts will be aggressively sought as a marketing tool in the development of a start-up company in small volume, high quality optics.

- A new ground probing radar system for surveillance will be introduced to the US market.
- Superconducting technology will be used to demonstrate stainless steel detection in food products.
- Novel instrumentation will be developed for measuring the fluid properties of materials and products during food processing.
- Technology will be developed for detecting internal damage in aerospace materials and components.

Measurement Standards

A key activity for this year will be to implement an action plan to meet the messages and challenges set by the Executive Committee for the Sector, based on the recently developed strategic plan.

- Establish regular operation of a super-accurate microwave frequency standard using ytterbium ions cooled to below 1K using laser light.
- Finalise the development of an experimental atomic-based mass standard and a facility for the measurement of density of silicon spheres to a level of accuracy of 1 part in 10⁷.
- Establish a versatile preparation facility for reference gas mixtures traceable to national standards.
- Develop a portable ultrasonic power standard for use in establishing traceability of measurement in the therapeutic use of ultrasound.

Services

The marketing and delivery of services is increasingly dominated by the Internet and electronic commerce.

- Develop telehealth systems to enhance home care of the frail and chronically ill.
- Develop decision support systems for improved diagnosis and treatment planning and simulation systems for training surgeons and anaesthetists.
- Continue development of the Acoustic Mine Imaging system for the Navy's Coastal minehunter program.

CTIP participates in six Cooperative Research Centres.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
IT&T	34.4
Integrated Manufactured Products	22.5
Measurement Standards	22.4
Services	10.1
Built Environment	4.9
Mineral Exploration & Mining	2.5
Climate & Atmosphere	1.8
Energy	1.0
Mineral Processing & Metal Production	0.6

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	53729
– Direct Appropriation (\$'000)	38215
– Research & Services (\$'000)	15514
– Other (\$'000)	0
Earnings Performance Indicator (%)	28.9
Operating Result (\$'000)	-2973
End of Year Cash Balance (\$'000)	2380
Research Staff (EFT)	310
Total Staff (EFT)	414

CSIRO Textile and Fibre Technology services the Textiles, Clothing and Footwear Sector and provides social and economic benefits to Australia through research into, and the development of, advanced technologies for the Australian wool, cotton, textiles and leather industries. Research areas range from the specification of raw wool, to finished textile products, and to the production of hides, skins and leather. Emphasis is on the development of innovative textile and clothing products, integrating all elements of the processing pipeline and ecologically sustainable production at all levels. The Division has a wide range of multidisciplinary skills capable of servicing wool, cotton, textiles and leather at national and international levels. We are recognised as the world's leading wool research laboratory supporting Australia's eighth largest earner of export revenue.

Outlook and Strategies

Wool prices are slowly recovering with the Korean economy booming and more optimism in Asia. Prices are the highest for eighteen months with keen demand for finer wools. Cotton prices are depressed although Australian production is higher than last year. The sheepskin and leather segments are still finding economic conditions difficult. Technical textiles continue to grow at around 6% per annum.

Many Australian textile companies are suffering intense competition from lower labour cost countries, which has resulted in further contraction of the sector. In contrast, some larger companies are actually expanding through acquisition.

The Division is continuing to diversify its activities to broaden its customer base to service the cotton and technical textiles industry.

The Division is actively pursuing projects in cotton as part of its role in the new Australian Cotton CRC. We are also the lead Division in a proposed CRC for Technical Textiles and Fibres.

The Division will continue to grow its consulting activities with Australian industry and build longer-term relationships through its newly established Account Management system and the new Marketing Manager.

The outcomes from the woolgrower vote and establishment of a new company to replace Woolmark will create new opportunities and threats for the Division. New relationship models will be progressed between the Division and the new organisation.

Planned Activities and Achievements

Textiles, Clothing, Footwear and Leather

- A new technology for the bleaching of cotton and cotton blends will be trialled in industry.
- In a joint project with The Woolmark Company and licencees, a shrink-resistant Optim fibre will be developed and trialled commercially.
- The viability of an easycare process for wool jackets will be established through trials with a commercial partner.
- New technologies will be developed to improve the process viability and to enhance adoption of total easycare wool trousers.

- A new silicone softener for chlorinated wool will be commercialised in conjunction with a local polymer manufacturer and wool processor.
- Planning will continue for a new CRC for Technical Textiles and Fibres (also involving CMST and CMolsci), to commence on July 1st 2001.
- Large-scale demonstration trials of continuous dyeing methods for cotton/wool blends, together with partners in the Australian cotton processing industry, will be performed.
- A new project to reduce fibre entanglement will be commenced with an equipment manufacturer.
- A new project to recover wool wax from wool scouring effluents will commence.
- A new project to investigate the mechanical removal of vegetable matter from scoured wool will commence in collaboration with an Australian wool processor.
- A new sliver washing development will be evaluated in industry, and if proven positive, will be prepared for release to industry at a major machinery exhibition in Singapore, 2001.
- A rapid, reliable, low priced method for testing pesticide residues on wool will be commercially proven.
- New product opportunities for wool blend fabrics will be developed by utilising and adopting recently released, high productivity, cotton spinning equipment in collaborative projects with two major Australian spinning plants.
- To help overcome problems of fibre quality issues in the Australian cotton crop, the effects of new lubricants in the ginning and high speed spinning of cotton will be investigated.
- The results of an NH&MRC funded trial of Australian Medical Sheepskins for the prevention of hospital acquired pressure ulcers will be published.
- Technology transfer to industry via specialised short course delivery will be trialed.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Textiles, Clothing & Footwear	100.0

RESOURCE SUMMARY 2000 – 2001

Total Revenue (\$'000)	19885
- Direct Appropriation (\$'000)	11785
- Research & Services (\$'000)	7900
- Other (\$'000)	200
Earnings Performance Indicator (%)	39.7
Operating Result (\$'000)	377
End of Year Cash Balance (\$'000)	6800
Research Staff (EFT)	109
Total Staff (EFT)	189

Tropical Agriculture provides options and solutions for northern Australian agriculture and related natural resource systems. The region's principal agricultural industries—beef cattle, sugar, and dryland cotton and grains—have three common concerns. These are: to increase the efficiency and profitability of production, to improve the quality and hence international competitiveness of their products, and to ensure that their production systems are ecologically sustainable. The Division takes a strong systems approach in addressing the R&D needs of rural industries and regional communities. In doing so, it draws on a broad range of skills and disciplines, ranging from molecular biology to natural resource economics.

