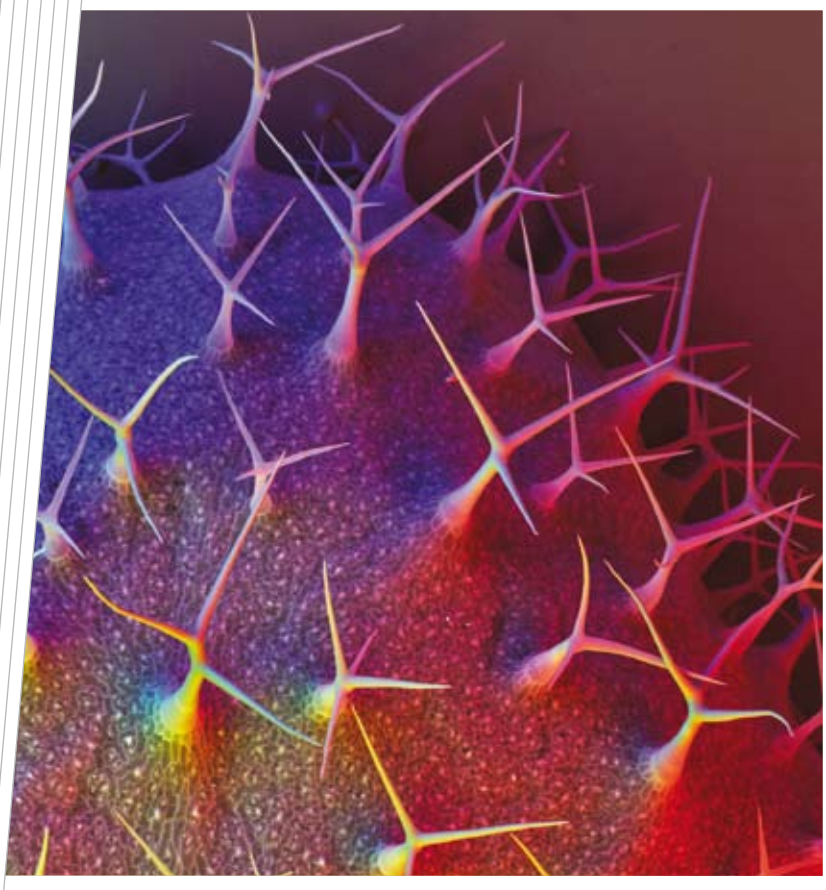
CSIRO



www.csiro.au

CSIRO Annual Report 2009–10

CSIRO

CSIRO – the Commonwealth Scientific and Industrial Research Organisation – is one of the largest and most diverse scientific organisations in the world. It has over 6,600 staff located across 56 sites throughout Australia and overseas.

Our history

The Council for Scientific and Industrial Research (CSIR) was established in 1926 with its primary research devoted towards agriculture. In the late 1930s this was extended to include industrial research.

In 1949, the CSIR was reconstituted as CSIRO, and gradually expanded its activities so that its research was related to almost every field of primary, secondary and tertiary industry in Australia.

Today, CSIRO is a trusted source of creative ideas and practical technologies to deliver impact for the nation.

Our purpose

By igniting the creative spirit of our people, we deliver great science and innovative solutions for industry, society and the environment.

Responsible Minister

Senator the Honourable Kim Carr
Minister for Innovation, Industry, Science and Research

Governing legislation

CSIRO is an Australian Government statutory authority constituted and operating under the provisions of the *Science and Industry Research Act 1949* (SIR Act).

This annual report is prepared in accordance with the requirements of the SIR Act and section 9 of the *Commonwealth Authorities and Companies Act 1997* (CAC Act).

CSIRO Board

The CSIRO Board is responsible to the Australian Government, through the responsible Minister, for the overall strategy, governance and performance of CSIRO. Further details of the CSIRO Board are on pages 90–91.

What we do

CSIRO carries out scientific research in areas including energy, the environment, information technology, health, mining, manufacturing, agriculture, and natural resources. We seek to make a difference and generate impact by focusing on the nation's big challenges and opportunities. Our research delivers:

- integrated solutions to help address major national challenges
- technologies to transform or create new markets for Australian industry
- innovative technologies to improve the competitiveness of existing industries
- advice, information and research to meet specific community needs
- knowledge-based services to governments and businesses.

CSIRO Corporate Centre

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Cover images: Scanning electron microscope image of an *Arabidopsis thaliana* leaf. *Arabidopsis thaliana* is used as a model organism in plant biology research and was the first plant to have its entire genome sequenced. ©Mark Talbot. A major study has provided new insights into the loss of structure in regions of the brain and its potential association with Alzheimer's disease. ©iStock. Australia's economic exclusion zone (EEZ) is illustrated on this globe map. Australia's EEZ is vast, some 11.1 million square kilometres. ©CSIRO

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Senator the Hon Kim Carr
Minister for Innovation, Industry, Science and Research
Parliament House
CANBERRA ACT 2600

We have pleasure in submitting to you, for presentation to Parliament, the sixty-second Annual Report of the Commonwealth Scientific and Industrial Research Organisation (CSIRO). This report has been prepared in accordance with the requirements of the *Science and Industry Research Act 1949* and in accordance with section 9 of the *Commonwealth Authorities and Companies Act 1997* (CAC Act).

Under section 9 of the CAC Act, CSIRO Board members are responsible for producing an annual report in accordance with the rules laid down in Schedule 1 of this Act, including a 'Report of Operations' prepared in accordance with the Finance Minister's Orders.

This report presents fairly the information required by the Minister for Finance and Deregulation as set out in the *Commonwealth Authorities and Companies (Report of Operations) Orders 2008.*

The report has been approved for presentation to you, signed this 25th day of August 2010 in accordance with a resolution of the Board members.

The report includes an appendix comprising a report from the Chief Executive of CSIRO, as trustee of the Science and Industry Endowment Fund (the Fund), established under the *Science and Industry Endowment Act 1926*, on the operations of the Fund together with a report by the Auditor-General on the accounts of the Fund.

CSIRO is required to report developments since the end of the financial year. On 1 July 2010, the Divisions of Materials Science and Engineering, and Molecular and Health Technologies merged to form CSIRO Materials Science and Engineering and the Agribusiness Group was renamed Food, Health and Life Science Industries. Entomology merged with Sustainable Ecosystems to become Ecosystem Sciences within the Environment Group.

We commend the Organisation's achievements to you.

Simon McKeon
Chairman of the Board

Megan Clark
Chief Executive

21 September 2010

Australian Science. Australia's Future www.csiro.au

Contents

Part one
Overview

Highlights of 2009–10

Recent highlights of CSIRO's science and its application include:

Climate

A joint CSIRO–AusAID project generated the first detailed regional climate change projections for Indonesia. This project provides accessible information that is now being used to assess vulnerability and adaptation options in Indonesia and other countries in the Pacific region (more on page 20).

Energy

Australia's first Zero Emission House designed to fit the Australian lifestyle, climate and budget of a typical middle income Australian family, showcases off-the-shelf building and renewable energy generation technologies, and new future-ready 'smart' energy management technologies (more on page 22).

Information technology

CSIRO's new web-based smart metering system enables householders, small businesses and electricity retailers to remotely control energy use over a broadband Internet connection (more on page 55).

Materials

A breakthrough polymer technology developed by CSIRO, dubbed RAFT, allows new materials to be designed to exactly fit customers' requirements (more on page 57).

Water

The Murray-Darling Basin Floodplain Inundation Model will allow water managers to ensure water flows can be tailored to maximise environmental outcomes (more on page 36).

Successes and challenges

The assessment of our **Impact** is positive and we have achieved most of our goals for the year. In a recent independent evaluation of the impact and value of our activities by ACIL Tasman, they concluded with high confidence that *CSIRO is delivering high value for money*. There have been some substantial projects delivered, such as the perfect prawn (see page 89). The report also found that our Flagships have begun to deliver tangible benefits and that they are on track to achieving their long-term goals.

The **Quality of our Science** is outstanding and we have delivered some excellent results this year. We continue to show a strong record of publication and citations – our average number of citations per paper exceeds comparable citation rates for Australia and the world, and is continuing to rise at a fast rate.

Our **Relationships** cover a number of areas, such as clients, partners, staff and the community. We continue to focus on improving our ability to understand our clients' strategic business requirements and improving the speed of our contract negotiations. We have successfully developed relationships and formed larger agreements with organisations, such as Orica Ltd and Centrelink.

We have had a pleasing improvement in our safety performance, with an increase in 'near miss' reporting and continued progress in the conduct of safety contacts.

Financial performance 2009–10

CSIRO's financial performance for 2009–10 is summarised in Table 3.1 on page 88.

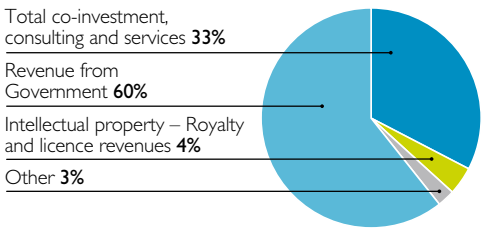
CSIRO's operating result for the year to June 2010 was a deficit of $169 million, which includes the gift from CSIRO to the Science and Industry Endowment Fund of $150 million. Also contributing to the deficit, were foreign exchange losses resulting from the wireless local area networks (WLAN) settlements recorded in 2008–09 and paid in 2009–10, write-down and impairment of assets resulting from asset valuations and other operational expenses. The operating result comprised total revenue of $1,164 million and total expenses of $1,333 million.

Looking ahead

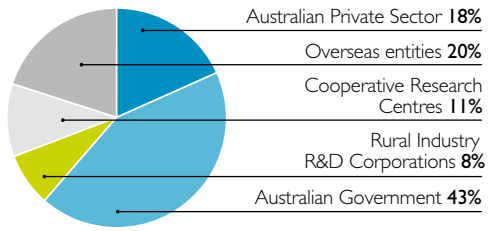
During the process of evaluating performance, the Executive Team considered the lessons learned from the past year. Some things we need to do differently are to:

- review the budget process to ensure budgets are finalised earlier in the year
- implement a multi-year budget process to provide greater certainty to projects
- ensure there is a clearer link between external revenue and project management to ensure that project milestones are more closely monitored.

Source of CSIRO revenue in 2009–10



Source of co-investment, consulting and services revenue 2009–10



Foreword by the Chairman

During 2009–10, a review began of what has been achieved under CSIRO's 2007–2011 Strategic Plan. Considerable thought has been given to how the Organisation can – through its 2011–2015 strategy – enhance its reputation globally and ensure that our National Innovation System is closely connected to the global innovation system.

There were a number of significant accomplishments achieved throughout 2009–10. During the past year, a team of our scientists were recognised for technology which has changed global communications, many of our CSIRO scientists have achieved national and international awards, and a recognised CSIRO team has achieved major marine discoveries. This Report contains many more highlights.

The economic operating environment, while still challenging, has also provided researchers and industry with an impetus to pursue co-investment and collaboration – leveraging from each other's strengths in order to tackle major barriers to sustainable development, nation building, competitive industries and job creation.

Evidence for this engagement on an international, national and local level is seen through our involvement in projects such as the Square Kilometre Array for international astronomy, the development of the *Atlas of Living Australia* to better understand our nation's ecology, studies into local waterways in order to map our country's water resources and working with industries across the aerospace, agricultural, energy and mining sectors.

Our Global Foresight Project indicates that this trend needs to continue at an enhanced level, so that science can better serve interconnected societies and environments, and better forecast

and advise on risks affecting the way we live, such as tsunami, floods, Eyjafjallajökull and global economic conditions.

Our very successful wireless intellectual property licensing campaign bore fruit in 2009, with agreements being signed with many of the world's largest technology companies. We decided to apply the proceeds to revitalise the Science and Industry Endowment Fund, thereby to fund new areas of scientific research to benefit Australia and the world. The team associated with this 18-year long endeavour received the CSIRO Chairman's Medal to recognise the achievement.

CSIRO now has another proud chapter in its history of delivering significant impact from technology development. Our experience sends a series of signals right across the innovation system – that Australian researchers continue to be able to develop world-class technology, that we live in a highly competitive global marketplace for intellectual property and that Australian entities must function expertly within this system to capture fair commercial returns.

This Report reveals the breadth of CSIRO's scientific excellence and our expertise in applying this to help governments, businesses and communities define, inform and address many of the challenges facing humanity.

On behalf of the Board of CSIRO, I congratulate and thank the management and staff of CSIRO for their contribution to the Organisation and to Australia's future.

For my part, it has been an honour to serve as Chairman of the Board. I welcome Mr Simon McKeon as the new Chairman and wish CSIRO well for 2010–11 and beyond.

Dr John W Stocker AO
Chairman of the CSIRO Board
(until 27 June 2010)

Changing of the guard: CSIRO's new Chairman

I was appointed to the CSIRO Board on 28 June 2010 and came in at the tail end of another successful year for CSIRO. I pay tribute to John Stocker who has served with distinction both as Chief Executive Officer and Chairman of CSIRO.

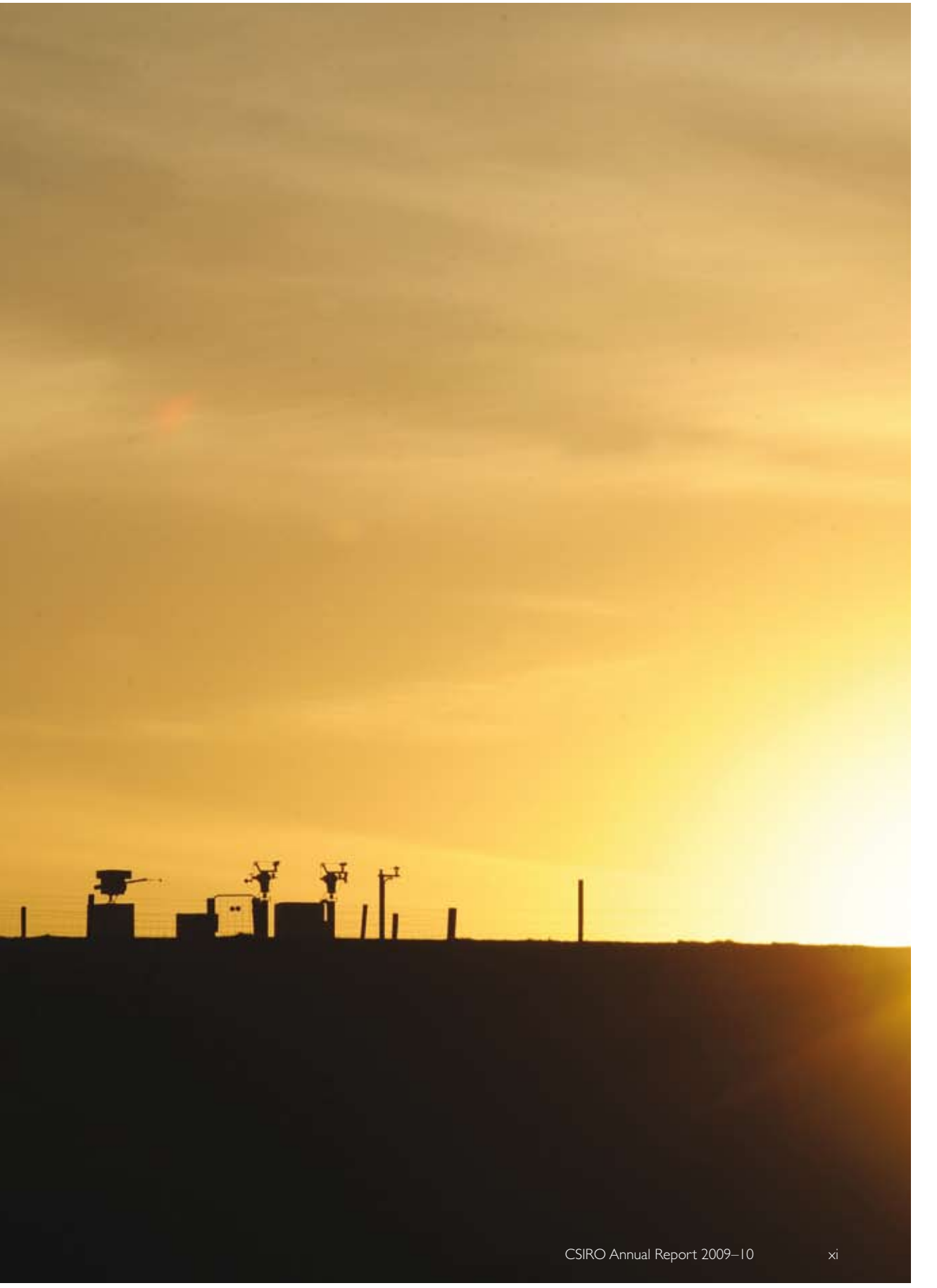
In my first few weeks, I have been travelling along my own steep CSIRO learning curve and along the way have been continually impressed with so much that I have observed, particularly the extraordinary ability and passion of CSIRO staff.

CSIRO's science is up with the world's best – and there has never been a time where the Organisation has been needed as much as now. Humanity faces some very sizeable challenges, as its global footprint increases and we continue our relentless search for an improved standard of living.

I am looking forward to 2010–11 and the prospect of more significant CSIRO initiatives and great scientific outcomes.

Simon McKeon

Simon McKeon
Chairman of the CSIRO Board
(as from 28 June 2010)



Chief Executive's report

Over the past year, CSIRO increased its positive impact on the social, environmental and economic wellbeing of Australia. Our contribution to our stakeholders and partners is reflected in a record number of active licences for our innovations, our external research services income and our research activity. We have responded quickly at home and around the globe to biosecurity threats and food security challenges.

A treatment to combat the Hendra virus was trialled; safer and faster longwall mining technology has been adopted by major equipment manufacturers; and the first signals were received from the Australian Square Kilometre Array Pathfinder (ASKAP) telescope. These are just three of the many achievements during 2009–10.

The five operational groups: Agribusiness (now Food, Health and Life Science Industries); Energy; Environment; Information Sciences; and Manufacturing, Materials and Minerals have each grown their impact, through the ten National Research Flagships, Divisional research, our national collections, as well as through our services and infrastructure.

Our performance

The **Agribusiness Group,** now the **Food, Health and Life Science Industries Group,** has made progress in improving agricultural productivity, food industry efficiency and human health outcomes.

CSIRO scientists developed a salt tolerant premium priced durum wheat that yields 25 per cent more grain than the parent variety in previously unsuitable saline soil.

In collaboration with the prawn industry we have developed a new prawn which produces record yields, supporting a sustainable food production industry and a premium product for Australian consumers and global markets.

In the health area our advanced brain scan analysis techniques will help in the development of new strategies for early diagnosis and more effective treatment of Alzheimer's disease.

Working across the full energy spectrum, the **Energy Group** has delivered results in petroleum, gas, geothermal, solar, low-emissions coal, as well as other renewable energies and energy efficiency.

A prototype hydrocarbon sensor was used to detect the movement and location of oil released during the Gulf of Mexico oil spill, helping to better understand the affected marine environment and aid in planning for future clean-up strategies.

The first Australian Zero Emission House targeting the mass market was launched in conjunction with industry partners and continues to function as a demonstration and research resource for the residential housing sector.

Understanding how Australia and the world will be affected by, and can respond to, the challenges of climate change remains a focus for the **Environment Group**.

Together with the Bureau of Meteorology, CSIRO issued the State of the Climate Report, which put on the record observations of Australia's climate.

Researchers in our Water for a Healthy Country Flagship continued to provide national leadership in quantifying water resource assets in northern Australia, south-west Western Australia and northern Tasmania, as well as enabling water security in south-east Queensland.

2010 was also the International Year of Biodiversity and the Environment Group continues to contribute to the global understanding of this subject, as well as showing national and global leadership through the development of the *Atlas of Living Australia* and contribution to the census of marine life.

The **Information Sciences Group** provides underpinning disciplines of mathematics and information and communication technologies to all CSIRO science, as well as world-leading strength in radio astronomy and space sciences.

CSIRO is now operating, on behalf of the Australian and US Governments, the Canberra Deep Space Communication Complex at Tidbinbilla in the Australian Capital Territory.

The Australian Square Kilometre Array Pathfinder (ASKAP) received the first signals from space in May through the first of 36 identical dishes that will make up the ASKAP telescope.

Our wireless local area network technology continues to grow in adoption and usage – the latest market forecast is that more than four billion devices will contain CSIRO wireless technology by the end of 2013.

During the year, we completed 15 licences for our technology. We also started the process of applying the net proceeds to new scientific research projects through the Science and Industry Endowment Fund. As Trustee of the Fund, I will ensure that Australia gains maximum benefit from the additional scientific research that has been made possible by one of CSIRO's inventions.

The **Manufacturing, Materials and Minerals Group** supports industries that are responsible for around 18 per cent of Australia's gross domestic product and over the last year supplied improved processes and technologies to generate new products and companies and stimulated the growth of green jobs.

A world record for efficient solar cells has been set with researchers developing thin film, solid state dye-sensitised solar cells. This technology has the potential to replace silicon in the next generation of solar collectors.

New automated control systems and tele-robotic technologies being trialled by CSIRO and partners are enabling mining companies to operate remote sites from a central location, creating safer, more efficient and more productive mine sites.

Our people

At the heart of our achievements and goals are our people. The effort and commitment by all our people this year has been extraordinary. I appreciate the efforts of all who have contributed to our successes and discoveries. To our staff, I reinforce the responsibility of every person in CSIRO to ensure scientific excellence, to build trust and respect each day with partners, to take the initiative to explore new horizons, consistently do what we say we will do and strive towards a healthy, safe and sustainable future.

Looking forward

We envisage an Australia where our science is used to deliver solutions for industry and the economy; to improve the wellbeing of the community and to create a sustainable future for our environment. We see a world where Australian science helps to create a sustainable future for humanity.

In the year ahead we will deliver on the milestones for the ASKAP for international astronomy research, the *Atlas of Living Australia* to document the country's flora and fauna, and a new National Marine Research Vessel to learn more about our oceans. We will also support the construction of the Australian Future Fibres Research and Innovation Centre at Deakin University and a new Indian Ocean Marine Research Centre at the University of Western Australia, which will be home to 240 researchers.

We will continue to address the Australian Government's National Research and Innovation Priorities, build external partnerships, improve our commercial practices and our ability to deliver impact, as well as delivering strategies to assist Australian industries and communities adapt to a changing climate.

I look forward to an exciting 2010–11.

Megan Clark
Chief Executive
September 2010

About CSIRO

CSIRO is Australia's national science organisation. We are one of the largest and most diverse scientific organisations in the world and we have been solving scientific problems in Australia and internationally since 1926.

We are a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability: we are nation builders. We seek to make a difference: to enhance national productivity through research and development, to apply our knowledge to the creation of industries, national wealth, a healthy environment and improved living standards. We do this by bringing together the right people from across multiple science disciplines to work together, explore new horizons, and produce real outcomes. We are proud of our record for science excellence and are committed to our role in sustaining Australia's prosperity and wellbeing.

CSIRO is accountable to the Australian Government. We have a four-year funding agreement with the Government that outlines our funding and reporting requirements. We develop a Strategic Plan to ensure we meet the requirements of this agreement and that we deliver on our promises to the Government and the Australian community.

CSIRO Board

The CSIRO Board is responsible to the Australian Parliament, through the responsible Minister, for the overall strategy, governance and performance of CSIRO.

Executive leadership

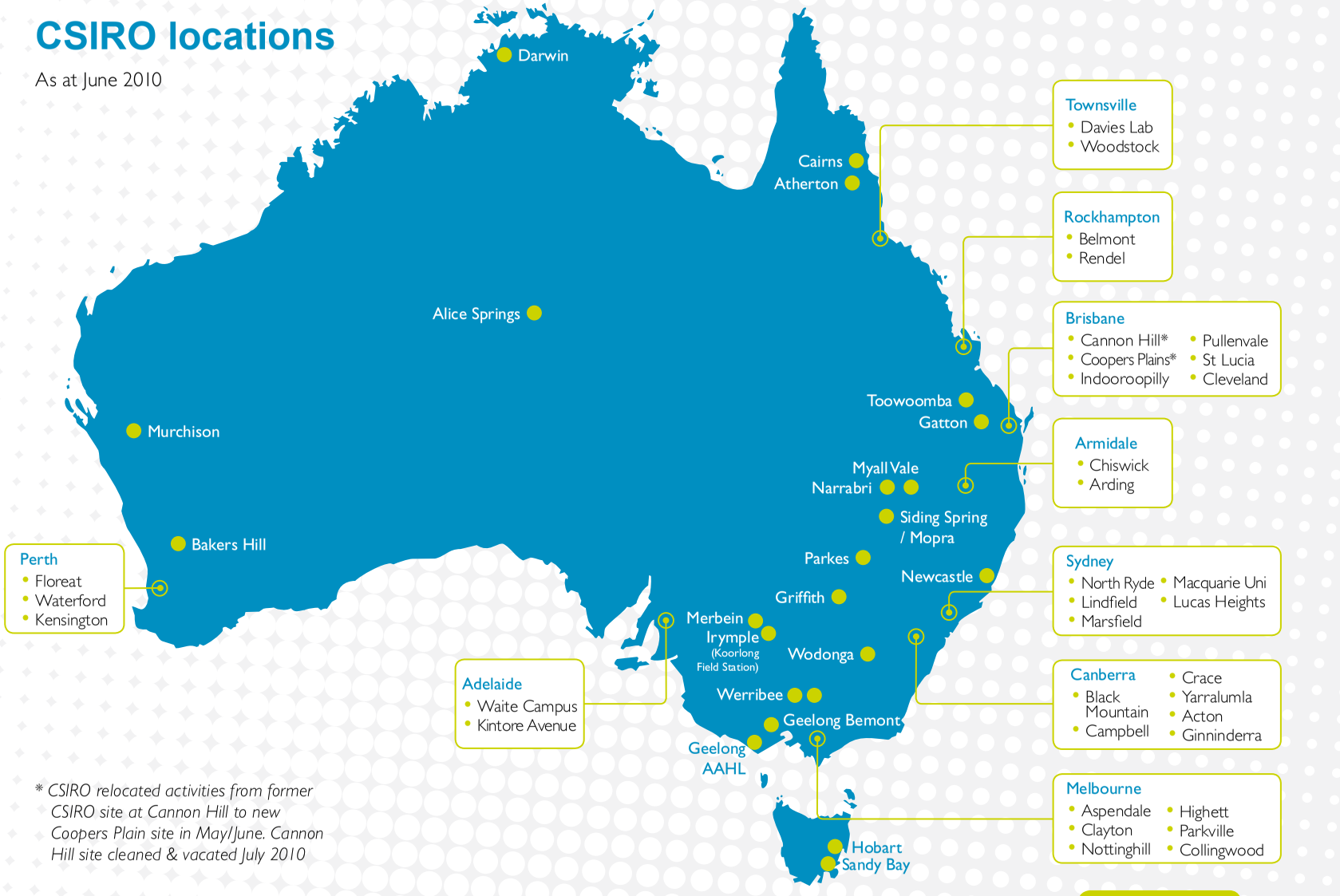
The CSIRO Chief Executive is responsible to the Board for the development of CSIRO's strategy and overall management and performance. The Chief Executive and Executive Team manage the Organisation in accordance with this strategy and the plans and policies approved by the Board. The Executive Team includes the Chief Executive, two Deputy Chief Executives, five science Group Executives and three Executive Directors.

Each science Group Executive leads a Group of Divisions, Flagships and other Portfolios, as well as Transformational capability platforms. Some Divisions are custodians of major national facilities and collections. The Deputy Chief Executives and Executive Directors lead Enterprise Functions that work across CSIRO. The Executive Management Council includes Chiefs of Divisions, Flagship Directors and other Portfolio Leaders, and General Managers. It is a forum for sharing information and discussing issues related to strategy and management.

CSIRO's organisational structure shows the reporting framework and the roles and responsibilities of senior management (see pages xviii–xix).

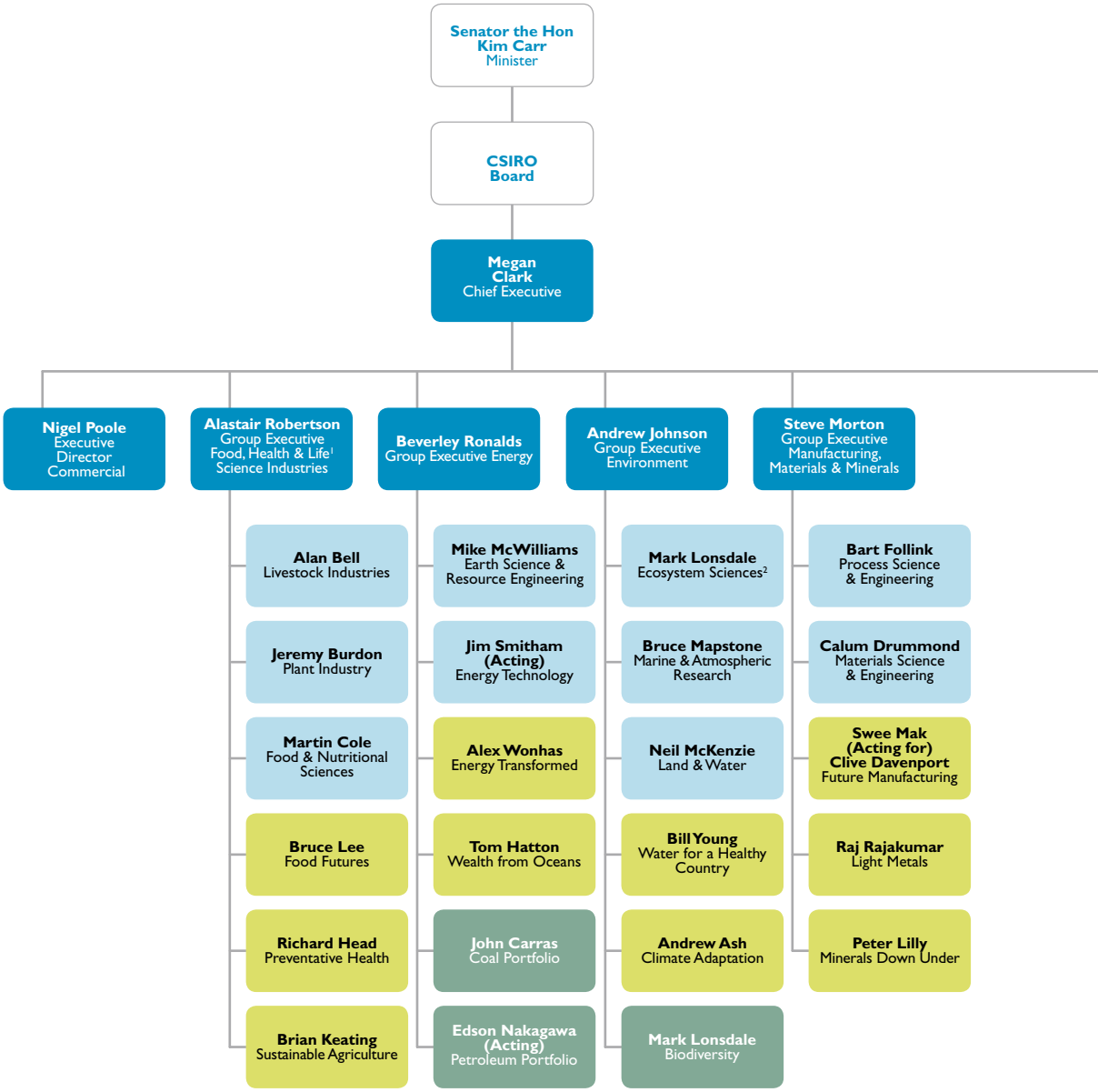
CSIRO locations

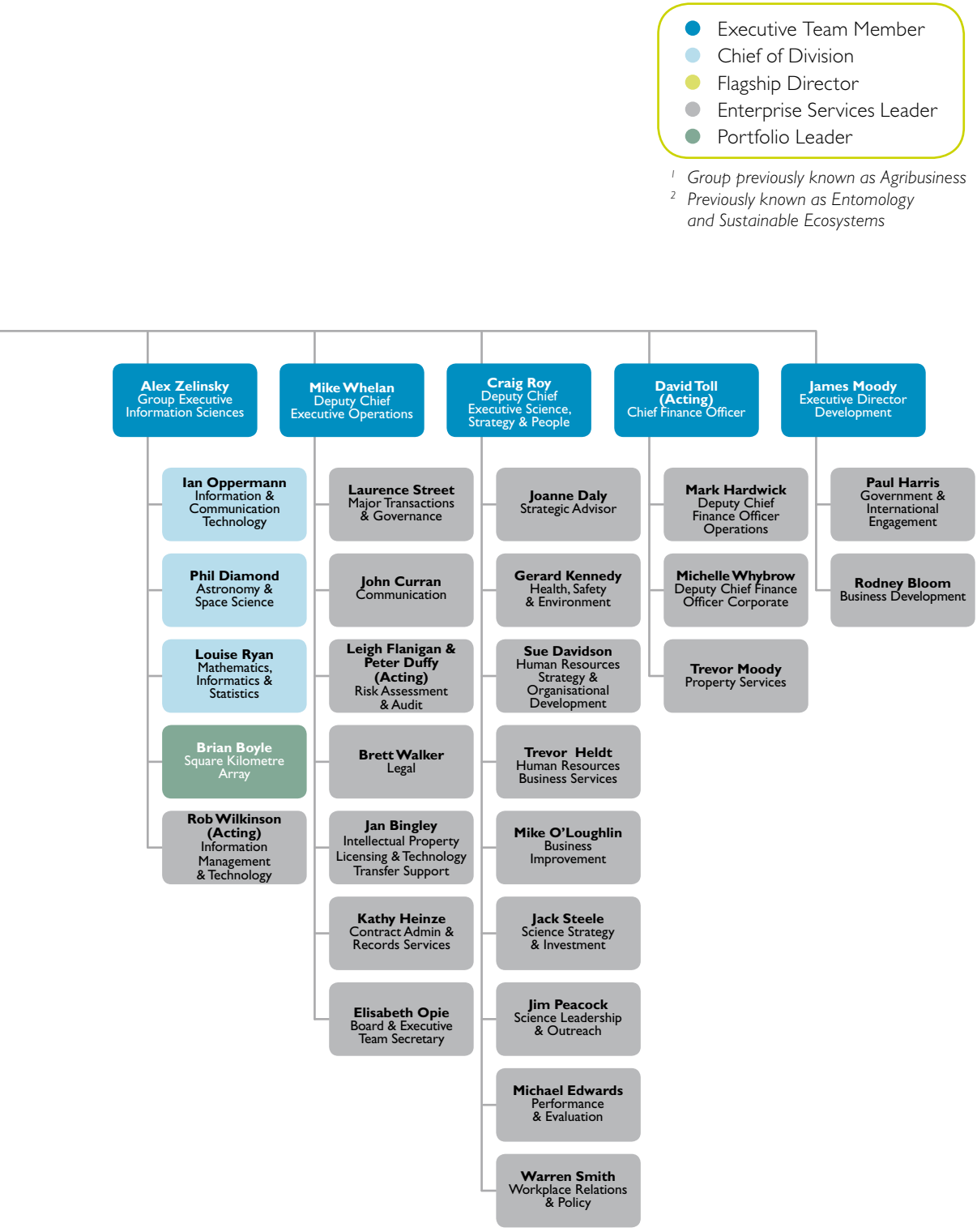
As at June 2010



* *CSIRO relocated activities from former CSIRO site at Cannon Hill to new Coopers Plain site in May/June. Cannon Hill site cleaned & vacated July 2010*

Organisational structure as at July 2010





[1] *Group previously known as Agribusiness*
[2] *Previously known as Entomology and Sustainable Ecosystems*

Part two

Our performance

Part two: Our performance

Our roles and strategy

CSIRO undertakes scientific research into practically all aspects of human activity and its interaction with natural and built environments. This includes our air and water; our diverse landscapes; oceans and climate; agriculture; energy; health; space technologies and exploration; manufacturing; materials science; minerals exploration and processing; information and communication technologies and more.

We seek to make a difference with our research and generate impact for Australia. We apply our knowledge to create jobs, national wealth, a healthy environment and improved living standards for all Australians.

Our place in Australia's National Innovation System (NIS) is unique due to our size, our breadth and depth of capability, our active research portfolio management and our ability to conduct large-scale, multidisciplinary research focused on tackling major challenges that matter to Australia's future. In 2009–10, over 90 per cent of our research addressed the Australian Government's National Research Priorities.

The conduct of excellent science on issues of national priority is fundamental to CSIRO's mission, but generating impact for the nation also depends on developing strong relationships with potential users and beneficiaries – in both the public and private sectors. We work with and on behalf of others, to turn results into social, economic and environmental benefits. CSIRO's Service Charter (see page 179) sets the standards of service we deliver to our customers.

Examples of how we are also addressing the Government's National Innovation Priorities are reflected throughout the annual report. Details on collaboration and partnering are provided on pages 102–105.

Five strategic elements form the core of CSIRO's 2007–2011 strategy.

Delivering on national challenges

We form partnerships to address national challenges and opportunities through our Flagships.

Exploring new horizons

We continuously extend and develop our science capabilities, promoting excellence in science delivery and shaping future research directions.

Conducting science with impact

We deliver impact for Australia through transformational science, better business practices, accelerated adoption of our solutions and enhanced communication.

Harnessing One-CSIRO

We work together in an innovative, collaborative, values and performance-based environment. Our systems, structures and processes support the enterprise and ensure that our people remain healthy, safe and productive.

Building our people and science excellence

We ensure a balance between developing our capability and delivering outcomes from science. We manage facilities and collections for national benefit.

Our outcome and program structure

The Australian Government appropriates revenue to departments and agencies such as CSIRO to deliver agreed 'Outcomes' set out in the relevant Portfolio Budget Statements. CSIRO's Outcome Statement is shown in Figure 2.1. To achieve the outcome, CSIRO allocates funds across four Programs, also shown in Figure 2.1. These programs reflect the Organisation's focus on delivering scientific solutions to Australian industry and communities, while simultaneously helping to build Australia's science base to meet ongoing challenges and opportunities.

The performance section of the Annual Report presents information on each of these four Programs including reporting against specific performance indicators set out in the Portfolio Budget Statements and the CSIRO Operational Plan.

The research and engagement activities that deliver on CSIRO's outcome and program objectives are managed through five Research Groups supported by Corporate Groups that provide critical enterprise functions. Each Research Group comprises a number of research portfolios and a number of Divisions.

- Research Portfolios (including Flagships) contain one or more research Themes with clear and specific goals.
- Divisions are the creators, builders and custodians of scientific capabilities. They develop and deploy capabilities to meet the objectives of Portfolios.

The five research groups for the reporting period 2009–10 are:

Agribusiness Group[3]

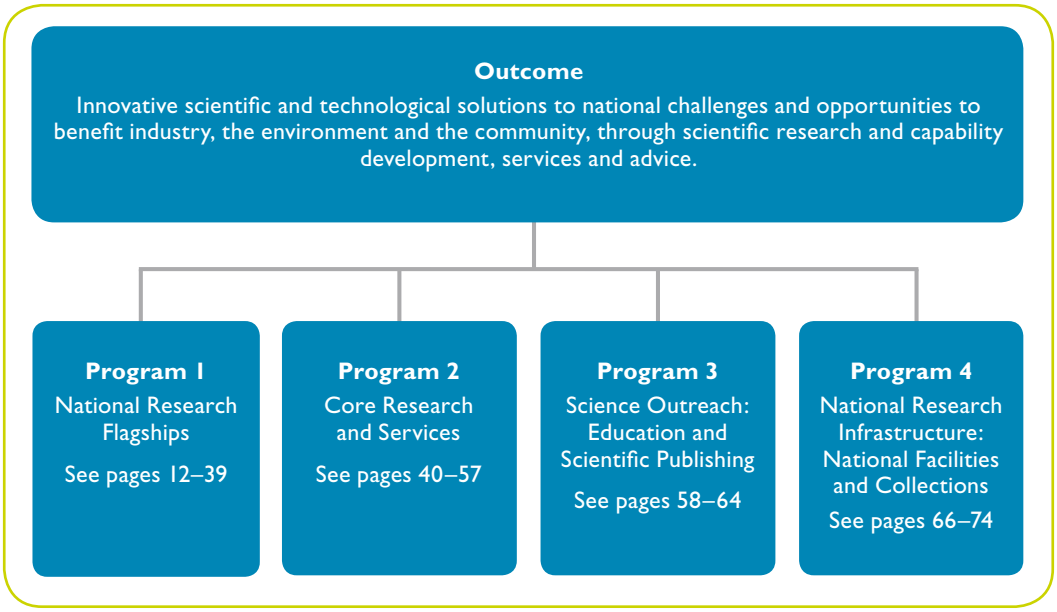
Portfolios: Food Futures Flagship; Preventative Health Flagship; Sustainable Agriculture Flagship; Entomology; Food and Nutritional Sciences; Livestock Industries; Plant Industry.

Divisions: Entomology; Food and Nutritional Sciences; Livestock Industries; Plant Industry.

The Agribusiness Group serves large and vital sectors of the Australian economy including the agrifood and fibre industries and the human health sector. In particular, the Group is responding to a strong demand for science-based solutions to global problems for humanity (food security, response to climate change, human health) that have a significant dependence on advances in biology. The Group's objective is to improve human wellbeing and community health by performing world-class and strategic research.

[3] *From July 2010 Agribusiness Group was renamed Food, Health and Life Science Industries; and Entomology merged with Sustainable Ecosystems to become Ecosystem Sciences within the Environment Group.*

Figure 2.1: CSIRO's Outcome and Programs



The Group also carries responsibility for policy oversight of biotechnology/bioeconomy, including regulation of gene technology research.

Energy Group

Portfolios: Energy Transformed Flagship; Wealth from Oceans Flagship; Coal Technology; Petroleum and Geothermal.

Divisions: Earth Science and Resource Engineering; Energy Technology.

The Energy Group is developing and applying leading-edge research to meet the triple goals of clean energy, energy security and wealth creation from energy in Australia and the region. Their priority is to help accelerate large-scale greenhouse gas emissions cuts, while achieving a smooth transition to a new energy future.

The Group also focuses on understanding Australia's oceans and their biodiversity, resources and relationships with the climate system.

Environment Group[4]

Portfolios: Climate Adaptation Flagship; Water for a Healthy Country Flagship; Biodiversity; Marine and Atmospheric Research.

Divisions: Land and Water; Marine and Atmospheric Research; Sustainable Ecosystems.

Australians have stewardship of a beautiful, diverse and unique environment. However, the cumulative effects of the past 200 years of natural resources development has left a legacy of environmental challenges juxtaposed with opportunities for new economies.

The Environment Group is responding to these challenges and opportunities by providing systems understanding, developing and applying new technologies and supporting our clients, partners and stakeholders in balancing economic development with ecological conservation.

Information Sciences Group

Portfolios: Astronomy; Australian Square Kilometre Array Pathfinder (ASKAP); Digital Technologies and Services.

Divisions: Astronomy and Space Science; Information and Communication Technologies (ICT) Centre; Mathematics, Informatics and Statistics; Information Management and Technology (IM&T).

The Information Sciences Group contains the core of CSIRO's research in the space sciences, information communication technology and mathematical sciences sectors. Each Business Unit within the Group has a unique focus:

- CSIRO Astronomy and Space Science: understand the universe and its origins.
- ICT Centre: develop globally applicable technologies to drive productivity gains in all sectors of the economy.
- CSIRO Mathematics, Informatics and Statistics: to develop innovative technologies and services through mathematical and information sciences research.
- IM&T: business support, data management and implementation of eResearch.

Manufacturing, Materials and Minerals Group[5]

Portfolios: Future Manufacturing Flagship; Light Metals Flagship; Minerals Down Under Flagship; Materials, Science and Engineering; Molecular and Health Technologies.

Divisions: Materials Science and Engineering; Molecular and Health Technologies; Process Science and Engineering.