Outlook and Strategies

The year 2000–2001 will see an upswing in political and financial interest in the “biotechnology revolution”, with an accompanying focus on securing a competitive place for Australian science and industry through public and private investment in biotechnology R&D. Commodity prices however, will remain under downward pressure, driving agricultural producers to focus on profitability. At the same time, public concerns will heighten scrutiny of the environmental credentials of these enterprises.

In response to these global drivers, the Division will increase emphasis on molecular genetics and genomics, and enhance its systems approaches to enterprise and whole-of-industry profitability linked with minimisation of undesirable on-site and off-site impacts. Investment of appropriation funds will be 78% to industry profitability and industry-linked resource management (Field Crops, and Meat, Dairy & Aquaculture Sectors) and 22% to catchment and regional scale resource issues (Land & Water, Biodiversity, Climate & Atmosphere, and Marine Sectors).

Implementation of the CSIRO responses to recommendations of the Livestock Research Infrastructure Review will be the major non-scientific task for the year.

Planned Activities and Achievements

Meat, Dairy and Aquaculture

- Development of research capabilities in functional genomics and systems approaches to the cattle production value chain.
- Developing guidelines to integrate production, profitability and resource management in livestock enterprises.
- Improved control of meat quality characteristics through breeding plans based on advanced genetic technologies.
- Genetic information delivered to industry via innovative spin-off and licensing mechanisms.
- Continuing participation in the renewed CRC for the Cattle and Beef Quality and the CRC for Sustainable Development of Tropical Savannas.

Field Crops

- Genetic improvement of field crops (grains and sugar), focussing particularly on development and application of biotechnology approaches.
- Strategic research on development of economically and environmentally sustainable farming systems for grains, cotton and sugar.

- Continuing participation in the CRCs for Sustainable Sugarcane Production and Tropical Plant Protection.

Land and Water, and Marine

- Implementation of a new multi-Division, multi-agency program in north Western Australia for collaborative R&D on integrated management of land, water and marine resources.
- Redesign of northern cropping systems to better improve utilisation of water and nutrients for improved efficiency and sustainability of production.

Biodiversity

- Improving understanding of the impacts of land use on biodiversity in northern rangelands.
- Developing principles of land management for conserving critical elements of biodiversity and maintaining ecosystem function.
- Defining impacts of exotic tropical woody weeds and developing strategies to reduce the impacts.

Climate and Atmosphere

- Improving predictive capability for the impacts of climate variability and climate change on northern production systems, including assessment of the value of long-range forecasts for managing production, economics and natural resources.

Research Infrastructure and Support

- Joint redevelopment of the Cunningham Laboratory site at St. Lucia in Brisbane (with the University of Queensland) will move into the construction phase; and cooperative arrangements with Central Queensland University will be progressed through the Rendel Laboratory in Rockhampton.
- Following recent staff reductions and line management restructuring, 2000–2001 will be a year of consolidation. There will be additional focus on developing strategic business capability, and on linking forward planning aspects of finance and human resource management to science needs and overall business strategy.

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Field Crops	43.5
Meat, Dairy & Aquaculture	34.7
Land & Water	12.3
Biodiversity	4.6
Climate & Atmosphere	2.8
Marine	2.0

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	32676
– Direct Appropriation (\$'000)	21159
– Research & Services (\$'000)	10500
– Other (\$'000)	1017
Earnings Performance Indicator (%)	32.1
Operating Result (\$'000)	-93
End of Year Cash Balance (\$'000)	2587
Research Staff (EFT)	191
Total Staff (EFT)	265

The Division's focus is the ecology of Australian landscapes. With skills in an array of ecological and biological disciplines it tackles important contemporary challenges in managing Australia's natural resources, especially those associated with land used both for food and fibre production as well as for conservation. The core research aim is to develop Australia's capacity to predict and respond aptly to future environmental change, whether caused by global warming, land degradation, changes in land use, the introduction of GMOs or expansion of pest animals. Producing tools which assist policy makers and land managers make complex decisions about competing uses of land is a key objective; this requires close working relationships with clients and stakeholders at national, state, regional and catchment levels.

Outlook and Strategies

- Internally, the appointment of Dr Steve Morton as the new Chief from 1 May 2000 will result in a period of review and possible adjustment to the blueprint developed in the interim period between Chiefs. The blueprint outlines how the Division will achieve a well-supported portfolio of high priority research and a balanced budget by the end of the next triennium.
- The blueprint is based on moving the mix of skills towards research areas that are in higher demand and building the skills and flexibility of all staff, within and across projects, as well as across programs. This will result in some staff transfers between projects and locations, and some redundancies. At the same time, we will continue to improve our relationships with key clients and stakeholders. Projects will be strongly supported in these activities by an expanded Commercial Group working closely with the Communication Group. A program of secondments to key external bodies will be developed and implemented.
- Externally, the recent government discussion paper "Managing Natural Resources in Rural Australia for a Sustainable Future" will be used to guide research development. In particular, its emphasis on regional level planning, and on close linking of economic, ecological and social factors will influence the shape of future research projects.

Planned Activities and Achievements

- Development of a framework for assessing the risk of ecological impact of GMOs at the landscape scale. (*Biodiversity*)
- Establishment of a new laboratory and research project on applying molecular systematics to the improvement of conservation of Australian birds. (*Biodiversity*)
- For the Natural Heritage Trust, delivery of practical guidelines for the conservation of biodiversity in the Riverina of NSW and Victoria, based on comprehensive surveys of fungi, plants and animals. (*Biodiversity*)

- An assessment of the ecosystem services, such as clean water and nutrient cycling, provided by the Goulburn-Broken catchment, and their contribution to economically important products. (*Biodiversity; Land and Water*)
- Estimation of the stocks and flows of carbon and key mineral elements in the Wet Tropics region, as a key input to models for predicting the impact of future land use and climate change. (*Biodiversity; Climate and Atmosphere*)
- Achievement of immune enhancement for an immunocontraceptive antigen from the rabbit, suitable for use in myxoma virus. (*Biodiversity; Meat, Dairy and Aquaculture; Textiles, Clothing and Footwear*)
- Delivery of a CD-ROM decision analysis package for the management of mice in the cereal growing regions of south-eastern Australia: MOUSER (Mark II). (*Field Crops*)
- Development of a scenario for Australian fisheries demand and supply by the year 2020. (*Marine*)
- Application of ecological design principles in the planning of a 2,000 ha urban and recreational development at Penrith Lakes, formerly a major sand and gravel quarry. (*Mineral Exploration and Mining*)
- Completion of market research on new opportunities for developing large integrated projects, ranging from revegetating Australia's farmed lands for biofuel production to management of rodents for food security and human health in Asia. (*Divisional Commercial Group*)

PLANNED INVESTMENT PROFILE BY SECTOR	(%)
Biodiversity	53.5
Land & Water	15.0
Textiles, Clothing & Footwear	8.6
Field Crops	8.0
Meat, Dairy & Aquaculture	6.5
Climate & Atmosphere	3.6
Forestry, Wood & Paper Industries	1.7
Marine	1.0
Mineral Exploration & Mining	1.0
Energy	0.7
Services	0.4

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	22145
– Direct Appropriation (\$'000)	15420
– Research & Services (\$'000)	6575
– Other (\$'000)	150
Earnings Performance Indicator (%)	29.7
Operating Result (\$'000)	-665
End of Year Cash Balance (\$'000)	4199
Research Staff (EFT)	141
Total Staff (EFT)	216

Corporate Units

FOCUS

The role of CSIRO's Corporate Units is to promote organisational cohesion and facilitate the research and development activities undertaken by CSIRO's Divisions in an efficient manner. The specific role of each unit is described below, together with a statement of activities and achievements planned for 2000–2001.

Corporate Executive Office

The Corporate Executive Office provides integrated support to the Board, Chief Executive, Deputy Chief Executives and Chiefs/Divisions to assist them in the efficient conduct of their business in the areas of policy development, interaction with Ministers and government departments/agencies, international matters, public awareness and promotion of science, school education activities and provision of an enquiry service for the public and industry. The Office provides briefing and action advice on meetings, correspondence and activities involving the Chairman, Board members and Chief Executive, and is responsible for the coordination and management of Board and Executive meetings. In 2000–2001, central tasks will include refining the corporate governance framework and assistance with the identification and appointment of the new Chief Executive. The Corporate Executive Office encompasses the following Corporate Units: Government Business, International Scientific Liaison, CSIRO National Awareness Program, CSIRO Education Programs, CSIRO Enquiries and the Administrative Law Unit (responsible for FOI etc).

Government Business provides a central contact point, coordination, analysis and quality control for CSIRO's corporate interactions with the Minister responsible for CSIRO, other Ministers as appropriate, Government Departments and other parts of the Australian R&D system. Specific activities and outcomes include:

- Coordination and management of CSIRO's negotiations on Government policy issues, including those associated with the *2000–2003 Triennium Funding Output Purchasing Agreement* and associated performance issues, and policy issues associated with the CRC Program. Liaison with Government Departments and agencies (including direct responsibility for committees with ISR, AFFA and DSTO) and with other parts of the research system, enabling input on issues relevant to CSIRO and collaboration when appropriate. Support for CSIRO's representations to Government on the importance of R&D and appropriate levels of funding, including for the Chief Scientist's Review of Australia's Science Capability. Preparation and maintenance of a document presenting the broad picture of CSIRO's linkages and contributions to the Australian innovation system. Follow-up to the Workshop with Government in February 2000.
- Provision of briefings for the Chief Executive, particularly for participation on high level councils and committees (Prime Minister's Science, Engineering and Innovation Council, the Standing Advisory Committee for PMSEIC, the Coordination Committee on S&T—attending as the CCST alternate when required, the CRC Committee) and facilitation of CSIRO's contributions in those fora. Representation of CSIRO on working groups and interdepartmental committees as appropriate. Provision of briefings for meetings with portfolio Ministers. Provision of quarterly summaries of a wide range of policy issues and inquiries to alert senior staff to opportunities for input

relevant to their areas. Preparation or coordination of corporate submissions and other input to external inquiries which arise during 2000–2001. Awareness of national and international developments in S&T policy and programs, and provision of briefing and advice to senior staff when relevant to CSIRO.

- Coordination and provision of Ministerial briefings and correspondence; briefing of Ministerial staff in portfolios with a major interest in R&D; briefings for other Parliamentarians on CSIRO; coordination of briefings for Senate Estimates hearings and follow up questions; coordination and preparation of CSIRO responses and contributions to Questions on Notice and Question Time Briefs; coordination of Parliamentarians' visits to CSIRO sites; advice to Chief Executive and Deputy Chief Executives on matters raised in Parliament affecting CSIRO; advice to senior CSIRO staff on protocols and processes associated with Parliament. Responsibility for obtaining and securing Cabinet documents and acquiring/drafting coordination comments. Maintenance of the database of Ministerials, particularly Ministerial approvals required under the *Science and Industry Research Act 1949*.

International supports CSIRO's corporate and statutory responsibilities in relation to international matters, with emphasis on international scientific liaison. Specific activities and outcomes include:

- Provision of advice and support for the development of corporate policy on international matters. Preparation of submissions and coordination of CSIRO representation for Government inquiries on international matters. Administration and review of CSIRO's international S&T agreements and facilitation of activities under them. Strengthening of CSIRO's liaison on international matters with departments, agencies and external bodies such as specific country business councils and embassy staff. Monitoring of developments in international fora such as APEC, to enable CSIRO input.
- Fostering of CSIRO's contributions to international scientific and technical cooperation. Effective briefing of the Chief Executive and Deputy Chief Executives for high level international meetings and seminars. Representation of CSIRO and coordination of CSIRO's interface with visiting delegations. Representation of CSIRO on the Australian Steering Committee on Collaboration for S&T Australia/Indonesia and representation of Australia on the Commonwealth Science Council, focussing on practical ways to achieve effective collaboration.
- Provision of a corporate focus for development of activities with selected countries, particularly Indonesia, China, Italy, France and other countries/institutions for which CSIRO provides corporate funding. Support for the development of strategies and activities associated with the CSIRO Indonesia Committee. Fostering of CSIRO's interactions with the World Bank and the Asian Development Bank in collaboration with Divisions and CSIRO's Commercial Network. Assistance for Divisions in identifying and facilitating international opportunities and sources of support; assistance with divisional presentation overseas of corporate as well as divisional information. Maximisation of the benefits of aid-related activities, including through provision of training placements.