[4] *Entomology merged with Sustainable Ecosystems to become Ecosystem Sciences within the Environment Group.*

[5] *From July 2010, Molecular and Health Technologies merged into Materials Science and Engineering.*

The Manufacturing, Materials and Minerals Group contains the core of CSIRO's research in the materials, manufacturing, minerals, mining, chemicals, health and infrastructure sectors. The focus of the operational units in the Group is to:

- stimulate and support the creation of sustainable value from Australia's minerals resources over the whole value chain
- maximise value to the manufacturing sector by developing and transferring innovative transformational technologies
- develop new materials and products for application in the health and chemical industries.

Corporate Groups

Enterprise functions provide critical support to both the development of research capability and the delivery of Theme outputs. These include the science outreach and education activities and the provision of support services, such as laboratory management, finance and accounting, property management, strategic and operational human resources capability (including leadership development), communications, procurement, legal and contract administration services, business development, technology transfer and licensing, intellectual property management and management of information technology systems.

Also critical is the development and communication of effective strategy and governance processes that help to guide CSIRO staff in fulfilling their duties, focus key management decisions and nurture valuable relationships with key stakeholders.

Mapping CSIRO's Programs to Research Groups and Portfolios

The research groups contribute to government programs by taking responsibility for a number of research portfolios as shown in Table 2.1.

Table 2.1: CSIRO's portfolios as at June 2010

CSIRO Budget Programs				
CSIRO Operating Groups	Program 1 National Research Flagships	Program 2 Core Research and Services	Program 3 Science Outreach	Program 4 National Research Infrastructure
Agribusiness[a]	• Food Futures • Preventative Health • Sustainable Agriculture	• Entomology • Food and Nutritional Sciences • Livestock Industries • Plant Industry		• Australian Animal Health Laboratory
Energy	• Energy Transformed • Wealth from Oceans	• Coal Technology • Petroleum and Geothermal		
Environment	• Climate Adaptation • Water for a Healthy Country	• Biodiversity • Marine and Atmospheric Research		• Marine National Facility • National Biological Collections
Information Sciences		• Astronomy • ASKAP • Digital Technologies and Services		• Australia Telescope National Facility Operations • Canberra Deep Space Communication Complex
Manufacturing, Materials and Minerals	• Future Manufacturing • Light Metals • Minerals Down Under	• Materials Science and Engineering • Molecular and Health Technologies [b]		
Corporate			• Discovery Centre • CSIRO Education • **CSIRO** PUBLISHING	

[a] *Agribusiness was renamed Food, Health and Life Science Industries from July 2010. Entomology and Sustainable Ecosystems merged to become Ecosystem Sciences.*

[b] *Molecular and Health Technologies merged into Materials Science and Engineering from July 2010.*

Enterprise performance

CSIRO's enterprise performance is measured against the five elements of the CSIRO strategy outlined on page 2. To put the strategy into effect in 2009–10, CSIRO's Operational Plan identified 15 key organisational objectives requiring focused executive action. Progress against these objectives is summarised in Table 2.2.

Table 2.2 Progress against key organisational objectives 2009–10

Key organisational objectives	Summary of progress
Delivering on national challenges	
Sharpen delivery through a focus on goals and leadership of the National Research Flagships.	Significant progress has been made towards achieving this objective, activities this year include: • The Sustainable Agriculture Flagship commenced operations on 1 July 2009. The new Flagship addresses agricultural productivity and food security in a resource/carbon constrained world – see pages 34–35. • CSIRO's research in the Energy area was repositioned during the year. The Energy Transformed Flagship (ETF) now focuses solely on alternative energy research, see pages 22–23. Coal research moved to a new Coal Technology Portfolio. Gas and geothermal activities ETF and Wealth from Oceans Flagship relocated to a new Petroleum and Geothermal Portfolio. • All Flagships have a roadmap that broadly communicates the path towards their goal. The current position on each roadmap is provided on pages 21–39. • Independent expert reviews of five Flagships – Food Futures; Light Metals; Minerals Down Under; Preventative Health; and Water for a Healthy Country – were conducted as planned. Review outcomes were largely positive and indicated that scientific work in Flagships were of a high standard, see pages 18–19.
Grow Flagship impact through partnerships with greater focus on global, national and small to medium enterprise partners.	This year we focused on identifying opportunities for partnerships with government and industry. As a result: • Flagships have secured significant opportunities including an alliance with Orica Ltd, a renewal of the BLUElink (ocean forecasting system) program, further work on sustainable yields (water resource assessment projects) and a significant titanium project with General Electric Company. • Four new Flagship Collaboration Fund Clusters were established, involving four international universities and 12 national universities, see page 176–178. • Future project opportunities have been identified out to the year 2020. Over 70 per cent of the concepts are aligned with Flagships. CSIRO's executive and commercial communities are now working to pursue these opportunities.

Key organisational objectives	Summary of progress
Increase the rigour and external ownership of CSIRO's broad direction setting by more inclusive involvement of key NIS stakeholders.	The broad direction setting document is the key document used to guide decision-making in relation to science investments and is reconsidered annually as the first part of the investment process. In 2010, CSIRO conducted an extensive process of engaging directly with external stakeholders in relation to future trends in the social and technology field. This included engagement with stakeholders across government, community and industry sectors. The process was led by the Chief Executive Officer and Board members and was very well received by participants. The document used to facilitate these discussions – *Megatrends and megashocks: A new view of our future world* – has been published, see: www.csiro.au/news/Megatrends-and-megashocks-a-new-view-of-our-future-world.html. The outcomes from this stakeholder engagement will be fed into the science investment processes for the 2011–12 financial year.
Exploring new horizons	
Increase CSIRO's capacity to explore 'new horizon' science. Establish and nurture mechanisms to catalyse more interaction between CSIRO's diverse set of capabilities with a view to exploring novel science opportunities and applications.	To grow CSIRO's capacity to explore 'new horizon' science we aim to increase funding to our capability development funds, transformational capability platforms (TCPs) and our science excellence scheme. This year: • the TCPs continued to operate effectively although the targeted increase in funding was not achieved. All four TCPs are now well established with an exciting program of research connecting scientists across multiple Divisions, see page 106. • the Office of the Chief Executive's Science Excellence Scheme continues to provide a successful mechanism for attracting and nurturing scientists in CSIRO. Funding targets were met in 2009–10 and will increase in 2010–11 to take on responsibility for the administration of the Science and Industry Endowment Fund (SIEF) scholarships and fellowships. • CSIRO continues to grow the number of postgraduate scholarships and the postdoctoral fellowships to a five-year high, see page 58. CSIRO encourages interaction amongst staff through a number of initiatives such as 'communities of practice'. This year CSIRO developed communities of practice across research areas and corporate functions to connect staff working across 56 sites. These communities met regularly, often using web-related technologies to discuss developments in their areas of focus. They also hold CSIRO-wide conferences and workshops.

Key organisational objectives	Summary of progress
Conducting science with impact	
Increase alignment of capability with our strategy and goals.	The science investment prioritisation for the 2010–11 direct research budgets was conducted during December 2009 – May 2010 and resulted in a number of significant shifts in investment. A smaller funding envelope resulted in reduced funding for some research Themes and put pressure on direct capability investment. Information from external Divisional and Flagship reviews was used to inform decisions on which Themes would receive reduced funding.
Increase adoption of our science for National and Global impact.	Increasing the adoption of CSIRO science is an ongoing objective. A key step is to carefully plan for impact and monitor and evaluate progress. Activities undertaken in 2009–10 towards this objective include: • Reviewing the potential use of the SAP 'Research Project Management' module to integrate our planning and monitoring processes. This work is ongoing. • The Board Commercial Committee approved an external and commercial engagement policy and guidelines. This policy provides a framework and supporting material to improve CSIRO's approach to engaging externally. The guidelines cover transactions and contract approvals, governance, delivery and capability identification and pricing.
Build enduring and meaningful partnerships across the NIS to ensure effective translation of CSIRO research into impact.	In 2009–10, we undertook to position CSIRO as a leader in climate modelling, marine research and clean/green technologies. During the year, we developed several major partnerships in these research areas. For example: • The Bureau of Metrology and CSIRO have led the ongoing development of the Australian Community Climate and Earth-System Simulator (ACCESS), which is now the accepted national platform for earth system simulation. • CSIRO continues to play a vital part in the Integrated Marine Observing System (IMOS), Marine Biodiversity Hub and the Great Barrier Reef 'eReefs' pilot project. • CSIRO has signed a Collaboration Framework Agreement with agencies in China and Japan to foster research collaboration into coal bed methane production.

Key organisational objectives	Summary of progress
Harnessing One-CSIRO	
Implement strategies to deliver zero harm in the CSIRO workplace and a carbon neutral footprint for the Organisation.	Initiatives for the creation of a zero harm safety environment and progression of the Environmental Sustainability Strategy are on track. Activities this year included: • a review of health, safety and environment (HSE) services to improve delivery • health, safety and environment training for 250 CSIRO leaders • the completion of energy, water and waste audits • the installation of an environmental data management system • the introduction of green power supply arrangements to increase green power use from 15 per cent in 2009 to 25 per cent in 2012, see page 101.
Create a consistent set of values across CSIRO which underpin a safe, innovative, responsive and collaborative working environment.	Activities to embed a values compass (see page 108), in CSIRO are on track and include the integration of the values into Human Resources management systems, such as rewards, recruitment, development and personal performance appraisals.
Deliver strategies to ensure a resilient and sustainable organisation.	Activities undertaken this year to ensure that CSIRO remains a resilient and sustainable organisation included: • implementation of planned changes to the communications and commercialisation functions to improve service delivery • a 'national footprint' project which has provided a clear picture of CSIRO's current infrastructure and partnerships across Australia and identified opportunities to establish strong capability partnerships into the future • a detailed study of CSIRO capital expenditure requirements. A Capital Management Plan will now be prepared to guide future capital expenditure allocations • the development of an improved framework for commercial engagement including standards and guidelines which are being rolled out across CSIRO.
Develop 2011–2015 Strategic Plan and approach to the 2011–2015 Quadrennium Funding Agreement (QFA)	A QFA steering committee and working group met regularly to coordinate preparation of the CSIRO Program Review, the 2011–15 Strategy and related communication and stakeholder engagement activities. The Program Review is on track for completion in September 2010 and the Strategy in the first half of 2011.

Key organisational objectives	Summary of progress
Building our people, capability and scientific excellence	
Establish an appropriate balance of investment between capability development and Portfolio delivery.	CSIRO must continue to develop and maintain high-quality research capabilities (including world-class scientists, facilities and collaborative relationships). Most capability is developed in the course of pursuing the objectives of our challenging research Themes. In addition, around 11 per cent of CSIRO research funding is directed towards direct capability funding via three mechanisms: transformational capability platforms (TCPs), Divisional capability development funds and Office of the Chief Executive Science Team. Total expenditure on direct capability investments was around eight per cent. Targets were met for the Science Team's capability development activities, but funding for Divisional capability development funds and transformational capability platforms fell below target.
Build effective workforce plans to ensure alignment of capability with strategy.	Most CSIRO Business Units (Divisions and Corporate functions) have now developed and implemented comprehensive Capability Development and Workforce Plans. These documents specifically address succession planning issues and the creation of capability development funds.
Through new leadership, increase CSIRO's focus on the development and maintenance of national facilities and collections.	During 2009–10, the major National Biological Collections, (see pages 66–74) have been managed together as a stream within CSIRO's newly formed Biodiversity portfolio. Dr Joanne Daly has been appointed to a new role, commencing early 2010–11 to establish a strategic framework and sustainable investment model for managing the collections.

Program 1– National Research Flagships

The National Research Flagships program addresses major national challenges and opportunities through large-scale multidisciplinary research partnerships. One of the largest research endeavours ever undertaken in Australia, Flagships extend traditional models of science to deliver scientific solutions to advance Australia's most pressing national objectives.

Recognising that complex challenges requires collaboration of the best and brightest researchers, the Flagships form partnerships with Australian Universities and publicly funded research institutions, the private sector and selected international organisations.

Flagships target clearly defined goals, framed from a deep analysis of the needs of people and enterprises. Flagships operate on a large-scale and long timeframes and have a strong focus on adoption and impact. Ten Flagships were operational in 2009–10.

The work and achievements of each Flagship is showcased on pages 20–39.

Flagship	Launched	Page
Climate Adaptation Flagship	July 2008	20
Energy Transformed Flagship	October 2003	22
Food Futures Flagship	March 2004	24
Future Manufacturing Flagship	September 2009	26
Light Metals Flagship	June 2003	28
Minerals Down Under Flagship	May 2008	30
Preventative Health Flagship	September 2003	32
Sustainable Agriculture Flagship	February 2010	34
Water for a Healthy Country Flagship	May 2004	36
Wealth from Oceans Flagship	August 2004	38

National Research Flagships: Key Performance Indicators (KPIs)

The following pages provide a report on the key performance indicators set for the National Research Flagships Program in the Portfolio Budget Statements.

KPI 1 – Evidence of growing economic, social, environmental and intangible benefits through demonstrated adoption of Flagship outputs.

KPI 2 – Maintain or increase the number of publications.

KPI 3 – Maintain or increase financial support by Flagship partners.

KPI 4 – Maintain customer satisfaction.

KPI 5 – Investment of the Flagship collaboration funds as per agreed guidelines.

Improve your health with CSIRO's new barley

After nearly 12 years of research, CSIRO has produced BARLEYmax™ – a natural wholegrain developed specifically to provide enhanced nutritional benefits for Australians.

In the late 1990s, CSIRO researchers developed a diverse collection of new barley variants in a project originally aimed at understanding the role of plant hormones.

The potential of this collection, together with CSIRO's research on understanding the genetic pathways of starch biosynthesis to create new barley types, was recognised and barleys with diverse starches and other dietary fibre components were identified. From this work came *BARLEYmax* – a grain with high levels of resistant starch and the potential to improve health.

Under the Food Futures National Research Flagship, an extensive program of experimental studies and human trials found a range of foods with *BARLEYmax* as their key ingredient had a low glycemic index and produced positive changes in a range of biomarkers of bowel health.

With twice the dietary fibre of current grains, four times the resistant starch and a low glycemic index, *BARLEYmax* offers many potential health benefits for the consumer. It also improves texture and enhances flavour with a pleasant 'nutty' taste distinguishing it from other grains.

BARLEYmax grains are having impact along the value chain (by providing speciality grains on farm that command premium prices, providing new opportunities in food product manufacturing, and delivering potential health impact for consumers) and have the potential to add significant value to the Australian economy, well in excess of $100 million per annum.

Two *BARLEYmax* breakfast cereals, developed by an Australian food manufacturer, are now available on supermarket shelves across Australia and a range of additional products is planned.

BARLEYmax is low GI and has twice the dietary fibre and four times the resistant starch of current grains. Credit: Carl Davies

'*BARLEYmax* offers many potential health benefits for the consumer.'

KPI 1 – Evidence of growing economic, social, environmental and intangible benefits through demonstrated adoption of Flagship outputs.

A variety of methods are used to demonstrate the adoption and impact of CSIRO's products and services including user surveys, economic analysis and testimonials. Benefits may be economic, social or environmental and may or may not be expressed in dollar terms.

Independent evaluations of a small sample of CSIRO activities concluded with high confidence that CSIRO is delivering high-value for money. This value consists of a mix of benefits already flowing and a substantially richer set of forward opportunities for Australia to deal better with major risks and opportunities.

In 2010, CSIRO contracted ACIL Tasman to undertake an independent evaluation of the impact and value of CSIRO's activities. ACIL Tasman undertook an impact assessment of 12 case studies. The case studies are broadly representative of the range of activities undertaken by CSIRO in fulfilling its major roles. ACIL Tasman found that:

- CSIRO is delivering high-value for money. This value consists of a mix of benefits already flowing – through commercialisation arrangements, improved Australian industry competitiveness and more soundly-based policy development and Government investment – and a substantially richer set of forward opportunities for Australia to deal better with major risks and opportunities.
- CSIRO has beneficially changed the structure of Australia's innovation capabilities, as well as adding to the scale and scope of research and development efforts. CSIRO's involvement has allowed for greater concentration of multidisciplinary skills on important challenges for Australia.
- CSIRO has extracted high-value from years of capability development – while adding capability for future innovation.
- Focusing on activity and resultant outcomes over the last few years, where the level of investment in CSIRO has been around $5 billion (about two-thirds of this direct Government funding), the value of the outcomes and impacts has almost certainly been of the order of several tens of billions of dollars, with substantial upside potential.

Specific case study and vignette impacts and inferred values that underpin ACIL Tasman's estimates are given in the Table 2.3. More detailed treatments of the following case studies are included throughout this report:

- Resistant starch grains (Barley*max*™) – page 13
- Climate change adaptation – page 75
- Murray-Darling Basin research – page 85
- Prawn breeding – page 89

Table 2.3: Impact assessment case studies

Case study	Explanation
Climate Adaptation Flagship	High-value from reduced costs of dealing with climate pressures, and increased insurance against limited international mitigation response. Conservative value of $2 billion plus.
Prawn breeding and novel feed supplementation	Value of increases delivered in prawn yield of $430 million plus options to extend to other species. Royalty streams and export potential from the feeds; possible contribution to wild fish stock conservation values.
Cement substitutes and novel products	Plausible royalty streams of tens to hundreds of millions of dollars on competitive niche products underwriting the risks in pursuing a major opportunity for low-cost reduction in carbon dioxide emissions from cement production, in Australia and globally.
Murray-Darling Basin Sustainable Yields Project	Conservative estimate of $2.8 billion linked to more efficient deployment of the investment of funds already committed to buyback and water infrastructure efficiencies.
Resistant starch grains	Improved health outcomes for Australia from products already entering markets, plus expansion of Australian agriculture into grains that can command price premiums. Very conservative value estimate of $100 million, plausibly several times as much.
Titanium within Light Metals	With commercial partnerships in place, opportunities for TiRO and product fabrication suggests significant strengthening above an earlier ACIL Tasman assessment value of $275 million plus.
The UltraBattery	Commercialisation in place for automotive and stationary applications will support returns to CSIRO, with plausible revenue streams valued at tens of millions of dollars. More speculative, but potentially very high-value, via accelerated moves to lower emission vehicles and more effective use of renewables.
Agricultural Production System sIMulator (APSIM) and other agricultural production decision support systems	Immediate value through use by researchers to identify key risks, and ways of managing them and communicating these results to farmers. High potential for flow-on economic, social and environmental benefits.
Mapping undersea mineral deposits	Immediate cultural and policy value and longer term potentially high-value in supporting commercial off-shore exploration.
Biochar	CSIRO adding to a field now receiving substantial attention. Plausible role for biochar as a substantial contributor to lower cost abatement, given its complementarity with several aspects of farm production and with steel production, with potential value of many billions of dollars under a carbon target policy.

Case study	Explanation
Cross-CSIRO climate work	Currently the subject of an active proposal for a major coordinated program of activities that could deliver very high-value, but this value has not been explicitly quantified. Examined as an example of options for future evolution of the CSIRO portfolio, in this case covering adaptation, mitigation and forecasting.
Radio astronomy and the Square Kilometre Array (SKA)	High-value for Australia if wanting to participate in big science projects in a cost-effective way. This is a project where Australia appears competitive as a site for locating the international facility, with potentially large value in overseas contributions to remote area infrastructure, plus on-going employment. Net tangible value likely in excess of $150 million, in addition to the value of the science.

Source: ACIL Tasman (2010) Assessing the impact and value of CSIRO

KPI 2 – Maintain or increase the number of publications

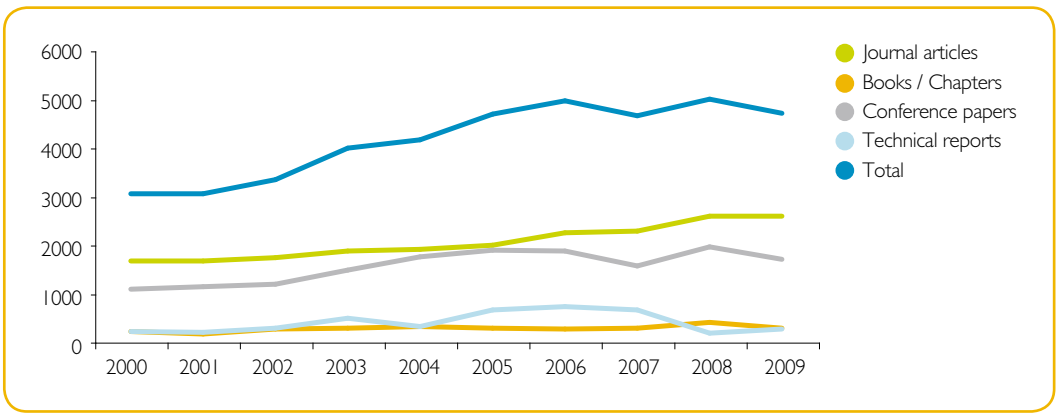
Where publications are defined as journal articles, books, book chapters, conference papers and technical reports.

The number of publications produced by CSIRO trended upward from 2000 to 2006. Since that time, journal articles have continued to increase while other categories of publications have been more variable year on year.

Figure 2.2 shows the trend in publication numbers for Program 1 and Program 2 combined. Roll out of a new electronic publications repository, 'e-Publish', began in 2009–10. When fully functional, e-Publish will enable publication numbers for each Program to be separately identified. Publication data for the last five years are provided in Appendix 6 (see page 190), which also includes data on the production of patents and other forms of intellectual property over the same period.

CSIRO's journal publication count represents 5.4 per cent of Australian scientific publications (down from 5.7 per cent in 2008–09 and 6.0 per cent in 2007–08). CSIRO is the eighth ranked Australian institution (in terms of publications) and its world ranking is 218 of 4,122 institutions (204 of 3,974 in 2008–09).

Figure 2.2: Number of publications by type



The total number of publications by CSIRO authors in leading journals *Nature*, *Nature* affiliates (e.g. *Nature Biotechnology, Nature Genetics*), *Science,* and *Proceedings of the National Academy of Sciences USA* for the past six years has remained relatively constant at around 20.

CSIRO's joint publications have increased over the past five years, both nationally and internationally. Joint publications with Australian universities have increased, from 478 publications in 2005 to 790 publications in 2009. Joint publications with our major international collaborators increased from 675 publications in 2005 to 1,156 in 2009.

KPI 3 – Maintain or increase financial support by Flagship partners

Amount of external revenue received by Flagships in real terms (constant 2008–09 $million)

Flagship partners continue to increase their financial support to National Research Flagships see Figure 2.3. Financial support increased by 33 per cent between 2008–09 and 2009–10.

CSIRO's total investment in the National Research Flagships is around $550 million. Of this, 31 per cent is from external partners. In contrast, in 2003–04 external revenue to Flagships accounted for seven per cent of total revenue.

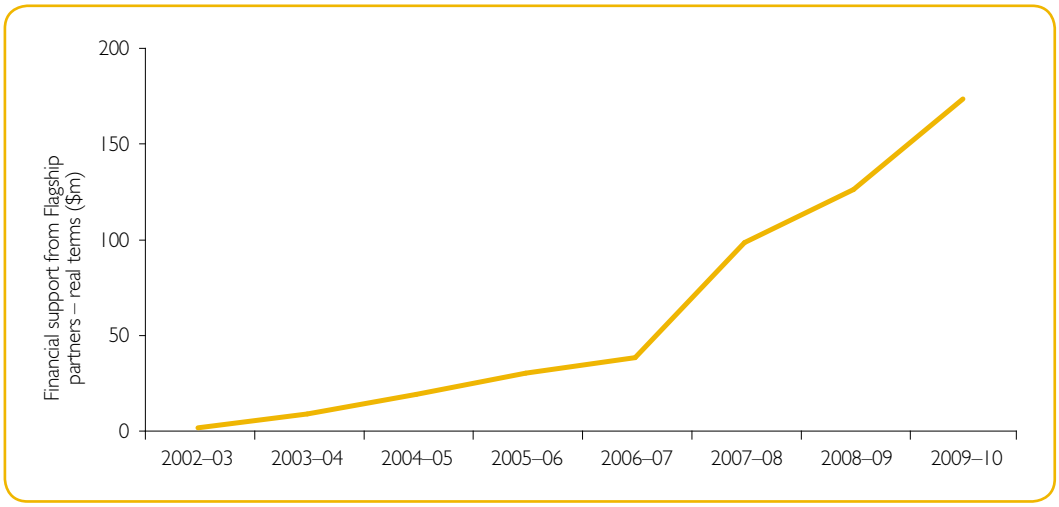
KPI 4 – Maintain customer satisfaction

Improve customer feedback based on customer value survey and qualitative feedback through client and stakeholder interviews.

Customers and stakeholders are satisfied with the professionalism and quality of CSIRO work. Areas for improvement include stakeholder communication and relationship management with partners.

Customer satisfaction, for Program 1 and Program 2 combined, has been determined through client and stakeholder interviews conducted by CSIRO senior executives who had no existing relationship with the client. Key findings of the interviews are:

Figure 2.3: Financial support from Flagship partners



- The feedback from clients and partners has been positive about the interview process and the willingness of CSIRO to listen and engage.
- At senior executive levels, relationships are positive and either stable or improving.
- The level of business with partners could grow.
- Engagement with partners should be more consistent and coordinated.
- Senior executive level strategic dialogue with their counterparts is important.

Additionally, in 2009–10 interviews were undertaken by an independent company with senior CSIRO stakeholders within the Australian Government, industry, peak body and university sectors. The key findings were that stakeholders rated CSIRO's professionalism and quality of work highly and rated their understanding of CSIRO's strategic direction as fair.

Over the past few years CSIRO has been carefully considering feedback to identify key areas of improvement in terms of how it engages externally. This has resulted in a number of improvements including more streamlined contracting, legal and approval processes. More recently the Board Commercial Committee approved a new external and commercial engagement policy and supporting guidelines which is currently in the process of being implemented. This policy puts in place a framework and supporting material in relation to transactions and contract approvals, governance, delivery and capability identification, and pricing.

CSIRO has recently initiated an external review to help identify the future operating model for relationship management and Business Development at CSIRO, and to map out the resources and changes required.

KPI 5 – Investment of the Flagship Collaboration Funds as per agreed guidelines

Investment of Flagship Collaboration Funds in 2009–10 was consistent with the agreed guidelines.

Collaboration is a key principle of the Flagship initiative. To develop collaborative partnerships, the Australian Government allocated $114.5 million over seven years to a Flagship Collaboration Fund. The Flagship Collaboration Fund includes a contestable collaborative research program (which offers funding for Flagship clusters and projects), visiting fellowships and postgraduate scholarships. For more information see: www.csiro.au/org/FlagshipCollaborationFundOverview.html

At the end of 2009–10, around $56 million has been disbursed from the Flagship Collaboration Fund. Overall, 84 per cent of the initial $114 million has been committed to scholarships, fellowships, projects and clusters.

In 2009–10, four new clusters involving 16 national and international universities and industry partners were approved for funding. See Appendix 1, (page 176) for a full list of Flagship Collaboration Clusters.

Additionally, a review of the Flagship Collaboration Fund was undertaken in 2010. Results are given on page 103.

External, expert reviews

To maximise the likelihood of achieving the planned outputs and outcomes of the National Research Flagships Program, CSIRO has instituted a program of Flagship reviews by external, expert review committees. This rigorous and independent process involves a review of each National Research Flagship,

three to four years after it is established, by independent experts, from both Australia and overseas. The reviews are prospective and output and outcome oriented. Results of the reviews are considered and responded to by senior research leaders and implementation of each Flagship's response to the recommendations is monitored by the CSIRO Executive.

Five Flagships were reviewed in 2009–10: Food Futures, Light Metals, Minerals Down Under, Preventative Health and Water for a Healthy Country.

The overall findings of review panels were positive and there were a number of common findings. All review panels found that Flagships were successful in bringing together multidisciplinary teams of expert researchers to achieve the goals of Flagship research Themes. The scientific work was generally of a high standard and panels commented frequently on the Flagship's world-leading quality.

For all Flagships external collaborators and stakeholders were extremely positive about their interactions with Flagships. The operation of Flagship Collaboration Fund programs (see pages 176–178), involving capability teams in universities and elsewhere, was a strong point. In those cases where a Flagship research Theme had progressed along the development path in collaboration with industry, even to the first commercial activities, there were positive statements from review panels about the need for Flagships and their special role in delivery of outcomes from discoveries.

However, review panels also commented on the need for CSIRO to better balance the shorter term emphasis on delivery of outcomes and the longer term continuing development of research capabilities of the highest quality.

Climate Adaptation Flagship

Flagship goal:

To equip Australia with practical and effective adaptation options to climate change and variability and in doing so create $3 billion per annum in net benefits by 2030.

Research expenditure 2009–10: $42.8 million

Overview

Research by the Climate Adaptation Flagship ensures Australia can effectively adapt to the impacts of climate change and variability. CSIRO's leading scientists are working in partnership with governments, industries and communities to address this urgent national challenge. The Flagship is developing regional and national scale climate change projections and vulnerability assessments to support adaptation.

The Flagship is addressing urban coastal vulnerability in settlements by creating design, infrastructure and management solutions to enhance adaptive capacity. We are developing conservation strategies to maximise resilience in marine and terrestrial ecosystems and effective adaptation options for Australia's primary industries and rural regions. We also support the information needs of our neighbours in the Asia–Pacific in their efforts to adapt to climate change.

Achievements 2009–10

Climate Adaptation Futures International Conference

The first major international conference to focus solely on climate impacts and adaptation was held in Australia, co-hosted by the Climate Adaptation Flagship and the National Climate Change Adaptation Research Facility. Over 1,000 scientists and decision-makers showcased practical examples of government, industry and the community working with science to make decisions in the face of uncertainty about climate change impacts.

Practical climate adaptation for Australian primary industries

More than 30 authors contributed to *Adapting Agriculture to Climate Change: Preparing Australian Agriculture, Forestry and Fisheries for the Future*. Already in its second printing, the book is proving to be an invaluable resource to Australian primary industries. It describes the consequences of climate change in eleven sectors and outlines practical actions to adapt to the impacts and harness the opportunities from a changing climate.

Improving climate change projections for Indonesia

CSIRO and the Indonesian Bureau of Meteorology have converted broad-scale climate change projections for south-east Asia into local-scale regional information. This assists Indonesian agencies to make better informed decisions about how to respond to potential impacts from climate changes.

Integrated assessments for south-east Queensland

Flagship scientists are developing new climate change projections and adaptation response scenarios through the South East Queensland Climate Adaptation Research Initiative. Bringing together key local research partners and stakeholders, the initiative has modelled how local energy demand is impacted by climate, and conducted first-pass vulnerability studies on human health, biodiversity, flooding and coastal hazards.

East Lake urban edge

CSIRO and the Australian Capital Territory government completed a detailed study that included climate impacts for wetlands at the urban edge. Based on the interface between an urban development area and the conservation value of the Jerrabomberra Wetlands Nature Reserve, the project developed a set of guiding principles and design considerations useful for other wetlands in urban renewal areas.

Adapting today's management for tomorrow's weeds

CSIRO has applied climate projections for the South Australian Department of Water, Land and Biodiversity Conservation to examine how weeds may shift in range across the State up to 2080. The project provided detailed profiles for 13 weed species and identified options to adapt management strategies to tackle emerging weed challenges.

Climate Adaptation Flagship Roadmap

	Short term 1–3 years		Medium term 4–9 years	Long term 10+ years
Pathways to adaptation	Define new approaches to vulnerability and adaptation assessments.	Adaptive capacity of communities and industries assessed; innovative approaches to climate projections.	Identify social and economic adaptation outcomes within different sectors and regions.	Biophysical, social and institutional dimensions of adaptive capacity more effective for Australia.
Sustainable cities and coasts	Development of methods to assess climate risk and vulnerability in cities and coasts, and community adaptive capacity and governance.		Flexible models of utilities, social sciences and governance for climate adapted urban planning and management.	Planning, design, infrastructure, management and governance solutions for Australia's cities and coasts responding to climate change.
Managing species and natural ecosystems	Studies of regions, single species and simple species interactions.	Greater model realism. Focus on threats and tools to assist natural resource managers.	Complex studies of biotic interactions and community ecology. Refine tools for ecosystem managers.	Deliver adaptation options to protect Australia's marine and terrestrial species and ecosystems from the impacts of climate change.
Adaptive primary industries, enterprises and communities	Improve analysis of interaction between climate drivers and management responses on farms.	Develop technologies and practices for local industry adaptation.	Shifts in vulnerability to climate change understood. Identify when transformational options may be needed.	Adaptation strategies provide economic benefit and improved livelihoods for primary industries, enterprises and communities.

Current Position

Energy Transformed Flagship

Flagship goal:

To halve greenhouse gas emissions and double the efficiency of the nation's new energy generation, supply and end use.

Research expenditure 2009–10: $35.1 million

Overview

Much of Australia's continuing growth and way of life is underpinned by access to affordable, secure and sustainable energy sources for electricity and transport. These two sectors combined, however, contribute 69 per cent of Australia's greenhouse gas emissions.

To secure Australia's environmental, economic and social wellbeing, it is imperative that we move quickly to identify pathways and solutions that will help reduce greenhouse gas emissions and improve energy security. This objective can only be achieved in close collaboration with industry, research organisations and government. The Energy Transformed Flagship, since its inception, has been a catalyst for this broad collaboration.

In 2009–10, the Flagship underwent a restructure, including the appointment of a new Director, Dr Alex Wonhas. The restructure focused the Flagship on renewable and alternate energy systems.

Achievements 2009–10

Australian zero emission house launched

Australia's Zero Emission House designed to fit the lifestyle, climate and budget of a typical middle income family, showcases off-the-shelf building and renewable energy generation technologies, and 'smart' energy management technologies.

Energy use in buildings is responsible for 26 per cent of Australia's greenhouse gas emissions – half of these emissions are from the residential housing sector. If all the new houses built in Australia between 2011 and 2020 were zero emission houses, 62 million tonnes of greenhouse gas emissions would be saved. The house was designed and built with partners Henley Property Group, Sustainability Victoria, and Delfin Lend Lease (see: www.csiro.au/science/Australian-Zero-Emission-House.html).

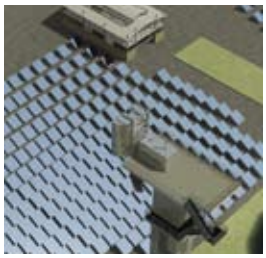
UltraBattery: no ordinary battery

CSIRO's UltraBattery is a cost-effective, longer lasting, efficient alternative to traditional batteries for hybrid electric vehicles and renewable energy storage.

In August 2009, the US Government granted East Penn Manufacturing, licensee of the technology in North America and Canada, US$32.5 million to accelerate the development of the battery for automotive use.

With regard to the UltraBattery's renewable energy storage applications, East Penn bought CSIRO start-up company Ecoult. As part of the agreement, CSIRO will receive royalties from the sale of UltraBattery products. (see: www.csiro.au/science/Ultra-Battery.html).

New solar tower and research facility under construction



In 2010, construction began on a new solar tower and research facility at CSIRO's National Solar Energy Centre in Newcastle, New South Wales. The new solar thermal field will pave the way for solar power of the future – solar power that only requires the sun and air to create electricity. Unlike most solar thermal power stations, CSIRO's Solar Brayton technology does not need water. This technology is therefore suited to many parts of Australia, and the world, which receive minimal rainfall (see: www.csiro.au/science/Solar-Brayton-Cycle.html).

Intelligent grid report into distributed energy

The Intelligent Grid report was the culmination of a three year research program examining the social, technological, environmental and economic value of distributed energy use in Australia. Distributed energy is a term that describes technologies and systems which provide local generation of electrical power (distributed generation), energy efficiency and management of when and how energy is used (demand management).

The ground-breaking report found the value of wide-scale deployment of distributed energy solutions could be as much as $130 billion by 2050 and that water usage associated with energy generation could be reduced by up to 75 per cent (see: www.csiro.au/resources/IG-report.html).

Energy Transformed Flagship Roadmap

	Short term 1–3 years	Medium term 4–9 years	Long term 10+ years
Carbon Futures	Develop models and reports to inform policy, industry and research; Undertake social attitude mapping; Hold a stakeholder energy forum.	Hold transport sector stakeholder forums; Undertake longitudinal and larger population social analysis studies; Commercialise software; Initiate integrated carbon assessment service.	Move to a low-carbon future by providing the tools and data to understand the technical and economic challenges for the stationary and energy sectors to 2020.
Sustainable Stationary Energy and Transport	Develop technologies for low-cost solar power production and energy storage. Prioritise potential fuel crops for large-scale, sustainable biofuels production.	Demonstrate significant technologies at pilot scale, with industry and government support.	Drive the cost-effective take-up of renewable electricity and transport fuels in Australia to 2020 and beyond and maximise the long-term renewables uptake to 2050.
Local Energy Systems	Develop low-emission distributed energy technologies. Identify and begin engagement with partners.	Develop distributed generation and efficiency options model to inform government and industry. Commercialise technologies.	Reduce greenhouse gas emissions by driving the uptake of distributed energy solutions, demand reduction and energy efficiency measures to 2020.

Current Position

Energy Transformed was restructured in July 2009 which resulted in a reduction and change of themes from four to three.

Food Futures Flagship

Flagship goal:

To transform the international competitiveness of the Australian agrifood sector, adding $3 billion annually, by applying frontier technologies to high potential industries.

Research expenditure 2009–10: $37.2 million

Overview

The Food Futures Flagship is working towards its goal by utilising a unique mix of CSIRO's in-house science capability, coupled with specialist input from strategically selected external partners and collaborators.

The Flagship is working along the value chain all the way from the farm to the consumer. It is achieving impact through the application of classical and molecular based breeding technologies to deliver new high-yielding and value-added grain, livestock and aquaculture species to farmers and the food industry. Consumers are benefiting through a supply of high-quality food products containing healthier food ingredients.

The Flagship's research teams form collaborative partnerships across CSIRO and with other research organisations and industry, to develop innovative technologies that will enhance existing agrifood industries and create new opportunities for Australia.

Achievements 2009–10

BARLEYmax™ launched

Breakfast cereals containing the BARLEYmax™ grain were launched into major supermarkets across Australia in August 2009. The *BARLEYmax* technology has been licensed for grain production to Austgrains Pty Ltd and for breakfast cereal manufacture to Popina Food Services. *BARLEYmax* contains twice the dietary fibre and four times the resistant starch of competitor grains and improves bowel and metabolic health (see case study page 13).

Prawn yields more than doubled

Ongoing research with elite stocks of selectively bred Black Tiger prawns has resulted in a step change in commercial performance and the generation of world record harvests. At one 50 hectare Gold Coast farm, the average pond harvest in 2010 was over 17 tonnes per hectare – more than double the best yield achieved anywhere in the world for farmed Black Tiger prawns (see case study page 89).

Cybernose® advances

Several major advances have been made towards delivering the *Cybernose*® – a device that can accurately detect and identify specific odours by combining the chemosensing ability of insects, such as the silkworm moth, with advanced engineering. The Flagship has developed ways of making

sensor proteins 'on demand' and can signal to an optoelectronic instrument when a specific chemical is detected. Sensitivity is approximately 1,000 times better than competing technologies.

Reducing salt and sugar

Two technologies have been developed that will allow sauce and soup manufacturers to reduce salt and sugar by up to 30 per cent without affecting the quality or taste of the final product. This research program is designed to significantly reduce salt and sugar levels to meet consumer demand and regulatory requirements, while still maintaining ingredient functionality and sensory quality.

Aquaculture feed from plant waste

Continued work with the novel aquafeed ingredient *Novacq*™, derived from low-value plant waste, has demonstrated a 50 per cent improved growth rate in farmed prawns compared with conventional fishmeal-based aquaculture feed products. This will dramatically improve returns to Australian prawn farmers and underpin the development of a new aquafeed ingredient production industry in Australia.

Crop yields increased

Research involving the genes that control starch development in cereal grains has led to the discovery of a novel way to increase grain yield and plant size in wheat crops. Reducing the expression of the glucan water dikinase gene in wheat, using CSIRO's RNAi technology, caused an unexpected beneficial change in plant growth and development. This work is now undergoing field trials and has major potential for increasing crop yield and improving sustainability.

Food Futures Flagship Roadmap

	Short term 1–3 years	Medium term 4–9 years	Long term 10+ years
Future grains	Optimise carbohydrate in grains, optimise omega-3 oils in plants and investigate genetic traits for improved quality and nutrition.	Combine beneficial traits for farmers and consumers, breed and commercialise long chain omega-3 oils in plants, and commercialise quality and nutrition traits.	Increase returns to Australia by $550 million per annum through enhanced grain quality attributes and human health benefits.
Breed engineering	Animal management systems adopted and breeding technology developed with commercial partners.	Industry adoption of testes cell transfer techniques, success of aquatic breeds and novel feeds and optimal genetics in livestock and aquaculture.	Boost the value of Australia's animal-based food industries by $350 million per annum for beef and $550 million per annum for seafood.
Designed food and biomaterials	Low fat foods, bioactives and separations achieved, biopolymer formulation rules created and naturally structured foods developed.	Design rules for new biomaterials and processing, healthier low-energy foods designed and commercialised.	Design healthier foods and reduce food production waste, increasing the value of Australian agrifood industry by $700 million per annum.
Quality biosensors	Development of test technology, odours predicting grape and wine quality identified.	Biosensor developed and adoption commenced in defence domain. Applications for food safety and quality in development. Flavour potential of wine grapes optimised.	Develop biosensor and improve current technology to optimise flavour in food and beverage value chain, adding $750 million per annum.

Current Position

Future Manufacturing Flagship

Flagship goal:

To provide transformational innovation for the Australian manufacturing industry, enabling outcomes that will ensure global competitiveness, enhance the manufacturing value chain and deliver high-value, export-oriented, environmentally sustainable products and services.

Research expenditure 2009–10: $32.6 million

Overview

CSIRO's Future Manufacturing Flagship will provide innovative technologies and materials to grow new manufacturing businesses, renew existing industries and help the Australian manufacturing sector address major national challenges such as energy, health, climate and waste.

The Australian manufacturing industry operates in a highly competitive global marketplace, with increasing competition from low-cost producers, global sourcing, fewer supply chains and the emergence of low-cost base economies, such as global manufacturing centres.

To address these challenges the Flagship, working with industry partners, is focusing on emerging manufacturing opportunities in flexible electronics, cleantech manufacturing and biomedical manufacturing. The Flagship is adopting an holistic approach that encompasses innovation together with market integration, to streamline the innovation pathway for Australian manufacturing, crucial to improving future competitiveness. Such an approach will support new, high technology green jobs of the future.

Achievements 2009–10

World record efficiency for organic solar cells

The Flagship, along with international partners in the Victorian Organic Solar Cell Consortium, have achieved world leading results for a new class of dyes used to develop thin film, solid-state, dye-sensitised solar cells. Researchers have achieved an energy conversion efficiency of 5.8 per cent which is an improvement of 14 per cent on previously reported results. Flexible organic solar cells are much cheaper and more efficient to produce. The technology has the potential to replace silicon in the next generation of solar collectors, enabling opportunities for new printing industries based on flexible electronics.

New lightweight concrete reduces greenhouse gases

Flagship scientists have developed a new lightweight, environmentally friendly geopolymer concrete material that will substantially reduce greenhouse gas emissions. For every 1,000-kilogram of manufactured concrete, geopolymer concrete uses 27 per cent less embodied energy, produces 50 per cent less carbon emissions and lessens the impact on the environment by 22 per cent compared to an equivalent Portland cement product. Geopolymer products are lightweight, fire-, blast- and acid-resistant, they are extremely strong and can also be used as an adhesive. Future development will see geopolymers applied to a wide range of cement products and applications.

New device helps diagnose colon disorders

Working closely with clinical research colleagues at the University of New South Wales and the St George Hospital in Sydney, the Flagship has developed a new device for the investigation of colon disorders such as chronic constipation. Based on optical fibre sensors, this new device provides significantly more information than previous technologies and promises to unravel the abnormalities that underpin the condition. Constipation is estimated to cost the global health system well in excess of US$7 billion per year, so potentially there are significant savings in overall health care by using this device. The project received the 2009 St George Hospital Clinical Research Project of the Year award.

Future Manufacturing Flagship Roadmap

	Short term 1–3 years	Medium term 4–9 years	Long term 10+ years
Biomedical manufacturing	Identify key market prospects for Australian biomedical manufacturing industry. Develop platform technologies.	Products gain appropriate regulatory approval and enter market.	Growth in the Australian biomedical manufacturing sector.
Cleantech manufacturing	Identify technologies for economically and environmentally sustainable construction materials and processes.	Deploy new platform technologies in partnership with industry.	Sustainable environmentally-conscious manufacturing in Australia.
Flexible electronics	New materials discovery. Device prototype optimisation and ruggedisation and scale-up.	Translate discoveries to create vibrant manufacturing industries based on flexible electronics.	Creation and growth of world-leading Australian companies in flexible electronics.

Current Position

The Future Manufacturing Flagship research portfolio was reduced from four Themes to three due to the transfer of the Nanosafety Theme to CSIRO's Advanced Materials Transformational Capability Platform in December 2009.

Light Metals Flagship

Flagship goal:

To lead a global revolution in light metals, doubling export income and generating significant new industries for Australia by the 2020s while reducing environmental impact.

Research expenditure 2009–10: $34.9 million

Overview

The Light Metals Flagship is exploring new ways to produce alumina, aluminium, magnesium and titanium, and the products made from them, so that manufacturers can reduce costs and greenhouse gas emissions and improve performance. The Flagship aims to make Australia the world leader in sustainable light metals production and manufacturing.

To do this, the Flagship relies on collaboration with industry and other research organisations, both in Australia and overseas. We work with associations such as AMIRA (an independent association of minerals companies), the Alumina Technical Panel, the Aluminium Association of Australia, the Australian and North American Die Casting Associations, and the International Titanium Association, as well as delivering leading light metals research through Cooperative Research Centres (CRCs).

The Flagship faces significant challenges in developing titanium and magnesium metal production industries for Australia. The globalised management of resource companies means that, increasingly, decisions on technology uptake and implementation are made outside Australia, and are subject to global economic constraints. To ensure that our technologies benefit Australia we need to present their advantages to a global audience.

Achievements 2009–10

Clearing the air

Sophisticated atmospheric chemistry measurements and meteorological modelling by CSIRO scientists helped resolve air quality concerns for a rural community in Western Australia. Working with the Western Australian Environment Protection Authority and the Wagerup Alumina refinery, CSIRO clarified the relationship between highly localised odour events, atmospheric conditions and refinery emission plumes, and helped the company to identify ways to reduce and avoid odour events.

Sustaining Australia's alumina exports

CSIRO research to improve the yield and quality of alumina particles, delivered through AMIRA, has provided potential annual savings of $150 million to the Australian alumina industry. Collectively the technologies offer a four per cent increase in asset utilisation. Process improvements from CSIRO help the Australian industry maintain its global position as the world's second biggest producer of alumina, and support annual export earnings of between $6–7 billion dollars.

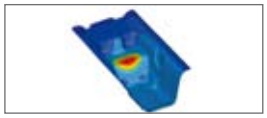
Reducing the cost of aluminium car parts

Nissan Casting Australia Pty Ltd (NCAP), Australia's largest exporter of aluminium automotive castings, is using CSIRO's CASTvac™ technology to improve productivity. CASTvac™ helps reduce costs associated with maintaining casting moulds (dies) and has been a significant contributor in NCAP maintaining its position as a major global car part supplier. CASTvac™ was developed by CSIRO in collaboration with the CAST CRC.

Titanium pipe plant for Australia

Frontline Australasia, a Victorian supplier to the automotive, aircraft and defence industries, has signed an agreement with CSIRO to establish a pilot plant for direct manufacturing of continuous seamless titanium pipe using cold spray. Assisted by an AusIndustry Climate Ready grant, Frontline and CSIRO scientists are further developing this application of cold spray technology. The pilot plant is expected to be the first Australian facility for fabrication of high integrity titanium items.

Safer mould shape eliminates hot splashes



CSIRO researchers have devised a safer, longer-lasting aluminium ingot mould design for Tomago Aluminium. The new design reduces ingot solidification time, improves mould life, and prevents boiling coolant water splashing onto molten aluminium in newly filled moulds.

Light Metals Flagship Roadmap

	Short term 1–3 years	Medium term 4–9 years	Long term 10+ years
Alumina	Develop more efficient and environmentally friendly production processes which support the existing alumina industry.	Scale-up of commercialisation of alternatives.	Building on Australia's bauxite resources to grow the share of global alumina production to 50%.
Aluminium production	Determine options for alternative paradigms. Identify response plans to reduce greenhouse emissions.	Develop more efficient cells and/or alternative production methods.	Reduce the global greenhouse impact (CO_2 equiv.) by 30% whilst improving cost-effectiveness.
Magnesium production	Improve electrolytic technology to enable a competitive smelter. Determine options for alternative paradigms.	Develop more asset efficient cells and/or alternative production methods.	Growth of a lowest cost quartile Australian Magnesium Industry to 20 kilotonnes per annum.
Aluminium and magnesium manufacturing	Develop processes and alloys for new cast and fabricated products.	Integrate process performance and alloy properties to reduce cost and weight.	Technologies that support internationally competitive semi-finished product and component industries in Australia.
Titanium	Define and trial pathways for reducing the cost of Ti production by 50%. Establish novel methods of fabrication and applications to enhance downstream industry.	Scale-up successful technologies. Complete integrated Ti plant.	Creation of a world scale (20kt pa) titanium industry, based on continuous processing and integrated with downstream manufacturing, in Australia.

Current Position

The 200 kilotonnes per annum goal for magnesium production has been revised to 20 kilotonnes in recognition of the changed industry outlook since Flagship inception. This is aligned with the outcomes of the 2009 external review of the Flagship.

Minerals Down Under Flagship

Flagship goal:

To assist the Australian minerals industry exploit new resources with an in-situ value of $1 trillion by the year 2030, and to more than double the size of the associated services and technology sector to $10 billion a year by 2015.

Research expenditure 2009–10: $77.5 million

Overview

The Minerals Down Under National Research Flagship focuses on technical challenges facing Australia's minerals industry.

This industry is central to the Australian economy, supplying raw materials, mining technologies and services around the world. However, Australia is facing mounting global competition while new deposits are not being found fast enough to replace those being extracted. Many of Australia's deposits are experiencing declining grades resulting in increased production costs, increased handling of ores with higher levels of impurities and increasing environmental pressure.

Working with numerous industry and research collaborators, the Flagship is helping to transform the economic and environmental performance of the Australian minerals industry through new concepts and technologies.

Achievements 2009–10

New technology for sustainable processing of slags

CSIRO researchers have developed a new method for treating slag, a waste residue from iron and steel making. The process could help the cement, iron and steel industries develop sustainable practices and derive value from waste. It could potentially reduce Australia's greenhouse gas emissions by about 1.8 million tonnes and save up to three billion litres of water each year.

Mineral maps of Australia

One of the Flagship's goals to enhance exploration effort is a new suite of publicly available 2D and 3D mineral maps of the Australian continent. This goal is now achievable with the development of new satellite, airborne and drill core logging hyperspectral technologies and related geoscience information processing and delivery systems.

Automated mining

In collaboration with industry, CSIRO is developing automated systems and telerobotic technologies to operate facilities at remote sites from one central location. Other developments include hard rock cutting, mine slope design global standards and automated mapping. These technologies offer improved safety, greater efficiency and increased productivity.

Automated analysis of minerals in iron ore

A new optical analysis system to automate identification of minerals and textures in iron ore. recognises minerals and ore textures based on colour and reflectance, hardness, porosity and mineral associations. The system removes the subjectivity associated with manual classification.

Recovering gold

CSIRO has developed a non-cyanide leaching and recovery process for some gold ores based on thiosulfate, and is assisting a major gold company to evaluate it. If successful, this will be the world's first demonstration of a thiosulfate leaching and resin in pulp process for recovering gold.

New analyser cuts complexity

Two x-ray based technologies have been combined to develop a new on-line analyser with nearly half the cost and complexity of using both. It combines the best of X-ray diffraction (XRD) and X-ray fluorescence (XRF), and can measure different elements and minerals, suiting it to a wide range of applications and industries.

Minerals Down Under Flagship Roadmap

	Short term 1–3 years	Medium term 4–9 years	Long term 10+ years
Driving sustainability through systems innovation	Develop concepts to reduce greenhouse gas and water use. Assess the implications of plausible futures.	Proof of concept for new eco-efficient technologies. New planning tools to support social licence to operate.	Demonstration of whole system approach. Social negotiation tools embedded in technology and project development.
Discovering Australia's mineral resources	Identify new exploration tools. Enable data interoperability. Build multi-party collaborations.	New 3D exploration tools developed and applied to buried deposits and new Greenfield sites.	3D visualisation, modelling and targeting embedded as an industry standard leading to new discoveries.
Transforming the future mine	Engagement with industry to develop innovative mining concepts and establish investment.	Field trials of novel automated continuous selective mining systems and integrated lightweight drill systems.	Adoption of new drilling, rock extraction and sorting systems. A vibrant mining technology services sector.
Securing the future of Australia's carbon steel materials industry	Develop infrastructure for precision iron ore and coke characterisation. Build relationships with industry.	Beneficiation and agglomeration process improvements being commissioned with resulting efficiency gains.	Low grade iron ores gaining traction in the Australian export market.
Creating wealth through advanced processing technologies	Laboratory testing of new ore characterisation, ore concentration and mineral/metal extraction techniques.	Continuous improvement of existing plant. Pilot plant and field trials of new techniques.	New ore reserves on-stream In-situ leaching viable. Australian mineral processing technology preferred.
Transforming productivity through on-line analysis	Collaborative projects for concept development. Technology trials with industry.	Industry partnerships for platform development. Spin-offs and commercialisation.	On-line analysis embedded in Australian operations with significant efficiency gains and reduced cut-off grades.

Current Position

CSIRO research in exploration, mining, mineral processing, minerals-related sustainability and metal production is now managed by the Minerals Down Under Flagship. The Light Metals Flagship retains light metals processing and production research. Minerals Down Under has expanded into an $80 million a year research portfolio with enhanced ability to facilitate larger scale projects, while providing a single CSIRO point-of-contact for most resource related activities.

Preventative Health Flagship

Flagship goal:

To improve the health and wellbeing of Australians and save $2 billion in annual direct health costs by 2020 through the prevention and early detection of disease.

Research expenditure 2009–10: $40.8 million

Overview

The Preventative Health Flagship is addressing our national health challenges in colorectal cancer and gut health; neurodegenerative diseases, mental disorders and brain health; and obesity and health.

In addressing these national health challenges, Flagship research teams are focusing on the early detection of neurodegenerative disease with imaging and physics. They are researching better methods of screening for, and early detection of, colorectal cancer. The teams are investigating new protective foods and how diet and lifestyle contribute to disease. The Flagship is working on better ways to monitor and measure health, including personalised nutritional and lifestyle approaches to disease prevention.

The Preventative Health Flagship is focusing on three specific targets to achieve its goal:

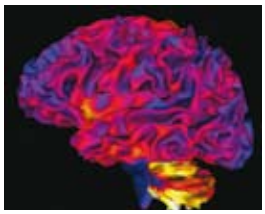
- Reduce colorectal cancer incidence by ten per cent, increase the five-year survival rate from 58 per cent to 65 per cent and lower by ten per cent the risk of inflammatory and infectious gut disease in Australia by 2020 through prevention and early diagnosis.
- Delay the onset of Alzheimer's and other neurodegenerative diseases in Australia by five years by 2020 through early detection and prevention, including lifestyle changes.
- Reduce the impact of obesity and associated complications on Australian adults and children by 2020, through the development and adoption of cost-effective, evidence-based lifestyle programs, novel food approaches and therapeutics.

Achievements 2009–10

Cutting-edge colonoscopy simulator

Colorectal cancer is a serious concern in Australia. Current figures indicate one in 22 Australians will develop colorectal cancer during their lives, one of the highest rates in the world. The Preventative Health Flagship, with collaborators, has developed a colonoscopy simulator which enables trainees to interact with accurate computer-based simulations of the human colon, allowing this complex procedure to be taught with no risk to patients. The simulator was developed by the Preventative Health Flagship in conjunction with the Australian e-Health Research Centre – a joint venture between CSIRO and the Queensland Government – and Ecole Polytechnique Fédérale de Lausanne in Switzerland. It was licensed to Swedish company, Surgical Science AB, which develops medical training tools using 'virtual' technologies.

Uncovering the early stages of Alzheimer's disease



CSIRO's Preventative Health Flagship established The Australian Imaging Biomarkers and Lifestyle Flagship Study of Ageing in 2006, in partnership with the University of Melbourne, the Mental Health Research Institute of Victoria, Edith Cowan University and Neurosciences Australia.

A major study stemming from this collaboration has provided new insights into the loss of structure in regions of the brain and its potential association with Alzheimer's disease. The findings suggest a build-up of deposits of the protein amyloid-beta in a region of the brain known as the temporal inferior cortex. The region is connected to the hippocampus, which is involved in memory. The results indicate that the increased accumulation of amyloid in the temporal inferior cortex disrupts connections with the hippocampus, causing the neurons to die. By helping better understand the mechanisms involved in the progression of the disease, the study may guide the development of new strategies for early diagnoses.

CSIRO Wellbeing Plan for Kids

The Flagship, in collaboration with Penguin Publishing, has released a publication to help families make healthy food and lifestyle choices for the all important formative years of growth. The *CSIRO Wellbeing Plan for Kids* provides families with guidance on children's activity and nutrition. The contents were developed following CSIRO's analysis of children's dietary intakes in the 2007 National Nutrition and Physical Activity Survey with the Commonwealth Department of Health and Ageing.

Preventative Health Flagship Roadmap

	Short term 1–3 years	Medium term 4–9 years	Long term 10+ years
Colorectal Cancer & Gut Health	New knowledge, Early Detection & Prevention, CRC & IBD.	Translation into marketable Diagnostics and Protective Foods.	Reduced morbidity and mortality from CRC & IBD in Australia.
Neurodegenerative Diseases	New knowledge about the aetiology and early detection of neurodegenerative disease.	Develop and commercialise neuroprotective agents and biomarkers for early detection and prevention.	Delay the onset of Alzheimer's and other neurodegenerative diseases in Australia by five years.
Obesity & Health	New evidence based lifecycle strategies for healthy weight – molecules to translation.	Establish programs to influence Australians' lifestyle behaviour through ICT systems, identify lead compounds for fat and energy regulation and design foods for satiety/low metabolic impact.	Healthier lifecycle eating behaviours, reduced impact of obesity and its complications.

Current Position

Sustainable Agriculture Flagship

Flagship goal:

To secure Australian agricultural and forest industries by increasing productivity by 50 per cent and reducing net carbon emissions intensity by at least 50 per cent by 2030.

Research expenditure 2009–10: $66 million

Overview

Australia's agricultural and forest industries have big challenges ahead to balance competing demands to increase production, reduce environmental footprints, mitigate greenhouse gas emissions and provide carbon biosequestration options.

The international demand for food is destined to increase in line with forecast rises in population and shifts in diet. At the same time, farmers are challenged with greater costs and/or reduced availability of nutrients, water and energy inputs.

Agriculture and forestry must achieve environmental, productivity and economic targets to ensure the sustainability of Australia's rural land use for future generations. Maintaining and enhancing healthy soils and ecosystems and developing eco-efficient agriculture and forestry are fundamental to these challenges.

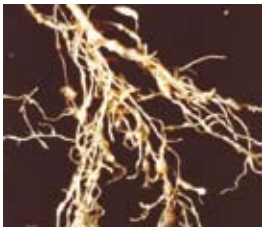
The Flagship was launched in February 2010, and is addressing these challenges in partnership with Australian industry, communities and government, as well as internationally, as part of Australia's contribution to global food security.

Achievements 2009–10

Storing greenhouse gases in rural Australia

The Flagship delivered an analysis of the potential for greenhouse gases to be stored or mitigated by changes in rural land use. The report provides the best available scientific information on mitigation strategies and carbon storage options for agriculture, forestry and rural land. This report was prepared for the Queensland Premier's Council on Climate Change (see: www.csiro.au/resources/carbon-and-rural-land-use-report.html).

Getting to the root of soil biological health



Root diseases cost the grains industry between $100–200 million a year, depending on seasonal conditions. The Flagship and its partners have found crops such as cotton, cereals and canola, can alter root zone microbiology in different ways. The Flagship is applying new molecular approaches to boost soil biological health. Researchers are developing crop specific beneficial micro-organisms which hold promise in lifting farm productivity and improving the efficiency of water and fertiliser use.

Sustainable development for Northern Australia

The Flagship took the lead in CSIRO's delivery of a comprehensive national science review on natural resource development in Northern Australia. Delivered to the Australian Government and the Northern Australia Land and Water Taskforce, the review investigated a range of climatic, land use, hydrological, conservation, Indigenous and governance issues and the complex interactions that occur. The review now informs planning and policy in government and industry (see: www.csiro.au/resources/Northern-Australia-Sustainable-Development.html).

Less water more food

In a significant national collaboration, the Flagship with the Grains Research and Development Corporation, industry partners and 19 regional farmer groups, is investigating new methods to increase water use efficiency on Australian grain farms. Early results have revealed how careful management of summer fallows can significantly preserve soil water and increase water use efficiency (see: www.csiro.au/science/Water-Use-Efficiency.html).

Sustainable Agriculture Flagship Roadmap

	Short term 1–3 years	Medium term 4–9 years	Long term 10+ years
Reducing net greenhouse gas emissions while increasing storage of new carbon in our lands	Assess mitigation practices and technologies in key industries, regions and systems.	Develop 'breakthrough' mitigation practices and technologies.	Profitable agricultural practices that contribute to GHG abatement are adopted by land managers.
	Develop greenhouse gas measurement, accounting and bio-sequestration support packages.	Total system greenhouse gas outcomes for different management, history, climate and soil combinations quantified with defined uncertainty and co-benefit assessment.	New carbon sinks created giving net increase in carbon sequestration with environmental and production benefits.
	Support national policy decisions and international frameworks on land use management for carbon storage and greenhouse gas mitigation.	Conduit for science and integration for industry and government.	National dialogue, policy and action are informed by robust science.
Advancing agricultural productivity and environmental health	Identify challenges and prospects for food and fibre productivity increases in key industries, regions and systems.	Direct links between genetics, breeding and farming systems research underpin accelerated improvements in food & fibre productivity.	Step-change in productivity achieved via industry adoption of agro-ecological innovations for 'smart' food and fibre production systems.
	Characterise resource and labour-use, soil and water constraints to sustained productivity.	Integrated whole-farm analyses support diverse sustainable enterprise options for efficient resource management.	More sustainable production practices adopted with gap between farm and benchmark resource-use efficiency significantly narrowed.
	Evaluate agro-ecological tradeoffs in farming systems for potential to improve productivity and NRM outcomes.	Assess environmental impacts of emerging productivity and mitigation practices, technologies and policies.	New markets developed and in use for effective on-farm environmental and biodiversity stewardship schemes.
Informing land use planning, policy and natural resource management	Observation of current status and historic change in key land management drivers.	Develop life-cycle based sustainability assessments for agri-food value chains.	Multi-scale temporal assessment of land use change.
	Enhance national soil and terrain data systems.	Triple bottom line modelling framework for land use systems.	International system for forest and carbon tracking.
Addressing global food and fibre security challenges through partnerships at home and abroad	Deliver enhanced science and impact via an integrated approach to international project portfolio.	Deepen partnerships with international R&D institutions leading to enhanced capacity building.	Monitoring and evaluation confirm realised sustainable livelihood benefits in target regions.

Current Position

Water for a Healthy Country Flagship

Flagship goal:

To provide Australians with solutions for water resource management, creating economic gains while protecting or restoring our major water ecosystems.

Research expenditure 2009-10: $93.2 million

Overview

The Water for a Healthy Country Flagship is addressing one of Australia's most pressing natural resource issues, the sustainable management of our water resources. The Flagship is Australia's largest research partnership focused on water in Australia. As demand for water increases, climate changes, and as economically and environmentally viable storage sites dwindle, Australia is looking to new strategies that manage demand, increase efficiency, re-use wastewater and allow water to be traded. Our science is informing the decisions on where and how to best invest in these options and is providing enabling technologies.

CSIRO's research is supporting some of the major water policy and strategies at national and regional scales including the National Water Initiative, the Reef Water Quality Protection Plan, the Living Murray Initiative, the Water for the Future Program and the Murray-Darling Basin Plan.

Achievements 2009–10

South Eastern Australian Climate Initiative

The South Eastern Australian Climate Initiative is a partnership between CSIRO and Australian and Victorian government research and policy agencies. The partnership aims to improve our understanding and projections of climate impacts on water availability in south-eastern Australia. The research will allow for better management and planning for the impacts of climate change and variability on water resources.

National guidelines for managed aquifer recharge

The Flagship provided knowledge to assist the National Water Commission to develop national guidelines for managed aquifer recharge in Australia. Managed aquifer recharge involves adding recycled water to an underground reservoir for storage and improved water quality. By developing guidelines for this process the Flagship is helping water managers ensure the safety of this innovative and environmentally-friendly treatment process.

Ecological outcomes for the Murray River

Flagship research is providing information that will allow water managers to improve delivery of environmental water to wetlands of international significance in the Murray-Darling Basin. The Murray-Darling Basin Floodplain Inundation Model will allow water managers to ensure water flows can be tailored to maximise environmental outcomes.

National standard for water data exchange

The Flagship and the Bureau of Meteorology have developed a new data transfer format which is enabling the Bureau to produce a clearer picture of Australia's water resources. The Water Data Transfer Format allows more than 200 data providers to efficiently provide more than six million electronic data files to the Bureau annually. This research will streamline the development of state-of-the-art water resources assessment and accounting systems.

Future sustainability of Australia's water resources

In 2008, the Council of Australian Governments commissioned CSIRO to undertake three new sustainable yields projects for northern Australia, south-west Western Australia and Tasmania. The projects have delivered the most comprehensive and complex water assessments undertaken for each of the regions. This knowledge is fundamental to the sustainable management of water in these three regions for current and future developments and for a future affected by climate change.

Water for a Healthy Country Flagship Roadmap

	Short term 1–3 years		Medium term 4–9 years	Long term 10+ years
Urban Water	Develop new tools and technologies for sustainable integrated management of water systems and infrastructure from city/regional to household level.	Inform state and national urban water policy through applied research of integrated urban water systems technologies.	Decision support systems, system performance knowledge, and new water management technologies to plan and deliver sustainable integrated urban water services.	To provide socially acceptable, affordable and environmentally beneficial management solutions for Australia's urban water systems.
Integrated Water Information Systems	In partnership with the Bureau of Meteorology, develop water reporting and forecasting tools. Develop sensor networks to improve real-time monitoring.	Enable water information interoperability through research investments in standards development, web service integration, semantic web and model interoperability.	Widely accessible national water information network based on open standards. Reporting and forecasting tools used in water demand regions.	Establish the platform for an Australia-wide network of integrated water information systems that deliver water accounts, assessments and forecasts.
Healthy Water Ecosystems	Establish a network of integrated models and evaluation tools and embed these in the adaptive management of high-priority water ecosystems.	Inland and coastal water ecosystems managed through the use of integrated knowledge platforms.	Significantly reduced long-term impacts of pollutants and changed flow regimes in priority water ecosystems.	To provide the knowledge to protect or restore Australia's major water ecosystems while enabling sustainable use of water resources.
Regional Water	Enable water savings in irrigation systems, and establish improved water efficiency and sustainability through improved surface and groundwater management options.	Develop options for improved institutional water use arrangements and evaluation of their economic, social and environmental consequences.	Achieve greater water supply certainty, enhanced substitution options, and improved productivity through integrated management of river basins and aquifers.	To provide systems knowledge and analysis tools for river basins and aquifers to ensure water security for all users.

Current Position

For the purposes of clarity, the Flagship has re-named the WRON Theme to the Integrated Water Information Systems Theme, which describes CSIRO's contribution to the original vision.

The Better Basin Future Theme has been renamed the Regional Water Theme. The new name is a clearer and simpler description of the Theme's research activities for both partners and stakeholders.

Wealth from Oceans Flagship

Flagship goal:

To position Australia by 2020 as an international benchmark in the delivery of economic, social and environmental wealth based on leadership in understanding ocean systems and processes.

Research expenditure 2009–10: $63.3 million

Overview

Australia is a marine nation, with one of the largest ocean territories in the world and a predominantly coastal population. CSIRO's Wealth from Oceans Flagship is focused on understanding our oceans and their biodiversity, resources and relationships with the climate system. The Flagship delivers science that enables governments, industries and communities to derive increased, sustainable benefits from Australia's ocean resources, while ensuring the conservation of Australia's marine biodiversity and coastal communities. It provides CSIRO's contribution towards national challenges where oceans play a central role.

The Flagship's core partners are Commonwealth and state government departments and agencies, where our science informs policy development and assists policy implementation across various sectors, such as oceans, environment, energy, fisheries and tourism. The Flagship also partners with industry and national and international universities, and participates in global collaborations.

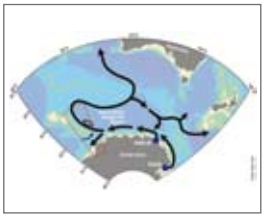
In 2009–10, the Flagship refocused and consolidated its research program. Many of the Flagship's general hydrocarbon projects moved to CSIRO's newly formed Petroleum and Geothermal Portfolio and the parent theme, Blue GDP, was closed. In addition, three older themes were rolled into two new ones (see Roadmap). The Flagship retains its interactions with the oil and gas sector through developing new technologies for offshore energy discovery. It is also building tools and frameworks to assist the industry develop more objective, robust and streamlined developmental approval processes.

Achievements 2009–10

World interest in Australian fishery impact method

An Australian method for assessing the environmental impact of marine fisheries has been adopted in the US, Canada, Ecuador and the Western and Central Pacific, and by the international eco-labelling organisation, the Marine Stewardship Council. The Flagship's ecological risk assessment method considers fish species that have been caught by accident, as well as threatened, endangered and protected species and their habitat. It contributes to the strategic assessment of fisheries and flags priorities for research, data collection, monitoring and management.

Massive Southern Ocean current discovered



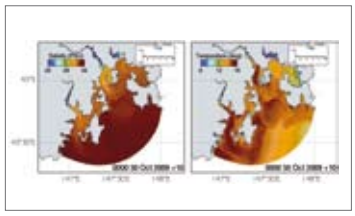
The Flagship, in collaboration with Hokkaido University, Japan, and the Antarctic Climate and Ecosystem Cooperative Research Centre, discovered a deep ocean current with a volume equivalent to 40 Amazon Rivers. The current is near the Kerguelen plateau in Antarctica, about 4,200 kilometres south-west of Perth. It is more than three kilometres below the surface and is an important pathway in understanding the global network of ocean currents that influence climate, now and in the future.

Finding sunken vessels; tracking oil slicks

BLUElink – the ocean forecasting system developed with the Bureau of Meteorology and the Royal Australian Navy – helped in the Australian and Queensland Governments' successful search for the Australian Hospital Ship *Centaur*, which was torpedoed in May 1943. The Flagship provided information to the expedition leader, David Mearns, about the unusual ocean conditions when the ship was sunk to focus the search area, and BLUElink forecasts to help him plan the search schedule.

BLUElink was also used by the Australian Maritime Safety Authority to monitor the oil slick following the Montara well blowout and spill in the Timor Sea.

Modelling coasts to support management



Decision-makers in several coastal regions of Australia are implementing the Flagship's sophisticated three-dimensional models that integrate biological and physical information. In south-east Tasmania, model results feed directly into sustainable aquaculture planning and have been incorporated into the Derwent Estuary water quality improvement plans. Through the South East Queensland Healthy Waterways Partnership, the Flagship is extending its water quality models to incorporate socio-economic interactions and world-leading ecosystem models and has engaged with stakeholders through workshops and interviews. This will aid planning in response to likely sea-level rises and coastal demographic changes.

Wealth from Oceans Flagship Roadmap

	Short term 1–3 years	Medium term 4–9 years	Long term 10+ years
The Dynamic Ocean	Gaps opportunities identified; tools, models being developed; partners committing funding.	Improved ocean-climate prediction; reliable forecasting systems operational; delivery to clients and public.	Oceans-climate knowledge delivering social, environmental and financial wealth to Australians.
Our Resilient Coastal Australia	New improved tools for: coastal observing networks; environmental assessment processes; management strategy evaluation; marine industries.	New coastal assessment tools implemented; multiple use management strategies applied; new technologies commercialised with industry.	Productive, resilient, sustainably managed coasts; new, environmentally friendly technologies delivering revenue to marine industries.
Sustainable Ocean Ecosystems and Living Resources	New, multidisciplinary, integrated tools underway for: sustainable commercial fisheries, spatial management, biodiversity conservation, threatened species assessment.	Integrated tools for ecosystem based fisheries management. National biodiversity management program including threatened species protection.	Australian and regional fisheries economically and environmentally sustainable; conservation and sustainable management of Australia's marine biodiversity.

Current Position

The Dynamic Ocean is one of the foundation themes of Wealth from Oceans and after nearly seven years is delivering outcomes and major impact nationally and internationally. The new themes build on prior portfolio knowledge, however, Our Resilient Coastal Australia represents a new focus and direction for CSIRO so is less advanced along its delivery path than Sustainable Ocean Ecosystems and Living Resources.

Program 2 – Core Research and Services

CSIRO's core research and services portfolios deliver new and improved technologies, management systems, intermediate and final products, catalyst services for business, advice relevant to policy development, and new knowledge and skills that benefit industry, the environment and community wellbeing.

Achievements from the core research and service portfolios are showcased on pages 48–57. Thirteen core research and services Portfolios were operational in 2009–10. They were, by Research Group:

Agribusiness Group[6]

Entomology

Integrates diverse biological sciences, from the level of the gene to the ecosystem, to deliver the knowledge needed for biosecurity and bioindustries.

Livestock Industries

Provides research solutions to increase the total factor productivity of Australia's livestock industries and to protect them against the threat of new and emerging diseases.

Food and Nutritional Sciences

Conducts research on food processing and food to support the health of the Australian community and the sustainability and viability of the Australian food industry.

Plant Industry

Promotes profitable and sustainable agrifood, fibre and horticultural industries through innovation and the development of new plant products.

[6] *Agribusiness was renamed Food, Health and Life Science Industries from July 2010. Entomology merged with Sustainable Ecosystems to become Ecosystem Sciences within the Environment Group.*

Energy Group

Coal Technology

Maximises the benefits from Australia's coal resources in an environmentally and socially responsible manner.

Petroleum and Geothermal

Supports a smooth transition to Australia's clean and secure energy future by optimising oil and gas exploration and production, and demonstrating the feasibility of geothermal energy use in Australia.

Environment Group

Biodiversity

Provides the data, tools and integrating knowledge to underpin a collective national effort to help halt biodiversity decline in Australia by 2020 and reverse this decline by 2035.

Marine and Atmospheric Research

Provides the earth-system science that creates new knowledge of Australia's climate, supports adaptation responses to increasing climate change and variability, and advises on mitigation strategies.

Information Sciences Group

Astronomy

Furthers the advancement of knowledge and understanding of the universe, to ensure the continuing world-class nature of the Australia Telescope and to exploit its unique southern location and technological advantages.

Australian Square Kilometre Array Pathfinder

Maximises returns to Australian science and industry through its participation in the international Square Kilometre Array (SKA) project and development of the Australian SKA Pathfinder.

Digital Technologies and Services

Provides the digital technologies and services that underpin national efforts in the delivery of globally competitive outcomes for society, government and industry.

Manufacturing, Materials and Minerals Group

Materials Science and Engineering

To transform existing Australian manufacturing industries to provide them with a sustainable, globally competitive future.

Molecular and Health Technologies[7]

Develops new technologies, with a focus on novel biological and chemical materials, to transform industries and improve health and wellbeing.

Core Research and Services: Key Performance Indicators

The following pages provide a report on the key performance indicators set for the Core Research and Services Program in the Portfolio Budget Statements and some additional indicators set in the CSIRO Operational Plan

KPI 1 – Evidence of economic, social, environmental and intangible benefits through demonstrated adoption of research outputs.

KPI 2 – Maintain or increase the number of refereed publications.

KPI 3 – Maintain customer satisfaction.

KPI 4 – Maintain or improve science excellence in CSIRO research capabilities

[7] *Molecular and Health Technologies merged into Materials Science and Engineering from July 2010.*

Additional indicators from the Operational Plan

PI 5 – Journal articles per researcher.

PI 6 – Proportion of journal publications in top-quartile journals.

PI 7 – Citations per paper compared to world rate.

PI 8 – Total citations compared to world rate

KPI 1 – Evidence of growing economic, social, environmental and intangible benefits through demonstrated adoption of Core Research outputs

For information on this performance indicator, see the achievements on pages 48–57 and the report on KPI 1 in Program 1, Page 14.

KPI 2 – Maintain or increase the number of publications and KPI 3 – Maintain customer satisfaction

For information on these performance indicators see pages 16–18.

KPI 4 – Maintain or improve science excellence in CSIRO research capabilities (proportion of capabilities rated benchmark or strong)

Independent review panels provide an assessment of the international competitive position of CSIRO Capabilities. This is done along two dimensions – in the international research community and the extent to which CSIRO's research results provide the scientific/technical means for leadership for those organisations adopting and using them.

The proportion of capabilities rated 'benchmark' or 'strong' in Round Two assessment is 63 per cent for industry dimension, 55 per cent for research / community dimension and 43 per cent when the two dimensions are combined.

A few factors complicate the reporting of this metric. First, in round one 17 Divisions were assessed between 2005 and 2007, see Figure 2.4. Round two commenced in late 2008. So far capabilities from 12 Divisions have been assessed, see Figure 2.5. A full comparison of results is difficult to undertake until the second round of assessments is complete. Capability groupings have also changed between the two rounds of assessment which further complicates direct comparisons.

Additionally, capabilities are made up of people, scientific infrastructure and relationships. Any change in the capabilities position may be due to any combination of these factors.

Overall the review panels were impressed with the quality of science across all the Divisions reviewed, see pages 106–107. The review panels found that the Divisions had strong capability areas of expertise, which were world-class in many parts of their programs. Some panels commented on deficiencies in research

Figure 2.4 – Capability assessments – Round 1

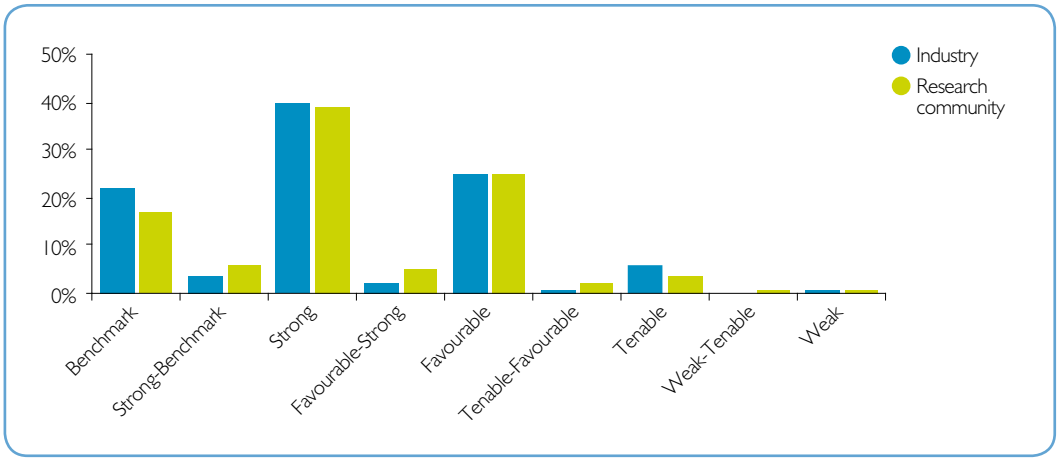
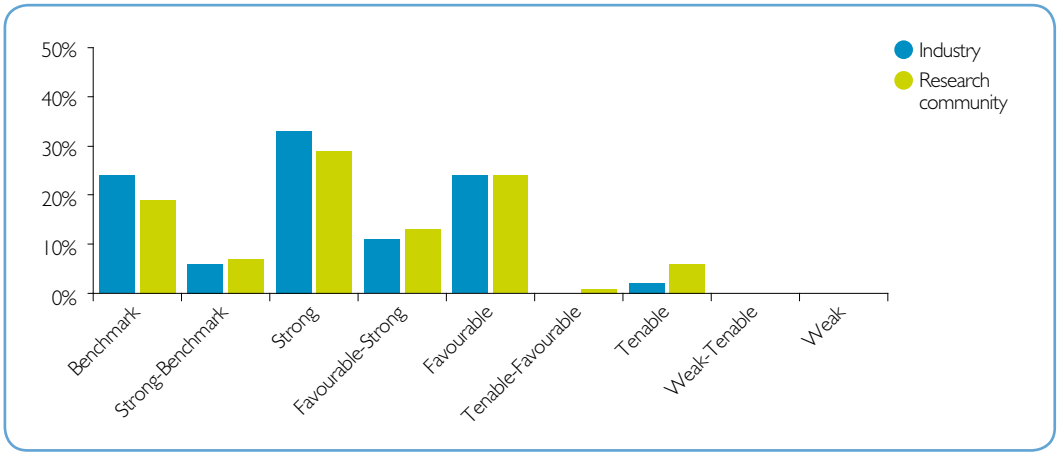


Figure 2.5 – Capability assessments – Round 2



infrastructure which was limiting CSIRO's research. Others commented on the need for increased investment in building new priority areas of research capability.

PI5 – Journal Articles per researcher

Journal articles are defined as articles and other items published as part of a journal (for example, an editorial or book review). Researcher is a staff member classified as research scientists/engineer + research manager + research consultant + senior specialist.

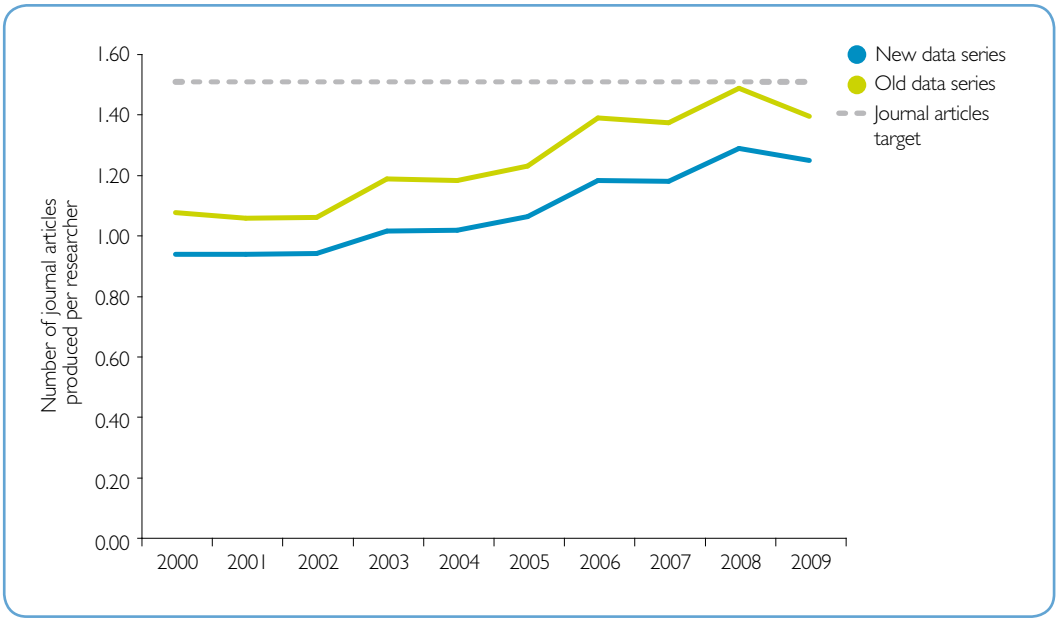
The number of journal articles per researcher has been trending upward toward the target of 1.5, albeit with a slight drop to 1.24 articles per researcher in 2009.

The method of calculation for this indicator has changed from the 2008–09 Annual Report. Previously researcher was defined as staff with a principal functional area of research scientist/engineer only. For comparative purposes Figure 2.6 shows the result using both the old and new indicators.

PI6 – Proportion of journal publications in top-quartile journals

Journals are divided into four equal groups or quartiles based on their average citation per publication rates over a five year period. An independent bibliometric analysis is conducted by the Australian National University (ANU) to determine the proportion of all CSIRO journal publications in each quartile.

Figure 2.6: Number of journal articles produced per researcher



The proportion of all CSIRO journal publications in the top-quartile between 1999 and 2003 was 33 per cent.

For the period 1999–2003 the proportion of CSIRO journal publications in the top-quartile (33 per cent) is slightly lower than the total Australian proportion (36 per cent) see Figure 2.7. However, CSIRO is at a disadvantage in this comparison as the full Thomson SCI journal set is used. The top quartile of this full journal set includes many high impact medical science journals. Medical science is an area in which CSIRO has little activity, with the overwhelming majority of medical science research in Australia being carried out in universities, medical research institutes and hospitals.

CSIRO has contracted the ANU to undertake another bibliometric analysis of CSIRO publications, which will provide an update to this performance indicator.

PI7 – Citations per paper compared to world rate in each research field

CSIRO is at least ten per cent above the world average citation rate in each of the 14 research fields in which it is in the top one per cent of global institutions.

Total citations are the default indicator commonly used to rank Institutions performance. In 2009–10, CSIRO ranked (by total citations) in the top one per cent of leading scientific institutions in 14 of the 22 research fields. These fields and their world rankings for 2004–05 and 2009–10 are given in Table 2.4.

Figure 2.7: Journal articles per quartile

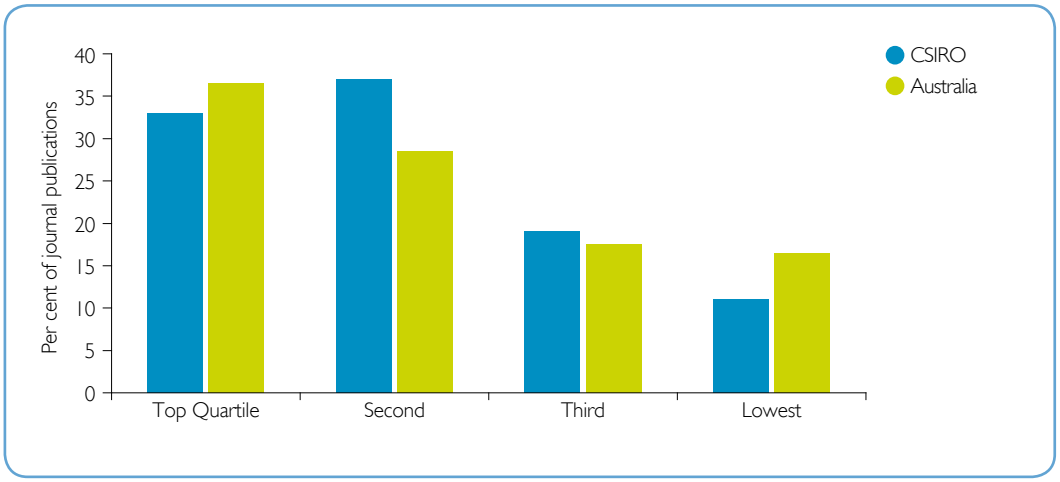


Table 2.4 – Citation rate by research field

Research field	CSIRO rate	World rate	Difference (%)
Geosciences	17.09	8.83	94
Plant and Animal Science	12.83	7.1	81
Chemistry	17.54	10.26	71
Clinical Medicine	19.83	12.02	65
Environment/Ecology	16.24	10.24	59
Engineering	6.81	4.27	59
Social Sciences	6.33	4.23	50
Materials Science	9.19	6.29	46
Computer Science	4.72	3.32	42
Agricultural Sciences	9.06	6.42	41
Biology and Biochemistry	19.47	16.09	21
Space Science	15.87	13.36	19
Molecular Biology and Genetics	27.67	24.08	15
Microbiology	15.8	14.11	12

Source: Thomson-Reuters/ISI Essential Science Indicators: May 2010[8]

PI8 – Total citations per paper compared to world rate

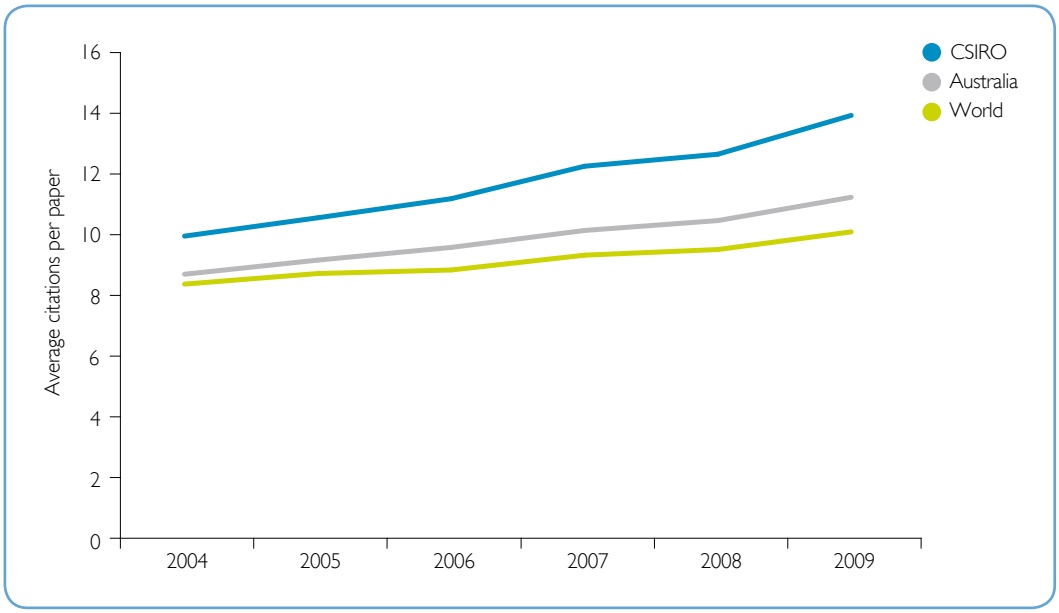
Average citation rate is the average number of total citations (utility) per published paper (productivity) and is the most accurate measure of scientific impact. The data was updated as of 1 May 2010 to cover a ten-year + two-month period, 1 January 2000 – 28 February 2010.