Corporate Units

- Management and enhancement of the CSIRO International website, development of a CSIRO International display for the Discovery Centre, annual updating of the CSIRO internal information document *Funds for International Scientific Activities*, management of a comprehensive database on CSIRO's international activities and its relationship with the PSS, and presentation of an annual report on CSIRO's international activities to the Board, with subsequent release as a public document.

CSIRO National Awareness Program assists adoption and commercialisation of CSIRO research through increased public awareness, via the media; improved industry awareness of the benefits of research; and enhanced political awareness of the importance of science and the contribution of CSIRO. Planned activities and achievements include:

- Enhancement of national and overseas media coverage of CSIRO scientific achievements, particularly via the "Australia Advances" and "Sci Files" television and radio series, and international email lists.
- High quality science briefings in Federal and State Parliaments and development of the Parliamentary Information Program.
- Further development and consolidation of a program for industry and national media using a network of professional science writers delivering major articles to influential publications.
- Preparation and delivery of the CSIRO Annual Report to Parliament.
- Development of Gene Technology Information Program, established in June 1999, to convey factual information to the public about CSIRO's gene technology research.
- Monitoring of public opinion about scientific issues and CSIRO.

CSIRO Education aims to alert school students, their families and teachers of science to the contribution of CSIRO and other scientific research to our community, encourage students to participate in scientific activities, especially those related to the applications of science, and encourage students to take up careers in science. Planned activities and achievements include:

- Targets for 2000–01 include 150,000 students/teachers attending CSIROSEC sessions, 12,000 members of CSIRO's Double Helix Science Club, an audited circulation of 17,000 for *The Helix* magazine, circulation of 6,000 for *Scientriffic* magazine, 300 students in CSIRO Student Research Scheme, 4,500 students achieving CREST Awards, 750 student entries in the BHP Science Awards, 280 schools participating in the GLOBE program and 35 half-hour science programs on *Totally Wild* national TV program.
- Obtain external funding for a number of the programs.

CSIRO Enquiries serves the Organisation's stakeholders by responding to requests for information about its research and activities. The major aim of the unit is to support Divisions by handling general enquiries on their behalf and to enhance CSIRO's reputation as Australia's leading research institution by making information about its research easily accessible. The unit receives in excess of 44,000 enquiries annually from

its clients, the general public (65%), students and educators (16%), the commercial sector (12%) government departments (5%) and media (2%).

The predominant method of client contact is by telephone via a national telephone number, although Internet use has increased fourfold over the past year. The Unit maintains an information resource database, on which is recorded reference to all divisional and corporate information sheets, publications, CD roms and videos, media releases, promotional literature and information on consulting and commercial services offered to industry. Achievements in 1999/2000 include:

- Operating a three-month pilot Gene Technology Information Service (GTIS) on behalf of Biotechnology Australia, and its partner agencies. The GTIS provides 1800 free-call telephone, fax and email facilities for enquirers. The major issues of interest were food labelling, and the possible long-term effects of gene technology on human health and the environment.

Planned activities for 2000/01 include:

- Developing an electronic web based information service to meet the needs of students and educators, to replace Student Information Packs. This project is being coordinated by a teacher working under the Teacher Release to Industry Program, assisted by an IT student from Swinburne University of Technology.
- Introducing a Performance Improvement Program, including identifying and implementing elements of Call Centre Best Practice.

Corporate Finance

Corporate Finance provides advice and services to support financial planning and financial management within CSIRO. It also specifies and implements financial systems to meet line management and statutory reporting requirements. Planned activities and achievements include:

- Support for the Chief Executive and Board in the development of strategies to ensure that, within Government parameters, CSIRO's appropriation funding is sustained and enhanced.
- Improvement of financial planning and management in CSIRO by working with Divisions to improve budgeting, accounting and management practices, especially in the areas of costing, pricing and project accounting.
- Preparation of the Organisation's financial data for Federal Budget documentation. In partnership with the Government Business Unit, development of the related triennium funding and pricing agreement.
- Development of strategic options and advice on financial management, including preparation of financial performance reports for the Executive Committee and Board. Production of CSIRO's statutory financial reports, including facilitation of its Audit Committee review and Board approval.
- Development and promulgation of financial policies and procedures relevant to CSIRO's business and statutory requirements.
- Support and development of UNIBIS and financial reporting systems.

Corporate Units

- In partnership with CSIRO Corporate Information Technology Services, development, implementation and subsequent support of PSS and associated management reports to meet the needs of project managers in Divisions and the Organisation's sector planning and reporting process.
- Investigate possible e-commerce applications to support purchasing processes.

Corporate Human Resources

Corporate Human Resources provides strategic leadership through the provision of advice and the development of processes and policies that will maximise the contribution of staff to the achievement of CSIRO goals. Planned activities and achievements include:

- Continued development of an effective CSIRO-wide HR Network focussing on collaboration in the achievement of CSIRO's HR strategy.
- Implementation of recommendations from the review of CSIRO's performance management, salary, classification and reward systems. Development of policy documentation and implementation to follow.
- Continuation of the review and consolidation of HR policy and participation in the corporate policy audit project.
- Consolidation and extension of improved employee consultation arrangements implemented.
- Provision of high quality HR advice to the Executive and Divisions.
- Development of improved HR information systems focussing on employee self service, electronic transactions and business information reporting.
- Implementation of the agreed occupational safety, health and environment strategy.
- Consolidation and extension of improved workforce planning processes and tools.
- Promulgation of corporate policy on ethics, conflicts of interest and declaration of private interests. This includes provision of appropriate training on these topics and on matters related to the *Commonwealth Authorities and Companies Act 1997*.
- Development and negotiation of a new Enterprise Agreement.
- Arrange changes to employment contracts and industrial agreements to facilitate improvements in administrative processes leading to productivity savings.
- Review management accountability, employee consultation and flexibility arrangements introduced in the 1998 Enterprise Agreement.
- Revision of internal grievance mechanisms.
- Adjust policies and procedures in line with introduction of the New Tax System.