The average citation rate for CSIRO journal articles continues to increase and is currently 13.83 citations per paper. This is 38 per cent above the world rate of 9.99 citations per paper, close to our target of 40 per cent.

CSIRO's citation rate has also increased at a rate greater than the Australian average of 11.14 and the world average of 9.99, see Figure 2.8. According to ISI Essential Science Indicators, CSIRO has the highest average number of citations per paper of the Australian research institutions that publish across a broad range of research fields.

[8] *Data updated as 1 May 2010 to cover a ten-year and two month period, 1 January 2000–28 February 2010.*

Figure 2.8: Average citations per paper



Source: Thomson-Reuters/ISI Essential Science Indicators: May 2010[9]

[9] *Data updated as 1 May 2010 to cover a ten-year and two month period, 1 January 2000–28 February 2010.*

CSIRO's WLAN now used in electronic devices worldwide

CSIRO's pioneering work in radio astronomy led the way to what is now the most popular way to connect computers without wires. That work involved complex mathematics known as 'Fast Fourier Transforms', as well as detailed knowledge about radio waves and their behaviour in different environments. Indoor environments are particularly difficult for the rapid exchange of large amounts of data using radio waves.

To solve these problems, CSIRO invented the technology behind most high-speed wireless local area networks (known as Wi-Fi). The technology underpins the wireless communication system found in almost every laptop computer and associated wireless device produced today and is used in homes and offices around the world. The invention and the widespread adoption of the technology has enabled a global revolution in mobile computing and in the way we live and work.

Following settlements of patent litigation in the US, CSIRO's patent is now licensed to 15 companies, including Hewlett-Packard, Intel, Dell, Toshiba, ASUS, Microsoft and Nintendo, under confidential terms. The revenue arising from these settlements to October 2009 was approximately $205 million.

Forecasters* predict that there are likely to be more than three billion devices sold worldwide over the next several years using the technology invented by CSIRO scientists.

* *Source: In-Stat LLC Wireless LAN Market Estimates and Forecast by Device 2009–2014*

The 'Fast Fourier Transform' processor chip was originally developed in the mid 1980s to help radio astronomers find exploding black holes in the universe. That early work led to CSIRO inventing a technology that is now used in almost every wireless local area network (Wi-Fi) device in the world, including laptop computers, smart phones and game consoles. Credit: Denis Redfern

Agribusiness[10]

Research group aim:

To achieve outcomes for Australia along the value chain of food and fibre production for economic, social and environmental benefits. The Agribusiness Group strives for excellence in animal, plant and microbial sciences to deliver enduring solutions in agriculture, food, health and the environment.

Group expenditure (excluding Flagships) 2009–10: $208.7 million

Overview

The Agribusiness Group is seeking to address two grand challenges over the next decade:

- Global food security – feeding the world under increasing resource constraints.
- Keeping people healthy in a changing world.

To address these challenges, the Group draws on rapid progress in the biological sciences globally and integrates with advances in other science fields such as informatics and biomaterials across CSIRO.

We apply these across the food value chain to address issues of productivity, biosecurity, sustainable resource use, and focus on areas where food provides solutions to preventative health and wellbeing issues.

The Group is rebuilding our national leadership position in food science and nutrition and maintains a strong focus on biosecurity, including zoonotic diseases, which are those which can pass from animals to humans. This will ensure our national preparedness for the emergence of human diseases of animal origin.

Achievements 2009–10[11]

Silk from insects

CSIRO scientists are researching silks from insects to help determine their effectiveness as new sources of biopolymers. The aim is to discover new protein materials with exceptional functional characteristics including extreme toughness and durability. Silks produced by many invertebrates are comprised of large proteins with repetitive amino acid sequences that are difficult to reproduce artificially.

Before silks can be utilised or reproduced, the sequence of underlying proteins and their functions need to be identified. CSIRO scientists are leaders in this research and are the first group to have produced mimics of 'natural' silk proteins artificially and fabricated these into silk fibres. This breakthrough has been possible because our scientists have discovered novel silk genes. Possible uses include tough, lightweight textiles and, because of their biocompatibility, medical applications, such as sutures, artificial tendons and ligaments.

[10] *The Agribusiness Group became the Food, Health and Life Science Industries Group on 1 July 2010.*
[11] *Excludes Flagship achievements. This Group manages the Food Futures Flagship, the Preventative Health Flagship and the Sustainable Agriculture Flagship, see Program 1, page 24, 32 and 34.*

Salt tolerant wheat

Salinity is one of the most significant environmental issues facing Australia today. In a major breakthrough for wheat farmers in salt-affected areas, CSIRO researchers have developed a salt tolerant durum wheat that yields 25 per cent more grain than the parent variety in saline soils. Recent field trials in northern New South Wales proved that durum wheat varieties containing new salt tolerant genes outperformed the other varieties in salty areas. Although durum wheat is less salt tolerant than bread wheat, it attracts a premium price because of its superior pasta making qualities.

Food safety book helps manufacturers

CSIRO PUBLISHING and CSIRO's food safety researchers published *Make It Safe: A Guide to Food Safety*, which provides small-scale food manufacturers with a practical guide to controlling food safety risks. The book translates sometimes complex descriptions of food safety practices and requirements into simple, easy-to-understand English. The book complements CSIRO's research that helps Australia's largest manufacturing sector continue to produce and export some of the world's safest food.

Female only chickens

Scientists have solved the long-standing mystery of what determines sex development in chickens. CSIRO and the University of Melbourne's Murdoch Children's Research Institute have discovered a gene – DMRT1 – and confirmed its role in the development of male chickens. This discovery, published in the scientific journal *Nature*, has major potential applications in the poultry industry. It is of particular interest to the egg industry, whose lack of requirement for male chickens presents a challenge globally for animal welfare.

Breakthrough in fight against the Hendra virus

A new treatment developed to combat the deadly Hendra virus is showing great potential in saving the lives of infected people. In a world first, a scientific team from CSIRO and the US have demonstrated that administering human monoclonal antibodies after exposure to the Nipah virus, which is closely related to the Hendra virus, protected animals under experimental conditions. This research suggests that an effective treatment for Hendra virus infections in humans should be possible, given the very strong cross-reactive activity this antibody has against Hendra virus.

Energy

Research group aim:

To develop and apply leading-edge energy research that meets Australian needs in order to reduce greenhouse gas emissions, ensure energy security and create wealth from energy.

Group expenditure (excluding Flagships) 2009–10: $83.45 million

Overview

Powering the future is arguably the greatest environmental, economic and social challenge we have to resolve in the early decades of the 21st century. To meet this challenge, our energy research portfolio aims to accelerate large-scale emission cuts while ensuring a smooth transition to a new energy future.

To facilitate our aims, the Energy Group underwent some structural changes in 2009–10 with the merger of two high-performing Divisions – CSIRO Exploration and Mining and CSIRO Petroleum Resources – to form the Division of CSIRO Earth Science and Resource Engineering. The Group also saw the Energy Transformed Flagship sharpen its focus on renewables and energy efficiency and the creation of the Coal Technology portfolio and the Petroleum and Geothermal portfolio. These changes affected the Wealth from Oceans Flagship structure which consolidated its focus on understanding our oceans and their biodiversity, resources and relationships with the climate system.

CSIRO energy's research covers emerging stationary and transport energy technology options including solar, geothermal, smart grids and energy storage. It also emphasises the relevance of gas as the transitional cleaner fossil fuel and carbon capture and storage, both providing energy security and wealth, as well as supporting and enabling the path towards a clean energy future. In addition to developing technology solutions, we are also developing sophisticated models to help paint a picture of our energy pathways, and working with community groups to inform and empower individuals ways to reduce their greenhouse gas emissions.

Achievements 2009–10[12]

New centre for geothermal energy development

The Western Australian Geothermal Centre of Excellence (WAGCOE) – a new centre to develop geothermal energy – was launched in Perth in December 2009. This joint venture is currently focused on using low temperature heat from the Perth basin to generate geothermal energy.

In June 2010, CSIRO also received significant funding to support the demonstration of geothermal technologies to heat and cool the Pawsey Centre, a high performance computing facility, and the adjacent Australian Resources Research Centre in Perth. Over the past year, WAGCOE scientists have undertaken a comprehensive study of the site and the underlying hot sedimentary aquifers, to determine their suitability for geothermal applications. The results from the data acquisition and detailed geological, engineering and financial modelling were a key element of the

[12] *Excludes Flagship achievements. This Group manages the Energy Transformed Flagship and the Wealth from Oceans Flagship, see Program 1, page 22 and 38.*

successful funding bid. The initiative will make the Pawsey Centre site one of Australia's largest direct heat use geothermal demonstration program sites (see: www.csiro.au/partnerships/WAGCOE.html).

World's miners adopt CSIRO technology

CSIRO's longwall mining technology has been adopted by five of the world's major longwall mining equipment manufacturers. Underground longwall coal mining involves large machines cutting into the coalface. Automation of some of the processes increases mine productivity and moves miners away from hazardous, noisy and dusty environments. An Australian Coal Association Research Program study showed that CSIRO's technology can result in the production of an additional 435,000 tonnes of coal per year, per longwall and a conservative five per cent increase in the cutting rate.

New technique to remove oil trapped in quartz

CSIRO researchers have developed a world first technique using lasers to remove oil, unaltered, from petroleum trapped in fluid-filled cavities within quartz. Analysis of petroleum trapped in these cavities, called inclusions, can help determine where the oil came from and therefore improve oil exploration efforts.

The technique enables the petroleum in each inclusion to be analysed for its unique geochemical make-up, which is not possible using the conventional method of fluid-inclusion analysis. This technology will enhance our understanding of how oil reservoirs are filled with petroleum, leading to more effective petroleum exploration (see: www.csiro.au/science/Laser-drills-the-way-to-oil.html).

Progress in underground carbon storage

The effective storage of carbon dioxide is an important factor in reducing greenhouse gas emissions. CSIRO played a significant role in a demonstration of carbon dioxide storage through its engagement in the Cooperative Research Centre for Greenhouse Gas Technologies Otway Project in south-western Victoria in August 2009. More than 65,000 tonnes of carbon dioxide was safely injected and stored in a depleted gas reservoir, with comprehensive monitoring verifying that the injected carbon dioxide was securely contained. CSIRO has begun modelling research for Stage 2 of the Otway project.

Environment

Research group aim:

To develop and apply leading-edge environmental research that will underpin the economic, environmental and social future of Australia.

Group expenditure (excluding Flagships) 2009–10: $78.6 million

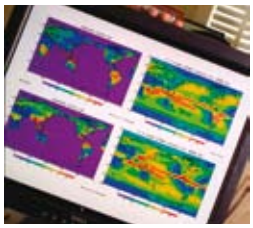
Overview

Australians have stewardship of a beautiful, diverse and unique environment. The cumulative consequences of the last 200 years of development of natural resources leave us with a legacy of environmental challenges. The future of Australia, the Asia-Pacific region, and indeed the whole world, is also being re-shaped by the forces of climate change and variability, natural resource quality and security, technological revolution, trade reform, poverty alleviation and national security concerns.

CSIRO's response to these challenges and opportunities involves the application of enhanced systems understanding as well as the development and deployment of new technologies, processes and services. CSIRO's Environment Group is doing this by boosting our understanding of the operation and interaction of entire ecosystems, regional economies, and societies. We aim to deliver the highest quality scientific research that will result in a more internationally competitive and sustainable Australia.

Achievements 2009–10[13]

Forecasting the weather more accurately



Every day Australians access the latest weather information which is the product of a partnership between CSIRO and the Bureau of Meteorology. The Australian Community Climate Earth-System Simulator (ACCESS) is a modelling system developed to deliver more reliable, timely and accurate forecasts of weather and climate for the future health, safety and prosperity of Australians. Through better assimilation of data, particularly those from satellites, ACCESS is providing improved weather forecasts.

New research vessel

In May 2009, the Australian Government dedicated $120 million for a new ocean-going research vessel. The new 85-metre vessel to be called *The Investigator* will more than double Australia's ocean climate and geoscience research capability. It will support activities across a range of disciplines in oceanographic, climate, geological, fisheries and ecosystem research. *The Investigator* is being designed, built and commissioned by CSIRO through the Future Research Vessel Project, as part of the Super Science Initiative and financed from the Education Investment Fund.

[13] *Excludes Flagship achievements. This Group manages the Climate Adaptation Flagship and the Water for a Healthy Country Flagship, see Program 1, page 20 and 36.*

New Indian Ocean Marine Research Centre

The new Indian Ocean Marine Research Centre based at The University of Western Australia (UWA) will be home to 240 world-class researchers from CSIRO, the Australian Institute for Marine Science and UWA. Marine scientists and engineers at the centre will investigate climate change, the sustainable use of marine resources, conserving marine biodiversity, coastal zone management and security and safety.

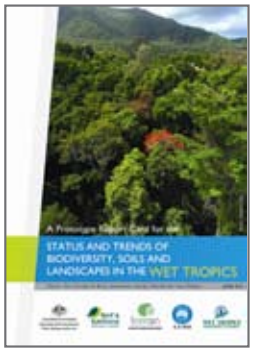
The Atlas of Living Australia

The Atlas of Living Australia consists of 20 million specimens and observations of Australian wildlife records. It is a collaborative Australian government funded initiative focused on making biodiversity information more accessible and useable online. *The Atlas of Living Australia* is a repository of linked information not previously available to the public on biodiversity research, literature, observations, maps and images. *The Atlas of Living Australia* aims to, over time, allow people across Australia to contribute sightings and pictures of plants and animals into the Atlas themselves. The first public release of online tools will be in October 2010.

Saving grasslands from extinction

Formerly widespread, only one per cent of pre-European temperate grasslands now remain. CSIRO researchers have used population simulation models to show that adding new genetic material to small populations of temperate grasslands can rescue them from extinction. CSIRO scientists are working with the New South Wales National Parks and Wildlife Service to develop a genetic management plan for the species.

Report card for Wet Tropics



CSIRO has developed a prototype report card for the biodiversity, soils and landscape assets of the Wet Tropics of North Queensland. The report card gives marks for their present condition based on expert opinion and the most recent available data. The report card highlights information gaps and makes recommendations on how these should be filled. The report card will inform the policies, plans and activities of a wide range of sectors, both public and private.

Information Sciences

Research group aim:

To work with partners to solve national challenges, drive the productivity of Australian industries, and deliver public good outcomes through the innovative application of mathematical, statistical, information and communication sciences and technologies.

Group expenditure (excluding Flagships) 2009–10: $110 million

Overview

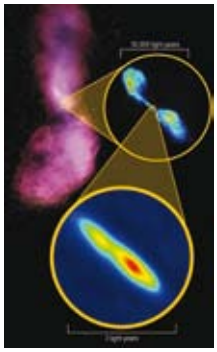
The Information Sciences Group contains the core of CSIRO's research focus in the data intensive sciences and services, providing Australia with world-class capabilities in Information and Communication Technologies (ICT), Mathematical Sciences, Astronomy and Space Science that are deployed through a collaborative partnering approach. The Group plays a key role in enabling CSIRO's multidisciplinary science across Outcome Domain portfolios and Flagship programs.

The Group is the national leader for e-enabling scientific research endeavours through a data-intensive approach. Through implementation of the eResearch Strategy, the way we conduct research at CSIRO is changing, enabling researchers to actively collaborate and share resources globally, and engage in cross-disciplinary research. The eResearch strategy supports research tackling 'big science' challenges and associated data management requirements.

The Group operates two world-class National Facilities in Astronomy and Space Science on behalf of the Australian Government.

Achievements 2009–10

First signal received by future telescope



The first of 36 antennas that will make up the Australian Square Kilometre Array Pathfinder (ASKAP) was assembled in January 2010 at the Murchison Radio-astronomy Observatory in the mid-west region of Western Australia.

By April 2010, the first ASKAP antenna was linked to existing CSIRO antennas in New South Wales and a new antenna in New Zealand to act as one giant telescope, linking up over a distance of 5,500 kilometres for the first time. The linked telescope was used to peer into the heart of a galaxy called Centaurus A. The construction of ASKAP's remaining antennas will proceed quickly with the complete ASKAP system expected to be finished by 2013. Once built, the ASKAP will be operated by CSIRO as part of the Australia Telescope National Facility.

CSIRO's graphics processing unit supercomputer

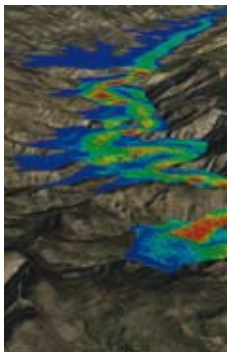
CSIRO's latest supercomputer cluster combines traditional central processing units with more powerful graphics processing units (GPUs) to provide a world-class computational and simulation science facility which will advance priority CSIRO science. CSIRO scientists are already utilising the power and speed of the GPU cluster in the areas of biotechnology

image analysis, materials science, computational fluid dynamics and environmental modelling. CSIRO has fostered a close collaboration with GPU developer NVIDIA who has recognised CSIRO as a 2010 Research Centre as part of an international program.

Relieving the electronic health records headache

CSIRO is helping the National E-Health Transition Authority (NEHTA) with Australia's electronic health record rollout. Inaccurate or missing data in patient records has resulted in people being hospitalised unnecessarily, and wasting an estimated 25 per cent of clinicians' time. NEHTA is implementing an internationally agreed standard for the dictionary of clinical terms used in electronic health records software, called SNOMED CT. Software developed by the Australian e-Health Research Centre is helping to translate terms in the myriad of existing health information systems to terms which are in SNOMED CT.

Modelling how dams break



CSIRO mathematicians are creating computational models of events like dam breaks and tsunamis to assist with planning for and understanding these phenomena. Catastrophic events such as these can have serious economic, environmental and humanitarian effects. CSIRO, working with the Chinese Academy of Surveying and Mapping is visualising and assessing the risks of a major dam break. Many dams in China lie upstream from densely populated towns which are at risk of collapse from structural failure or earthquakes. CSIRO has used its software to model the hypothetical collapse of the Geheyan Dam in China, which holds up to 3.12 billion cubic metres of water. The highly accurate models have been essential as part of risk and disaster management for the academy.

Remote-access meters can cut your energy costs

CSIRO's new web-based smart metering system enables householders, small businesses and electricity retailers to remotely control energy use over a broadband Internet connection. The aim is to help small scale energy users cut energy use, costs and carbon emissions. CSIRO has worked with energy service company, Energy Response, and hardware designer, Saturn South, to develop a system able to aggregate a large number of smaller users. The system will give householders the flexibility to cut back their electricity use at times when it is needed elsewhere on the grid.

Opals set to shine with new grading technology

CSIRO developed the Gemmological Digital Analyser™ with a consortium of Australian opal miners to assess the complex colour characteristics and grade of cut and polished opal. Its development has been a very significant achievement for the opal industry, eliminating errors from human assessments and increasing the reliability of opal prices for both the miner and consumer.

Manufacturing, Materials and Minerals

Research group aim:

To help grow Australia's wealth by fostering increased efficiency and supporting business and job creation in an environmentally and socially responsible manner.

Group expenditure (excluding Flagships) 2009–10: $113.6 million

Overview

The focus of the Manufacturing, Materials and Minerals Group is to grow a high-value, globally competitive sustainable manufacturing sector and help address Australia's key national challenges and opportunities in the minerals sector.

The Group's research supports industries that are responsible for around 18 per cent of Australia's gross domestic product. Despite the global financial crisis, manufacturing still employs over one million Australians and contributed exports worth $81.4 billion in 2009. Business expenditure on research and development in manufacturing in Australia is higher than for any other sector.

CSIRO supports manufacturing with a portfolio of technologies in sustainable manufacturing, automotive/aerospace, smarter textiles, health technologies and light metals. We are working to supply improved processes and new technologies to generate new products and new companies, and stimulate the growth of green jobs.

CSIRO supports the minerals industry by helping to transform its economic and environmental performance through novel concepts and technologies from exploration to mining and processing.

Achievements 2009–10[14]

CSIRO technologies help grow international sales

CSIRO is helping an Australian equipment manufacturer to compete in the global market. CSIRO's improved pouring and casting technologies enabled o.d.t. Engineering's ingot casting machines to operate faster, providing a 20 per cent increase in productivity, and sparking commercial interest both within Australia and internationally. CSIRO partners with o.d.t. Engineering through the CAST CRC.

Fast and accurate measurement of cotton

A testing device designed to improve the quality of fibre produced by Australian cotton growers has been developed by CSIRO, with support from the Cotton Research Development Corporation and the Cotton Catchment Communities CRC. The 'Cottonscope' automatically and rapidly measures cotton fibre maturity, directly and accurately, enabling optimum harvesting time and prediction of final quality of cotton fabrics. The device has been licensed to start-up Australian company Cottonscope Pty Ltd.

[14] *Excludes Flagship achievements. This Group manages the Future Manufacturing Flagship, the Light Metals Flagship and the Minerals Down Under Flagship, see Program 1, page 26, 28 and 30.*

Recovering materials from waste

Researchers have developed a new high throughput process that extracts precious and hazardous metals from waste materials and therefore the environment. Working in partnership with the Korea Institute of Geoscience and Mineral Resources, scientists are enabling cost-effective recovery of high-value metals from waste materials such as batteries, electronic and electrical goods.

Computing boost for mineral explorers

Mineral explorers have found it difficult to access publicly available geological data held in different databases around Australia. To address this challenge, CSIRO and partners have developed the AuScope Grid. The Grid provides tools for explorers to access and analyse large volumes of existing exploration data over the Internet. This is the first time in the world such technology has been successfully deployed.

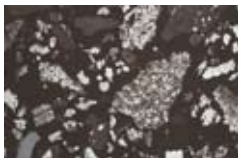
Science masters the mix

CSIRO's Rotated Arc Mixer (RAM), an industrial mixer with the ability to mix thick fluids such as paints, foods, cosmetics or explosives has been commercialised by Tasweld Engineering, with the assistance of the Advanced Manufacturing Cooperative Research Centre and the Victorian Centre for Advanced Materials Manufacturing. The RAM consumes 60 to 90 per cent less energy than conventional devices, while retaining or improving performance levels.

RAFT creates new materials

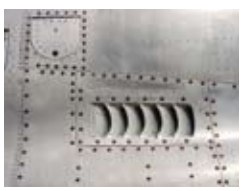
A breakthrough polymer technology developed by CSIRO dubbed RAFT, allows new materials to be designed to exactly fit customers' requirements. Applications for the technology will include intelligent drug delivery, biocompatible materials, paints and coating to meet stricter environmental guidelines, targeted personal care and cosmetics, synthetic rubbers, additives to promote fuel efficiency and ink jet media.

Removing phosphorus from iron ore



As Australia mines its high grade iron ore deposits, we need to find ways to make lower value, high-phosphorus iron ores more attractive to steel producers. CSIRO researchers are developing cost-effective processes to reduce phosphorus levels. This could increase the attractiveness of eight billion tonnes of high-phosphorus ore close to existing mines.

Self-healing coatings for the aerospace industry



A new coating system that 'self-repairs' has the potential to replace conventional chromate based coating systems in the aerospace industry. Developed in partnership with the Delft University of Technology and the Netherlands Institute of Applied Scientific Research, the high performance, multi-functional coating system lowers the environmental footprint of the process, while also allowing the coating to 'self repair'.

Program 3 – Science Outreach: Education and Scientific Publishing

Communicating scientific research helps raise the profile of science and CSIRO within the community. CSIRO conducts a range of science education programs for primary and secondary school students and their teachers and the public and hosts the CSIRO Discovery Centre in Canberra.

CSIRO's postgraduate scholarship program provides opportunities in science and engineering for outstanding graduates who enrol at Australian tertiary institutions as full-time postgraduate students for research leading to the award of a PhD. PhD students at CSIRO are co-supervised by a university, allowing students to maintain and develop their university connections while being exposed to research in a working environment, see Table 2.5. Some CSIRO Divisions have collaborative arrangements with universities to foster PhD studies in particular areas – for example CSIRO Marine and Atmospheric Research and the University of Tasmania run a joint PhD Program.

Table 2.5: Science outreach: CSIRO's postgraduate students

Sponsored postgraduates[a]	2005–06	2006–07	2007–08	2008–09	2009–10
PhD	259	256	241	338	375
Masters	8	4	18	9	13
Honours	10	16	13	17	25
Total	**277**	**276**	**272**	**364**	**413[b]**

Supervised postgraduates[a]	2005–06	2006–07	2007–08	2008–09	2009–10
PhD	352	582	523	629	733
Masters	40	31	48	56	47
Honours	31	61	63	58	60
Total	**423**	**674**	**634**	**743**	**840**
Postdoctoral Fellows	290	294	301	304	330

[a] As at 31 May each year. A student may be either sponsored, supervised or both. The total number of individual students sponsored and/or supervised as at 31 May 2010 was 840, including more than 75 supervised in collaboration with CRCs and 56 through the Flagship Collaboration Fund. See glossary page 211 for definition of sponsorship and supervision.

[b] Includes 147 students fully sponsored and 266 students partially sponsored by CSIRO.

CarbonKids: teaching kids about climate change

In August 2009, students and teachers from 16 Canberra schools gathered at Forrest Primary School to celebrate the national launch of CSIRO Education's new CarbonKids education program. CarbonKids is a program for schools committed to tackling climate change. The program offers a range of ideas and activities for the early, primary and middle years of schooling. The program was piloted in 26 schools across Australia with funding support from Shell.

Like most of the schools involved in the trial, the Canberra schools integrated a selection of climate change curriculum resources into their existing school curriculum framework, putting a climate change focus on existing units. Students also developed an understanding of how to reduce greenhouse gas emissions in their schools and local communities and how planting trees absorbs carbon from the atmosphere. The schools engaged students, teachers, parents and other members of the community to evaluate their carbon footprint and develop a better understanding of the science behind climate change.

An external evaluation showed that the CarbonKids program 'met a significant need in schools for improving teaching and learning about the science of climate change and its implications (such as carbon reduction and sustainability)'. Through a heavy focus on critical literacy, numeracy, cultural awareness and open-investigations, the program inspired values, skills and a deep understanding of our need to mitigate and adapt to the effects of global warming.

With funding from Bayer, CarbonKids will engage an additional 90 schools and continue to develop new classroom resources for students to discuss and investigate a range of social, economic and scientific issues related to climate change.

Students involved in the sequestration of carbon. Credit: The Department of the Environment, Water, Heritage and the Arts

'...the program inspired values, skills and a deep understanding of our need to mitigate and adapt to the effects of global warming.'

CSIRO also operates **CSIRO** PUBLISHING as an independent science and technology publisher with a global reputation for quality products and services covering a wide range of scientific disciplines, including agriculture, chemistry, the plant and animal sciences, and environmental management.

Science Outreach – Education: Key Performance Indicators

CSIRO continued to enhance its profile delivering a diverse range of outreach programs. A summary of performance for these programs against the 2009–10 Portfolio Budget Statements key performance indicators follows.

KPI 1 – Utilisation of science outreach programs.

KPI 2 – Awareness of science by CSIRO stakeholders.

KPI 3 – Evidence of success of participants in the Science Outreach programs.

KPI 1: Utilisation of science outreach programs

Utilisation as shown by the number of participants and users of each science outreach program and the proportion of uptake within the target groups.

The utilisation of most science outreach programs continues to increase. Participation in CSIRO Discovery Centre increased by 17 per cent, Science by Email increased by 18 per cent and Creativity in Science and Technology increased by five per cent. Participation in other programs remained stable or fell slightly. Visitation and participation numbers are shown in Table 2.6.

CSIRO Education continues to offer a range of valued programs to teachers and students. The regional centres saw similar numbers of students as last year and Science by Email continued to increase its readership. In 2009, the CarbonKids pilot program was implemented and

Table 2.6: Science outreach: visitation and participation numbers

Science outreach program	2005	2006	2007	2008	2009
Parkes radio telescope	109,879	94,305	104,783	92,369	112,342
Canberra Deep Space Communication Complex	63,615	65,467	62,162	67,538	67,582
CSIRO Science Education Centres	363,463	369,919	383,499	390,947	386,500
CSIRO Discovery Centre	50,235	60,581	73,772	80,555	94,365
Double Helix Science Club	16,813	18,945	19,545	20,253	19,656
Science by Email	13,915	20,689	28,516	29,560	34,933
Creativity in Science and Technology (CREST)	5,549	6,509	5,999	8,355	8,801
BHP Billiton Science Awards	604	2,677	4,103	2,568	3,114

the Scientists in Schools program reached 1,473 teacher-scientist partnerships and introduced the sub-program, Mathematicians in Schools. *SCOPE*, the national weekly science TV program is now broadcast on Saturday mornings, where it reaches a higher proportion of young people. The program is now available for purchase for use by teachers in the classroom or at home. The book, *Polar Eyes*, was shortlisted for the Children's Book Council of Australia's Book of the Year.

CSIRO's Parkes radio telescope has been visited by over half a million people in the last five years. 6,500 visitors attended the CSIRO Parkes Observatory Open Weekend in July 2009, which won the Parkes Shire Australia Day Award for Community Event of the Year.

KPI 2: Awareness of science by CSIRO stakeholders

A community awareness survey identified CSIRO as well known in the community. Unprompted, 70 per cent of respondents identified CSIRO as a leading player in Australian Research.

A community attitudes survey, undertaken by an independent organisation[15] found that CSIRO is seen by the community as a leading player in research in Australia with CSIRO mentioned unprompted by 70 per cent of the community when asked to name organisations doing science and research in Australia compared to five per cent for universities and six per cent for health research organisations (prompted awareness was 96 per cent for CSIRO, and 25 and 21 per cent respectively for universities and health research organisations). In an unrelated 2009 survey of Australians' trust in people and organisations in relation to information about science and technology, CSIRO was the highest rated organisation.[16]

[15] *CSIRO – Community Attitudes Research Ogilvy Illumination, August 2010.*

[16] *Swinburne University of Technology, National Technology and Society Monitor, 2009, p11.*

KPI 3: Evidence of success of participants in the Science Outreach programs

Demand for science outreach programs such as CarbonKids and Scientists in Schools continues to grow. Independent evaluations on several science outreach programs concluded that these programs provided positive experiences for the participants.

An external review of Scientists in Schools gave an extremely positive view of the impact on all participants, with students more engaged, teachers more confident and scientists feeling rewarded and motivated. Other external reviews for CarbonKids and Maths by Email were equally positive. Maths by Email started in March 2010 and had already gained 5,461 subscribers by 30 June. CarbonKids is in great demand with the evaluation demonstrating a strong impact on teachers and students. Two winners from the BHP Billiton Science Awards attended the International Science and Engineering Fair in the USA and one student gained a third place in his category.

'I learnt from CREST that there is never one answer to a problem and that you have to keep trying. When you succeed it is very rewarding and the area is so broad you constantly learn new things and face new challenges.' (Rhianna, student)

CSIRO's Discovery Centre supports communication and education activities by promoting an understanding and appreciation of research. School children from every state and territory in Australia visit the centre and this number is growing annually, as many schools make multiple repeat visits. Discovery's unique and very popular 90 minute minds-on, hands-on program gives students an insight into CSIRO's work and the value of research to Australian

society. During 2009–10, new exhibitions were completed to showcase our research into climate change and water.

'Through the activities of teachers using the CarbonKids Program, their students' knowledge, skills and attitudes in relation to the science of climate change and practical actions to reduce carbon has significantly increased.' (Independent evaluator in 2009)

The Canberra Deep Space Communication Complex receives data from and sends commands to over 40 robotic spacecraft exploring the Solar System and beyond. During 2009, the Complex celebrated the 40th anniversary of Apollo XI and its role in that history-making endeavour. Highlights also included the 'Hello from Earth' project which reached a worldwide audience contributing messages transmitted to a distant planet and Jupiter: Project 24, which engaged students and the public in 'live' radio astronomy science during the International Year of Astronomy.

Science Outreach – Scientific Publishing: Key Performance Indicators

CSIRO PUBLISHING is an information business operating within CSIRO on a commercial basis on behalf of authors and customers in Australia and overseas. A summary of performance against the 2009–10 Portfolio Budget Statement key performance indicators follows.

KPI 4 – International reach and impact of published journals.

KPI 5 – Add 50 new book titles.

KPI 6 – Positive net profit outcome from **CSIRO** PUBLISHING.

CREST supports students undertaking open ended science investigations. Credit: Mandy Timmers

KPI 4: International reach and impact of published journals

Continue to grow the International reach and impact for the 25 Journals published in partnership with the Australian Academy of Science and other societies.

International submissions continue to grow at 20 per cent annually and the drive for quality saw impact factors, as measured by the Institute for Scientific Information, continue to improve.

Twenty-six peer-reviewed research journals were published during the financial year in partnership with the Australian Academy of Science and other societies.

Multimedia products continue to deliver web-based science and maths learning opportunities for the national schools curriculum through partnerships with the Academy of Science and an educational publisher. CSIRO's film archive is being digitised to make content accessible within CSIRO, to commercial outlets and for a general audience through YouTube.

Two magazines are published by **CSIRO** PUBLISHING: *ECOS* which offers leadership and better understanding in the sustainability area for schools and general readers and *Preview* which is the official magazine of the Australian Society of Exploration Geophysicists.

KPI 5: Add 50 new book titles

Number of new book titles added to the wide-ranging backlist of over 1,200 publications targeting both Australian and international readers.

Forty-seven new books were published during the year, with three other titles rescheduled to the first quarter of 2010–11.

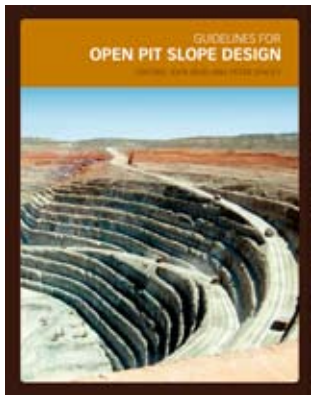
Forty-seven new books were published during the year with reference works such as *Guidelines for Open Pit Slope Design*, *Adapting Agriculture to Climate Change*, *Make it Safe: A Guide to Food Safety* and *Australia's Biodiversity and Climate Change* making significant contributions to industry and / or the understanding of key issues. Other works such as *Out of the Scientist's Garden*, *Dry Times* and *Contested Country* have been both critical and financial success stories with the broader Australian community.

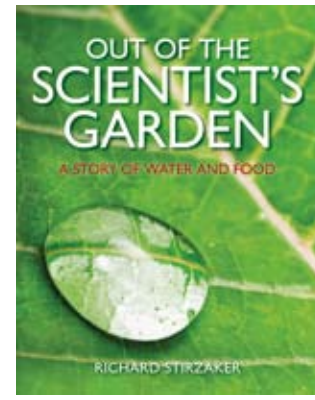
The shift to digital content and services across the business continues with the release of our first eBook collection of 160 titles the most exciting development during the year. The collection is being enthusiastically taken up by libraries and is available to all CSIRO staff through arrangements with our own library services.

KPI 6: Positive net profit outcome from **CSIRO** PUBLISHING

A positive net profit of $755,000 was delivered. This is an improvement of around eight per cent from 2008–09.

CSIRO PUBLISHING successfully managed the potentially negative impact of the global financial crisis on the information community to deliver a 'best ever' net revenue result of $755,000 for the year. Strategies to sustain international subscriptions proved to be particularly successful with the focus on quality product and first rate service to customers, delivering revenue of $11.4 million.





Guidelines for Open Pit Slope Design edited by John Read and Peter Stacey
Cover and text design by James Kelly, cover photo courtesy AngloGold Ashanti Australia Ltd

ECOS 154 featuring an update on renewable energy progress in Australia.
Design by James Kelly, cover photo Horizon Power

Out of the Scientist's Garden by Richard Stirzaker
Cover and text design by James Kelly, cover iStockphoto.

CSIRO and social media

During 2009, CSIRO launched an integrated social media presence to introduce the Organisation to a diverse new audience and support the communication of CSIRO science in an easily accessible and engaging format.

Comprising a Facebook Fan page, YouTube Channel, and podcast and vodcast series, CSIRO's social media is used to promote the breadth of our research along with other activities, such as education and recruitment. All the social media platforms are integrated to maximise reach and draw people to each channel and CSIRO's website. While social media allows CSIRO to reach people of all ages, it offers a particular opportunity to reach younger audiences – our future scientists and decision makers.

With more than 3,377 fans, the Facebook Fan page continues to grow in popularity and a vibrant community with a genuine interest in CSIRO has started to emerge. CSIRO's YouTube channel has so far attracted more than 150 subscribers and over 120,000 video views, while podcast downloads for the year reached 362,665 and vodcast downloads reached 33,448.

'Great vodcasts. Well made and great watching. Keep it up.'

'Thank you indeed for posting so much useful research here on YT, a great way to spread information of significance.'

CSIRO's in-house journalist, Glen Paul, at work in the studio. CSIRO's podcasts were downloaded 362,665 times in 2009–10 and are popular on iTunes. Credit: David McClenaghan

Program 4 – National Research Infrastructure: National Facilities and Collections

CSIRO manages two types of national research infrastructure on behalf of the nation; National Research Facilities and National Biological Collections. CSIRO hosts three major National Research Facilities and over 30 other research facilities, such as the Riverside Life Sciences Centre and the Australian Resources Research Centre. As well as the National Biological Collections we manage several national reference collections, including the National Tree Seed Collection and the Scientific Marine Data Collection.

National Research Facilities

CSIRO operates a range of specialised laboratories, scientific and testing equipment, and other research facilities which are available for use by both Australian and international researchers. The three major National Research Facilities are:

- **The Australian Animal Health Laboratory (AAHL)** – located in Geelong, Victoria, is a national centre of excellence in disease diagnosis, research and policy advice in animal health. It is Australia's front line defence, helping to protect Australia from the threat of exotic and emerging animal diseases.
- **The Australia Telescope National Facility (ATNF)** – is operated and managed by CSIRO's Division of Astronomy and Space Science and is made up of radio telescopes at three observatories, near the towns of Parkes, Coonabarabran and Narrabri in New South Wales. A fourth telescope, the next generation Australian Square Kilometre Array Pathfinder (ASKAP) is currently being built at the Murchison Radio-astronomy Observatory in Western Australia and will consist of 36 antennas. Once fully complete, the ASKAP will also be operated by CSIRO as part of the Australia Telescope National Facility. Construction of ASKAP was on track during 2009–10 with the first antenna built and used in early scientific research. About 90 per cent of radio astronomy research in Australia is undertaken using the Australia Telescope.
- **The Marine National Facility (MNF)** – is made up of a 66 metre blue-water research vessel, *Southern Surveyor*, a package of unique scientific equipment and instrumentation, and a collection of 25 years of marine data. It has the scientific, technical and administrative expertise required to safely, effectively and efficiently manage an ocean-going research platform. The *Southern Surveyor* is particularly suited to multidisciplinary research projects in the deep oceans surrounding Australia. CSIRO is managing a major project to design and build a new state of the art research vessel, *The Investigator,* scheduled to be operational in 2012.

National Biological Collections

CSIRO is the custodian of several collections of animal and plant specimens that contribute to the discovery, inventory, understanding and conservation of Australia's plant and animal biodiversity, these include the:

- Australian National Insect Collection (ANIC), specialising in Australian insects
- Australian National Wildlife Collection (ANWC), specialising in land vertebrates
- Australian National Fish Collection (ANFC), specialising in marine fishes
- Australian National Herbarium (ANH), specialising in native plants and weeds

Together, these collections support a significant part of the country's taxonomic, genetic, agricultural and ecological research. They are vital resources for conservation and the development of sustainable land and marine management systems. Good science and sound decisions on biodiversity and natural resource management require correct identification of Australia's native species.

National Research Infrastructure – National Facilities and Collections: Key Performance Indicators

This section provides a summary of performance against the 2009–10 Portfolio Budget Statement key performance indicators, for the National Facilities and Collections.

KPI 1 – Utilisation of the National Research Infrastructure.

KPI 2 – Maintenance and operation of National Research Infrastructure.

KPI 3 – Proportion of National Biological Collections digitised and available to the public.

KPI 4 – Coverage of National Biological Collections.

KPI 5 – Demonstrated response to national events.

KPI 6 – Demonstrated high-quality scientific contributions in support of National Research Flagships, CSIRO Core Research and external users.

KPI 7 – The AAHL Collaborative Biosecurity Research Facility is built and operated in accordance with the NCRIS/CSIRO agreement.

KPI 1: Utilisation of National Research Infrastructure

As shown by the number of loans, visitor days, research days, observation time and operational time.

Use of the National Facilities and Collections by the Australian and international scientific community continues to grow. The national research infrastructure managed by CSIRO provides significant and growing support to Australian and international researchers.

As in previous years, the **Australian Animal Health Laboratory** (AAHL) has remained operational 24 hours a day, seven days a week. During the financial year, significant engineering work has been undertaken including a completion of the air handling and effluent treatment systems upgrades, the replacement of chillers and the introduction of a new computerised central management system. Work is underway to complete the 350 square metres of additional Physical Containment Level 4 (highest level of biocontainment) laboratories.

The **Australia Telescope National Facility** (ATNF) exceeded its target of 70 per cent of time allocated for astronomical observations, while the time lost during scheduled observations from equipment failure was below five per cent. Twenty-four per cent of telescope time was allocated to ATNF staff, 23 per cent to other Australian researchers and 53 per cent to international researchers. More information can be found in the ATNF's Annual Report at: www.atnf.csiro.au/AR2009

The **Marine National Facility** (MNF) provided 177 days of ship time grants out of 250 days requested. Internationally, scientists from Russia, Fiji, Vanuatu, United States, New Zealand, France and Germany utilised the facilities of the MNF. New funding will provide a step change in capacity and capability of the MNF, bringing the available sea days from 180 to approximately 300. This will enhance the opportunity for Australian scientists and their international collaborators to undertake research. More information can be found in the MNF Annual Report at: www.marine.csiro.au/nationalfacility

Combined, the **National Biological Collections** dispatched over 29,300 specimens in 147 outward going loans, sent around 3,800 tissue samples through 44 grants, hosted 186 visitors for a combined total of 713 research days and hosted 57 tours with a total of 597 people.

KPI 2: Maintenance and operation of National Research Infrastructure

All National Research Infrastructure maintained and operated to relevant international standards.

National Research Infrastructure managed by CSIRO continues to be maintained and operated at international standards. National facilities and collections remain a key strategic initiative for CSIRO.