Corporate Property

Corporate Property provides a property management and facility development service that ensures CSIRO has appropriate and functional research accommodation and facilities at the most effective cost. Corporate Property also seeks to maximise the utility of CSIRO's sites and enable the Organisation to apply cost-effective and efficient practices. Planned activities and achievements include:

- Implementation of the Board approved Property Management Plan 1997–2000 and development of the 2001–2005 Property Management Plan to include strategies such as rationalisation and consolidation of specific sites; the development of joint State or University/CSIRO initiatives; and evaluating industry and other research establishment's capital investment benchmarks.
- Development and management of the CSIRO's Capital Investment Plan in recognition of emerging sectoral priorities.
- Management of CSIRO's Internal Leasing Scheme for cost effective use of premises.
- Management of major CSIRO development initiatives, such as North Ryde (Riverside Corporate Park) NSW; Pinjarra Hills, Qld (Stage 2) and Bentley, WA (Stage 1) and remediation and development of Bradfield Park, NSW.
- PWC approvals for the CSIRO developments at North Ryde (Food Science Australia), St Lucia (Tropical Agriculture), Clayton (Manufacturing Science and Technology), North Ryde (Building, Construction and Engineering), Newcastle (Energy Technology) and implementation of the design development and tendering processes.
- Participation on the Organisation's Environmental Committee, to develop and implement a CSIRO Environmental Policy and Management System together with developing strategies to audit and remediate all contaminated sites.
- Implementation of planning and "value adding" strategies for the disposal over the next 1 to 3 years of Ryde (NSW), Syndal (Vic), Preston (Vic), and Samford (Qld). An accommodation/site review is to occur for Hightett (Vic), Yarralumla (ACT) and parts of Black Mountain (ACT), Floreat Park (WA) and Clayton (Vic).
- Implementation of a CSIRO Site/Regional Management System for the Repairs and Maintenance Program to achieve greater effectiveness.
- Implementation of the Organisation's Security Policy with development of localised security expertise.
- Implementation of the Organisation's Fraud Control Policy.
- Monitoring of the Organisation's energy usage with associated development of strategies/advice to effectively utilise energy usage.
- Corporate Property will assist the Sub-Committee of the CSIRO Board with the disposal and leaseback of the assets identified during a recent independent review of CSIRO's property holdings.

Information Technology Services

Information Technology Services provides and maintains CSIRO's corporate information infrastructure. This includes: transmission of voice, data and image Australia wide; support of the Unix and NT operational environments for corporate applications; maintenance and development of corporate systems such as the payroll, human resources, finance, contracts and project support systems; coordination of IT Security across the Organisation; and support of the provision of library and records management systems and services both corporately and in Divisions. In keeping with these functions, ITS develops corporate strategic plans for information technology, networks, telecommunications and integrated information management. Planned activities and achievements include:

- Continuation of the corporate infrastructure equipment rolling upgrade to enhance the responsiveness of users.
- Implementation of an architecture for a single IT systems log-on across CSIRO utilising the Microsoft NT domain model.
- Deployment of Microsoft NT file server environment and Exchange based messaging services across CSIRO.
- Consolidation of Unix and NT storage.
- Full implementation of Systems and Network Management System.
- Implementation of SMS and whole of CSIRO model.
- Negotiation of further additions to CSIRO's electronic journals collection and integration of other datasets into the system.
- Planning and development of a pre-print server and management strategy for CSIRO publications.
- Redevelopment of CSIRO's Intranet and development of an infrastructure for extranets for major funding bodies for CSIRO's research.
- Implementation of improved records management and record-keeping practices throughout CSIRO, including electronic and scientific records. Establish access to the records management system on the desktop and introduce electronic document management.
- Use the data network lines for telephone traffic by replacing voice telines with Voice over IP technology. This will drastically reduce telephony costs.
- Conduct a major review of data links to all sites and upgrade those links underperforming.
- Continued development of the CSIRO Project Support System including implementation of a Commercial Information System.
- Finalise the planned approach to replacing or enhancing the human resources system, and commence work on that project.
- Continued support and enhancement of the Unibis financial system.
- Provision of expert technical and systems advice and, where required, development and implementation of cost effective solutions in consultation with relevant system owners, divisional staff and the Executive.

- Achieve economies of scale, expertise and approach through cooperative activities with similar external organisations (eg CAUL, CAUDIT, science agencies cluster).
- Work with the Office of Asset Sales and IT Outsourcing (OASITO) to implement IT outsourcing so as to meet Government policy without compromising science and the requirements of CSIRO's clients and collaborators.
- Develop strategies and solutions to support the integration of common information management work tools on the desktop.
- Negotiate and manage Corporate IT and Library materials purchasing agreements to achieve economies of scale for CSIRO.
- Coordination of IT Security strategies, standards and practices across CSIRO.
- Finalise the implementation of security firewalls and develop a prototype intrusion detection system for installation at all major network points-of-presence.
- Develop a pilot intranet 'portal' to provide staff with customisable access to a range of information resources and systems.
- Define requirements for business intelligence tools and implement a pilot project.

Risk Assessment and Audit

The Risk Assessment and Audit Unit provides Management with assurance on the effectiveness and efficiency of the Organisation's internal control and risk assessment framework. The Unit's plans are approved by the Chief Executive and endorsed by the Board Audit Committee. Progress against approved plans is reported to the Board on a quarterly basis and typically covers risk and control issues encompassing asset and information systems security, internal policy and external regulatory compliance and operational efficiency and effectiveness. Planned activities and achievements include:

- Continuing to promote the benefits of "risk awareness" throughout the Organisation through value adding risk assessment and control assurance projects, the provision of training and timely response to management requests for facilitation on matters of risk and control.
- A review of the Organisation's occupational health safety & environment management systems and processes.
- An assessment of risks associated with corporate strategic initiatives including electronic commerce and information technology outsourcing.
- Feedback on commercial practices including a specific focus on commercial issues associated with cooperative research centres and spin off companies.
- The ongoing review of Organisational compliance with base line controls in financial management, commercial practices and information technology security.

Corporate Units

Strategic Planning and Evaluation

Strategic Planning and Evaluation promotes and facilitates a strategic approach to planning and evaluation at all levels of CSIRO; provides or locates planning and evaluation services for CSIRO managers; coordinates the sector planning and reporting process; and coordinates the preparation of corporate planning and evaluation documents. A particular challenge this year is to introduce a new and comprehensive performance measurement and reporting system. Planned activities and achievements include:

- Oversee the design and implementation of performance and accountability measures for Executive Committee's strategic management of CSIRO and performance management across all divisions and corporate groups.
- Facilitate the Executive's monitoring of progress against planned sector outcomes and commission return on investment (adoption/impact) studies on major CSIRO projects.
- Prepare planning and performance information for Federal Government budget documentation and the CSIRO Annual Report.
- Prepare and provide data on CSIRO's research effort and economic and trade statistics in response to internal and external needs.
- Promulgate and encourage responses to the results of the sector planning process to external parties.
- Disseminate the results of the recently completed ARC/CSIRO patent citation study to key CSIRO staff and assist in developing a strategic response.
- Direct a learning program focusing on enhancing the organisational development and operational skills of planning and related staff operating in a complex environment.