National Research Facilities

AAHL continued to operate at the highest level of bio-containment, ensuring the physical containment of highly pathogenic organisms. The laboratory has maintained full national accreditation (ISO 17025) and environmental accreditation (ISO 140001), and has met all the Office of the Gene Technology Regulator, Security Sensitive Biological Agents and Australian Quarantine Inspection Service requirements for operation. It should be noted that a number of these regulations have been considerably enhanced following the escape of equine influenza virus from an Australian quarantine station. AAHL has fully complied with these additional requirements.

The **ATNF** continues to be the most productive and powerful radio astronomy facility in the Southern hemisphere. Demand for its use from internationally prominent astronomers within and outside Australia remains high. Over one hundred papers using ATNF data were published in refereed journals in the last year. In 2008, (the latest year for which the analysis has been made) the ATNF ranked second internationally for radio astronomy papers in major journals. New instrumentation to maintain performance at the standard of comparable international facilities continues to be installed on the telescopes. A high rate of availability for astronomy was maintained despite undertaking a major upgrade of the Compact Array during the year.

In 2009–10, the **MNF** received new funding of $6 million over three years for a new program of enhanced maintenance on the RV *Southern Surveyor*. This program will maintain the reliability of the 40-year old vessel to international standards until a new state-of-the-art blue-water research vessel can be delivered. The 2009–10 Federal Budget provided $120 million for the replacement of Australia's Marine National Facility. The new vessel will provide a major boost to marine research in Australia. It will be commissioned in 2012–13 and has been named *The Investigator*.

National Biological Collections

All the collections are housed in purpose-built facilities and are stored, curated and managed according to international standards.

The **Australian National Insect Collection** (ANIC) is the first collection in Australia to trial 'whole-drawer' specimen imaging, with a view to providing users with 'virtual' access to the ANIC's collection of over ten million specimens.

The **Australian National Wildlife Collection** (ANWC) has upgraded its database, has acquired new bird specimens from the Northern Territory following an expedition, and has received a private egg collection as a cultural gift.

The **Australian National Herbarium** (ANH) has eliminated a 25-year backlog of unprocessed collections, with a resultant increase in specimens and data available for research.

The **Australian National Fish Collection** (ANFC) submitted its 10,000th tissue for barcoding as part of the international Fish Barcode of Life Initiative (FISH-BOL).

KPI 3: Proportion of Collections digitised and available to the public

Percentages vary from collection to collection and are dependent on the diversity of organisms and size of collections. Five per cent of the ANIC is digitised, 86 per cent of the ANWC, 100 per cent of the ANFC and 76 per cent of the ANH.

All 350,000 **ANIC** digitised specimen records are available publicly through the ANIC specimen database (see: anic.ento.csiro.au/database/index.aspx), OZCAM (see link above), the Global Biodiversity Information Facility (GBIF) *(see:* data.gbif.org/welcome.htm) and Zipcode Zoo (see: www.zipcodezoo.com/). As with the ANFC, it is anticipated that the *Atlas of Living Australia* will facilitate more records being made available for interrogation by users of the specimen data.

The *Atlas of Living Australia* project was expanded in 2009–10 under a national project managed by CSIRO and will facilitate a step-change in online availability of collection information nationally.

Of the 112,581 digitised records for **ANWC**, 109,335 records are available publicly through OZCAM (see above link) on a manual provision basis. This will change to dynamic online provision from the ANWC database by December 2010.

The majority of **ANH** Australian specimen records are digitised, with a 100 per cent available through *Australia's Virtual Herbarium* (see: www.ersa.edu.au/avh/) and soon through the *Atlas of Living Australia* (see: www.ala.org.au/). Images of Australian plants are also available via the *Australian Plant Image Index* (see: www.anbg.gov.au/anbg/photo-collection/photo.index.html), a comprehensive collection of over 25,000 images.

All 48,130 **ANFC** specimen records are digitised, with 57 per cent available through the Online Zoological Collections of Australian Museums (see: www.ozcam.gov.au/) and BioMaps (see: www.biomaps.net.au/biomaps2/). The *Atlas of Living Australia* will result in a greater proportion of the data being available. The ANFC contains the Photographic Index of Australian Fishes, which is the largest collection of images of Australasian fishes. More than 2,000 images are available to the public via CSIRO's Scienceimage online (see: www.scienceimage.csiro.au/).

KPI 4: Coverage of National Biological Collections

Per cent of known species covered in each National Biological Collection.

Overall coverage is estimated at approximately 70 per cent for the ANIC and ANH, 50 per cent for the ANFC and 55 per cent for the ANWC.

Percentage coverage of each national biological collection provides an estimation of how well the natural diversity of each group of organisms is represented within the collections. Easily observed organisms such as butterflies, birds and some plants are better represented than other less obvious groups, such as some insects and fishes.

KPI 5: Demonstrated response to national events.

AAHL continued to ensure that all diagnostic requests for an exotic disease exclusion, (a test that excludes a particular disease) had a 24 hour turn around time or less.

AAHL conducted approximately 42,000 tests in the reporting year on around 24,000 samples. The majority of these related to both diagnosis and surveillance work on the influenza virus, however there were a significant number of exclusions for Hendra virus, including a number of positive cases. AAHL undertook an external

post mortem on a horse with Hendra using full biosecurity suits, a new operational activity for the laboratory.

Research has continued to focus on developing more effective control strategies for avian influenza and on risk mitigation for Hendra virus, whilst maintaining a significant number of projects on emerging diseases in general. The first case of atypical scrapie, a brain disease of sheep, was diagnosed at AAHL in March 2010 and confirmed at the World Reference Laboratory, UK. This is a rare disease of sheep, entirely different to scrapie with no trade or human health implications.

KPI 6: Demonstrated high-quality scientific contributions in support of National Research Flagships, CSIRO Core Research and external users

National Research Infrastructure continues to provide positive contributions to the research of CSIRO and external users.

See pages 70–74 for examples of National Research Infrastructure contributions to support CSIRO's research.

KPI 7: The AAHL Collaborative Biosecurity Research Facility is built and operated in accordance with the NCRIS/CSIRO agreement

At AAHL, work is now well underway on the construction of a new specialised pathogen containment level four laboratory.

Funded by the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS), the AAHL Collaborative Biosecurity Research Facility (ACBRF) will enable international researchers to work on those diseases that affect both humans and animals and for which there are currently no treatments.

It is anticipated that this laboratory will open in late 2010. Design plans have now been completed for the new ACBRF insectary and construction work will commence in July 2010, with the completion of all NCRIS work by June 2011. Access arrangements, fees and training requirements for NCRIS users are now available. A specialised training facility for the site has been completed and utilised as part of an AAHL held international biosafety training course.

Scientific contributions of CSIRO's National Research Infrastructure

This section highlights some of the contributions to science achieved through the National Facilities and Collections.

Australian Animal Health Laboratory

The AAHL continues to focus on key emerging diseases of livestock and people, undertaking underpinning research that enables Australia to better manage the risks associated with these diseases. This year, there has been a continuing focus on avian and porcine influenza, Hendra virus, Newcastle Disease of poultry and the identification of a case of atypical scrapie, a

Reducing the Australian Animal Health Laboratory's environmental footprint

CSIRO's Australian Animal Health Laboratory (AAHL) in Geelong, Victoria has made significant changes to the way the facility operates in order to reduce the facility's environmental footprint. Prior to the upgrades, AAHL's air intake system ran continuously with fans drawing on a significant amount of power to function. Old steam boilers and hot water generators were inefficient, with water consumption being of major concern.

Over a five year period, a multi-million dollar project focused on progressively upgrading and replacing the facility's engineering plant and equipment whilst concurrently maintaining AAHL's functional operations. Various modifications to extend the life of the facility by installing state-of-the art equipment were undertaken.

AAHL's heating system now has an average operating efficiency of 75 per cent compared to the original steam boilers which had only 50 per cent. Fans now operate with a variable speed drive at the minimum speed necessary to provide the required air flow and pressure, significantly reducing energy usage. AAHL recently announced a natural gas consumption saving of more than 25 per cent over a five year period. Overall, equipment upgrades have resulted in a 40 per cent reduction in the facility's energy and gas consumption helping us reduce our environmental footprint.

The Australian Animal Health Laboratory at Geelong, Victoria. Credit: CSIRO

brain disease of sheep. All requirements listed in the Memorandum of Understanding between AAHL and the Department of Agriculture, Fisheries and Forestry have been fully met. AAHL organised and held a major international symposium on Foot and Mouth Disease (FMD), providing up-to-date information on national and international approaches to managing the risks associated with FMD.

Australia Telescope National Facility

The Australian Square Kilometre Array Pathfinder (ASKAP) is a program within CSIRO to build a world-class radio telescope in the mid-west of Western Australia. It will be operated by CSIRO as part of the Australia Telescope National Facility. ASKAP, as well as being a next generation telescope in its own right, will provide an important test-bed for the future Square Kilometre Array (SKA) project. The SKA project is a proposal by the international community to develop a future radio telescope that will have capabilities in excess of ASKAP. Combining speed and sensitivity, the ASKAP telescope will be a world leading survey instrument, operational in 2013.

Following recommendations provided by an international panel of expert astronomers, ten major science projects, representing 363 scientists from 131 institutions, have been selected for ASKAP's first five years of operations.

Of the ten projects' scientists, 33 per cent are from Australia and New Zealand, 30 per cent from North America, 28 per cent from Europe, and nine per cent from elsewhere in the world. This response illustrates the international interest in the ASKAP program and its potential to help cast light on fundamental physics and processes at work in the Universe.

Marine Research Vessel, *Southern Surveyor*

During 2009–10, *Southern Surveyor* research voyages included explorations by University of Tasmania geoscientists in the South Pacific. Through deep sea tectonic studies, their research aims to improve the understanding of Australia's geological history.

As part of climate change research, CSIRO was granted voyage time in the Tasman Sea to study how nutrients control oceanic primary productivity and carbon uptake. Similarly, Antarctic climate and ecosystem scientists conducted voyages in the Southern Ocean to

deploy and service moorings which measure the transfer of carbon dioxide from the atmosphere to the surface and deeper ocean waters. Further studies by CSIRO and University of Western Australia scientists studied the impact of climate variability on nutrient transfer across the continental shelf and human and climate-induced changes on Ningaloo Reef in Western Australia. More information can be found at: www.marine.csiro.au/nationalfacility/

Australian National Insect Collection

To support Australian biosecurity, the ANIC employs officers from the Australian Quarantine and Inspection Service (AQIS) and the Department of Agriculture, Fisheries and Forestry (DAFF) who provide rapid response assistance when urgent identification of an insect is required. Using remote diagnostics via a web-based technology, insects can be speedily identified, saving time and resources. This is particularly important in a quarantine setting where response time is crucial to the outcome.

The AQIS Officer facilitates interactions between AQIS and the ANIC, giving AQIS the ability to utilise the collection and gain advice from taxonomic specialists, both of which are invaluable tools in making quarantine decisions and ultimately protecting Australia's biosecurity.

Australian National Wildlife Collection

The ANWC received a major boost with the purchase of a Micro CT scanner which will greatly enhance research into Australian mammal fauna. This exciting new research tool opens new ways of studying specimens of sometimes tiny mammals, such as many small bats and carnivorous marsupials. Whether they have been preserved whole in alcohol or traditionally dried, researchers can now obtain staggeringly detailed three dimensional images of skull morphology. The potential for uses in other groups of organisms is immense.

Australian National Fish Collection

The Australian National Fish Collection (ANFC) underpins research in the Wealth from Oceans Flagship and the Climate Adaptation Flagship, providing expertise in fish identification, biodiversity and biogeography. Specimens from the ANFC have helped resolve taxonomic problems across the Indo-Pacific region and the Southern Ocean.

The revision of the Australian Handfishes (Brachionichthyidae) resulted in the description of three new genera and nine new species and was published in *Zootaxa*. At least ten species new to science were discovered in the first ever comprehensive survey of Borneo's sharks and rays, in a collaborative project between the governments of the United States, Malaysia, Indonesia and Australia, and funded by the National Science Foundation. *Sharks and Rays of Borneo* identifies the features, size, distribution, local common names, habitat, biology and conservation status of 118 species.

Australian National Herbarium

The ANH and the Centre for Plant Biodiversity Research is researching the biology of three species of threatened orchid to secure their survival in the face of major roadworks in the Buladelah area on the north coast of New South Wales. This work is focused on relocating affected orchid populations to alternative sites prior to the construction of major roadworks. The project also has wider implications for research into threatened species conservation, translocation and orchid biology, habitat preferences, pollination strategies, natural versus human-assisted regeneration, and the isolation, identification and establishment of associations between the orchid's roots and fungi, which is an essential process for orchid seed germination.

CSIRO's approach to climate change adaptation

Australia is particularly vulnerable to many of the climatic changes projected by CSIRO and other international scientists. Our water supplies, coastal settlements, agriculture and natural ecosystems are especially affected by climate change. In fact we have been assessed as one of the developed nations most vulnerable to climate change.

CSIRO's Climate Adaptation Flagship brings together a wide range of skills and capabilities to help Australia adapt to a changing climate. Our researchers provide the scientific basis to support sound adaptation decisions by government, industry and communities. We aim to minimise the negative consequences of climate change and climate variability and take advantage of new opportunities that may arise.

For agriculture our research is developing strategies for mixed cropping and grazing systems Australia-wide to adapt to projected climate change and other business pressures. By combining information from real mixed cropping systems with expected climate change impacts, farmers can identify management options to offset negative impacts.

A Flagship Collaboration Cluster is assessing the benefits of coastal adaptation. The South East Queensland Climate Adaptation Research Initiative is investigating a range of options to reduce the population at risk of inundation in low lying coastal areas.

Flagship scientists led a project to develop the Marine Climate Change Impacts and Adaptation Report Card for Australia. It communicates observed and expected changes together with key adaptation options for environmental and resource managers and anyone with recreational and financial interests in our coasts and oceans.

By equipping Australia with practical and effective options to adapt to climate change and variability the Flagship aims to create $3 billion per annum in net benefits by 2030.

Coastal inundation will be more frequent as sea level rises. Credit: Liese Coulter

Awards and honours

Outstanding performance in research is also recognised by various international and national award schemes. Here are just a few examples of awards and honours granted in 2009–10 that are a further demonstration of our effectiveness in research and its application in industry and the community.

Order of Australia

Member (AM)

Dr Ian Grey (Process Science and Engineering) for service to science, particularly in the field of mineralogy as a crystallographer, and to the mineral sands export industry.

Dr Roger Laurence Kitching (Formerly, Entomology) for service to conservation science as an academic, researcher and educator, particularly in the field of tropical rainforest ecology and ecosystem management.

Medal (OAM)

Dr Robert (Bob) Anderssen (Mathematics, Informatics and Statistics) for services to mathematical and information sciences in Australia.

Prime Minister's Prizes for Science

Prime Minister's Prize for Science

Dr John O'Sullivan (Astronomy and Space Science) for achievements in astronomy and wireless technologies.

Malcolm McIntosh Prize for Physical Scientist of the Year

Dr Amanda Barnard (Materials Science and Engineering) for major contributions to the field of nanoscience.

The Sir Ian Clunies Ross Award 2010

Dr John O'Sullivan and **team, Mr Graham Daniels, Mr John Deane, Mr Diet Ostry** and **Dr Terry Percival** (Astronomy and Space Science, ICT Centre, National ICT Australia) were awarded the *Australian Academy of Technological Sciences and Engineering Clunies Ross Award* for the invention of the technology behind most high-speed wireless local area networks (WLANs). Their invention and the widespread adoption of WLAN technology helped enable a global revolution in mobile computing and in the way we live and work.

Australian Museum Eureka Prizes 2009

Dr Debbie Abbs, Dr Kathy McInnes and **Dr Ben Preston** (Marine and Atmospheric Research) were part of the Cities Adapting to Climate Change team that won the *NSW Department of Environment and Climate Change Eureka Prize Innovative Solutions to Climate Change* prize. The team were awarded the prestigious prize for developing an innovative, transferable method for assessing regional climate change vulnerability in cities.

Dr Kishore Prayaga and **team**, **Dr Max Mariasegaram** and **Ms Stephanie Sinclair** (Livestock Industries) were awarded the *Research that Contributes to Animal Protection Eureka Prize* for the development of a simple genetic test which has the potential to end the need for the painful practice of dehorning cattle in Australia.

Dr Nick Cutmore and **team, Dr Yi Liu, Dr Brian Sowerby** and **Dr James Tickner** (Process Science and Engineering) and the Air Cargo Scanner team won the *Outstanding Science in Support of Defence or National Security Eureka Prize* for the novel air cargo scanning technology which will improve air cargo security.

CSIRO Chairman's Medal

The Chairman's Medal honours the most exceptional research in CSIRO and is awarded to the scientist or team whose research is of national or international importance in advancing scientific knowledge, technology application or commercialisation.

The winners of the *2009 Chairman's Medal* were **Dr John O'Sullivan** (team leader) and the **Wireless Local Area Network (WLAN) team.** The team received the medal for delivering major technical benefits to Australia and the world and substantial returns to CSIRO from the WLAN technology now underpinning wireless communication systems in over one billion products world-wide.

Further information on CSIRO Awards can be found at: http://www.csiro.au/news/CSIRO-Medal-winners.html

The CSIRO Medal for Lifetime Achievement

The CSIRO Medal for Lifetime Achievement is awarded to individuals who have a record of sustained and meritorious achievement over a prolonged period of CSIRO service.

Dr Ezio Rizzardo (Molecular and Health Technologies) for seminal contributions to polymer science and pioneering work in controlled free radical polymerisation which has revolutionised the way polymers are made,

Winners of the Chairman's Medal: the WLAN team (back row) Mr Diethelm Ostry, Mr Denis Redfern, Dr Hajime Suzuki, Mr Graham Daniels, Mr John Deane, Mr Nigel Poole, Dr Megan Clark, Dr Jack Steele, Dr Dennis Cooper, Ms Sarah Spencer. Front row: Ms Julie Berwick, Ms May Ling Goode, Mr Terry Healy, Ms Katrina O'Leary, Dr John Stocker, Dr John O'Sullivan, Ms Julie Filazzola, Ms Debbie Davis. Credit: Leo Farrell

Winner of the CSIRO Lifetime Achievement Medal, Dr Ezio Rizzardo (middle) with Dr John Stocker (Chairman) (left) and Dr Megan Clark (Chief Executive) (right). Photo: Leo Farrell

Winner of the CSIRO Lifetime Achievement Medal, Dr Warwick Wilson (middle) with Dr John Stocker (Chairman) (left) and Dr Megan Clark (Chief Executive) (right). Photo: Leo Farrell

leading to the development of new generations of polymeric materials in the field of electronics, healthcare and biotechnology.

Dr Warwick Wilson (Astronomy and Space Science) for inspirational leadership spanning 27 years and ensuring consistent development and delivery of benchmark research instrumentation that has helped establish and maintain CSIRO's position as a world leader in the field of radio astronomy.

Fellows of Societies

Dr Tom Beer (Marine and Atmospheric Research) was elected an Honorary Member of the *Hungarian Academy of Sciences*.

Dr Jeremy Burdon (Plant Industry) and **Dr Frank de Hoog** (Mathematics, Informatics and Statistics) were elected as Fellows of the *Australian Academy of Technological Sciences and Engineering*.

Dr John Oakeshott (Entomology) was elected a Fellow of the *Australian Academy of Science*.

Dr Mike Raupach (Marine and Atmospheric Research) was elected a Fellow of the *American Geophysical Union*.

Dr Ezio Rizzardo (Molecular and Health Technologies) was elected a Fellow of the *Royal Society*.

Part three

Our organisation

Part three: Our organisation
Management and accountability

Operating model

CSIRO's Operating Model supports the effective governance and management of the Organisation by defining the roles, relationships and accountabilities of leaders and operating units. It also outlines CSIRO's Policy Framework and processes for planning, investment, review and reporting. It is designed to support the successful execution of CSIRO's strategy and delivery of CSIRO's goals. The Model includes our commitment to the values which guide our interactions with colleagues and external partners and stakeholders.

The Model is documented in *CSIRO – the way we work* which was published in March 2010 and is available to everyone who works in CSIRO.

'The CSIRO Operating Model should support individual creativity and flexibility and allow people to readily work together and across boundaries, within the context of our legislative framework.'

Megan Clark, Chief Executive

Further information on CSIRO's governance arrangements can be found at:
www.csiro.au/governanceoverview

Legislation and government policy

CSIRO is an Australian Government statutory authority constituted and operating under the provisions of the *Science and Industry Research Act 1949* (SIR Act).

CSIRO's **primary functions** are to:

- carry out scientific research to:
  - assist Australian industry and to further the interests of the Australian community
  - contribute to national and international objectives and responsibilities of the Australian Government
- to encourage or facilitate the application and use of the results of CSIRO scientific research.

Our **secondary functions** include international scientific liaison, training of research workers, publication of research results, technology transfer of other research, provision of scientific services and dissemination of information about science and technology.

Reporting, accountability and other rules for CSIRO's operations are set out in the *Commonwealth Authorities and Companies Act 1997* (CAC Act).

Pursuant to a service agreement, CSIRO provides administrative support services to the Trustee of the Science and Industry Endowment Fund consistent with the *Science and Industry Endowment Act 1926*. The Fund has its own governance structure.

In October 2009, CSIRO submitted an annual Compliance Report to the Government regarding the Organisation's compliance with the CAC Act and its financial sustainability.

General policies of the Australian Government that applied to CSIRO in 2009–10 under Section 28 of the CAC Act are: Commonwealth Fraud Control Policy; Australian Government Foreign Exchange Risk Management Guidelines; and Outsourcing of IT Infrastructure Services. In addition, CSIRO has complied with the Commonwealth Procurement Guidelines as they apply to CSIRO.

The Quadrennium Funding Agreement 2007–08 to 2010–11 between CSIRO and the Government includes the principles of quadrennium funding, resourcing of outputs, performance reporting and other matters agreed by the parties.

Responsible Minister

In 2009–10, the Minister responsible for CSIRO was Senator the Honourable Kim Carr, Minister for Innovation, Industry, Science and Research.

Under the SIR and CAC Acts, the Minister has power to:

- add to the purposes for which CSIRO may carry out scientific research (SIR Act, section 9)
- provide to the CSIRO Board in writing, directions and guidelines with respect to the performance of the functions, or the exercise of the powers, of the Board or of the Organisation (SIR Act, section 13).

In February 2010, the Minister provided the CSIRO Board with a Statement of Expectations. This Statement outlines the Government's expectations on CSIRO's research and innovation priorities, strategic direction, governance and communication. The Minister expects the Board to position the Organisation to play an active role in Australia's innovation agenda, address national and global research challenges, and contribute to Australia's productivity and competitiveness. The Board responded with a Statement of Intent. The Statement of Expectations can be found at: www.csiro.au/resources/Statement-of-Expectations.html

CSIRO also operates in accordance with the Public Research Agency Charter signed by the Minister and the CSIRO Board in 2008. The Charter has provided guidance to CSIRO and its researchers when engaging in public debate on a broad range of topics including environmental sustainability and climate change. The Charter can be found out: www.csiro.au/resources/pf1lc.html

Ministerial directions and notifications

No new directions were received in 2009–10. In 2008, the Minister directed the CSIRO Board to implement and comply with the Australian Government Employment Bargaining Framework and Supporting Guidance. The current CSIRO Enterprise Agreement was developed in accordance with the Employment Bargaining Framework.

During 2009–10, 20 notifications of significant events under Section 15 and 16 of the CAC Act were made to the Minister. These related to participation in partnerships, joint ventures or similar arrangements, the commencement of business activity, share transactions, the disposal of a business and the modification of existing contractual arrangements.

CSIRO Board

CSIRO is governed by a Board which is responsible to the Australian Government for the overall strategy, governance and performance of the Organisation.

The CSIRO Board comprises nine part-time, non-executive members including the Chairman and a full-time Chief Executive. All non-executive members are appointed by the Governor-General. The Chief Executive is appointed by the CSIRO Board, in consultation with the Minister.

The CSIRO Board operates partly through four standing committees:

- Board Audit Committee
- Board Commercial Committee
- Board Nominations and Remuneration Committee
- Board Endowment Committee.

Newly appointed Board members are informed of their responsibilities and rights through a formal induction process. In the

pursuit of their duties, Board members may take such independent professional advice as is considered necessary, and have complete access to senior management. The Board reviews its performance at least every 18 months. Every second review involves a review by an independent consultant commissioned by the Board. The Board Committees assess their performance at least once per year and report the outcomes to the Board. **Disclosure of interests** by Board members and the Chief Executive are made in accordance with the SIR Act and CAC Act, as appropriate.

Details of the 2009–10 Board members, including qualifications and terms of appointment are on page 90–91. Details of remuneration, membership of Board Committees and attendance at meetings are shown on pages 159–162 in the Financial Statements. The Board Charter and membership profiles are available at:
www.csiro.au/boardoverview

CSIRO Executive Management

The Chief Executive conducts the affairs of the Organisation in accordance with the strategy, plans and policies approved by the Board and the Board Directions to the Chief Executive. These Directions were reviewed in June 2010. The Chief Executive is supported by the Executive Team.

The Executive Team is assisted by a number of management and advisory committees, including the Science Committee, CSIRO Appraisal and Investment Committee and Commercial Executive (ComEx) Committee. The CSIRO Health, Safety and Environment Committee is accountable to the Chief Executive.

The Executive Management Council of senior managers provides a forum for sharing and discussing issues relating to the management and future strategy for CSIRO.

Policies, standards and procedures

The CSIRO Board approved a new Policy Framework for CSIRO which comprises:

Policies:	Define CSIRO's commitment and responsibilities in an area.
Standards:	Define minimum mandatory performance requirements for all CSIRO staff, sites and operations
Procedures:	Define the minimum mandatory actions or processes that must be followed by CSIRO staff in performing a particular task or activity.

The Framework will improve compliance by making the roles and responsibilities and performance requirements clearer. Documents will be easier to follow and access from a user perspective. Existing policy material is comprehensive but will be reviewed as part of the implementation of the new Framework.

Policies

As part of the Framework, the CSIRO Board approved five policy statements that represent the Organisation's commitment in relation to:

- Science and Delivery
- People
- Governance
- Risk
- Health, Safety, Environmental Sustainability and the Community.

Standards and procedures

Standards and procedures focus on essential steps and the parameters within which we should operate. The standards will be developed during 2010 as part of a review of all policies, standards and procedures.

CSIRO research supports the Murray-Darling Basin

Australia's Murray-Darling Basin, which generates 70 per cent of Australia's irrigated produce, is under enormous stress due to past water-allocation decisions, prolonged drought, and climate change, resulting in a loss of water security for communities and the environment. The Basin supports agriculture production of the order of $15 billion annually and is the primary water supply for urban centres, including Adelaide and Melbourne.

The Murray-Darling Basin Authority is developing a Basin Plan to manage water resources and ensure there is sufficient water available to make sure key environmental assets and functions of the Basin are not compromised, while seeking to optimise social and economic outcomes.

CSIRO has a long history of undertaking important research in the Murray-Darling Basin to understand the region's ecology, support improved water management and to support the development of the Basin Plan.

In 2008, CSIRO's Murray-Darling Basin Sustainable Yields Project provided the world's first rigorous assessment of the potential impacts of development and climate change on surface water and groundwater availability across the Basin. This research has provided governments, industry and communities with an unprecedented level of water information to guide future resource planning, management and investment.

CSIRO researchers are also undertaking research:

- on the potential impacts of changes in water availability on Indigenous communities of the Basin
- to investigate the relationships between watering strategies and the health of vegetation, fish and other animals in the Basin to help water managers to improve and justify delivery of environmental water
- on groundwater resources in the Basin to support its future management
- on social and economic affects of changing water availability
- to investigate the impact of a changing climate on future water resources of the Murray-Darling Basin.

The Murtho Floodplain near Renmark, South Australia. Credit: Tanya Doody

The procedures reviewed and introduced this year included:

- Ethical Conduct in Human Research
- Indigenous Cadetships
- Indigenous Research Engagement Protocol
- Copyright and Publication
- Recordkeeping
- Workplace Discrimination and Bullying
- Whistleblower Scheme.

All staff must comply with the **CSIRO Code of Conduct** which sets out expected standards of behaviour in relation to dealing with the public, external clients and colleagues. CSIRO has an effective framework for the exercise of delegations and authorities.

Planning, investment, review and reporting

Our planning, investment, review and reporting processes are the way we decide how to invest our resources and then measure and report on our performance, including financial and publication performance.

The Organisation's broad vision for the future is set out in the 2007–2011 CSIRO Strategic Plan. The Plan, together with the science investment process, directs the development of the annual CSIRO Operational Plan and Portfolio Budget Statements. During 2010, the CSIRO Board and Executive Team will develop the 2011–15 Strategic Plan in consultation with stakeholders.

CSIRO's science investment process operates within the context of the planning system. Investment decisions are based on the criteria of relevance and impact for Australia.

The key steps in CSIRO's planning and investment processes are:

- **broad direction setting** – an annual review that guides the direction and timing of investment shifts and the specific role CSIRO plays in Australia's innovation system
- **enterprise level balancing** – an annual examination and balancing of portfolio, capability and functional investment priorities
- **performance and investment appraisals** – CSIRO's Appraisal and Investment Committee conducts Portfolio and Divisional appraisals to monitor progress and assess the level of ongoing investment in research themes and capability development
- **independent reviews** – external reviews of Divisions, Portfolios and Functions are conducted on a rolling 3–5 year basis. Eleven reviews were conducted in 2009–10. Further details of CSIRO's Science Assessment Reviews are shown on pages 106–107.

CSIRO's performance is regularly reported and reviewed by the CSIRO Board and Executive Team to assist with their decision-making and governance responsibilities.

Advisory mechanisms

CSIRO's Sector Advisory Councils provide advice on the high-level strategic directions for research and development for their sector. The Councils comprise external representatives from industry and other stakeholders and cover energy and transport; environment and natural resource management; health; information, communication and services; manufacturing; and mineral resources sectors.

There are also Advisory Committees for each of the National Research Flagships.

Details of the Sector Advisory Councils and Flagship Advisory Committees can be found at: www.csiro.au/SAC and www.csiro.au/FAC

Risk management

CSIRO's risk management framework sets out the responsibilities of all individuals across CSIRO, including the Board and management for identifying and managing risk. It also provides the methodology

by which CSIRO's risk profile is articulated and regularly updated. Risks are managed on an enterprise basis through mitigation strategies that include, in appropriate circumstances, insurance to transfer the financial impact of risk.

In 2010, the risk framework was revised, strengthening integration into organisational planning, commercial approval processes and performance management.

External audit and internal controls

Assurances about the Organisation's financial state of affairs, compliance issues and control environment are provided through a comprehensive range of processes including the internal Risk Assessment, Audit, Fraud Control and Security functions.

External audit is provided by the Australian National Audit Office (ANAO).

CSIRO maintains a Whistleblower Scheme and uses mechanisms such as Control Self-Assessment Questionnaires signed by senior managers to provide additional assurance.

The CSIRO Strategic Protective Security Risk Assessment was updated in February 2009 and was reviewed in February 2010. The Government released its new Protective Security Policy Framework in mid-June 2010 and, as a result, will lead to a revision of some CSIRO security policies.

Administrative law: Freedom of Information

The *Freedom of Information Act 1982* requires each Australian Government agency to publish a statement setting out the general right of access to documents. This statement is available in Appendix 3, page 180. There were 33 requests for information under the FOI Act during 2009–10.

Privacy legislation

CSIRO provides information as required to the Privacy Commissioner under section 36 of the *Privacy Act 1988*. During 2009–10 there was one investigation, which is subject to determination. See Appendix 3, page 180.

Commonwealth disability strategy

CSIRO recognises the importance of the Commonwealth's disability strategy. CSIRO is committed to identifying areas for improvement to meet its obligations under the Act. CSIRO's performance against the indicators issued by the Office of Disability during 2009–10 is detailed in Appendix 4, page 182.

Financial performance 2009–10

CSIRO's financial performance for 2009–10 is summarised in Table 3.1.

CSIRO's operating result for the year to June 2010 was a deficit of $169 million, which includes the gift from CSIRO to the Science and Industry Endowment Fund of $150 million. Also contributing to the deficit were foreign exchange losses resulting from the wireless local area networks (WLAN) settlements recorded in 2008–09 and paid in 2009–10, write-down and impairment of assets resulting from asset valuations, and other operational expenses. The operating result comprised total revenue of $1,164 million and total expenses of $1,333 million.

Table 3.1: CSIRO's Financial performance

Financial performance					
Revenue Source	**2005–06**	**2006–07**	**2007–08**	**2008–09**	**2009–10**
Co-Investment, consulting and Services					
Australian Private Sector	67.6	58	68.2	76.3	71.8
Australian Government	96.5	116	119.5	148.3	169.8
Rural Industry R&D Corporations	44.3	43.2	30.2	36.5	31.8
Cooperative Research Centres	35.2	39.8	38.2	40.3	42.3
Overseas entities	36.4	37.2	35.3	61	78.3
Other	-	-	-	-	-
Work in progress / Deferred Revenue	-8	-8.5	-1.4	-14.5	-13.6
Total co-investment, consulting and services	272	285.7	290	347.9	380.4
IP - Royalty and licence revenues	32.4	30.6	81.7	229.6	46.7
Total Research and Services Revenue	304.4	316.3	371.7	577.5	427.1
Other External Revenue	43.9	44.5	41.3	40.1	32.1
Gain/(Loss) on sale of assets	15.5	2.7	4.8	17.2	
Other fair value gains and reversals	-	0.1	10.8	-	-
Total external Revenue	363.8	363.6	428.6	634.8	459.2
Revenue from Government	593.9	610.1	663.2	668.1	704.9
Total Revenue	957.7	973.7	1,091.8	1,302.9	1,164.1
Less: expenses	947.8	972.7	1,044.1	1,180.9	1,333.1
Operating Result	9.9	1.0	47.7	122.0	(169.0)

Australian Black Tiger prawn boosts local industry

CSIRO scientists have collaborated with the Australian prawn industry to develop a new prawn that is producing record yields and can be sustainably farmed. With around 50 per cent of all prawns in Australia currently imported from other countries such as China and Vietnam, this research will dramatically improve the production efficiency and profitability of locally produced seafood.

After ten years of research, the new Australian Black Tiger prawn is a major boost for both the local prawn industry and consumers wanting to buy Australian seafood. This Food Futures National Research Flagship project has combined selective breeding techniques with DNA fingerprinting to develop a naturally bred Black Tiger prawn that captures the best features nature can provide.

The new breed is grown and farmed in 'drought-proof' saltwater ponds, has improved growth and survival rates and greater disease resistance combined with improved taste, texture and colour. Its high yields could also play an important role in securing food supplies, both in Australia and globally, through the production of a more sustainable and high yielding source of healthy protein.

The average harvest yield from Australian Black Tiger prawn farms is five tonnes per hectare. The average yield of the new breed developed by CSIRO and Gold Coast Marine Aquaculture in 2010 was 17.5 tonnes per hectare, with 30 per cent of the ponds producing more than 20 tonnes per hectare – a world record yield result for Black Tiger prawns.

If the entire Australian Black Tiger prawn industry adopts this new breeding technology, it will increase the industry's production from 5,000 tonnes to 12,500 tonnes and add $120 million per annum to the value of the industry by 2020.

The new breed is providing a real boost for the prawn farming industry in Australia resulting in job growth, more profitable and productive business, and fresher home-grown product. Credit: Darren Jew

Board membership 2009–10

Chairman
Dr John Stocker AO
BMedSc MBBS PhD FRACP FTSE
Company Director
28 June 2007 – 27 June 2010

Chairman
Mr Simon McKeon
BCom LLB FAICD F FIN
28 June 2010 – 27 June 2015

Deputy Chairman
Dr Terry Cutler
BA(Hons) PhD FTSE Hon DUniv (QUT) FAIM FAIPA
Principal
Cutler and Company Pty Ltd
25 July 2002 – 24 July 2012

Chief Executive
Dr Megan Clark
BSc(Hons) PhD DSc FTSE GAICD
Chief Executive
1 January 2009 – 31 December 2014

Ms Mary Boydell
BCom
Company Director
26 June 2009 – 25 June 2014

Professor Ian Chubb AC

MSc DPhil Oxon, Hon DSc Flinders
Vice-Chancellor and President
The Australian National University
7 August 2008 – 6 August 2012

Dr Eileen Doyle

BMath(Hons) MMath PhD FAICD
Company Director
15 February 2006 – 14 February 2011

The Honourable John Kerin AM

BA BEc Hon DScAgr *(UNE)* Hon DSc *(UWA)* Hon DLitt *(UTas)*
Company Director
3 October 2008 – 2 October 2011

Ms Deborah O'Toole

LLB Company Director 16 April 2003 – 15 April 2008
1 May 2008 – 30 April 2011

Mr Douglas Rathbone AM

DipChemEng BCom
Nufarm Ltd
Managing Director and Chief Executive
26 September 2007 – 25 September 2010

Professor Tom Spurling AM

BSc(Hons) PhD
Research Professor
Swinburne University of Technology
1 May 2008 – 30 April 2012

Executive Team membership 2009–10

Dr Megan Clark
BSc(Hons) PhD DSc FTSE GAICD
Chief Executive

Dr Alastair Robertson
BSc(Hons) PhD FRSC CChem FIFST
Deputy Chief Executive, Science Investment Strategy and Performance

Mr Mike Whelan
BEc
Deputy Chief Executive, Operations

Dr Beverley Ronalds
BE(Civil)(Hons) MSc PhD FIEAust FICE FTSE FAICD
Group Executive, Energy

Dr Andrew Johnson
BAgrSc(Hons) PhD MPA (Harvard)
Group Executive, Environment

Dr James Bradfield Moody
BInfoTech(Hons) BEng (Elec) PhD
Executive Director, Development

Absent: Mr Allan Gaukroger BA FCPA
Chief Finance Officer (till November 2009)

Executive team profiles are available at:
www.csiro.au/executiveteam

Dr Steve Morton
BSc(Hons) PhD
Group Executive, Manufacturing, Materials and Minerals

Mr Nigel Poole
LLB BCom FAICD
Executive Director, Commercial

Dr Joanne Daly
BSc(Hons) PhD PSM
Group Executive, Agribusiness

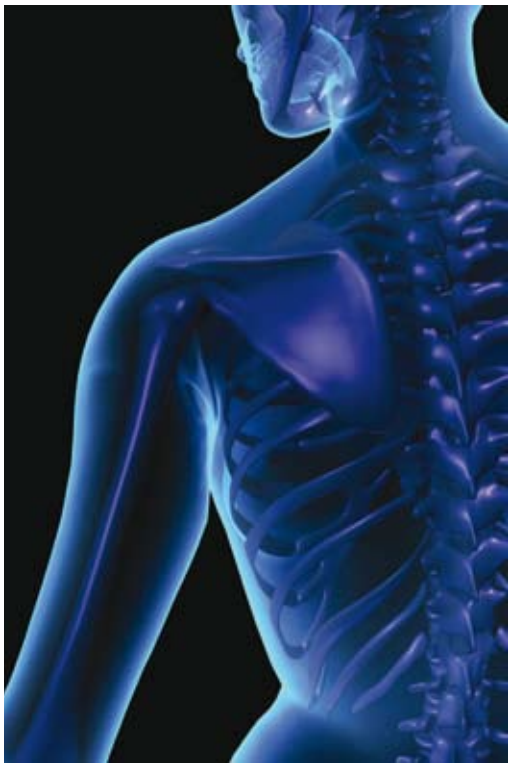
Mr Craig Roy
BSc MSc MBA GAIDC
Executive Director, Human Resources, Safety and Sustainability

Mr David Toll
BA, MAccounting, MBA, CPA
Acting Chief Finance Officer (from November 2009)

Dr Alex Zelinsky
BMaths(Hons) PhD FTSE FIEEE FAICD FIEAust
Group Executive, Information Sciences

Health and safety

CSIRO is committed to the health and safety of its staff and recognises the importance of positive interventions aimed at improving staff health and safety. CSIRO acknowledges its responsibilities under Section 74 of the *Occupational Health and Safety Act 1991*.



Health, Safety, Environmental Sustainability and Community Policy

CSIRO's Health, Safety, Environmental Sustainability and Community Policy reflects our commitment to ensuring the safety and wellbeing of our staff, visitors and the communities in which we work. It reinforces our Health, Safety and Environmental (HSE) strategic goal of '*Striving for Zero Harm*' to our people, the environment and the communities in which we operate.

A summary of CSIRO's performance and its compliance with Section 74 of the *Occupational Health and Safety Act 1991* is provided below.

Health and safety management arrangements

Health and safety management arrangements are documents concerning the management of health and safety in CSIRO. They are one of the mechanisms by which CSIRO demonstrates commitment to meeting its duty of care under the Act.

In recognition of this duty, CSIRO has developed these health and safety management arrangements in consultation with our staff and their representatives. The Act emphasises consultation and cooperation between employers and employees in regard to occupational health and safety issues by requiring the establishment of a framework incorporating:

- health and safety management arrangements
- designated work groups
- health and safety representatives
- health and safety committees
- dispute resolution processes.

These structures and arrangements are in place and effective within CSIRO.

Initiatives undertaken during the year to ensure the health, safety and welfare at work of employees and contractors

- The implementation and completion of phase two of CSIRO's health and safety leadership training will equip the next level of leaders to take a higher profile in growing the Organisation's *Zero Harm* culture.
- The implementation of a HSE Review Program for Business Units commenced. This program is primarily an engagement tool aimed at assessing the effectiveness of HSE management and operational controls, observing site HSE conditions, staff behaviours, physical controls and implementing corrective processes should gaps be identified.
- The Contractor HSE Management Training program for scientific managers who manage or engage contractors continued. The program highlights the specific HSE requirements necessary for safe completion of contracted works within CSIRO.
- The Gas Safety Review Program was completed across all sites to assess gas safety in relation to equipment, practices and behaviours.
- An enterprise wide policy and procedure simplification program is underway. Current procedures are being simplified and streamlined to ensure that they are easier for staff to access, understand and comply with.
- A re-structure of the HSE function to improve efficiency and effectiveness of our HSE service delivery commenced across the Organisation.
- A new Employee Assistance Program contract was engaged for the next five years providing confidential counselling services for staff and their families.
- As a component of the Health and Wellbeing Strategy, CSIRO sponsored and supported staff participation in the Global Corporate Challenge (GCC). The GCC has been developed specifically for the workplace. With a daily target of 10,000 steps and a journey that provides reward for effort, participants and their teams have an opportunity to maintain the long-term commitment and motivation needed to bring about positive habitual change in their fitness. With 840 participants, CSIRO was placed 53rd out of 1,000 global companies taking part in this year's 125-day challenge.

Health and safety outcomes

- An increased awareness of the roles and responsibilities and expected leadership behaviours for senior leaders is anticipated as a result of the HSE leadership training and Safety Contacts Program.
- An improvement in leadership behaviors and staff engagement through the HSE Review Program is expected.
- An overall improvement in health and safety performance is recognised in reduced injuries, illnesses and the workers compensation premium.
- An increased awareness and better understanding of how to manage contractors through completion of a three year training program explaining how to better manage contractors for safe work.
- An increased awareness of gas safety standards and requirements with significant improvements implemented to increase staff safety.
- Continued counselling support for staff and their immediate families.