Training and Development

The Leadership, Career and Team Development group designs and delivers leadership and personal development programs for staff at significant career transition points. The group also develops corporate policies and provides advice and consultancy services on education, training and professional development. All major programs are accredited with Deakin University and the Association of Professional Engineers, Scientists and Managers, Australia (APESMA) and provide status towards the University's Graduate Certificate, Diploma and Masters courses on technology management.

Planned activities include:

- The Team Leadership in CSIRO program to provide communication, performance management, interpersonal and coaching skills for leaders of teams in all functional groups.
- Project Leadership courses for staff moving into research project leadership roles.
- Leadership in Innovation courses (in collaboration with the Business/Higher Education Round Table) for leaders of multi organisational teams in universities, the private sector, public sector research agencies and CRCs.

- Thriving on Complexity Program for integrating research activities that span a number of divisions within a research sector.
- Commercial Awareness Development Program to build the commercial capability of research leaders, business managers and other senior staff.
- The Leadership Development Program to develop senior staff and to support succession planning.
- The Leadership Consortium: a collaboration with a group of Australian companies to develop and promote leadership capability.
- Consultancy services to divisions on leadership team development, change management and strategic planning.
- Research on the effectiveness of R&D teams and leaders.
- Consultancy services on research leadership and management development for other R&D organisations such as the Indonesian Institute of Sciences (LIPI) and Crown Research Institutes in New Zealand.

Legal and Intellectual Property

Legal and intellectual property activities in CSIRO provide vital support to CSIRO's research, technology transfer, commercial and other activities carried out in pursuit of the Organisation's statutory functions. Principal legal activities include:

- Provision of corporate governance advice and services to the Chief Executive, Executive Committee and the Board of CSIRO to ensure that CSIRO and its members and officers are aware of and comply with their legal obligations, including those under the *Science and Industry Research Act 1949* and the *Commonwealth Authorities and Companies Act 1997*.
- Provision of legal advice and services to the Chief Executive, Deputy Chief Executives, Chiefs and others to ensure that commercial arrangements comply with CSIRO's legal obligations and represent the best available position for CSIRO; commercial arrangements include research contracts, intellectual property licences, collaborations, joint ventures and start-up company formations.
- Provision of litigation, arbitration, mediation, negotiation and reporting advice and services to assist CSIRO in the management of disputes and compliance with CSIRO's statutory reporting and insurance obligations.

Principal intellectual property activities include:

- Maintenance through an external contractor of a database of all of CSIRO's registerable intellectual property and provision of professional patent attorney advice to facilitate decision-making by Divisions.
- Providing access to world-wide intellectual property information, particularly through on-line databases.

Planned activities and achievements include:

- Creation of a legal intranet to provide a range of services throughout CSIRO, including access to relevant legislation, legal advice and standard form agreements.

Contact Details

- Implementation through Intellectual Property Management (CSIRO's contracted provider of IP services) of an intranet service throughout CSIRO to provide access to the database of CSIRO's registered IP holdings.
- Providing continuing advice and services in the following areas:
- Ensuring CSIRO's corporate governance policies, practices and compliance programs are appropriate from a legal perspective.
- Ensuring that CSIRO's commercial arrangements are structured optimally from a legal perspective.
- Implementing best practice in the management and utilisation of CSIRO's IP resources.
- Implementing corporate-level risk management strategies to minimise risks of legal conflicts.
- Ensuring that CSIRO adopts the best defence strategies and practices against legal conflicts initiated by outside parties.
- Training in legal and IP issues.

Commercial Committee and Network

The CSIRO Commercial Committee and Network have responsibility to ensure that CSIRO's interaction with industry leads to an appropriate capture of the benefits from investment in research, occurs in an appropriate fashion, and enables the Organisation to respond to changes in the external environment. Committee develops policy in this area, monitors implementation of the policies, and facilitates interaction between professionals in the legal, intellectual property and commercial areas across the Organisation. The Committee is responsible to the Executive Committee which acts as a point of accountability for a number of functions in the commercial, legal and intellectual property areas. The Commercial Network was established by the Commercial Committee and covers all staff with a professional role in the commercial activity of the Organisation. The Network is involved in dialogue with the Commercial Committee and is the principal conduit for staff in raising the professional standards in the commercial activity of the Organisation. Planned activities and achievements include:

- Revision of the CSIRO Commercial Practice Manual to reflect changes in the Organisation and in the commercial environment in which the Organisation operates. This is an annual activity which this year will see the establishment of a more user-friendly intranet web version.
- Consolidation of customer, contract and project information into an Organisation-wide database to assist staff to improve CSIRO's level of customer service.
- Revision of CSIRO's standard form contractual documents for use in research contracts, technology licences and collaboration with other parties.
- Establishment of a more extensive resource base and improvement to the processes for an account management system which facilitates interaction between the Organisation and its key customers.
- Establishment of procedures, checklists and policies relating to the setting up of internal incubation and spin-off companies.

- Implementation of the recommendations of the review of the business and commercial skills within the Organisation.
- Education of staff in the commercial area through induction and training programs, workshops and conferences.
- Provision of advice to the Executive Committee on matters including: CSIRO's equity holdings in companies formed to commercialise CSIRO technology; use of the CSIRO Development Fund and other means of facilitating the effective commercialisation of technologies.

CSIRO Publishing

CSIRO Publishing operates within CSIRO on a commercial basis publishing quality science for both Australian and overseas markets in three main product streams: primary research journals; academic and reference books and CDs; and secondary education and general reference books, magazines and CDs. Planned activities and achievements include:

- Launching Science Image Online as a source of science images for the media, students and commercial users.
- Releasing eCommerce facilities for the purchase of journal articles on a paper-by-paper basis.
- Publication and distribution of over 100 issues of 16 primary research journals to customers world-wide in both print and online formats.
- Publication of more than 30 new academic reference titles in both print and CD-ROM format with international appeal and sales potential.
- Broadening the readership of Ecos, CSIRO's science and environment magazine, to reach both print subscribers and online browsers.
- Publication of 20 books and CDs for the school and home education markets, with an emphasis on developing co-publishing arrangements with other academic-based publishers.
- Development of Landlinks Press as both a publisher and distributor of technical products in the rural sector needing practical technical information.
- Enhancing the CSIRO Publishing online catalogue of products and content with eCommerce facilities to ensure 24-hour access to customers in all countries.