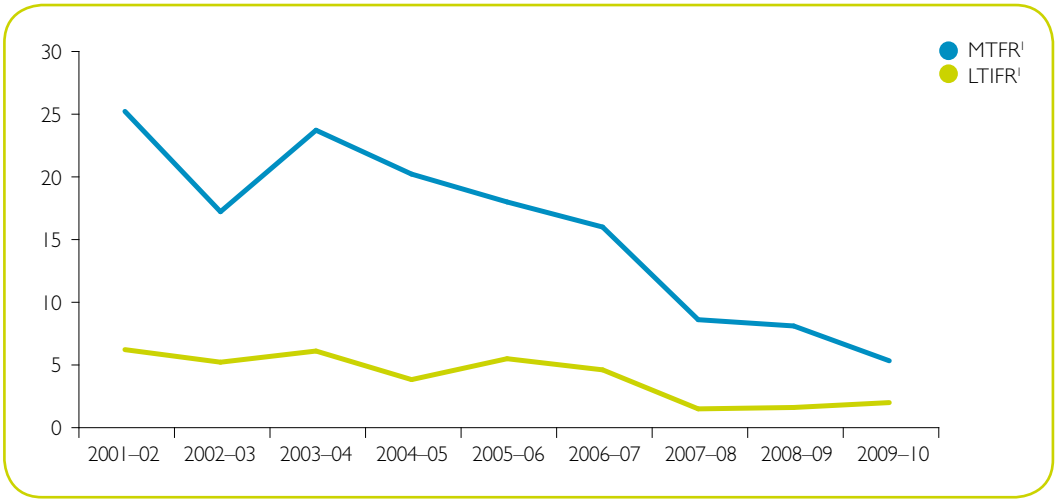
Statistics of any accidents or dangerous occurrences during the year that arose out of the conduct of undertakings by CSIRO that required the giving of notice under section 68 (see Figure 3.1)

- The lost time injury frequency rate (LTIFR) increased from 1.4 in 2008–09 to 1.8 in 2009–10. The majority of the lost time injuries, 10 out of 21, relate to body stressing type injuries which are being addressed through our Musculoskeletal Management Strategy.
- The medical treatment frequency rate (MTFR) has improved from 7.9 in 2008–09 to 5.1 in 2009–10 meaning that less people have been injured to the extent that they need medical treatment for their injuries.
- The number of workers compensation claims shows a significant reduction from 87 in 2008–09 to 58 in 2009–10. Part of this improvement can be attributed to the introduction of the early intervention program designed to prevent relatively minor injuries progressing to a more disabling stage.
- The reporting of near misses has improved considerably from 396 in 2008–09 to 464 in 2009–10 reflecting a growing awareness among supervisors and staff of the value of reporting and rectifying risks before people get injured.
- The number of Notifiable Incidents has increased from 46 in 2008–09 to 50 in 2009–10.
- Improvements in our claims performance resulted in a reduction in the workers compensation premium from 0.37 per cent ($1.7 million) to 0.34 per cent ($1.49 million) of payroll. (This compares favourably with the average government rate of 1.20 per cent of payroll.)

Details of any investigations conducted during the year that relate to undertakings carried on by the employer, including details of all notices given to the employee under section 29, 46 or 47 during the year

- Comcare conducted three investigations of incidents during the reporting year:
  - Incident Investigation Number 4421 – Dangerous Occurrence – small scaffold collapse.
  - Incident Investigation Number 4221 – Serious Personal Injury – superficial burns to face, neck and arms resulting from a reaction following the mixing of hazardous substances.
  - Incident Investigation Number 4418 – Serious Personal Injury – ethanol ignition burning pads of two fingers. The investigation was completed to Comcare's satisfaction.
- No Provisional Improvement Notices were served on CSIRO by Health and Safety Representatives.
- No Prohibition Notices were served on CSIRO.
- One Improvement Notice was served on CSIRO by Comcare Incident Investigation Number 4221.

Figure 3.1: CSIRO's injury frequency rates

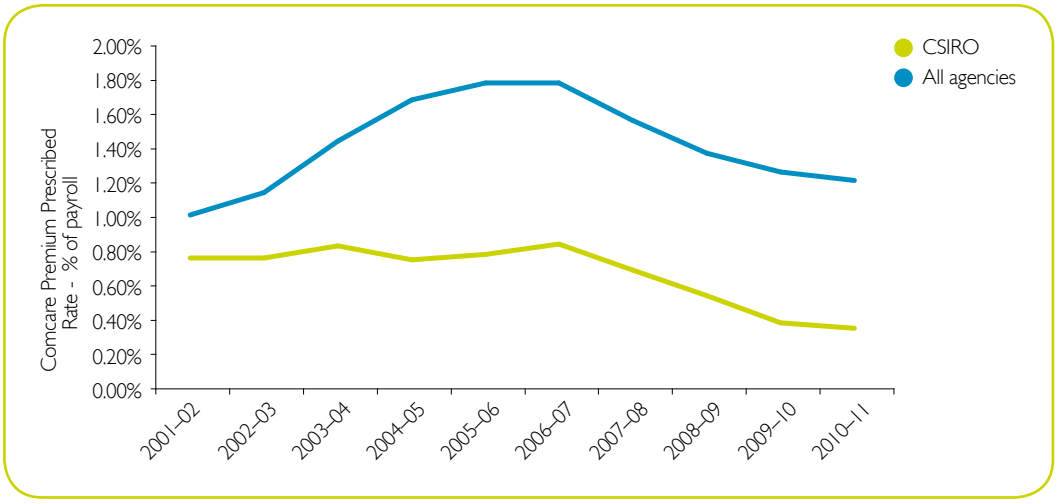


[1]*Definitions:*

- *LTIFR is the number of incidents involving lost time from work greater than or equal to one full day or shift per million hours worked.*
- *MTFR is the number of compensation claims per million hours worked plus the number of injuries requiring medical treatment.*

CSIRO's health and safety performance compares favorably with other Australian Government agencies. This is reflected in our workers' compensation premium (Figure 3.2). CSIRO's premium rate, determined on four year injury and claims performance, is one of the lowest amongst all agencies.

Figure 3.2: CSIRO's workers' compensation premium



Environmental performance

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) sets out the principles of ecologically sustainable development as:

- decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- the principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making
- improved valuation, pricing and incentive mechanisms should be promoted.

Section 516A of the *EPBC Act* requires CSIRO to report on the following subsections of the Act in its Annual Report.

CSIRO's contribution to environment protection and biodiversity

CSIRO has a strong association over its 84-plus year history with the development of industry, agriculture, environment and social aspects of Australia's history. As a community leader and Australian government agency, CSIRO has an obligation, both statutory through the EPBC Act and morally, to minimise its environmental impact and to protect and maintain biodiversity and heritage within its control. CSIRO holds its responsibility in high importance and is pro-active in assessing and maintaining its assets with any architectural, natural, cultural or social significance.

How CSIRO's activities accord with the principles of ecologically sustainable development
(Section 516A(6)(a))

CSIRO contributes to ecologically sustainable development (ESD) through its research activities and operations. For example, activities within the Sustainable Agriculture Flagship program include research to reduce the greenhouse gas emissions from livestock; increasing productivity while decreasing impact on ecosystems and increasing carbon capture.

Other CSIRO activities contribute to ESD through programs that:

- improve the management of native plant ecosystems, including the conservation of flora and fauna biodiversity
- increase carbon capture and improve water security
- reduce the environmental impact of electricity generation and improve building efficiency
- raise community awareness about environmental issues.

Outcome contribution to ecologically sustainable development
(Section 516A(6)(b))

CSIRO has allocated funding to support the implementation of a seven-year environmental sustainability strategy (ESS). CSIRO's ESS aims to reduce carbon usage, halve mains water consumption and halve waste to landfill by 2015. The goals will be achieved through reduced energy and water demand, utilisation of alternative sources; utilisation of CSIRO research; and staff engagement and improvements to procurement practices. Through the strategy, CSIRO will demonstrate leadership in environmental sustainability associated with its operations.

Effects of CSIRO's activities on the environment

(Section 516A(6)(c))

CSIRO's electricity and gas consumption for 2009–10 is estimated at 734 Terajoules (TJ), which is a one per cent increase compared to 2008–09 (see Figure 3.3). Electricity consumption increased by five per cent, while gas consumption decreased slightly over the same period. One site recorded a significant increase in electricity consumption, which is currently under investigation to ensure accuracy of the data. Over the past five years, energy consumption (electricity and gas only) has increased by two per cent, mainly due to the inclusion of electricity consumption attributed to the Tidbinbilla site in 2008–09, which now accounts for approximately eight per cent of CSIRO's electricity consumption.

Figure 3.3: CSIRO energy consumption (TJ)

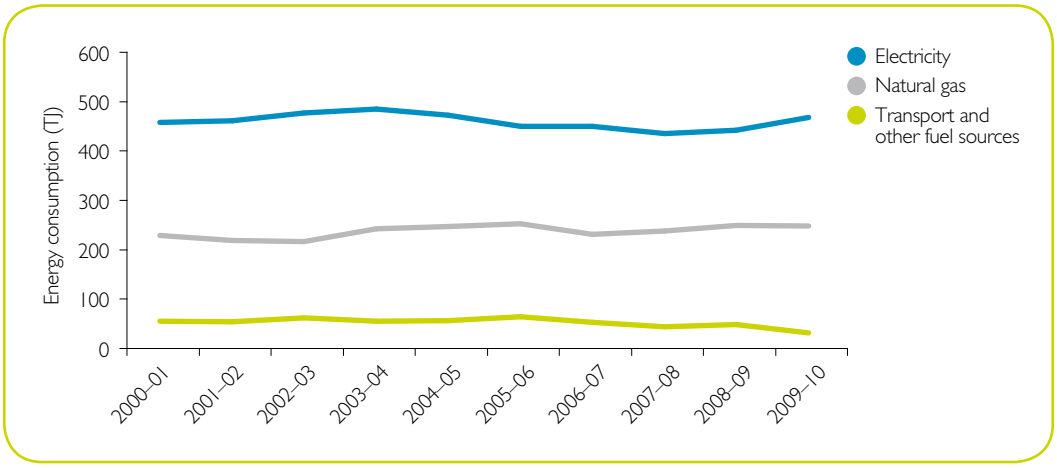
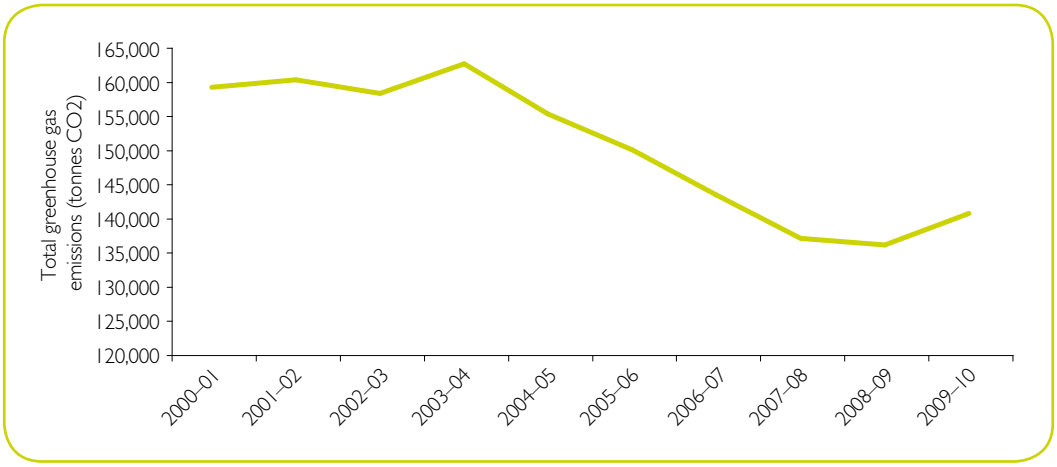


Figure 3.4: CSIRO greenhouse gas emissions (tonnes CO_2e)



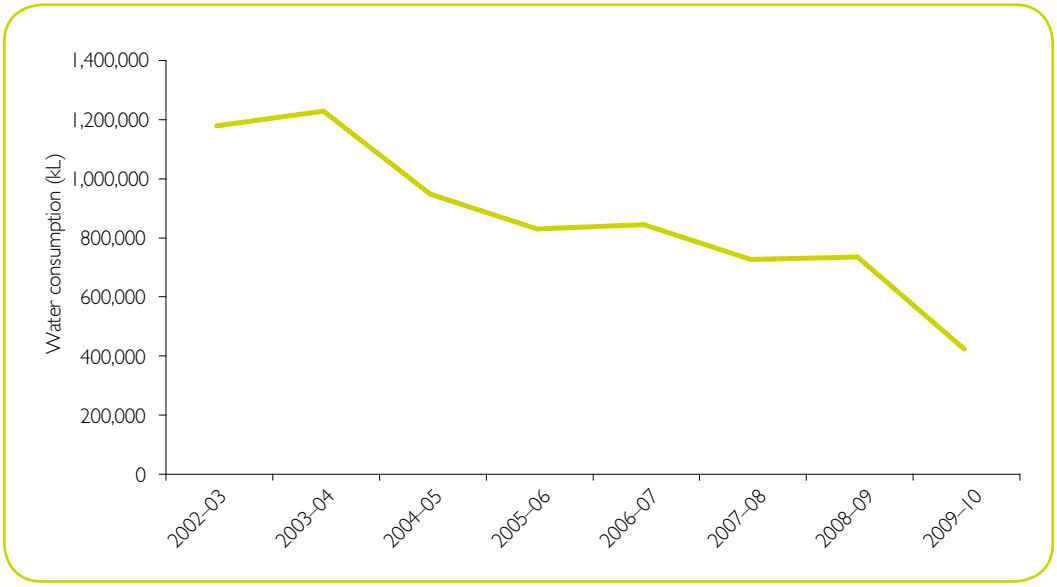
In January 2010, CSIRO increased its procurement of GreenPower to 20 per cent through its main electricity contract, equating to approximately 18 per cent GreenPower across the Organisation. Under the Environmental Sustainability Strategy (ESS), procurement of GreenPower will increase to 25 per cent in two years, ultimately accounting for 35 per cent of procured electricity by 2015.

CSIRO gradually decreased its greenhouse gas (GHG) emissions attributed to energy consumption during the period from 2003–04 to 2007–08 (see Figure 3.4, page 99) through increased utilisation of gas, site consolidation and smaller site-specific initiatives, such as installation of automated lighting and building optimisation. Inclusion of the Tidbinbilla site under CSIRO's energy reporting in 2008–09 resulted in an increase in total energy consumption of five per cent. In 2009–10, a significant increase in electricity consumption at one CSIRO site has resulted in an increase in GHG emissions. An investigation is underway to determine the reason for the increase.

During 2009–10, CSIRO sites consumed approximately 415 megalitres (ML) of potable water (see Figure 3.5). In previous years, CSIRO has reported total water consumption, based on potable water consumption and the irrigation water usage attributed to one of its Queensland sites. In alignment with the ESS, CSIRO has reported its potable water consumption only. Overall, water consumption has trended downwards over the past five years, mainly due to the implementation of improved management of building facilities, changes to processes, reduced landscape irrigation and the installation of water-saving fixtures, such as water-efficient toilets.

A detailed analysis of air travel profiles and associated greenhouse gas emissions is undertaken by CSIRO on a quarterly basis. The number of air kilometres travelled during 2009–10 decreased by an estimated 22 per cent compared to 2008–09, which equated to a similar reduction in greenhouse gas emissions attributed to air travel (domestic and international). Increased use of videoconferencing technologies, as an alternative to air travel, will further reduce the need for air travel and CSIRO's emissions.

Figure 3.5: CSIRO potable water consumption (kL)



Measures taken to minimise CSIRO's impact on the environment
(Section 516A(6)(d)

During 2009–10, a comprehensive audit program across 31 CSIRO sites was completed to identify improvement opportunities that minimise energy and water consumption and reduce waste generation. Key improvement opportunities included upgrading air-conditioning on some sites, modification of air conditioning programming and further installation of energy and water efficient fixtures. In addition, strategies to improve the diversion of waste from landfill and strategic procurement of goods to reduce packaging were highlighted. Implementation of priority recommendations will commence in early 2009–10.

Two CSIRO technologies called ComfortSense and OptiCool have been trialled in several CSIRO office-based buildings with the aim to improve the energy efficiency of those buildings. A number of parameters, including building internal environment and electricity consumption were monitored to achieve the optimal energy efficiency. Outcomes from the trials will be known in early 2010–11.

New CSIRO facilities are built with consideration for ESD principles, including building design, energy and water efficiency, and landscaping. The retrofit of existing buildings with energy and water-efficient fixtures forms a key component of the facility management of CSIRO buildings.

In addition, CSIRO has systems, such as risk assessment and fieldwork processes, in place to manage the potential environmental impacts of research activities. CSIRO also works with local indigenous communities to ensure that cultural aspects are protected during fieldwork or site development. A recent example was the environmental impact study undertaken as part of the Australian Square Kilometre Array project in north-west Western Australia to identify areas of cultural and environmental significance, with the intent to minimise impact by the project.

Mechanisms for reviewing and improving measures to minimise CSIRO's impact on the environment
(Section 516A(6)(e))

CSIRO has implemented mechanisms for reviewing and increasing the effectiveness of the above measures. Progress towards achievement of the ESS goals is monitored via several mechanisms. These include progress reports to senior management and the Board Audit Committee.

Heritage protection

The CSIRO Heritage Strategy is used as the basis for the management of actions and activities associated with CSIRO's heritage. During the financial year, heritage assessments were performed by heritage consultants on Lindfield and North Ryde, New South Wales; and Hobart and Sandy Bay, Tasmania. The four New South Wales sites that are used for radio astronomy purposes, being Marsfield, Parkes, Culgoora and Mopra will have heritage assessments undertaken in July 2010.

The heritage program provides for recording and reporting of management, maintenance and expenditure on CSIRO's heritage assets. Prior to any development activity occurring on CSIRO owned or controlled property; heritage values are assessed and incorporated into the development proposal.

Collaboration and partnering

University collaboration

CSIRO has extensive collaborative relationships and arrangements with universities both in Australia and overseas.

We support the training of future researchers as a means of building Australia's scientific capability and capacity. CSIRO shares research infrastructure to maximise the efficiency and impact of its use, and collaborates extensively in delivering science-based solutions that increase Australia's competitive advantage.

Some examples of collaboration include:

- CSIRO staff supervise, co-supervise and/or sponsor 840 postgraduate students in conjunction with universities.
- Approximately 40 per cent of CSIRO's staff are currently located on, or directly adjacent to, university campuses, providing the means for sharing infrastructure, joint publications and improving opportunities for increased collaboration.
- Through the Flagship Collaboration Fund, CSIRO committed to the investment of $17 million in research conducted by more than 36 universities. This complements and contributes to CSIRO's Flagship research, delivering to identified National Research Priorities.
- Throughout the year, CSIRO has undertaken a thorough review of all of its sites across Australia, paying particular attention to those co-located with Australian universities to explore opportunities for strengthening collaboration.
- CSIRO and James Cook University (JCU) with support from the Queensland Government have constructed the state of the art Tropical Sciences Innovation Precinct on the JCU campus in Townsville. The development, due for occupation in late 2010, will bring together scientists from the university and CSIRO working on the social, environmental and economic challenges facing northern Australia.
- In June 2010, the Australian Government announced a range of significant new initiatives under the Education Investment Fund for collaborative infrastructure. CSIRO is part of the new global centre in carbon fibre research at Deakin University in Geelong, as well as a significant marine research node in Western Australia in partnership with the University of Western Australia and Australian Institute of Marine Science.

Cooperative Research Centres

CSIRO remains the largest single participant in the Cooperative Research Centre (CRC) program. Throughout the life of the program, CSIRO has been a participant in 126 of the 169 CRCs that have existed, (rounds 1–10 inclusive).

When combined with funding from the Government and external sources provided specifically for CRCs, the total research commitment by CSIRO during 2009–10 was $83 million or seven per cent of CSIRO's total portfolio. CSIRO's lifetime involvement in the program equates to around $1.3 billion in total investment.

CSIRO is a participant in four of the ten Round 11 CRCs that were announced to receive funding in November 2009, of which three are extensions to existing CRCs: CRC for Antarctic Climate and Ecosystems; Poultry CRC; CRC for Greenhouse Gas Technologies; and one which is new: Deep Exploration Technologies CRC.

Round 12 funding was announced in November 2009. CSIRO is in the final stages of negotiation to participate in three CRCs, of which two are extensions and one is new.

The opening of Round 13 was announced in December 2009, with submissions to the Department of Innovation, Industry, Science and Research due on the 2 July 2010. CSIRO is in the early stages of negotiation with nine CRC bid teams, of which six are extensions to existing CRCs and three are new.

CSIRO engages in CRCs to build critical mass in research ventures which tackle clearly articulated major challenges for end users and Australia. It is an essential requirement for CSIRO's participation that the CRC program embraces and delivers on medium to long-term end-user driven collaborative research, end-user focused education, small to medium enterprise engagement and strategies to build their innovation and R&D capacity, and utilises research activities to achieve impact.

Customer engagement

During 2009–10, CSIRO continued to strengthen its commitment to working effectively with clients and partners. Over the course of the year, CSIRO commenced implementation of a Board Commercial Committee approved external and commercial engagement policy and supporting guidelines. This policy puts in place a framework and supporting material to improve the Organisation's approach to engaging externally. These guidelines cover a number of key areas, such as transactions and contract approvals, governance, delivery and capability identification, and pricing.

Throughout the year, CSIRO continued significant engagements with a number of key clients including the Department of Agriculture, Fisheries and Forestry, the Department of the Environment, Water, Heritage and the Arts, the Grains Research and Development Corporation, the Department of Climate Change and Energy Efficiency, the Australian Centre for International Agricultural Research and BHP Billiton.

In addition to further developing its existing relationships and external engagement framework, during 2009–10 CSIRO also implemented new strategic alliances with industry and government entities such as Centrelink, Orica Ltd and AusAID.

Flagship Collaboration Fund

The Flagship Collaboration Fund was externally reviewed by an independent expert panel during April 2010. The review included an examination of documentation and an intensive program of interviews and discussions with CSIRO and university staff. In its report, the panel strongly endorsed the continuation of the Fund and its broad objectives of contributing to the National Research Flagships Program goals, building capability across the National Innovation System and building longer-term research collaborations. See Appendix 1, page 176 for information on Flagship Collaboration Fund Clusters, the most significant component of the Fund (see case study page 173).

Government engagement

A critical part of CSIRO's broader relationship with Government is its role as a trusted advisor, providing relevant scientific and technical input and advice to decision makers. Key activities during 2009–10 included:

- Membership on each of the Australian Government's seven Industry Innovation Councils, and membership on a range of other government boards and advisory bodies, for organisations including Commercialisation Australia and the Office of the Chief Scientist.
- Regular meetings with Ministers and parliamentarians and with senior staff from relevant government departments, and secondment of key staff into departments to provide scientific information and advice to inform policy development and program implementation and evaluation. An example during 2009–10 was ongoing strategic engagement with the Department of Agriculture, Fisheries and Forestry and relevant Ministers and parliamentarians on issues of agricultural sustainability and food security. CSIRO also convened workshops on Future Cities and on Oceans with a wide range of relevant departments and agencies.

- Development and maintenance of strategic alliances with government agencies, such as AusAID and Centrelink. CSIRO and Centrelink entered into a four year, $20 million research alliance to address current and future challenges in human services delivery by applying evidence-based methods that integrate CSIRO's capabilities in information and communication technologies, mathematical and socio-economic sciences.
- CSIRO made 39 submissions to government inquiries and reviews (both Federal and State) and CSIRO officers attended 13 hearings to provide further evidence to these processes.
- CSIRO held five *Science for Breakfast* briefings at Parliament House and in parallel with these also provided targeted briefings for departments and individual parliamentarians.

International engagement

CSIRO is an active member of the global research community, with a commitment to strengthening strategic international engagement to improve both the quality and impact of its science. On average over the last five years, CSIRO has engaged in approximately 750 collaborative activities per annum with partners in 70 countries across the globe.

CSIRO has a four-year international strategy directed towards developing talent, science impact and networks. The strategy also focuses on enhancing CSIRO's engagement with China, India, North America and Europe, as well as in 'research for development' activities in the Asia-Pacific and Africa. Highlights during the reporting year include:

- An increase to approximately 48 per cent of CSIRO's peer-reviewed scientific publications in 2009 being co-authored with international partners, where our top publishing partner countries were the United States, the United Kingdom and China.
- An increase in the number of other collaborative activities under contract to approximately 850 in 2009–10, with leading partner countries the United States, China and New Zealand.
- In 2009–10, CSIRO received a total of $77.6 million in external revenue for work with international partners. This was up from a total of $59.2 million in 2008–09.
- The commencement of a researcher exchange program with CSIR India, promoting collaborative work on minerals processing, energy management, and regenerative medicine.

Key industry partnerships with large multinational corporations such as Boeing and Bayer CropScience are of continuing importance to CSIRO. Our collaboration with Bayer expanded during 2009–10 to include the development and application of models to assess the system-wide sustainability consequences of new generation cereals in the context of global environmental and food security challenges.

CSIRO is a founding member of the Global Research Alliance (GRA) – the aim of the GRA is to combine the scientific capabilities of nine leading applied research institutes worldwide to contribute to addressing the Millennium Development Goals through the application of research.

CSIRO also provides active support and scientific input to the international activities of a wide range of Australian Government departments, in line with bilateral and multilateral agreements and processes – this 'science diplomacy' role is an important part of CSIRO's overall international engagement.

Indigenous Engagement Strategy

2009–10 saw the completion of Phase 1 of the Indigenous Engagement Strategy (IES). In late 2009, the IES Steering Committee commissioned a review by the Leading the Research Enterprise (LRE) program to assess the success of the Strategy.

The LRE review team were impressed with the outcomes of the Strategy and recommended its extension for another three years. The review report concluded that the Strategy had made good progress and must be continued into a second phase to ensure Indigenous engagement is entrenched in CSIRO's culture. The Executive Team (ET) confirmed its continued support for the implementation of the Indigenous Engagement Strategy and has committed to resourcing Phase 2 for three years. The ET also confirmed support for a focus in Phase 2 on Indigenous employment and cultural learning and development.

During 2009–10, the four pillars of the IES continued to provide the focus of activities surrounding the Strategy.

Scientific opportunities: An Indigenous roundtable on health was held during the year that resulted in a partnership between CSIRO's Preventative Health Flagship and the Cooperative Research Centre on Aboriginal Health (now the Lowitja Institute) for collaborative research. During the year, a high-level Policy Reference Group comprising State and Federal Government departments and agencies was established as part of the Livelihoods Focal Project.

Indigenous employment: CSIRO's Indigenous Employment Strategy was finalised. The Employment Strategy includes processes for the provision of services to assist mangers and Indigenous applicants and a mentoring program for Indigenous cadets with the aim of increasing the attractiveness of CSIRO as an employer of choice for Indigenous Australians. Over the first phase of the IES, five Indigenous students have been engaged through cadetships and scholarships (including three PhDs) and two new employees.

Education outreach: Within the Indigenous Science Education Pathway project, CSIRO and the Queensland Department of Education and Training are now moving towards formalising an agreement aimed at increasing the participation and education and employment outcomes for Indigenous students in science. An Indigenous Science Expo aimed at attracting Indigenous students in Years 10–12 into the project was held in November 2009 and the P-3 phase of the project was launched in February 2010.

Cultural learning and development: A fifth Indigenous Strategic Awareness Program was held bringing the total to 150 people who have undertaken the program during Phase 1 of the IES. Indigenous culture awareness was also provided for the teachers participating in the Indigenous Science Education Pathway project. Throughout the year, work began on the development of an Indigenous Intellectual Property Protocol to replace the Indigenous Research Engagement Interim Protocol with the aim of providing a more comprehensive guide to researchers working for CSIRO with Indigenous people and communities.

Research capabilities – investment and review

The quality of CSIRO's research is critical to the Organisation's reputation and impact. CSIRO must therefore continue to develop and maintain high-quality scientific capabilities (including world-class researchers, research infrastructure and collaborative relationships).

Divisions are the 'home' of CSIRO research staff and infrastructure. Their primary role is to develop, build, maintain and deploy CSIRO's world-class research capabilities. Divisions manage professional development, staff succession and staff wellbeing. They are also responsible for deploying staff to research Themes. Individual Themes regularly draw on staff and resources from multiple Divisions for challenging multidisciplinary research. Divisions are responsible for the development of around 110 research capabilities.

In addition to the development of capability through the activities of research Themes, there are additional direct investments in capability development at both the Division and whole-of-enterprise levels. Direct capability investments include:

- **Transformational capability platforms** – described below
- **Divisional capability development funds** – provide Divisions with greater flexibility to explore opportunities for initiating new research capability areas or extending existing capabilities into new areas
- **Science Team programs** – encourage, promote and support science excellence through the development of scientists and communication of science.

Transformational capability platforms

Transformational capability platforms (TCPs) enable CSIRO to remain at the forefront of international science in the critical areas of transformational biology; advanced materials; computational and simulation sciences; and sensors and sensor networks.

The TCPs are cross-organisational, applicable across multiple areas of CSIRO research, and underpin sustained high-impact for the Organisation. They are aimed at enabling a step-change in CSIRO's research capabilities on a scale and scope beyond what is possible for individual Divisions. Funding is used to accelerate capability development and establish CSIRO science networks to foster connectivity and integration.

The TCPs in 2009–10 have performed well and funding will be increased in 2010–11 to $33 million.

Science assessment reviews

CSIRO conducts a rolling cycle of science assessment reviews to ensure that the quality and relevance of its science base is maintained at a high-level. This robust, rigorous and independent assessment process involves a review of each Division's research capabilities by independent experts, from both Australia and overseas. Results of the reviews are considered and responded to by senior research leaders and implementation of each Division's response to the recommendations is monitored by the CSIRO Executive.

During 2009–10 the second cycle of reviews, which began in late 2008, continued. (The first cycle of reviews was undertaken between 2005 and 2007.) Science reviews were undertaken of seven Divisions: Earth Science and Resource Engineering; Entomology; Land and Water; Livestock Industries; Molecular and Health Technologies; Sustainable Ecosystems; and Plant Industry. Each review panel consisted of five scientific experts, usually three from overseas and two from Australia.

Overall, the panels were impressed with the quality of science across all the Divisions reviewed. The review panels found, without exception, that the Divisions had strong capability areas of

expertise, which were world-class. The panels recognised that the ability to conduct long-term programs in their research areas is a strength of CSIRO's research operations.

The importance of interacting with external stakeholders was recognised, and in discussions with industry and research collaborators, the panels found that there was a high-level of respect from these groups when working with CSIRO scientists.

All Divisions reported an improvement in the number of publications in high-level peer-reviewed international journals compared with the first cycle of reviews. However, panels recommended that continued attention needed to be paid to high-quality publications as an important component of the science process.

Postgraduate students and postdoctoral fellows; interaction with leading national and international research groups and research infrastructure were also common themes in the findings and recommendations of the review panels. The panels noted the importance of the appointments of the Office of the Chief Executive Science Leaders, Postdoctoral Fellows and Julius Awards granted to early career scientists for outstanding research which were of significance in the excellence of the research programs.

The desirability of an increase in the number of postgraduate students and postdoctoral fellows was a common finding. This would assist with refreshing CSIRO's research capabilities and lead to more extensive collaboration with university research teams, as well as provide training of skilled scientists for the future.

Collaboration with leading national and international research teams was evident; however, in some Divisions the review panel encouraged more extensive and deeper interaction with other leading research groups.

Some panels commented on deficiencies in research infrastructure which was limiting CSIRO's research. Others commented on the need for increased investment in building new priority areas of research capability.

These areas – collaboration; the number of postgraduate students and postdoctoral fellows; research infrastructure; and investment in high priority areas of new research capability – are all topics being considered in the development of CSIRO's strategy for 2011–15.

Our staff

CSIRO looks to its staff to support its values and to work together in a collaborative and positive way to achieve the Organisation's aims. CSIRO seeks to attract the best minds, and be a place where people want to work, where people are challenged. CSIRO also seeks to provide the environment, facilities and opportunities people need to meet those challenges.

CSIRO's Human Resources function provides support and leadership on people issues to leaders and staff across CSIRO. The goal is to develop high-performing teams working across the Organisation's boundaries. There are two key themes to this work:

- nurturing CSIRO's innovative culture by fostering a safe environment where innovation, collaboration, flexibility and performance flourish
- working effectively and efficiently by using common systems, structures and improved processes to support CSIRO's operations.

Services are delivered through a 'shared' service model.

Enterprise agreement

The CSIRO Enterprise Agreement 2008–2011 came into effect on 3 December 2008. It was developed in consultation with the CSIRO Staff Association, the Australian Manufacturing Workers Union and the Electrical Trades Union of Australia. The current Agreement provides terms and conditions of employment for CSIRO staff and reaches its nominal expiry date on 16 February 2011.

CSIRO People Policy

The CSIRO People Policy confirms our commitment to developing and supporting our staff members.

Code of Conduct standard

The CSIRO Code of Conduct reflects our roles, values and commitments. Our values guide our decisions and interactions with our colleagues and with our external partners and stakeholders. The code details how individuals are expected to behave in the context of the expectations we set ourselves collectively as an organisation. The Code contains principle based requirements and is a formal document that is binding on all staff members and CSIRO affiliates.

As an organisation we comply with applicable laws, regulations and Australian Government policies. We are committed to promoting a culture of fair and ethical behaviour and encourage the reporting of matters that are detrimental to CSIRO and our reputation. The consistent application of the Code will ensure that CSIRO is a great place to work and collaborate with.

CSIRO's values compass

CSIRO's values were launched by the Chief Executive through communication with staff in early 2009. CSIRO's values are symbolised through the CSIRO values compass:

- Embracing **scientific excellence** and working together ethically and with **integrity** in everything we do.
- Building **trust and respect** each day with our communities, collaborators, industry, research partners and colleagues.
- Taking the **initiative to explore** new horizons and taking responsibility to create an environment where innovation thrives.
- Consistently **delivering on our commitments**. 'Do what we say we will do'.
- Striving towards **a healthy, safe and sustainable** future.

CSIRO's values are symbolised through the CSIRO values compass.

A project team has developed a 3–5 year plan to embed these values using a whole-of-organisation systems approach.

Significant progress has been achieved in building awareness and in reinforcing the desired standards of organisational behaviour through refinement of (primarily Human Resources) systems and processes. Progress continues in activities to translate words to action and actions to behavioural change across the Organisation. Senior leadership role-modelling and advocacy of the values is the single most important intervention in achieving our values aspiration.

Staff surveys

Throughout 2009–10 we undertook to engage with staff in a focused, topic specific, qualitative way (for example, focus groups, reference groups). This was in response to a strategic review of our survey approach which led to the decision not to run a whole-of-organisation staff opinion survey.

An Enterprise Support Services performance feedback survey was undertaken for the fifth consecutive year. The trend over the last two years for the vast majority of the enterprise functions has been positive. Satisfaction has improved from 75 per cent in 2005 to 86 per cent in 2010. A recent report by PricewaterhouseCoopers indicates that support services are in general performing strongly at or above relevant external benchmarks.

In a staff survey conducted for CSIRO by Towers Watson in June/July 2010, there was a ten point improvement in responses to the question: 'Taking everything into account, how satisfied are you with CSIRO as a place to work?' compared with responses to the same question in 2007. CSIRO's 2010 result is 16 points above the norm for R&D organisations used as a comparator by Towers Watson. Similarly, there was a 14 point improvement between 2007 and 2010 in positive staff responses to the statement: 'I would recommend CSIRO as a good place to work', and the 2010 result is 13 points above the norm for R&D organisations.

Learning and development

Twenty potential senior leaders from across the Organisation participated in CSIRO's senior leadership program, *'Leading the Research Enterprise'* in 2009–10. In addition to their personal development gains, program participants provided significant contribution to a number of strategic initiatives, through involvement in action learning projects.

Many emerging leaders took advantage of the CSIRO *'New People Leader Program'* to support their transition into people leadership positions.

The New Starter Orientation Program also continued to provide support to new employees transitioning into CSIRO. A review of the program will see future developments in CSIRO's approach to bringing on board new staff, including significant use of eLearning methodologies.

The Learning and Development team, in partnership with the CSIRO Project Management Office, developed a two-day Project Management program to build foundational skills and capability in effective project management.

Equal employment opportunities

CSIRO is developing a new Workplace Diversity Plan. The Plan builds upon the previous CSIRO Workplace Diversity Plans and includes a number of strategies in the areas of education and awareness raising, selection and recruitment and increasing the use of the family friendly work arrangements.

CSIRO has also implemented an Indigenous Engagement Strategy (see page 105), which aims to increase Indigenous participation in CSIRO's research and development agenda and activities. The Strategy addresses four focus areas: scientific opportunities, employment, education outreach and cultural learning and development. The Indigenous Employment Strategy, which is one stream of the Engagement Strategy, aims to increase the employment of Indigenous peoples, reaching 2.7 per cent employment nationally within CSIRO by 2015 through the implementation of several new employment programs and targeted approaches.

Staff demographics

CSIRO staff are employed under section 32 of the *Science and Industry Research Act 1949*. At 30 June 2010, CSIRO had a total of 6,680 staff, which has an equivalent full time (EFT) of 5,956 Table 3.2 shows the number of staff employed in different job categories, called principal enterprise functions.

The total number of staff increased by 170 (2.6 per cent) over the last 12 months whilst the number of Research Scientists increased by 70 (3.8 per cent). The proportion of female staff in CSIRO has increased from 38.5 per cent to 39.1 per cent since 2005–06 and the proportion of female research staff has increased from 18.7 per cent to 22 per cent over the same period.

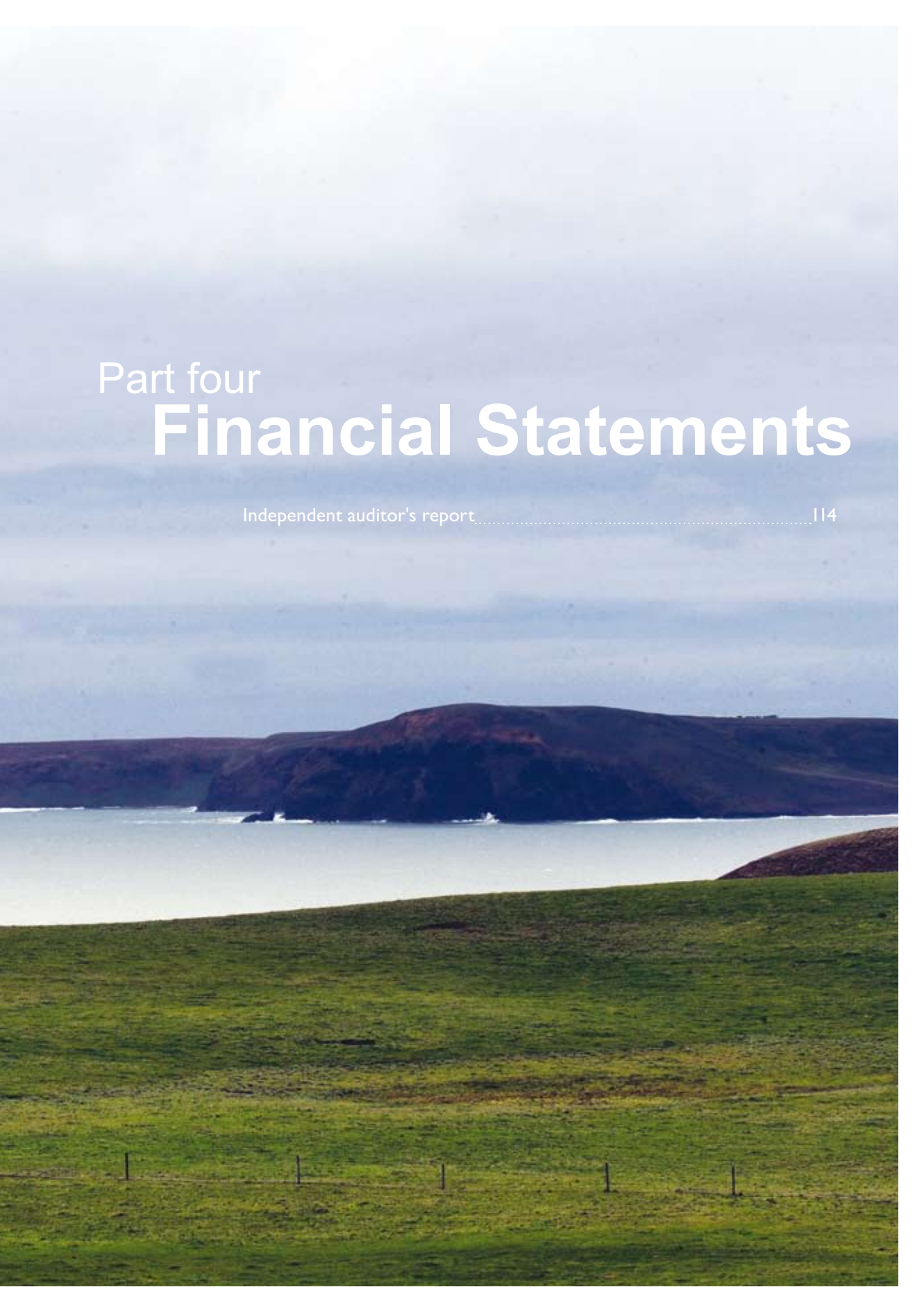
Table 3.2: Staff numbers (headcount) as at 30 June

Principal enterprise functions	2005–06	2006–07	2007–08	2008–09	2009–10	% Female
Research Scientists	1,630	1,688	1,727	1,837	1,907	23
Research Management	187	188	194	176	161	7
Research Consulting	33	28	29	26	34	18
Research Project Staff	2,358	2,199	2,246	2,215	2,241	42
Senior Specialists	38	25	13	13	15	13
Technical Services	622	581	542	545	630	12
Communication and Information Services	439	384	402	407	429	61
General Services	87	75	66	51	48	54
Administrative Support*	1,041	1,046	1,082	1,112	1,075	75
General Management	123	117	122	128	140	26
Total headcount	**6,558**	**6,331**	**6,423**	**6,510**	**6,680**	**39**
EFT equivalent	**5,903**	**5,695**	**5,768**	**5,866**	**5,956**	

**Administrative Support includes: Staff who provide science-based administrative and management services and systems.*

Part four

Financial Statements



Australian National
Audit Office

INDEPENDENT AUDITOR'S REPORT

To the Minister for Innovation, Industry, Science and Research

Scope

I have audited the accompanying financial statements of the Commonwealth Scientific and Industrial Research Organisation and the consolidated entity for the year ended 30 June 2010, which comprise: a Statement by the Chairman of the Board, Chief Executive Officer and Chief Financial Officer; Statement of Comprehensive Income; Balance Sheet; Statement of Changes in Equity; Cash Flow Statement; Schedule of Commitments; Schedule of Contingencies; Schedule of Asset Additions; and Notes to and Forming Part of the Financial Statements, including a Summary of Significant Accounting Policies. The consolidated entity comprises the Commonwealth Scientific and Industrial Research Organisation and the entities it controlled at the year's end or from time to time during the financial year.

The Board Members' Responsibility for the Financial Statements

The members of the Board of the Commonwealth Scientific and Industrial Research Organisation are responsible for the preparation and fair presentation of the financial statements in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards (which include the Australian Accounting Interpretations). This responsibility includes establishing and maintaining internal controls relevant to the preparation and fair presentation of the financial statements that are free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. I have conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. These auditing standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor

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considers internal control relevant to the Commonwealth Scientific and Industrial Research Organisation's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Commonwealth Scientific and Industrial Research Organisation's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the members of the Board, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Independence

In conducting the audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the requirements of the Australian accounting profession.

Auditor's Opinion

In my opinion, the financial statements of the Commonwealth Scientific and Industrial Research Organisation and the consolidated entity:

(a) have been prepared in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards; and

(b) give a true and fair view of the matters required by the Finance Minister's Orders including the Commonwealth Scientific and Industrial Research Organisation's and the consolidated entity's financial position as at 30 June 2010 and its financial performance and cash flows for the year then ended.

Australian National Audit Office

John McCullough
Audit Principal
Delegate of the Auditor-General

Canberra
27 August 2010

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
STATEMENT BY THE CHAIRMAN OF THE BOARD, CHIEF EXECUTIVE AND CHIEF FINANCIAL OFFICER

In our opinion, the attached financial statements for the year ended 30 June 2010 are based on properly maintained financial records and give a true and fair view of the matters required by the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997, as* amended.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Group will be able to pay its debts as and when they become due and payable.

This Statement is made in accordance with a resolution of the Board Members.