RESOURCE SUMMARY 2000–2001

Total Revenue (\$'000)	52145
– Direct Appropriation (\$'000)	39791
– Research & Services (\$'000)	6172
– Other (\$'000)	6183
Earnings Performance Indicator (%)	11.8
Operating Result (\$'000)	-1190
End of Year Cash Balance (\$'000)	2372
Research Staff (EFT)	15
Total Staff (EFT)	319

This summary includes resourcing estimates for all the above Corporate Units and the CSIRO Executive.

Contact Details

DIVISIONAL CHIEFS

Australian Animal Health Laboratory

Director: Dr Mike Rickard
Private Bag 24, Geelong VIC 3220
Ph: (03) 5227 5050 Fax: (03) 5227 5250
Email: mike.rickard@dah.csiro.au

CSIRO Atmospheric Research

Chief: Dr Graeme Pearman
Private Bag 1, Aspendale VIC 3195
Ph: (03) 9239 4650 Fax: (03) 9239 4460
Email: graeme.pearman@dar.csiro.au

Australia Telescope National Facility

Director: Professor Ron Ekers
PO Box 76, Epping NSW 1710
Ph: (02) 9372 4300 Fax: (02) 9372 4310
Email: rekers@atnf.csiro.au

CSIRO Building, Construction and Engineering

Chief: Mr Larry Little
PO Box 56, Highett VIC 3190
Ph: (03) 9252 6114 Fax: (03) 9252 6241
Email: larry.little@mel.dbce.csiro.au

CSIRO Energy Technology

Chief: Dr John Wright
PO Box 136, North Ryde NSW 1670
Ph: (02) 9490 8610 Fax: (02) 9887 3590
Email: john.wright@det.csiro.au

CSIRO Entomology

Chief: Dr Jim Cullen
GPO Box 1700, Canberra ACT 2601
Ph: (02) 6246 4025 Fax: (02) 6246 4028
Email: jim.cullen@ento.csiro.au

CSIRO Exploration and Mining

Acting Chief: Dr John Read
PO Box 883, Kenmore Qld 4069
Ph: (07) 3212 4460 Fax: (07) 3212 4578
Email: j.read@dem.csiro.au

Food Science Australia

Chief Executive: Dr Michael Eyles
PO Box 52, North Ryde NSW 1670
Ph: (02) 9490 8341 Fax: (02) 9490 8455
Email: Michael.Eyles@foodscience.afisc.csiro.au

CSIRO Forestry and Forest Products

Chief: Dr Glen Kile
PO Box E4008, Kingston ACT 2604
Ph: (02) 6281 8314 Fax: (02) 6281 8277
Email: glen.kile@ffp.csiro.au

CSIRO Health Sciences and Nutrition

Chief: Professor Richard Head
PO Box 10041, Adelaide BC SA 5000
Ph: (08) 8303 8865 Fax: (08) 8303 8808
Email: richard.head@hsn.csiro.au

CSIRO Land and Water

Chief: Dr Graham Harris
GPO Box 1666, Canberra ACT 2601
Ph: (02) 6246 5621 Fax: (02) 6246 5595
Email: graham.harris@clw.csiro.au

CSIRO Livestock Industries

A/g Chief: Mr Shaun Coffey
Comprising:

CSIRO Animal Production

Chief: Dr Oliver Mayo
Locked Bag 1, Delivery Centre Blacktown NSW 2148
Ph: (02) 9840 2833 Fax: (02) 9840 2940
Email: o.mayo@prospect.anprod.csiro.au

CSIRO Tropical Agriculture

Chief: Dr Elizabeth Heij
120 Meiers Road, Indooroopilly QLD 4068
Ph: (07) 3214 2217 Fax: (07) 3214 2886
Email: Elizabeth.Heij@tag.csiro.au

CSIRO Manufacturing Science and Technology

Chief: Dr Ian Sare
Private Bag 33, Clayton South MDC VIC 3169
Ph: (03) 9545 2787 Fax: (03) 9545 2829
Email: ian.sare@cmst.csiro.au

CSIRO Marine Research/RV Franklin

Chief: Dr Nan Bray
GPO Box 1538, Hobart TAS 7001
Ph: (03) 6232 5212 Fax: (03) 6232 5125
Email: Nan.Bray@marine.csiro.au

CSIRO Mathematical and Information Sciences

Chief: Dr Murray Cameron
Locked Bag 17, North Ryde NSW 1670
Ph: (02) 9325 3203 Fax: (02) 9325 3226
Email: murray.cameron@cmis.csiro.au

CSIRO Minerals

Chief: Dr Rod Hill
Box 312, Clayton South VIC 3169
Ph: (03) 9545 8600 Fax: (03) 9562 8919
Email: Rod.Hill@minerals.csiro.au

CSIRO Molecular Science

Chief: Dr Annabelle Duncan
Private Bag 10, Clayton South MDC VIC 3169
Ph: (03) 9545 2470 Fax: (03) 9545 2447
Email: annabelle.duncan@molsci.csiro.au

CSIRO Petroleum Resources

Chief: Dr Adrian Williams
PO Box 3000, Glen Waverley VIC 3150
Ph: (03) 9259 6889 Fax: (03) 9259 6995
Email: a.williams@dpr.csiro.au

CSIRO Plant Industry

Chief: Dr Jim Peacock
GPO Box 1600, Canberra ACT 2601
Ph: (02) 6246 5250 Fax: (02) 6246 5530
Email: jim.peacock@pi.csiro.au

CSIRO Telecommunications and Industrial Physics

Acting Chief: Dr Gerry Haddad
PO Box 76, Epping NSW 1710
Ph: (02) 9372 4200 Fax: (02) 9372 4210
Email: gerry.haddad@tip.csiro.au

CSIRO Textile and Fibre Technology

Chief: Dr Brett Bateup
PO Box 21, Belmont VIC 3216
Ph: (03) 5246 4777 Fax: (03) 5246 4057
Email: brett.bateup@tft.csiro.au