Simon McKeon	**Megan Clark**	**David Toll**
Chairman of the Board	Chief Executive and Board Member	Acting Chief Financial Officer
25 August 2010	25 August 2010	18 August 2010

CONSOLIDATED FINANCIAL STATEMENTS
STATEMENT OF COMPREHENSIVE INCOME
For the period ended 30 June 2010

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
EXPENSES					
Employee benefits	3.1	685 600	641 509	685 330	639 241
Supplier expenses	3.2	383 662	422 210	533 939	424 460
Depreciation and amortisation	3.3	95 659	87 965	95 659	87 965
Finance costs	3.4	3 463	2 979	3 463	2 979
Write-down and impairment of assets	3.5	4 476	21 295	4 476	21 295
Net foreign exchange losses	3.6	5 433	-	5 433	-
Net loss from sale of assets	3.7	4 813	-	4 813	-
Other expenses	3.8	31	4 868	-	4 838
Total expenses		**1 183 137**	**1 180 826**	**1 333 113**	**1 180 778**
LESS:					
OWN-SOURCE INCOME					
Own source revenue					
Sale of goods and rendering of services	4.1	377 919	347 877	380 422	347 877
Interest	4.2	10 422	5 036	7 222	5 000
Rental income	4.3	8 562	7 387	8 562	7 387
Royalties	4.4	42 985	15 948	42 985	15 948
Other revenues	4.5	15 587	232 598	16 149	232 587
Total own source revenues		**455 475**	**608 846**	**455 340**	**608 799**
Gains					
Net gain from sale of assets	4.6	-	25 612	-	25 612
Net foreign exchange gains	4.7	-	319	-	319
Realisation of fair value gain reserve	4.8	3 866	-	3 866	-
Total gains		**3 866**	**25 931**	**3 866**	**25 931**
Total own-source income		**459 341**	**634 777**	**459 206**	**634 730**
Net cost of service		**(723 796)**	**(546 049)**	**(873 907)**	**(546 048)**
Revenues from Government	4.9	704 884	668 120	704 884	668 120
Share of net operating surplus/(deficit) of joint venture accounted for using the equity method	8	30	(71)	30	(71)
Surplus on continuing operation		**704 914**	**668 049**	**704 914**	**668 049**
Surplus/(Deficit) attributable to the Australian Government		**(18 882)**	**122 000**	**(168 993)**	**122 001**
OTHER COMPREHENSIVE INCOME					
Increase/(decrease) in asset revaluation reserves	5.1	-	(5 711)	-	(5 711)
Increase/(decrease) in other reserves	5.2	16 754	(40 901)	16 754	(40 901)
Total other comprehensive income /(loss)		**16 754**	**(46 612)**	**16 754**	**(46 612)**
Total comprehensive income/(loss) attributable to the Australian Government		**(2 128)**	**75 388**	**(152 239)**	**75 389**

The above Statement should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS
BALANCE SHEET
As at 30 June 2010

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Financial Assets					
Cash and cash equivalents	6	231 293	164 687	132 722	164 156
Trade and other receivables	7	102 138	166 854	100 546	166 843
Investments accounted for using the equity method	8	573	543	573	543
Other investments	9	32 641	62 453	32 641	62 453
Total financial assets		**366 645**	**394 537**	**266 482**	**393 995**
Non-Financial Assets					
Land and buildings	10	1 366 747	1 333 237	1 366 747	1 333 237
Plant and equipment	11	330 317	298 107	330 317	298 107
Investment properties	12	50 665	41 340	50 665	41 340
Intangibles	13	26 806	26 513	26 806	26 513
Inventories	14	1 153	1 276	1 153	1 276
Other non-financial assets	15	42 037	31 064	42 037	31 064
Total non-financial assets		**1 817 725**	**1 731 537**	**1 817 725**	**1 731 537**
Properties held for sale	16	47 913	56 760	47 913	56 760
TOTAL ASSETS		**2 232 283**	**2 182 834**	**2 132 120**	**2 182 292**
LIABILITIES					
Payables					
Suppliers	17	93 742	94 383	93 742	94 383
Other payables	18	157 755	144 216	208 225	144 196
Total payables		**251 497**	**238 598**	**301 967**	**238 579**
Interest Bearing Liabilities					
Leases	19	69 256	63 636	69 256	63 636
Deposits	20	2 462	5 687	2 462	5 687
Total interest bearing liabilities		**71 718**	**69 323**	**71 718**	**69 323**
Provisions					
Employee provisions	21	189 111	181 747	189 111	181 747
Total provisions		**189 111**	**181 747**	**189 111**	**181 747**
TOTAL LIABILITIES		**512 326**	**489 668**	**562 796**	**489 649**
NET ASSETS		**1 719 957**	**1 693 165**	**1 569 324**	**1 692 643**
EQUITY					
Contributed equity		36 790	7 870	36 590	7 670
Assets revaluation reserves		1 093 712	1 093 712	1 093 712	1 093 712
Other reserves		(13 577)	(30 331)	(13 577)	(30 331)
Retained surplus		603 032	621 914	452 599	621 592
TOTAL EQUITY		**1 719 957**	**1 693 165**	**1 569 324**	**1 692 643**

The above Balance Sheet should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS

STATEMENT OF CHANGES IN EQUITY– CONSOLIDATED

For the period ended 30 June 2010

	Retained Surplus		Asset Revaluation Reserves		Other Reserves		Contributed Equity/Capital		Total Equity	
	2010 $'000	2009 $'000	2010 $'000	2009 $'000	2010 $'000	2009 $'000	2010 $'000	2009 $'000	2010 $'000	2009 $'000
Opening balance	**621 914**	**499 914**	**1 093 712**	**1 099 423**	**(30 331)**	**10 570**	**7 870**	**200**	**1 693 165**	**1 610 107**
Comprehensive income										
Other comprehensive income	-	-	-	(5 711)	16 754	(40 901)	-	-	**16 754**	**(46 612)**
Surplus/(deficit) for the period	(18 882)	122 000	-	-	-	-	-	-	**(18 882)**	**122 000**
Total comprehensive income	**(18 882)**	**122 000**	**-**	**(5 711)**	**16 754**	**(40 901)**	**-**	**-**	**(2 128)**	**75 388**
Transactions with owners										
Contributions by owners										
Equity injection	**-**	**-**	**-**	**-**	**-**	**-**	28 920	7 670	**28 920**	**7 670**
Closing balance	**603 032**	**621 914**	**1 093 712**	**1 093 712**	**(13 577)**	**(30 331)**	**36 790**	**7 870**	**1 719 957**	**1 693 165**

The above Statement should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS

STATEMENT OF CHANGES IN EQUITY– CSIRO

For the period ended 30 June 2010

	Retained Surplus		Asset Revaluation Reserves		Other Reserves		Contributed Equity/Capital		Total Equity	
	2010 $'000	2009 $'000	2010 $'000	2009 $'000	2010 $'000	2009 $'000	2010 $'000	2009 $'000	2010 $'000	2009 $'000
Opening balance	**621 592**	**499 591**	**1 093 712**	**1 099 423**	**(30 331)**	**10 570**	**7 670**	**-**	**1 692 643**	**1 609 584**
Comprehensive income										
Other comprehensive income	-	-	-	(5 711)	16 754	(40 901)	-	-	**16 754**	**(46 612)**
Surplus/(deficit) for the period	(168 993)	122 001	-	-	-	-	-	-	**(168 993)**	**122 001**
Total comprehensive income	**(168 993)**	**122 001**	**-**	**(5 711)**	**16 754**	**(40 901)**	**-**	**-**	**(152 239)**	**75 389**
Transactions with owners										
Contributions by owners										
Equity injection	**-**	**-**	**-**	**-**	**-**	**-**	28 920	7 670	**28 920**	**7 670**
Closing balance	**452 599**	**621 592**	**1 093 712**	**1 093 712**	**(13 577)**	**(30 331)**	**36 590**	**7 670**	**1 569 324**	**1 692 643**

The above Statement should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS
CASH FLOW STATEMENT
For the period ended 30 June 2010

	Notes	Consolidated		CSIRO	
		2010 $'000	2009 $'000	2010 $'000	2009 $'000
OPERATING ACTIVITIES					
Cash received					
Receipts from Government		704 884	668 120	704 884	668 120
Goods and services		564 444	567 729	566 828	567 638
Interest		9 841	4 393	8 484	4 351
Net GST received		14 289	7 802	14 407	7 898
Total cash received		**1 293 458**	**1 248 044**	**1 294 603**	**1 248 007**
Cash used					
Employees		680 354	630 139	679 163	629 216
Suppliers		453 760	446 039	554 136	446 929
Finance costs		3 275	2 785	3 275	2 785
Deposits		2 966	6 279	2 966	6 279
Total cash used		**1 140 355**	**1 085 242**	**1 239 540**	**1 085 209**
Net cash from operating activities	22	**153 103**	**162 802**	**55 063**	**162 798**
INVESTING ACTIVITIES					
Cash received					
Proceeds from sale of property, plant and equipment		2 279	42 399	2 279	42 399
Proceeds from sale of equity investments and intellectual property		49 941	11 281	49 941	11 281
Total cash received		**52 220**	**53 680**	**52 220**	**53 680**
Cash used					
Purchase of property, plant and equipment		155 957	151 056	155 957	151 056
Purchase of equity investments		6 016	2 970	6 016	2 970
Other selling costs		735	340	735	340
Total cash used		**162 708**	**154 366**	**162 708**	**154 366**
Net cash used by investing activities		**(110 488)**	**(100 686)**	**(110 488)**	**(100 686)**
FINANCING ACTIVITIES					
Cash received					
Contributed equity		28 920	7 670	28 920	7 670
Total cash received		**28 920**	**7 670**	**28 920**	**7 670**
Cash used					
Other cash used		4 929	4 162	4 929	4 162
Total cash used		**4 929**	**4 162**	**4 929**	**4 162**
Net cash from financing activities		**23 991**	**3 508**	**23 991**	**3 508**
Net increase/(decrease) in cash held		**66 606**	**65 624**	**(31 434)**	**65 620**
Cash and cash equivalents at the beginning of the reporting period		164 687	99 063	164 156	98 536
Cash and cash equivalents at end of the reporting period	6	**231 293**	**164 687**	**132 722**	**164 156**

The above Statement should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS
SCHEDULE OF COMMITMENTS
As at 30 June 2010

	Consolidated		CSIRO	
	2010	**2009**	**2010**	**2009**
	$'000	**$'000**	**$'000**	**$'000**
BY TYPE				
Capital commitments payable				
Land and buildings[1]	14 095	59 187	14 095	59 187
Plant and equipment[2]	7 912	13 256	7 912	13 256
Investments[3]	2 907	3 432	2 907	3 432
Total capital commitments payable	**24 914**	**75 875**	**24 914**	**75 875**
Other commitments payable				
Operating leases[4]	308 164	347 908	308 164	347 908
Research and development commitments[5]	524 217	545 284	524 217	545 284
Other commitments[6]	28 813	12 265	28 813	12 265
Total other commitments payable	**861 194**	**905 457**	**861 194**	**905 457**
Commitments receivable				
Research and development commitments[5]	(357 519)	(339 446)	(357 519)	(339 446)
Other receivables[6]	(7 117)	(11 389)	(7 117)	(11 389)
Total commitments receivable	**(364 636)**	**(350 835)**	**(364 636)**	**(350 835)**
Net commitments by type	**521 472**	**630 497**	**521 472**	**630 497**
BY MATURITY				
Capital commitments payable				
One year or less	18 020	65 974	18 020	65 974
From one to five years	6 894	9 901	6 894	9 901
Total capital commitments payable	**24 914**	**75 875**	**24 914**	**75 875**
Operating lease commitments payable				
One year or less	34 864	39 565	34 864	39 565
From one to five years	127 765	126 551	127 765	126 551
Over five years	145 535	181 792	145 535	181 792
Total operating lease commitments payable	**308 164**	**347 908**	**308 164**	**347 908**
Other commitments payable				
One year or less	348 582	365 943	348 582	365 943
From one to five years	204 448	191 606	204 448	191 606
Total other commitments payable	**553 030**	**557 549**	**553 030**	**557 549**
Commitments receivable				
One year or less	(232 879)	(219 808)	(232 879)	(219 808)
From one to five years	(130 322)	(129 253)	(130 322)	(129 253)
Over five years	(1 435)	(1 774)	(1 435)	(1 774)
Total commitments receivable	**(364 636)**	**(350 835)**	**(364 636)**	**(350 835)**
Net commitments by maturity	**521 472**	**630 497**	**521 472**	**630 497**

SCHEDULE OF COMMITMENTS (cont)

1. Land and building commitments are outstanding contractual payments for buildings under construction.

2. Plant and equipment commitments are for the purchase of plant and equipment.

3. Investment commitments are for additional contributions to equity investments.

4. Operating leases are effectively non-cancellable and comprise:

Nature of lease	General description of leasing arrangement
Leases for office and scientific research accommodation	Lease payments are subject to an annual increase in accordance with the terms of agreement e.g. upward movements in the Consumer Price Index. The accommodation leases are still current and each may be renewed at the Group's option following a once-off adjustment of rentals to current market levels.
Leases for motor vehicles	No contingent rentals exist. There are no purchase options available to the Group.
Leases for computer equipment	The lessor provides computer equipment designated as necessary in the supply contract for a general period of 2–3 years.

5. Research and development commitments payable and receivable are Agreements Equally Proportionately Unperformed for research and development contracts.

6. Other commitments payable and receivable are for services and property leases respectively.

7. Commitments are GST inclusive where relevant.

SCHEDULE OF CONTINGENCIES
As at 30 June 2010

	Consolidated		CSIRO	
	2010	2009	2010	2009
	$'000	$'000	$'000	$'000
Contingent assets				
Claims for damages or costs	-	-	-	-
Total contingent assets	**-**	**-**	**-**	**-**
Contingent liabilities				
Claims for damages or costs	250	250	250	250
Total contingent liabilities	**250**	**250**	**250**	**250**
Net contingent assets/(liabilities)	**(250)**	**(250)**	**(250)**	**(250)**

Details of each class of contingent liabilities and contingent assets listed above are disclosed in Note 23: Contingent Liabilities and Assets, along with information on contingencies that cannot be quantified.

The above Schedule should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS
SCHEDULE OF ASSETS ADDITION – CSIRO
For the period ended 30 June 2010

The following non-financial non-current assets were added in 2009–10:

	Land	Buildings	Investment Properties	Plant & equipment	Intangibles	Total
	$'000	$'000	$'000	$'000	$'000	$'000
By purchase - Government funding	145	79 313	-	72 594	3 276	**155 328**
By purchase - donated funds	-	-	-	-	-	**-**
By purchase - other	-	-	-	-	-	**-**
By finance lease	3 340	6 960	-	-	-	**10 300**
Assets received as gifts/donations	-	-	-	-	-	**-**
Total additions	**3 485**	**86 273**	**-**	**72 594**	**3 276**	**165 628**

CONSOLIDATED FINANCIAL STATEMENTS
NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
For the period ended 30 June 2010

CONSOLIDATED FINANCIAL STATEMENTS
NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
For the year ended 30 June 2010

Note 1 Summary of significant accounting policies

1.1 Objective of the Organisation and its subsidiaries (the Group)

CSIRO is an Australian Government controlled entity. It is a research enterprise that aims to deliver great science and innovative solutions for industry, society and the environment.

CSIRO is structured to meet the following outcome:

Outcome: Innovative scientific and technology solutions to national challenges and opportunities to benefit industry, the environment and the community, through scientific research and capability development, services and advice.

The continued existence of CSIRO in its present form and with its present programs is dependent on Government policy and on continuing funding by Parliament for the CSIRO's administration and programs.

For the purposes of AASB 127 *Consolidated and Separate Financial Statements* consolidated accounts are prepared to include subsidiaries (refer Note 1.5).

1.2 Basis of Preparation of the Financial Report

The financial statements are required by Clause 1(b) of Schedule 1 to the *Commonwealth Authorities and Companies Act 1997* and are general purpose financial statements.

The Commonwealth Scientific and Industrial Research Organisation and the Group's Consolidated Financial Statements have been prepared in accordance with:

- Finance Minister's Orders (FMOs) for reporting periods ending on or after 1 July 2009; and
- Australian Accounting Standards and Interpretations issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The financial statements have been prepared on an accrual basis and in accordance with the historical cost convention, except for certain assets and liabilities at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position.

The financial statements are presented in Australian dollars and values are rounded to the nearest thousand dollars unless otherwise specified.

Unless an alternative treatment is specifically required by an Accounting Standard or the FMOs, assets and liabilities are recognised in the balance sheet when and only when it is probable that future economic benefits will be required and the amounts of the assets or liabilities can be reliably measured. However, assets and liabilities arising under Agreements Equally Proportionately Unperformed are not recognised unless required by an accounting standard. Liabilities and assets that are unrecognised are reported in the schedule of commitments or the schedule of contingencies.

Unless alternative treatment is specifically required by an Accounting Standard, income and expenses are recognised in the statement of comprehensive Income when, and only when, the flow, consumption or loss of economic benefits has occurred and can be reliably measured.

1.3 Significant Accounting Judgements and Estimates

In the process of applying the accounting policies listed in this note, CSIRO has made the following judgements that have the most significant impact on the amounts recorded in the financial statements:

- The fair value of properties classified as 'properties held for sale' and 'investment properties' has been taken to be the market value of similar properties as determined by an independent valuer and CSIRO registered valuer.

- The fair value of land which will continue to be used for research activities, and buildings held for specialised purposes and where there is no readily available market price, fair value has been taken to be 'existing use value' and 'depreciated replacement cost' respectively, as determined by CSIRO's registered valuer.

- The fair value of plant and equipment has been taken to be the 'depreciated replacement cost' as determined by an independent valuer.

- The fair value of investments in unlisted companies is based on the generally accepted valuation guidelines 'International Private Equity and Venture Capital Valuation Guidelines'.

- Gains or losses arising from changes in fair value are recognised in reserves or equity with the exception of impairment. Investments in listed companies have been assessed for impairment and the decline in fair value does not represent impairment. Hence, the total decline in fair value is recognised directly in reserves or equity.

1.4 New Australian Accounting Standards

Adoption of new Australian Accounting Standard requirements
No Accounting Standard has been adopted earlier than the application date as stated in the standard.

CSIRO has reviewed new standards, revised standards and interpretations/amending standards issued prior to the signing of the financial statements and considers that none of these have had a material financial impact.

Future Australian Accounting Standard requirements
The following new standard was issued by the Australian Accounting Standards Board prior to the signing of the financial statements, which may have a financial impact on CSIRO for future reporting periods:

- AASB9 *Financial Instruments* released in December 2009 includes requirements for the classification and measurement of financial assets resulting from the first part of Phase 1 of the International Accounting Standards Board's project to replace IAS 39 Financial Instruments: Recognition and Measurement (AASB 139 Financial Instruments: Recognition and Measurement). These requirements are intended to improve and simplify the approach for classification and measurement of financial assets compared with the requirements of AASB 139. The IASB plans to complete its work on financial liabilities during 2010 and will issue requirements for financial liabilities that will be included in AASB 9 in due course. The main changes in AASB 9 relevant to CSIRO are:

    - Financial assets are classified based on (a) the objective of the entity's business model for managing the financial assets; and (b) the characteristics of the contractual cash flows. This replaces the numerous categories of financial assets in AASB 139, each of which had its own classification criteria.

    - AASB 9 allows an irrevocable election on initial recognition to present gains and losses on investments in equity instruments that are not held for trading in other comprehensive income.

    - Financial assets can be designated and measured at fair value through profit or loss at initial recognition if doing so eliminates or significantly reduces a measurement or recognition inconsistency that would arise from measuring assets or liabilities, or recognising the gains and losses on them, on different bases.

- The effective date for the application of AASB 9 is for annual reporting periods beginning on or after 1 January 2013. Early adoption of the standard is not permitted for CSIRO in 2009-10.

Other new standards, revised standards and interpretations/amending standards that were issued prior to the signing of the financial statements and are applicable to the future reporting period are not expected to have a future financial impact.

1.5 Consolidation

AASB 127 (Consolidated and Separate Financial Statements) requires a parent entity that is in a group to present consolidated financial statements that consolidate its investments in controlled entities in accordance with AASB 127. The parent and controlled entities apply consistent accounting policies and the effects of all transactions and balances between the entities are eliminated in full. The financial statements of the controlled entities are prepared for the same reporting period as the parent entity.

The consolidated financial statements incorporate the assets and liabilities of all entities controlled by CSIRO as at 30 June 2010 and the results of the controlled entities for the year then ended.

1.6 Revenue

Revenue from sale of goods is recognised when:

- the risks and rewards of ownership have been transferred to the buyer;
- the entity retains no managerial involvement nor effective control over the goods;
- the revenue and transaction costs incurred can be reliably measured; and
- it is probable that the economic benefits associated with the transaction will flow to the entity.

Revenue from rendering of services is recognised by reference to the stage of completion of contracts at the reporting date. The revenue is recognised when:

- the amount of revenue, stage of completion and transaction costs incurred can be reliably measured; and
- it is probable that the economic benefits associated with the transaction will flow to the entity.

The stage of completion of contracts at the reporting date is determined by reference to the proportion that costs incurred to date bear to the total costs of the transaction. The balances of contract research and development activities in progress are accounted as either contract research work in progress (Note 15), being the gross unbilled amount expected to be collected from clients for contract research and services performed as at 30 June 2010, or contract research revenue received in advance (Note 18), where revenue for contract research and services received and/or billed exceeded revenue earned.

Receivables for goods and services, which have 30 day terms, are recognised at the nominal amounts due less any impairment allowance. Collectability of debts is reviewed as at end of reporting period. Allowances are made when collectability of the debt is no longer probable.

Interest revenue is recognised using the effective interest method as set out in AASB 139 *Financial Instruments: Recognition and Measurement*.

Resources received free of charge are recognised as revenue when, and only when, a fair value can be reliability determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense.

Royalty revenue is recognised on an accrual basis in accordance with the substance of the relevant royalty agreements.

Revenue from legal settlements related to intellectual property is recognised on an accrual basis in accordance with the substance of the relevant licensing agreements.

Revenues from Government
Funding received from the Australian Government Department of Innovation, Industry, Science and Research (appropriated to CSIRO as a CAC Act body payment item) is recognised as Revenue from Government unless they are in the nature of an equity injection or a loan.

1.7 Gains

Resources Received Free of Charge
Resources received free of charge are recognised as revenue when and only when the fair value can be reliably determined and the services would have been purchased if they had not been donated. Use

of those resources is recognised as an expense.
Resources received free of charge are recorded as either revenue or gains depending on their nature.

Contributions of assets at no cost of acquisition or for nominal consideration are recognised as gains at their fair value when the asset qualifies for recognition, unless received from another Government agency or authority as a consequence of a restructuring of administrative arrangements.

Sale of Assets
Gains from disposal of non–current assets are recognised when control of the asset has passed to the buyer.

1.8 Transactions with the Government as Owners

Equity Injections
Amounts that are designated as equity injections for a year are recognised directly in contributed equity in that year.

1.9 Research and Development Expenditure and Intellectual Property

All research and development costs, including costs associated with protecting intellectual property (e.g. patents and trademarks) are expensed as incurred.

1.10 Employee Benefits

Liabilities for short-term employee benefits (as defined in AASB 119) and termination benefits due within twelve months of the end of reporting period are measured at their nominal amounts. The nominal amount is calculated with regard to the rate expected to be paid on settlement of the liability.

Other long-term employee benefit liabilities are measured at the present value of the estimated future cash outflows to be made in respect of services provided by employees up to the reporting date.

Leave
The liability for employee benefits includes provisions for annual leave, long service leave and severance payments. No provision has been made for sick leave as all sick leave is non-vesting and the average sick leave taken in future years by employees is estimated to be less than the annual entitlement for sick leave.

The leave liabilities are calculated on the basis of employees' remuneration at the estimated salary rates that will apply at the time the leave is taken, including the employer superannuation contribution rates to the extent that the leave is likely to be taken during service rather than paid out on termination.

The liability at 30 June 2010 for long service leave has been determined by the short hand method and reference to the work of an actuary. The estimate of the present value of the liability takes into account attrition rates and pay increases through promotion and inflation.

Separation and redundancy
Provision is made for separation and redundancy benefit payments. CSIRO recognises a provision for termination when it has developed a detailed formal plan for the terminations and has informed those employees affected that it will carry out the terminations.

Superannuation
Employees of CSIRO are members of the Commonwealth Superannuation Scheme (CSS), the Public Sector Superannuation Scheme (PSS), or the PSS accumulation plan (PSSap).
The CSS and PSS are defined benefit schemes for the Australian Government. The PSSap is a defined contribution scheme.

The liability for defined benefits is recognised in the financial statements of the Australian Government and is settled by the Australian Government in due course. This liability is reported by the Department of Finance and Deregulation as an administered item.

CSIRO makes employer contributions to the employee superannuation schemes at rates determined by an actuary to be sufficient to meet the cost to the Government of the superannuation entitlements of the Group's employees. CSIRO accounts for the contributions as if they were contributions to defined contribution plans.

The liability for superannuation recognised as at 30 June represents outstanding contributions for the final fortnight of the year.

1.11 Workers' Compensation

CSIRO's workers' compensation liability is covered by the premium paid to the Commission for the Safety, Rehabilitation and Compensation of Commonwealth Employees 'Comcare' and no additional provision for liability is required.

1.12 Insurance

As part of its risk management strategy, CSIRO has insured for risks through the Australian Government's insurable risk managed fund 'Comcover'.

1.13 Cash

Cash and cash equivalents includes cash on hand and demand deposits in bank accounts with an original maturity of four months or less that are readily convertible to known amounts of cash and subject to insignificant risk of change in value. Cash is recognised at its nominal amount.

1.14 Financial Assets

CSIRO classifies its financial assets in the following categories:

- available for sale financial assets; and
- loans and receivables.

The classification depends on the nature and the purpose of financial assets and is determined at the time of initial recognition.

Financial assets are recognised and derecognised upon trade date.

Effective Interest Method
The effective interest method is a method of calculating the amortised cost of a financial asset and of allocating interest income over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash receipts through the expected life of the financial asset or, where appropriate, a shorter period.

Income is recognised on an effective interest rate basis.

Available-for-Sale Financial Assets
Available-for-sale financial assets are non-derivatives that are either designated in this category or not classified in any of the other categories.

Available-for-sale financial assets are recorded at fair value. Gains and losses arising from changes in fair value are recognised directly in the reserves (equity) with the exception of impairment losses. Interest is calculated using the effective interest method and foreign exchange gains and losses on monetary assets are recognised directly in profit or loss. Where the asset is disposed of or is determined to be impaired, part (or all) of the cumulative gain or loss previously recognised in the reserve is included in the operating result for the period.

CSIRO has investments in a number of unlisted start-up companies over which it has significant influence or control. These companies have been established for the purpose of commercialisation of CSIRO's intellectual property (refer accounting policy note 1.9).

CSIRO also has some investments in companies which have since initial start-up been sold to third parties and subsequently listed on the Australian Stock Exchange.

CSIRO's investments in listed and unlisted companies are accounted for in accordance with AASB 139 *Financial Instruments: Recognition and Measurement*, and have been designated as 'available-for-sale' financial assets.

Fair value of investments in listed companies
The fair value of investments in listed companies has been determined by reference to their closing bid price at the reporting date.

Fair value of investments in unlisted companies
For investments in unlisted companies where there is no readily available market pricing for the equity instruments, the fair value has been determined by applying valuation techniques in line with the generally accepted valuation guidelines 'International Private Equity and Venture Capital Valuation Guidelines (AVCAL)'.

Where recent transactions for the unlisted companies' equity have taken place, these equity transaction prices are used to value CSIRO's investment.

For unlisted companies that have not had any recent equity transactions, other AVCAL valuation techniques are used such as discounted cash flows and share of net assets.

In addition, independent valuations are performed as at reporting date for unlisted companies that are considered to have a material impact on CSIRO's investment portfolio.

Investments in special purpose entities are either valued at cost or share of net assets since a reliable estimate of fair value cannot be established. These entities have been set up primarily to gain access to research facilities/networks, or to provide services to owners. Hence, there is no 'active market' for these equity investments. CSIRO is a long-term shareholder and is unlikely to dispose of its interest in these investments.

Loans and Receivables
Trade receivables, loans and other receivables that have fixed or determinable payments that are not quoted in an active market are classified as 'loans and receivables'. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest is recognised by applying the effective interest rate.

Impairment of Financial Assets
Financial assets are assessed for impairment at each balance date.

Financial assets held at amortised cost – if there is objective evidence that an impairment loss has been incurred for loans and receivables, the amount of the loss is measured as the difference between the asset's carrying amount and the present value of estimated future cash flows discounted at the asset's original effective interest rate. The carrying amount is reduced by way of an allowance account. The loss is recognised in the statement of comprehensive income.

Available-for-sale financial assets – if there is objective evidence that an impairment loss on an available-for-sale financial asset has been incurred, the amount of the difference between its cost, less principal repayments and amortisation, and its current fair value, less any impairment loss previously recognised in expenses, is transferred from equity to the statement of comprehensive income.

Available-for-sale financial assets (held at cost) – if there is objective evidence that an impairment loss has been incurred the amount of the impairment loss is the difference between the carrying amount of the asset and the present value of the estimated future cash flows discounted at the current market rate for similar assets.

1.15 Financial liabilities
Financial liabilities are recognised and derecognised upon trade date.

Supplier and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).

1.16 Acquisition of Assets

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken. Financial assets are initially measured at their fair value plus transaction costs where appropriate.

Assets acquired at no cost or for nominal considerations are initially recognised as assets and revenues at their fair value at the date of acquisition.

1.17 Property, Plant and Equipment

Asset Recognition Threshold
Purchases of property, plant and equipment are recognised initially at cost in the balance sheet, except for purchases costing less than $3 000, which are expensed in the year of acquisition (other than where they form part of a group of similar items which are significant in total).

The initial cost of an asset includes an estimate of the cost of dismantling and removing the item and restoring the site on which it is located.

Revaluations
Following initial recognition at cost, property, plant and equipment, including assets under finance leases are carried at fair value less accumulated depreciation and accumulated impairment losses. Valuations are conducted with sufficient frequency to ensure the carrying amount of assets do not differ materially from the assets' fair value as at reporting date. The regularity of valuation depends upon the volatility of movements in the market values for the relevant assets.

Revaluation adjustments are made on a class basis. Any revaluation increment is credited to equity under asset revaluation reserve, except to the extent that it reverses a previous revaluation decrement of the same asset class that was previously recognised in the surplus/deficit. Revaluation decrements for a class of assets are recognised directly through surplus/deficit except to the extent that they reverse a previous revaluation increment for that class.

Any accumulated depreciation as at the revaluation date is restated proportionately with the change in the gross carrying amount of the asset so that the carrying amount of the asset after revaluation equals its revalued amount.

Fair value for each class of asset is determined as follows:

- Land, which will continue to be used for research activity, is valued by CSIRO's registered valuer at 'existing use value'. Existing use contemplates the continued use of the asset for the same application as at the date of valuation.
- Buildings and leasehold improvements, which will continue to be used for research activities, are valued by the Group's registered valuer at their depreciated replacement cost using current building prices to arrive at current gross replacement cost less accumulated depreciation having regard to the age, condition and suitability for research and development activities. Building valuations include plant, fit-outs, fixtures and fittings, which form an integral part of buildings.
- Properties held or identified for sale and investment properties are valued by independent valuers as at reporting date.
- Property, plant and equipment which are purchased from contract research funds and where the control and subsequent sale proceeds are refunded to contributors under the terms of the agreements, are expensed during the year of purchase. Separate records for these assets are maintained and disclosed in Note 25.

Depreciation and Amortisation
Depreciable property, plant and equipment assets are written-off to their estimated residual values over their estimated useful lives using, in all cases, the straight-line method of depreciation. Leasehold improvements are depreciated on a straight-line basis over the lesser of the estimated useful life of the improvements or the unexpired period of the lease. Land is not depreciated.

Depreciation/amortisation rates (useful lives), residual values and methods are reviewed at each reporting date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate.

Depreciation rates applying to each class of depreciable asset are based on the following useful lives:

	2010	2009
Buildings on freehold land	30 to 50 years	30 to 50 years
Leasehold improvements	Lease term	Lease term
Passenger vehicles	7 years	7 years
Agricultural and transport equipment	3 to 20 years	3 to 20 years
Computing equipment	2 to 5 years	2 to 5 years
Scientific equipment	5 to 20 years	5 to 20 years
Furniture and office equipment	5 to 15 years	5 to 15 years
Workshop equipment	20 to 25 years	20 to 25 years
Research vessel	25 years	25 years
Australia Telescope	15 to 58 years	15 to 58 years

Impairment
All assets were assessed for impairment at 30 June 2010. Where indications of impairment exist, the asset's recoverable amount is estimated and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

The recoverable amount of an asset is the higher of its fair value less costs to sell and its value in use. Value in use is the present value of the future cash flows expected to be derived from the asset. Where the future economic benefit of an asset is not primarily dependent on the asset's ability to generate future cash flows, and the asset would be replaced if the entity were deprived of the asset, its value in use is taken to be its depreciated replacement cost.

Derecognition
An item of property, plant and equipment is derecognised upon disposal or when no further future economic benefits are expected from its use or disposal.

1.18 Investment Properties

Investment properties are measured initially at cost, including transaction costs. Subsequent to initial recognition, investment properties are stated at fair value, which is based on active market price, adjusted if necessary, for any difference in nature, location or condition of the specific asset at the balance sheet date. Gains or losses arising from changes in the fair values of investment properties are recognised in the profit or loss in the year in which they arise.

Investment properties are derecognised either when they have been disposed or when the investment property is permanently withdrawn from use and no future economic benefit is expected from its disposal. Any gains or losses on disposal of an investment property are recognised in profit or loss in the year of disposal.

1.19 Intangibles

Intangibles comprise internally developed and acquired software for internal use. These assets are carried at cost, less accumulated amortisation and impairment losses, except where the estimated cost of software is less than the $250 000 threshold and expensed in the year of acquisition.

Software is amortised on a straight-line basis over its anticipated useful life. The useful lives of software are 2 to 10 years (2008–09: 2 to 10 years).

All software assets were assessed for indications of impairment as at 30 June 2010.

1.20 Inventories

Inventories held for sale represent books, CD-ROMs and videos of publishing and media products. They are valued at the lower of cost and net realisable value.

1.21 Consumable Stores

Stocks of consumable stores, which are not held for resale, are expensed in the year of purchase. These stores mainly consist of fuel and lubricants, chemical supplies, maintenance materials and stationery. The total value is not considered material in terms of total expenditures or total assets.

1.22 Leases

A distinction is made between finance leases and operating leases. Finance leases effectively transfer from the lessor to the lessee substantially all the risks and rewards incidental to ownership of leased assets. An operating lease is a lease that is not a finance lease. In operating leases, the lessor effectively retains all such risks and benefits.

Where an asset is acquired by means of a finance lease, the asset is capitalised at either the fair value of the lease property or, if lower, the present value of minimum lease payments at the inception of the contract and a liability recognised at the same time and for the same amount.

The discount rate used is the interest rate implicit in the lease. Leased assets are amortised over the period of the lease. Lease payments are allocated between the principal component and the interest expense.

Operating lease payments are expensed on a straight-line basis which is representative of the pattern of benefits derived from the leased assets.

1.23 Foreign Currency Transactions

Transactions denominated in a foreign currency are translated at the exchange rate prevailing at the date of the transaction. Foreign currency receivables and payables are translated at the exchange rates prevailing at reporting date. Foreign currency translation gains and losses are recognised in the operating result. The Group has not entered into specific forward exchange contracts during the reporting period.

1.24 Taxation/Competitive Neutrality

Taxation
In accordance with Section 53 of the *Science and Industry Research Act 1949*, CSIRO is exempt from all forms of Australian taxation except fringe benefits tax (FBT) and the goods and services tax (GST). The Organisation pays applicable taxes in overseas countries.

Revenues, expenses and assets are recognised net of GST except:

- where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- for receivables and payables.

The Science Industry Endowment Fund is exempt from income tax in Australia. WLAN Services Pty Ltd is subject to all applicable taxes in Australia.

Competitive neutrality
The Australian Government *Competitive Neutrality Guidelines for Managers* require government bodies to operate with no net competitive advantages over private sector competitors. CSIRO's competitive neutrality policy is applied to consulting and services. Neutrality is achieved by incorporating tax equivalence and rate of return components in pricing of these services.

1.25 Joint Ventures

Joint venture operations–Cooperative Research Centres (CRCs)
The proportionate interests in CRCs regarded as joint venture operations are disclosed in the financial statements under appropriate headings. Their primary source of funding is from the Australian Government and funding is progressively drawn down over the life of the CRCs and distributed to participants, including CSIRO and universities, for research and development purposes. CSIRO's contributions to the CRCs are expensed as incurred and funds received from CRCs are recognised as revenue to the extent that work has been performed in the income statement. CSIRO is a participant in 27 CRCs and the names of these CRCs are disclosed in Note 24.

Joint venture entities–unincorporated (Refer Note 8)
Murray-Darling Freshwater Research Centre (MDFRC) – The Group's 36.6% interest in the MDFRC is accounted for using the equity method.

1.26 Borrowing Costs

All borrowing costs are expensed as incurred.

1.27 Contingent Liabilities and Contingent Assets

Contingent liabilities and contingent assets are not recognised in the balance sheet but are reported in the relevant schedules and notes. They may arise from uncertainty as to the existence of a liability or asset, or represent a liability or asset in respect of which the amount cannot be reliably measured. Contingent assets are disclosed when settlement is probable but not virtually certain and contingent liabilities are disclosed when settlement is greater than remote.

1.28 Properties held for sale

Properties which are expected to be recovered primarily through sale rather than through continuing use are classified as 'properties held for sale'. Immediately before classification, the properties are remeasured in accordance with the Group's accounting policies. Thereafter, at reporting date the properties are measured at the lower of their carrying amount and fair value less cost to sell. Impairment losses on initial classification as held for sale and subsequent gains or losses on re-measurement are recognised in the statement of comprehensive income.

1.29 Presentation of financial statements

The Group applies revised AASB 101 Presentation of Financial Statements (2007), which became effective as of 1 January 2009. As a result, the Group presents in the consolidated statement of changes in equity all owner changes in equity, whereas all non-owner changes in equity are presented in the consolidated statement of comprehensive income.

Comparative information has been re-presented so that it also is in conformity with the revised standard.

Note 2 Events after the balance sheet date

At the time of completion of this note, the Group is not aware of any significant events occurring after the reporting date.

Note 3 Expenses	Notes	Consolidated 2010 $'000	Consolidated 2009 $'000	CSIRO 2010 $'000	CSIRO 2009 $'000
3.1 Employee benefits					
Wages and salaries		516 876	491 918	516 615	489 750
Superannuation-defined contribution plans		80 974	80 773	80 965	80 673
Leave and other entitlements		78 098	79 428	78 098	79 428
Separation and redundancies		9 652	7 411	9 652	7 411
		685 600	659 530	685 330	657 262
Less, Recovery of employee expenses from Food Science Australia joint venture		-	(18 021)	-	(18 021)
Total employee benefits		**685 600**	**641 509**	**685 330**	**639 241**
3.2 Suppliers					
Goods and services					
Goods		101 570	82 477	101 570	82 477
Services		266 930	324 001	417 207	326 251
Total goods and services		**368 500**	**406 478**	**518 777**	**408 728**
Goods and services are made up of:					
Provision of goods – related entities		-	-	-	-
Provision of goods – external parties		101 570	82 477	101 570	82 477
Rendering of services – related entities		22 181	18 165	172 174	18 165
Rendering of services – external parties		244 749	305 836	245 033	308 086
Total goods and services		**368 500**	**406 478**	**518 777**	**408 728**
Other Supplier expenses					
Operating lease rentals:					
Minimum lease payments		13 534	13 747	13 534	13 747
Workers compensation expenses		1 628	1 985	1 628	1 985
Total other supplier expenses		**15 162**	**15 732**	**15 162**	**15 732**
Total supplier expenses		**383 662**	**422 210**	**533 939**	**424 460**
3.3 Depreciation and amortisation					
Depreciation					
Plant and equipment		38 801	29 870	38 801	29 870
Buildings and leasehold improvements		53 875	55 611	53 875	55 611
Total depreciation		92 676	85 481	92 676	85 481
Amortisation					
Intangibles – computer software		2 983	2 484	2 983	2 484
Total depreciation and amortisation		**95 659**	**87 965**	**95 659**	**87 965**
3.4 Finance costs					
Finance leases		**3 463**	**2 979**	**3 463**	**2 979**

Note 3 Expenses (cont)	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
3.5 Write-down and impairment of assets					
Assets write downs and impairments from:					
Bad debts		173	103	173	103
Increase/(decrease) in allowance for impairment		(589)	728	(589)	728
Impairment of available for sale investments		3 472	13 753	3 472	13 753
Net impairment loss on revaluation of properties held for sale and investment properties		1 420	6 195	1 420	6 195
Net realisation of fair value loss reserve on available for sale investments		-	516		516
Total write-down and impairment of assets		**4 476**	**21 295**	**4 476**	**21 295**
3.6 Net foreign exchange losses					
Non-speculative		**5 433**	**-**	**5 433**	**-**
3.7 Net loss from sale of assets					
Equity investment and intellectual property					
Proceeds from sale of equity investments		47 791	-	47 791	-
Proceeds from sale of intellectual property		2 120	-	2 120	-
Total proceed		49 911	-	49 911	-
Carrying value of assets sold		(52 977)	-	(52 977)	-
Selling expenses		(445)	-	(445)	-
Net loss from equity investment and intellectual property		**3 511**	**-**	**3 511**	**-**
Land and Buildings					
Proceeds from sale		1 364	-	1 364	-
Carrying value of assets sold		(1 564)	-	(1 564)	-
Selling expenses		(280)	-	(280)	-
Net loss from sale of land and buildings		**480**	-	**480**	-
Plant and equipment					
Proceeds from sale		771	-	771	-
Carrying value of assets sold		(1 583)	-	(1 583)	-
Selling expenses		(10)	-	(10)	-
Net loss from sale of plant and equipment		**822**	-	**822**	-
Total net loss from sale of assets		**4 813**	**-**	**4 813**	**-**
3.8 Other expenses					
Contribution to FSA joint venture loss		-	4 868	-	4 838
Other expenses		31	-	-	-
Total other expenses		**31**	**4 868**	**-**	**4 838**

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 4 Income					
4.1 Sale of goods and rendering of services					
Provision of goods – related entities		-	7	-	7
Provision of goods – external parties		12 410	14 891	12 410	14 891
Total sale of goods		**12 410**	**14 898**	**12 410**	**14 898**
Rendering of services – related entities		148 355	136 731	150 858	136 731
Rendering of services – external parties		217 154	196 248	217 154	196 248
Total rendering of services		**365 509**	**332 979**	**368 012**	**332 979**
Total sale of goods and rendering of services		**377 919**	**347 877**	**380 422**	**347 877**
4.2 Interest					
Bank and term deposits		**10 422**	**5 036**	**7 222**	**5 000**
4.3 Rents					
Rental income		**8 562**	**7 387**	**8 562**	**7 387**
4.4 Royalties					
Royalties		**42 985**	**15 948**	**42 985**	**15 948**
4.5 Other revenues					
Legal settlement (2009)		-	205 228	-	205 228
Vehicle contributions – staff		1	62	1	62
Sale of primary produce		986	1 259	986	1 259
FSA cost recovery, except employee costs		-	10 177	-	10 177
Donation		103	-	103	-
Capital contributions		1 069	5 375	1 069	5 375
Education programs and subscriptions		3 510	4 881	3 510	4 881
Other		9 918	5 616	10 480	5 605
Total other revenues		**15 587**	**232 598**	**16 149**	**232 587**

Note 4 Income (cont)	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
4.6 Net gain from sale assets					
Equity investment and intellectual property					
Proceeds from sale of equity investments		-	3 413	-	3 413
Proceeds from sale of intellectual property		-	7 818	-	7 818
Total proceeds		-	11 231	-	11 231
Carrying value of assets sold		-	(2 770)	-	(2 770)
Selling expenses		-	(12)	-	(12)
Net gain from equity investment and intellectual property		**-**	**8 449**	**-**	**8 449**
Land and Buildings					
Proceeds from sale		-	38 493	-	38 493
Carying value of assets sold		-	(21 184)	-	(21 184)
Selling expenses		-	(322)	-	(322)
Net gain from sale of land and buildings		**-**	**16 987**	**-**	**16 987**
Plant and equipment					
Proceeds from sale		-	1 007	-	1 007
Carying value of assets sold		-	(826)	-	(826)
Selling expenses		-	(5)	-	(5)
Net gain from sale of plant and equipment		**-**	**176**	**-**	**176**
Total net gain from sale of assets		**-**	**25 612**	**-**	**25 612**
4.7 Net foreign exchange gains					
Non-speculative		**-**	**319**	**-**	**319**
4.8 Other gains					
Net realisation of fair value gain reserve on available for sale investments		**3 866**	**-**	**3 866**	**-**
4.9 Revenue from Government					
Department of Innovation, Industry, Science and Research					
CAC Act body payment item		**704 884**	**668 120**	**704 884**	**668 120**

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
Note 5 Other comprehensive income		**$'000**	**$'000**	**$'000**	**$'000**
5.1 Changes in asset revaluation reserves					
Impairment of land and buildings		-	(9 926)	-	(9 926)
Revaluation of plant and equipment		-	4 215	-	4 215
Net decrease in assets revaluation reserve		**-**	**(5 711)**	**-**	**(5 711)**
5.2 Change in other reserve					
Net change in fair value gain/(loss) of available for sale investments		16 754	(41 417)	16 754	(41 417)
Realisation of fair value loss on sale and impairment of available for sale investment		-	516	-	516
Net increase/(decrease) in other reserve		**16 754**	**(40 901)**	**16 754**	**(40 901)**
Note 6 Cash and cash equivalents					
Cash at bank and on hand		23 053	89 187	17 722	89 156
Term deposits		208 240	75 500	115 000	75 000
Total cash and cash equivalents		**231 293**	**164 687**	**132 722**	**164 156**
Total cash includes deposits held on behalf of third parties totalling $2.4 million (2009 $5.6 million).	20				

Note 7 Trade and other receivables	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Goods and services:					
Goods and services – related entities		17 504	24 083	17 504	24 083
Goods and services – external entities		61 087	60 376	61 087	60 376
Total receivable for goods and services		**78 591**	**84 459**	**78 591**	**84 459**
Other receivables:					
GST receivable from the ATO		726	46	429	46
Interest		2 640	589	786	578
Loans		-	1 470	-	1 470
Other receivables		21 202	81 900	21 761	81 900
Total other receivables (gross)		**24 568**	**84 005**	**22 976**	**83 994**
Total trade and other receivables (gross)		**103 159**	**168 464**	**101 567**	**168 453**
Less impairment allowance:					
Goods and services		(1 021)	(1 610)	(1 021)	(1 610)
Total trade and other receivables (net)		**102 138**	**166 854**	**100 546**	**166 843**
Receivables are expected to be recovered in:					
No more than 12 months		102 138	166 854	100 546	166 843
Total trade and other receivables (net)		**102 138**	**166 854**	**100 546**	**166 843**
Not overdue		98 678	158 716	97 086	158 705
Overdue by:					
0 to 30 days		2 390	3 410	2 390	3 410
31 to 60 days		691	3 845	691	3 845
61 to 90 days		375	595	375	595
More than 90 days		1 025	1 898	1 025	1 898
Total receivables (gross)		**103 159**	**168 464**	**101 567**	**168 453**
The impairment allowance is aged as follows:					
Overdue by:					
More than 90 days		1 021	1 610	1 021	1 610
Total impairment allowance		**1 021**	**1 610**	**1 021**	**1 610**

Note 7 Trade and other receivables (cont)

Reconciliation of impairment allowance:	Consolidated Goods and services	CSIRO Goods and services
Movements in relation to 2010	**$'000**	**$'000**
Opening balance	1 610	1 610
Decrease recognised in net deficit	(589)	(589)
Closing balance	**1 021**	**1 021**
Movements in relation to 2009		
Opening balance	882	882
Increase recognised in net surplus	728	728
Closing balance	**1 610**	**1 610**

	Consolidated		CSIRO	
	2010	**2009**	**2010**	**2009**
	$'000	**$'000**	**$'000**	**$'000**
Note 8 Investments accounted for using the equity method				
Murray-Darling Fresh Water Research Centre	**573**	**543**	**573**	**543**

Movements of the carrying amount of investment in the MDFRC joint venture entity are as follows:

Carrying amount at beginning of the financial year	543	614	543	614
Share of MDFRC's net operating surplus/(deficit) for the year	10	(55)	10	(55)
Adjustment based on audited accounts	20	(16)	20	(16)
Adjusted share of MDFRC's net operating surplus/(deficit) for the year	30	(71)	30	(71)
Carrying amount of investment in MDFRC as at 30 June	**573**	**543**	**573**	**543**

Murray-Darling Fresh Water Research Centre (MDFRC)

The Murray-Darling Fresh Water Research Centre is a collaborative joint venture for the purpose of Murray-Darling Basin freshwater research and the generation of knowledge required to ensure the sustainable management of water and associated environmental resources of the Murray-Darling Basin.