Contact Details

CSIRO Wildlife and Ecology

Chief: Dr Steve Morton
PO Box 284, Canberra City ACT 2601
Ph: (02) 6242 1740 Fax: (02) 6242 1782
Email: Steve.Morton@dwe.csiro.au

SECTOR COORDINATORS

Biodiversity—Dr Brian Walker

CSIRO Wildlife and Ecology
PO Box 284, Canberra City ACT 2601
Ph: (02) 6242 1740 Fax: (02) 6242 1782
Email: Brian.Walker@dwe.csiro.au

Built Environment—Mr Larry Little

CSIRO Building, Construction and Engineering
PO Box 56, Hightett VIC 3190
Ph: (03) 9252 6114 Fax: (03) 9252 6241
Email: larry.little@mel.dbce.csiro.au

Chemicals and Plastics—Dr Greg Simpson

CSIRO Molecular Sciences
Private Bag 10, Clayton South MDC VIC 3169
Ph: (03) 9545 2519 Fax: (03) 9545 2447
Email: greg.simpson@molsci.csiro.au

Climate and Atmosphere—Dr Graeme Pearman

CSIRO Atmospheric Research
Private Bag 1, Aspendale VIC 3195
Ph: (03) 9239 4650 Fax: (03) 9239 4460
Email: graeme.pearman@dar.csiro.au

Energy—Dr John Wright

CSIRO Energy Technology
PO Box 136, North Ryde NSW 1670
Ph: (02) 9490 8610 Fax: (02) 9887 3590
Email: john.wright@det.csiro.au

Field Crops—Dr Jim Peacock

CSIRO Plant Industry
GPO Box 1600, Canberra ACT 2601
Ph: (02) 6246 5250 Fax: (02) 6246 5530
Email: jim.peacock@pi.csiro.au

Food Processing—Mr John Buhot

Food Science Australia
PO Box 3312, Tingalpa DC Qld, 4173
Ph: (07) 3214 2028 Fax: (07) 3214 2025
Email: john.buhot@foodscience.afisc.csiro.au

Forestry, Wood & Paper Industries—Dr Glen Kile

CSIRO Forestry and Forest Products
PO Box E4008, Kingston ACT 2604
Ph: (02) 6281 8314 Fax: (02) 6281 8277
Email: glen.kile@ffp.csiro.au

Horticulture—Dr Nigel Steele Scott

CSIRO Plant Industry
PO Box 350, Glen Osmond SA 5064
Ph: (08) 8303 8626 Fax: (08) 8303 8635
Email: nigel.scott@pi.csiro.au

Information Technology and Telecommunications—Dr Rhys Francis

CSIRO Mathematical & Information Sciences
723 Swanston Street, Carlton VIC 3053
Ph: (03) 8341 8231 Fax: (03) 8341 8222
Email: rhys.francis@cmis.csiro.au

Integrated Manufactured Products—Dr Ian Sare

CSIRO Manufacturing Science and Technology
Private Bag 33, Clayton South MDC VIC 3169
Ph: (03) 9545 2787 Fax: (03) 9545 2829
Email: ian.sare@cmst.csiro.au

Land and Water—Dr Graham Harris

CSIRO Land and Water
GPO Box 1666, Canberra ACT 2601
Ph: (02) 6246 5621 Fax: (02) 6246 5595
Email: graham.harris@clw.csiro.au

Marine—Dr Nan Bray

CSIRO Marine Research
GPO Box 1538, Hobart TAS 7001
Ph: (03) 6232 5212 Fax: (03) 6232 5125
Email: Nan.Bray@marine.csiro.au

Measurement Standards—Dr Barry Inglis

CSIRO Telecommunications and Industrial Physics
PO Box 218, Lindfield NSW 2070
Ph: (02) 9413 7460 Fax: (02) 9413 7383
Email: barry.inglis@tip.csiro.au

Meat, Dairy and Aquaculture—Mr Shaun Coffey

CSIRO Livestock Industries
PO Box 5545, Rockhampton Mail Centre QLD 4702
Ph: (07) 4923 8182 Fax: (07) 4923 8155
Email: Shaun.Coffey@tag.csiro.au

Mineral Exploration and Mining—Dr John Read

CSIRO Exploration and Mining
PO Box 883, Kenmore QLD 4069
Ph: (07) 3212 4460 Fax: (07) 3212 4578
Email: j.read@dem.csiro.au

Mineral Processing and Metal Production—Dr Rod Hill

CSIRO Minerals
Box 312, Clayton South VIC 3169
Ph: (03) 9545 8600 Fax: (03) 9562 8919
Email: Rod.Hill@minerals.csiro.au

Petroleum—Dr Adrian Williams

CSIRO Petroleum Resources
PO Box 3000, Glen Waverley VIC 3150
Ph: (03) 9259 6889 Fax: (03) 9259 6995
Email: a.williams@dpr.csiro.au

Pharmaceutical & Human Health—Professor Richard Head

Health Sciences and Nutrition
PO Box 10041, Adelaide BC SA 5000
Ph: (08) 8303 8865 Fax: (08) 8303 8808
Email: richard.head@hsn.csiro.au

Radio Astronomy—Professor Ron Ekers

Australia Telescope National Facility
PO Box 76, Epping NSW 1710
Ph: (02) 9372 4300 Fax: 9372 4310
Email: rekers@atnf.csiro.au

Service—Dr Murray Cameron

CSIRO Mathematical and Information Sciences
Locked Bag 17, North Ryde NSW 1670
Ph: (02) 9325 3203 Fax: (02) 9325 3226
Email: murray.cameron@cmis.csiro.au

Textiles, Clothing & Footwear—Dr Peter Gordon

CSIRO Textile and Fibre Technology
PO Box 21, Belmont VIC 3216
Ph: (03) 5246 4104 Fax: (03) 5246 4057
Email: Peter.Gordon@tft.csiro.au

OUR PURPOSE

**WE SERVE THE AUSTRALIAN COMMUNITY
THROUGH OUTCOMES WHICH PROVIDE:**

Benefit to Australia's industry
and economy

Environmental benefit to Australia

Social benefit to Australians

Support to Australia's national and
international objectives

**THROUGH EXCELLENCE IN SCIENCE AND
TECHNOLOGY, AND IN THE PROVISION OF
ADVICE AND SERVICES.**