CSIRO's 36.59% (2009 36.59%) investment in MDFRC is accounted for using the equity method. In accordance with the joint venture agreement, the operating surplus/(deficit) was shared by participants in the joint venture. CSIRO's share of MDFRC's operating surplus was $9 977 (2009 $35 322 deficit).

Note 8 Investments accounted for using the Equity Method (cont)

The following is a summary of the financial performance and position of MDFRC:

	Total Revenues	Net Operating deficit	Total Assets	Total Liabilities	Net Assets
	$'000	$'000	$'000	$'000	$'000
2010					
MDFRC (unaudited)	1 910	27	4 450	2 884	1 566
2009					
MDFRC (audited)	6 775	(97)	4 764	3 225	1 539

No indicators of impairment were found for investments accounted for using the equity method.
No investments accounted for using the equity method are expected to be sold within the next 12 months.

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 9 Other investments					
At fair value classified as available for sale investments.	1.14				
Shares (or equity investments)					
Listed companies		12 935	35 607	12 935	35 607
Unlisted companies		19 706	26 846	19 706	26 846
Total investments		**32 641**	**62 453**	**32 641**	**62 453**

All other investments are expected to be recovered in more than 12 months.

Available for sale investments were impaired by $3 472 363 (2009: $13 752 761)

Note 10 Land and buildings

Freehold land – fair value	**369 587**	**367 102**	**369 587**	**367 102**
Buildings on freehold land				
– fair value	1 720 189	1 692 411	1 720 189	1 692 411
– accumulated depreciation	(1 097 061)	(1 052 372)	(1 097 061)	(1 052 372)
	623 128	640 039	623 128	640 039
– work in progress	33 957	35 557	33 957	35 557
Total buildings on freehold land	**657 085**	**675 596**	**657 085**	**675 596**
Leasehold improvements				
– fair value	261 475	232 145	261 475	232 145
– accumulated depreciation	(93 974)	(86 450)	(93 974)	(86 450)
	167 501	145 695	167 501	145 695
– work in progress	61 898	32 323	61 898	32 323
Total leasehold improvements	**229 399**	**178 018**	**229 399**	**178 018**
Buildings under finance lease				
– fair value	176 004	179 208	176 004	179 208
– accumulated amortisation	(65 328)	(66 687)	(65 328)	(66 687)
Total buildings under finance lease	**110 676**	**112 521**	**110 676**	**112 521**
Total land and buildings	**1 366 747**	**1 333 237**	**1 366 747**	**1 333 237**

No indicators of impairment were found for land and buildings.

No land or buildings are expected to be sold or disposed of within the next 12 months.

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 11 Plant and equipment					
Plant and equipment					
– fair value		718 344	673 834	718 344	673 834
– accumulated depreciation		(448 556)	(415 186)	(448 556)	(415 186)
		269 788	258 648	269 788	258 648
– work in progress		54 400	34 097	54 400	34 097
Total plant and equipment		**324 188**	**292 745**	**324 188**	**292 745**
Research vessel					
– fair value		15 461	15 591	15 461	15 591
– accumulated depreciation		(11 273)	(10 904)	(11 273)	(10 904)
		4 188	4 687	4 188	4 687
– work in progress		1 407	-	1 407	-
Total research vessel		**5 595**	**4 687**	**5 595**	**4 687**
Plant and equipment under finance lease					
– fair value		2 335	2 335	2 335	2 335
– accumulated amortisation		(1 801)	(1 660)	(1 801)	(1 660)
Total plant and equipment under finance lease		**534**	**675**	**534**	**675**
Total plant and equipment		**330 317**	**298 107**	**330 317**	**298 107**

All revaluations are conducted in accordance with the revaluation policy stated in Note 1. Plant and equipment were revalued as at 30 June 2009 by the Australian Valuation Office.

No indicators of impairment were found for plant and equipment.

No plant and equipment is expected to be sold or disposed within the next 12 months.

Notes 10 – 11 Land and buildings and plant and equipment (cont)

(a) Reconciliation of the opening and closing balances of Land and Buildings, Plant and Equipment (2009–10) – Consolidated

	Land	Buildings	Total Land and Buildings	Plant and Equipment	Total
	$'000	$'000	$'000	$'000	$'000
As at 1 July 2009					
Gross book value	367 102	2 171 644	2 538 746	725 857	3 264 603
Accumulated depreciation and impairment	-	(1 205 509)	(1 205 509)	(427 750)	(1 633 259)
Net book value as at 1 July 2009	**367 102**	**966 135**	**1 333 237**	**298 107**	**1 631 344**
Additions:	3 485	86 273	89 758	72 594	162 352
Reclassification	(1 000)	(1 284)	(2 284)	-	(2 284)
Depreciation expense	-	(53 875)	(53 875)	(38 801)	(92 676)
Disposals	-	(89)	(89)	(1 583)	(1 672)
Net book value 30 June 2010	**369 587**	**997 160**	**1 366 747**	**330 317**	**1 697 064**
Net book value as of 30 June 2010 represented by:					
Gross book value	369 587	2 253 523	2 623 110	791 947	3 415 057
Accumulated depreciation and impairment	-	(1 256 363)	(1 256 363)	(461 630)	(1 717 993)
Net book value as of 30 June 2010	**369 587**	**997 160**	**1 366 747**	**330 317**	**1 697 064**

Notes 10 – 11 Land and buildings and plant and equipment (cont)

(b) Reconciliation of the opening and closing balances of Land and Buildings, Plant and Equipment (2008–09) – Consolidated

	Land	Buildings	Total Land and Buildings	Plant and Equipment	Total
	$'000	$'000	$'000	$'000	$'000
As at 1 July 2008					
Gross book value	367 915	2 104 338	2 472 253	640 975	3 113 228
Accumulated depreciation and impairment	-	(1 147 991)	(1 147 991)	(380 287)	(1 528 278)
Net book value as at 1 July 2008	**367 915**	**956 347**	**1 324 262**	**260 688**	**1 584 950**
Additions:	5 240	76 100	81 340	63 942	145 282
Reclassification	(5 200)	(1 498)	(6 698)	(42)	(6 740)
Revaluations and impairments recognised in other comprehensive income	(835)	(9 091)	(9 926)	4 215	(5 711)
Depreciation expense	-	(55 611)	(55 611)	(29 870)	(85 481)
Disposals	(18)	(112)	(130)	(826)	(956)
Net book value 30 June 2009	**367 102**	**966 135**	**1 333 237**	**298 107**	**1 631 344**
Net book value as of 30 June 2009 represented by:					
Gross book value	367 102	2 171 644	2 538 746	725 857	3 264 603
Accumulated depreciation and impairment	-	(1 205 509)	(1 205 509)	(427 750)	(1 633 259)
Net book value as of 30 June 2009	**367 102**	**966 135**	**1 333 237**	**298 107**	**1 631 344**

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 12 Investment properties					
Investment properties – fair value	1.18	**50 665**	**41 340**	**50 665**	**41 340**
Reconciliation of the opening and closing balances of investment property					
As at 1 July		41 340	48 540	41 340	48 540
Net gain from fair value adjustments		3 625	-	3 625	-
Reclassification from/(to) property held for sale		5 700	(7 200)	5 700	(7 200)
Net book value as at 30 June		**50 665**	**41 340**	**50 665**	**41 340**

As at 30 June 2010 investment properties comprise properties that are leased to third parties. The lease contains an initial non-cancellable period of ten years. No contingent rents are charged. Rental income from investment properties was $2.4 million (2009 $2.37 million). No separate record was maintained on direct operating expenses including repairs and maintenance for those investment properties.

No indicators of impairment were found for investment properties.

Note 13 Intangibles

Computer software	1.19				
Internally developed – in use		28 619	26 665	28 619	26 665
Internally developed – in progress		4 862	2 771	4 862	2 771
		33 481	**29 436**	**33 481**	**29 436**
Accumulated amortisation		(6 675)	(2 923)	(6 675)	(2 923)
Total intangibles		**26 806**	**26 513**	**26 806**	**26 513**

No indicators of impairment were found for intangible assets.

No intangibles are expected to be sold or disposed of within the next 12 months.

Note 13 Intangibles (cont)

(a) Reconciliation of opening and closing balances of Intangibles (2009–10) – Consolidated

	Internally developed software	Acquired software	Total
	$'000	$'000	$'000
As at 1 July 2009			
Gross book value	29 193	243	29 436
Accumulated amortisation and impairment	(2 680)	(243)	(2 923)
Net book value 1 July 2009	**26 513**	**-**	**26 513**
Additions by purchase or internally developed	3 276	-	3 276
Reclassification	-	-	-
Amortisation	(2 983)	-	(2 983)
Net book value as of 30 June 2010	**26 806**	**-**	**26 806**
Net book value as of 30 June 2010 represented by:			
Gross book value	33 481	-	33 481
Accumulated amortisation and impairment	(6 675)	-	(6 675)
Net book value as of 30 June 2010	**26 806**	**-**	**26 806**

(a) Reconciliation of opening and closing balances of Intangibles (2008–09) – Consolidated

As at 1 July 2008			
Gross book value	22 249	4 941	27 190
Accumulated amortisation and impairment	(235)	(203)	(438)
Net book value 1 July 2008	**22 014**	**4 738**	**26 752**
Additions by purchase or internally developed	2 244	-	2 244
Reclassification	4 698	(4 698)	-
Amortisation	(2 443)	(40)	(2 483)
Net book value as of 30 June 2009	**26 513**	**-**	**26 513**
Net book value as of 30 June 2009 represented by:			
Gross book value	29 193	243	29 436
Accumulated amortisation and impairment	(2 680)	(243)	(2 923)
Net book value as of 30 June 2009	**26 513**	**-**	**26 513**

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 14 Inventories held for sale					
Books and media products – at lower of cost and net realisable value	1.20	**1 153**	**1 276**	**1 153**	**1 276**

No items of inventory were recognised at fair value less cost to sell.
All inventory is expected to be sold in the next 12 months.

Note 15 Other non-financial assets					
Contract research work in progress – at cost	1.6	30 398	25 550	30 398	25 550
Other prepayments		11 639	5 514	11 639	5 514
Total other non-financial assets		**42 037**	**31 064**	**42 037**	**31 064**

No indicators of impairment were found for other non–financial assets.
All other non-financial assets are expected to be recovered in no more than 12 months.

Note 16 Properties held for sale					
Properties held for sale	1.28	**47 913**	**56 760**	**47 913**	**56 760**
Reconciliation of the opening and closing balances of properties held for sale					
As at 1 July		56 760	69 126	56 760	69 126
Additions		1 089	985	1 089	985
Reclassification		(3 417)	13 898	(3 417)	13 898
Disposals		(1 474)	(21 054)	(1 474)	(21 054)
Impairment loss on revaluation		(5 045)	(6 195)	(5 045)	(6 195)
Net book value as at 30 June		**47 913**	**56 760**	**47 913**	**56 760**

Balance as at 30 June 2010 represents properties identified as surplus to CSIRO and classified as 'held for sale'. These properties have been valued by independent valuers. They are expected to be sold in the market and settled within the next 12 months. An impairment loss of $5 million on the re-measurment of properties held for sale to the lower of their carrying amount and fair value cost to sell, has been recognised in the Statement of Comprehensive Income.
Properties held for sale are expected to be sold within the next 12 months.

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 17 Suppliers					
Trade creditors and accruals		**93 742**	**94 383**	**93 742**	**94 383**
Supplier payable expected to be settled within 12 months.					
Related entities		2 387	409	2 387	409
External entities		91 355	93 974	91 355	93 974
		93 742	**94 383**	**93 742**	**94 383**
Settlement is usually made within 30 days.					
Note 18 Other payables					
Accrued salaries and wages		12 143	13 310	12 143	11 954
Redundancies		8 154	9 326	8 154	9 326
Contract research revenue received in advance		99 904	81 876	100 386	81 876
Other revenue received in advance		26 053	7 616	26 053	7 616
Other creditors and accrued expenses		11 501	25 210	61 489	26 546
Amount owing to FSA joint venture		-	6 878	-	6 878
Total other payables		**157 755**	**144 216**	**208 225**	**144 196**
All other payables are expected to be settled within 12 months.					
Note 19 Leases					
Finance leases		69 256	63 636	69 256	63 636
Total finance leases		**69 256**	**63 636**	**69 256**	**63 636**
Payable:					
Within one year					
Minimum lease payments		7 129	6 574	7 129	6 574
Deduct: future finance charges		(3 074)	(2 633)	(3 074)	(2 633)
Total payable within one year (current)		**4 055**	**3 941**	**4 055**	**3 941**
In one to five years					
Minimum lease payments		28 324	24 379	28 324	24 379
Deduct: future finance charges		(10 697)	(9 230)	(10 697)	(9 230)
Total payable in one to five years		**17 627**	**15 149**	**17 627**	**15 149**
In more than five years					
Minimum lease payments		59 023	55 370	59 023	55 370
Deduct: future finance charges		(11 449)	(10 824)	(11 449)	(10 824)
Total payable in more than five years		**47 574**	**44 546**	**47 574**	**44 546**
Total finance leases recognised on the balance sheet		**69 256**	**63 636**	**69 256**	**63 636**

Finance leases exist in relation to certain buildings and major equipment assets. The leases are non-cancellable and for fixed terms ranging from 2 to 25 years. CSIRO guarantees the residual values of all assets leased. There are no contingent rentals. The interest rate implicit in the leases averaged 5% (2009 4%). The lease liabilities are secured by the lease assets.

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 20 Deposits					
Deposits		**2 462**	**5 687**	**2 462**	**5 687**
Deposits represent monies held on behalf of the following third parties:					
Cooperative Research Centres		250	290	250	290
Lower Emissions Energy Centre		-	1 754	-	1 754
Others		2 212	3 643	2 212	3 643
Total deposits		**2 462**	**5 687**	**2 462**	**5 687**
All deposits are expected to be settled within the next 12 months.					
Note 21 Employee provisions					
Annual leave		57 803	52 385	57 803	52 385
Long service leave		125 114	123 995	125 114	123 995
Severance pay		6 194	5 367	6 194	5 367
Total employee provisions		**189 111**	**181 747**	**189 111**	**181 747**
Employee provisions are expected to be settled in:					
No more than 12 months		175 219	163 421	175 219	163 421
More than 12 months		13 892	18 326	13 892	18 326
Total employee provisions		**189 111**	**181 747**	**189 111**	**181 747**

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 22 Cash flow reconciliation					
Reconciliation of cash and cash equivalents as per Balance Sheet to Cash Flow Statement					
Cash and cash equivalents as per:					
Cash Flow Statement		231 293	164 687	132 722	164 156
Balance Sheet	6	231 293	164 687	132 722	164 156
Difference		-	-	-	-
Reconciliation of net cost of services to net cash from operating activities:					
Net cost of service		(723 796)	(546 049)	(873 907)	(546 048)
Add revenue from Government		704 884	668 120	704 884	668 120
Share of net operating surplus/(deficit) of joint venture accounted for using the equity method		30	(71)	30	(71)
Adjustments for non-cash items					
Depreciation and amortisation		95 659	87 965	95 659	87 965
Net write-down and impairment of assets		4 476	21 295	4 476	21 295
(Gains)/loss from sale of property, plant and equipment		1 302	(17 163)	1 302	(17 163)
(Gains)/loss from sale of equity investments and intellectual property		3 511	(8 449)	3 511	(8 449)
Realisation of fair value gain reserve on available for sale investments		(3 866)	-	(3 866)	-
Changes in assets/liabilities					
(Increase)/decrease in trade and other receivables		65 396	(97 558)	66 680	(97 564)
(Increase)/decrease in inventories		123	(183)	123	(183)
(Increase)/decrease in other non–financial assets		(10 973)	1 633	(10 973)	1 633
(Increase)/decrease in GST receivable		(680)	1 702	(383)	1 702
Increase/(decrease) in employee liabilities		7 364	5 641	7 364	5 641
Increase/(decrease) in supplier payables		(641)	12 468	(641)	12 468
Increase/(decrease) in other payables		13 539	39 714	64 029	39 715
Increase/(decrease) in deposits–liabilities		(3 225)	(6 263)	(3 225)	(6 263)
Net cash from operating activities		**153 103**	**162 802**	**55 063**	**162 798**

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
		$'000	$'000	$'000	$'000
Note 23 Contingent liabilities and assets					
Quantifiable Contingencies					
Contingent assets					
The Organisation's net share of the contingent asset		-	-	-	-
Contingent liabilities					
Estimated legal claims arising from employment, motor vehicle accidents, commercial and patent disputes. The Organisation has denied liability and is defending the claims. The estimate is based on precedent in such cases.		(250)	(250)	(250)	(250)
Total net contingent asset/(liability)		**(250)**	**(250)**	**(250)**	**(250)**

Unquantifiable contingencies

CSIRO is currently involved in eight legal proceedings in the USA related to a wireless local area network (WLAN) patent which it owns and wishes to license broadly. The proceedings are additional to proceedings settled by CSIRO in April 2009, and include actions under which declarations of non-infringement and patent invalidity against CSIRO have been sought. CSIRO has claimed (or counter-claimed) for infringement as appropriate. The proceedings are in various phases. If successful, CSIRO expects to receive significant revenue which would exceed the associated legal cost. At this stage, the revenue and costs are considered unquantifiable.

Note 24 **Joint Ventures – Cooperative Research Centres (CRCs)**

The Group was a party to 27 CRCs during 2009–10.

All CRCs have been classified as joint venture operations as the purpose is for the pursuit of collaborative scientific research where participants share in the scientific outcomes and outputs of the CRCs. In the event that CRC research results in a move to commercialisation, a separate legal entity is established and the Group's share of the new entity is treated either as subsidiary, joint venture or associate in the balance sheet as appropriate.

The Group's total cash and in-kind contribution (e.g. staff and use of assets) to CRCs from its own resources was $45.1 million (2009 $50.1 million). Contributions made by the Group are expensed as incurred and these are included in the Income Statement.

No contingent liabilities were reported by the CRCs in which the Group is a participant.

The Group is a participant in the following CRCs as at 30 June 2010:

Name of CRC	Termination date
Advanced Manufacturing CRC	30 June 2014
Australian Seafood CRC	30 June 2014
Bushfire CRC	30 June 2013
CAST CRC	30 June 2012
Cotton Catchments Communities CRC	30 June 2012
Advanced Automotive Technology CRC	30 June 2012
Advanced Composite Structures CRC	30 June 2010
Forestry CRC	30 June 2012
Polymers III CRC	30 June 2012
Cancer Therapeutics CRC	30 June 2014
eWater CRC	30 June 2012
Future Farm Industries CRC	30 June 2014
Australian Invasive Animals CRC	30 June 2012
Parker CRC	30 June 2012
Sheep Industry Innovation CRC	30 June 2014
Vision CRC	30 June 2010
Australian Biosecurity CRC	30 June 2010
National Plant Biosecurity CRC	30 June 2012
Antarctic Climate and Ecosystems CRC	30 June 2017
Greenhouse Gas Technologies CRC	30 June 2017
Irrigation Futures CRC	30 June 2010
Sugar Industry Innovation through Biotechnology CRC	30 June 2010
Sustainable Resource Processing CRC	30 June 2010
Australian Poultry Industries CRC	30 June 2017
Beef Genetic Technologies Limited	30 June 2012
CRC for Biomarker Translation Limited	30 June 2014
Desert Knowledge CRC	30 June 2010

Note 25 Resources made available to the Group and not included in the balance sheet

	Land	Buildings	Plant and Equipment	Total
	$'000	$'000	$'000	$'000
At cost or fair value	12 015	50	27 138	39 203
Accumulated depreciation	-	-	(25 853)	(25 853)
Net value as at 30 June 2010	**12 015**	**50**	**1 285**	**13 350**
Net value as at 30 June 2009	**12 075**	**50**	**521**	**12 646**

The above assets are made available to the Group at little or no cost in accordance with formal agreements with contributors. They have either been purchased out of contract research monies and expensed in the year of purchase, in accordance with accounting policy Note 1.7, or made available to CSIRO at little or no cost. The assets include vehicles, computers and scientific equipment.

These assets are controlled and accounted for in the contributors' books and any proceeds from their disposal are refundable to the contributors in accordance with formal agreements on equity share. There are some restrictions on how these assets are operated. The fair value of in-kind contributions of these assets could not be reliably determined and therefore are not brought to account in the Statement of Comprehensive Income.

Note 26	Monies held in trust	2010 $'000	2009 $'000
	Monies held in trust represented by cash, deposits and investments for the benefit of the Group which are not included in the Balance Sheet are:		
	The Australia National Wildlife Collection (ANWC)–established to maintain over 80 000 specimens of Australian wildlife collection, including a comprehensively documented collection of Australian-New Guinean birds in the world.	-	409
	The Sir Ian McLennan Achievement for Industry Award – established to award outstanding contributions by the Group's scientists and engineers to national development.	262	246
	The Elwood and Hannah Zimmerman Trust Fund – established to fund weevil research and the curation of the Australian National Insect Collection (ANIC) weevil collection.	2 116	2 006
	The Schlinger Trust – established to research the taxonomy, biosystematics, general biology and biogeography of Australasian Diptera conducted by the Australian National Insect Collection.	2 243	2 286
	Total monies held in trust as at 30 June 2010	**4 621**	**4 947**

Movement summary of monies held in trust:

	ANWC $'000	McLennan $'000	Zimmerman $'000	Schlinger $'000	Total $'000
Balance as at 1 July 2009	409	246	2 006	2 286	4 947
Receipts during the year	-	-	30	-	30
Interest income	1	26	201	49	276
Expenditure	(410)	(10)	(121)	(92)	(633)
Balance as at 30 June 2010	**-**	**262**	**2 116**	**2 243**	**4 621**

Note 27 **Collections**

The CSIRO has a number of collections used for scientific research. These collections have been established over time and cover an extensive range of evolution and change in species. The collections are irreplaceable, bear scientific and historical value and are not reliably measurable in monetary terms. Therefore, the CSIRO has not recognised them as an asset in its Financial Statements.

The main collections held by the CSIRO are:

- Australian National Herbarium (ANH)
  The ANH is one of the largest plant collections in Australia with approximately one million preserved plant specimens. It is unique among the Australian Herbaria in having a national focus for its collections, acquisition and research programs.

- Australian National Insect Collection (ANIC)
  The ANIC has over 11 million specimens and is the largest research collection of Australian insects and related organisms in the world.

- Australian National Wildlife Collection (ANWC)
  The ANWC, with over 80 000 specimens, holds land vertebrate collections, including the most comprehensively documented collections of Australian–New Guinean birds in the world.

- Australian National Fish Collection (ANFC)
  The ANFC, also known as the 'ISR Munro Ichthyological Collection', houses more than 80 000 registered adult and 40 000 registered larval specimens of almost 3 000 species from Australasia, Asia, Antarctica, and the Sub-Antarctic Islands. It is among Australia's most diverse ichthyological collections and contains one of the largest collections of sharks, rays and deepwater fishes in the Southern Hemisphere.

Other collections include, but are not limited to, the Australian Tree Seed Centre, the Dadswell Memorial Wood Collection, CSIRO Collection of Living Microalgae and the Wood-Inhabiting Fungi Collection.

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
Note 28 Remuneration of auditors		$	$	$	$
Financial statement audit services are provided to the Group by the Auditor-General					
The fee for auditing services provided was :		**310 400**	**329 000**	**298 000**	**323 000**
No other services were provided by the Auditor-General.					
Note 29 Remuneration of Board Members					
Remuneration and superannuation benefits received or due and receivable by full-time and part-time Board Members, excluding the Chief Executive Officer, were:					
Board Members' remuneration		495 716	473 753	495 716	473 753
Payments to superannuation funds for Board Members		44 522	42 588	44 522	42 588
Total remuneration		**540 238**	**516 341**	**540 238**	**516 341**

The remuneration of the Chief Executive Officer, who is also a Board Member of the Group is reported under Note 30 Remuneration of Senior Executives.

The number of Board Members whose total remuneration fell within the following bands were:

$	Number	Number	Number	Number
Nil – 14 999	-	3	-	3
15 000 – 29 999	-	1	-	1
30 000 – 44 999	1	-	1	-
45 000 – 59 999	6	6	6	6
60 000 – 74 999	1	1	1	1
75 000 – 89 999	-	-	-	-
90 000 – 104 999	1	1	1	1
Total	**9**	**12**	**9**	**12**

	Notes	Consolidated		CSIRO	
		2010	2009	2010	2009
Note 30 Remuneration of Senior Executives					
(a) Senior Executive Remuneration					
The number of the senior executives of the Group who received:		**Number**	**Number**	**Number**	**Number**
less than 144 999*		-	2	-	2
145 000 – 159 999		-	-	-	-
160 000 – 174 999		2	-	2	-
175 000 – 189 999		-	1	-	1
190 000 – 204 999		-	-	-	-
205 000 – 219 999		2	1	2	1
220 000 – 234 999		1	1	1	1
235 000 – 249 999		2	1	2	1
250 000 – 264 999		2	2	2	2
265 000 – 279 999		3	-	3	-
280 000 – 294 999		-	2	-	2
295 000 – 309 999		6	2	6	2
310 000 – 324 999		2	6	2	6
325 000 – 339 999		4	4	4	4
340 000 – 354 999		1	2	1	2
355 000 – 369 999		3	2	3	2
370 000 – 384 999		3	5	3	5
385 000 – 399 999		-	2	-	2
400 000 – 414 999		-	1	-	1
415 000 – 429 999		1	-	1	-
430 000 – 444 999		1	-	1	-
445 000 – 459 999		-	-	-	-
460 000 – 474 999		1	1	1	1
475 000 – 489 999		1	-	1	-
490 000 – 504 999		-	2	-	2
610 000 – 624 999		1	-	1	-
Total		36	37	36	37

* Excluding acting arrangements and part-year service.

Total expense recognised in relation to Senior Executive employment					
		$	$	$	$
Short-term employee benefits:					
Salary (including annual leave taken)		8 416 177	8 234 663	8 416 177	8 234 663
Changes in annual leave provisions		143 032	693 167	143 032	693 167
Performance bonus		1 686 903	1 464 259	1 686 903	1 464 259
Other[1]		745 968	542 809	745 968	542 809
Total short-term employee benefits		**10 992 080**	**10 934 898**	**10 992 080**	**10 934 898**
Superannuation (post-employment benefits)		1 014 415	1 223 574	1 014 415	1 223 574
Other long-term benefits		151 690	484 788	151 690	484 788
Total		**12 158 185**	**12 643 260**	**12 158 185**	**12 643 260**

During the year the entity paid $179 431 (2009: $227 753) in termination benefits to senior executives.

Notes

1. 'Other' includes motor vehicle allowances and other allowances.

Note 30 Remuneration of Senior Executives (cont)

The number of Senior Executives of the Group included in these figures are shown below in the relevant remuneration bands.

During 2009-10 those positions were: the Chief Executive and other members of the Executive Team (12), Chiefs of Divisions (14), joint venture Chief Executive Officer (1) and Flagship Directors (10), a total of 37 positions.

(b) Salary Packages for Senior Executives

Average annualised remuneration packages for substantive Senior Executives

	Consolidated						CSIRO					
	As at 30 June 2010			As at 30 June 2009			As at 30 June 2010			As at 30 June 2009		
	No.	Base salary $	Total $	No.	Base salary $	Total $	No.	Base salary $	Total $	No.	Base salary $	Total $
Total remuneration*:												
Less than 264 999	1	214 821	260 000	1	214 821	260 000	1	214 821	260 000	1	214 821	260 000
265 000 – 279 999	4	199 842	279 472	5	193 440	271 907	4	199 842	279 472	5	193 440	271 907
280 000 – 294 999	1	190 849	282 000	6	209 289	290 177	1	190 849	282 000	6	209 289	290 177
295 000 – 309 999	7	208 913	299 429	3	224 932	302 026	7	208 913	299 429	3	224 932	302 026
310 000 – 324 999	3	229 387	312 597	5	207 778	319 193	3	229 387	312 597	5	207 778	319 193
325 000 – 339 999	6	229 720	331 112	2	227 822	331 089	6	229 720	331 112	2	227 822	331 089
340 000 – 354 999	1	238 382	342 677	5	255 600	347 977	1	238 382	342 677	5	255 600	347 977
355 000 – 369 999	2	286 062	359 045	3	242 619	360 322	2	286 062	359 045	3	242 619	360 322
370 000 – 384 999	4	261 402	374 202	1	303 882	377 371	4	261 402	374 202	1	303 882	377 371
415 000 – 429 999	2	312 622	423 205	2	322 911	425 267	2	312 622	423 205	2	322 911	425 267
445 000 – 459 999	-	-	-	1	295 524	456 693	-	-	-	1	295 524	456 693
460 000 – 474 999	2	330 511	469 823	-	-	-	2	330 511	469 823	-	-	-
655 000 – 669 999	-	-	-	1	454 293	669 600	-	-	-	1	454 293	669 600
685 000 – 699 999	1	464 486	689 688	-	-	-	1	464 486	689 688	-	-	-
Total	**34**	**3 166 997**	**4 423 250**	**35**	**3 152 911**	**4 411 622**	**34**	**3 166 997**	**4 423 250**	**35**	**3 152 911**	**4 411 622**

Excluding acting arrangements and part-year service.

Note 31 Meetings of the Board and Board Committees - Consolidated

During the financial year, nine Board meetings, seven Board Audit Committee meetings, eight Board Remuneration Committee meetings, five Board Endowment Committee meetings and nine Board Commercial Committee meetings were held. The number of meetings attended by each of the Board members was as follows:

Board Member	CSIRO Board		CSIRO Board Audit Committee		CSIRO Board Nominations and Remuneration Committee		CSIRO Board Commercial Committee		SIEF Board Endowment Committee	
	Number eligible to attend as a member	Number attended	Number eligible to attend as a member	Number attended	Number eligible to attend as a member	Number attended	Number eligible to attend as a member	Number attended	Number eligible to attend as a member	Number attended
M S Boydell	9	9	5	6	-	1	-	1	-	-
I Chubb	9	8	-	-	8	5	-	-	-	-
M Clark	9	9	-	6	-	7	-	9	-	5
T A Cutler	9	9	7	7	-	1	9	9	5	4
E J Doyle	9	9	-	-	8	8	9	9	-	2
J Kerin	9	9	7	6	-	1	-	2	-	2
D J Rathbone	9	8	7	5	-	1	-	-	-	-
D M O'Toole	9	9	7	6	-	1	-	1	5	4
J W Stocker	9	9	2	6	8	8	9	9	5	5
T H Spurling	9	9	-	1	2	4	9	9	-	3
S McKeon	-	1	-	1	-	1	-	1	-	-

Note: S McKeon, the Chairman, commenced from 28 June 2010 and attended meetings as an observer.

Note 32 Related party disclosures

(a) Controlled Entities

Names	CSIRO Investment Amount		% Equity Interest Held	
	2010 $	2009 $	2010 $	2009 $
Science and Industry Endowment Fund (SIEF) *	-	-	100%	100%
WLAN Services Pty Ltd	1	1	100%	100%
Hydropem Pty Ltd (inactive) **	1	1	100%	100%
Total	**2**	**2**		

* Science and Industry Endowment Fund was established under the *Science and Industry Endowment Act 1926*. The Fund is deemed to be a CSIRO controlled entity in accordance with AASB 127 Consolidated and Separate Financial Statements and UIG 112. The Science and Industry Endowment Fund's separate financial statements are reported on page 197 of the CSIRO Annual Report.

** Hydropem Pty Ltd is an inactive company and as a result it has not been included in the consolidated financial statements.

(b) Board Members

The Board Members of the Group during the financial year were:

J W Stocker (Chairman until 27 June 2010)
S McKeon (Chairman from 28 June 2010)
T A Cutler (Deputy Chairman)
M Clark (Chief Executive)
E J Doyle
D J Rathbone
D M O'Toole
T H Spurling
I Chubb
The Honourable J Kerin
M S Boydell

Remuneration – the aggregate remuneration of Board Members is disclosed in Note 29.

(c) Board Members' interest in contracts

Since 1 July 2009, no Board Member of CSIRO has received or become entitled to receive a benefit, other than a benefit included in the aggregate amount of remuneration received or due and receivable shown in Note 28 by reason of a contract made by CSIRO with the Board Member or with a firm of which the Board Member is a member or with a company in which the Board Member has a substantial financial interest.

This information relates to the period 1 July 2009 to 30 June 2010.

(d) Other transactions of Board Members – related entities

Ms M S Boydell is the Chairperson of the Gladstone Area Water Board, a Director of Energex Ltd and Commissioner of the Queensland Water Commission. During the 2009–10 financial year, Ms Boydell was also Chairperson of the Rural Industries Research and Development Corporation and a member of the Australian Government Department of Agriculture, Fisheries and Forestry Audit Committee. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Note 32 Related party disclosures (cont)

(d) Other transactions of Board Members – related entities (cont)

Professor I Chubb is the Vice-Chancellor of the Australian National University and the Chair of the International Alliance of Research Universities. He is also a member of the Group of Eight Universities, Australia; Frei University Advisory Board, Berlin; and Global Foundation Advisory Board. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Dr T A Cutler is the Principal of Cutler & Company, a technology and strategy consultancy. He is also a Director of The National Health Call Centre Network, ltd, Multimedia University (Universiti Telekom Sdn. Bhd.) Malaysia; and Chunky Move. He is Chairman of the Advisory Board of the Centre of Excellence for Creative Industries and Innovation and is a member of the Design Research Institute Advisory Board RMIT. Dr Cutler is a member of the Advisory Board to the Australian Biological Resources Study (ABRS) and Chairman of Pharmacy Australia Centre of Excellence (PACE) Precinct, Brisbane. During the 2009/10 year Dr Cutler stepped down from being a member of the International Advisory Panel for the Multimedia Supercorridor in Malaysia and as a director of MSC Technology Centre Sdn. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Dr E J Doyle is Chair of the Hunter Valley Research Foundation. She is also a Director of OneSteel; Hunter Founders Forum, Ross Human Directions Ltd; Steel & Tube Ltd, New Zealand, GPT Ltd and Boral Ltd. During the 2009-10 financial year, Dr Doyle was a Director of Benex Technologies Pty Ltd (until April 2009), Chairman of Port Waratah Coal Services (until August 2009), a Director of the Hunter Medical Research Institute (until August 2009) and a Director of State Super Financial Services Australia (until December 2009). She is a Conjoint Professor at the University of Newcastle Graduate School of Business. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

The Honourable Mr John Kerin is Chair, Interim Advisory Committee to the Australian Weed Research Centre. He is Chair of the Poultry CRC; member of the Board of Governors and Chair NSW and ACT Committees of The Crawford Fund; a member of the Board for Southern Rivers Catchment Management Authority; and a member of the Audit Committee of the Board, Southern Rivers Catchment Management Authority. Mr Kerin is also a Board Member of the Clunies Ross Foundation. During the 2009-10 financial year, Mr Kerin was Chair of the CRC for Tropical Savannas (until April 2010). All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Mr S McKeon was appointed Chairman of CSIRO on 28 June 2010. Mr McKeon is the Executive Chairman of Macquarie Group's Melbourne Office, President of the Australian Government's Takeovers Panel, Chairman of Multiple Sclerosis Research Australia and Chairman of Business for Millennium Development. He is also a Director of Global Poverty Project, a Director of Red Dust Role Models and a Director of Vision Fund International. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Ms D M O'Toole is the Chief Financial Officer of Queensland Rail and a former Director of Norfolk Group Ltd, and a former CFO of MIM Holdings Limited. She was a member of the Queensland Biotech Advisory Council and is a member of the Advisory Committee for the Banking and Finance School of the Queensland University of Technology. During the 2009-10 financial year, Ms O'Toole was CFO of Queensland Cotton. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Mr D J Rathbone is Managing Director and Chief Executive of Nufarm Limited. He is also a Director of the Children's Cancer Centre Foundation, Royal Children's Hospital, Victoria. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Professor T H Spurling is a Research Professor in the Faculty of Life and Social Sciences, Swinburne University of Technology, Victoria. He is also a member of the Board of the International Centre for Radio Astronomy Research; and Chairman of the Board of Advanced Molecular Technologies Pty Ltd. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Note 32 Related party disclosures (cont)

(d) Other transactions of Board Members – related entities (cont)

Dr J W Stocker was Chairman of the CSIRO Board until 27 June 2010, the Chairman of Sigma Pharmaceuticals Ltd (until 21 June 2010) and Chairman of the Australian Wine Research Institute Ltd (until 6 October 2009). He is a Director of Telstra Corporation Ltd, Nufarm Ltd and a Principal and Director of Foursight Associates Ltd. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Dr M Clark is a member of the St Vincent's Hospital Foundation Board, a member of the Prime Minister's Science, Engineering and Innovation Council, and a member of the Automotive Industry Innovation Council and the Great Barrier Reef Foundation. She is also trustee of the Science Industry Endowment Fund and a member of the Australia Advisory Board of the Bank of America Merrill Lynch. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Note 33 Financial instruments	Notes	Consolidated 2010 $'000	Consolidated 2009 $'000	CSIRO 2010 $'000	CSIRO 2009 $'000
(a) Categories of financial instruments					
Financial assets					
Available for sale financial assets					
Investments	9	32 641	62 453	32 641	62 453
Loans and receivables					
Cash at bank	6	23 053	89 187	17 722	89 156
Term deposits	6	208 240	75 500	115 000	75 000
Receivables for goods and services	7	78 591	84 459	78 591	84 459
Loans receivables	7	-	1 470	-	1 470
Other receivable	7	23 842	82 489	22 547	82 478
Carrying amount of financial assets		**366 367**	**395 558**	**266 501**	**395 016**
Financial liabilities					
Finance lease liabilities	19	69 256	63 636	69 256	63 636
Trade creditors	17	93 742	94 383	93 742	94 383
Research revenue received in advance	18	99 904	81 876	100 386	81 876
Deposits	20	2 462	5 687	2 462	5 687
Other creditors	18	57 851	62 339	107 839	62 319
Carrying amount of financial liabilities		**323 215**	**307 921**	**373 685**	**307 901**
(b) Net income and expense from financial assets					
Cash at bank and term deposits					
Interest revenue	4.2	10 422	4 966	7 222	4 930
Interest revenue loans receivable	4.2	-	70	-	70
Net gain from financial assets		**10 422**	**5 036**	**7 222**	**5 000**
(c) Net income and expense from financial liabilities					
Finance Leases					
Interest expense	3.4	3 463	2 979	3 463	2 979
Net loss from financial liabilities		**3 463**	**2 979**	**3 463**	**2 979**

(d) Fair value of financial instruments

A comparison between the fair value and carrying amount of the Group's financial assets and liabilities is not disclosed because the Group considers that the carrying amounts reported in the balance sheet are a reasonable approximation of the fair value of these financial assets and liabilities.

Note 33 – Financial instruments (cont)

(e) Fair value hierarchy

The table below analyses financial instruments carried at fair value, by valuation method. The different levels have been defined as follows:

Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities.

Level 2: inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly (i.e., as prices) or indirectly (i.e., derived from prices).

Level 3: inputs for the asset or liability that are not based on observable market data (unobservable inputs).

	Level 1 $'000	Level 2 $'000	Level 3 $'000	Total $'000
30 June 2010				
Available for sale financial assets	**12 935**	**-**	**19 706**	**32 641**

There have been no transfers to or from Level 1 and Level 3 during the year ended 30 June 2010 (2009: no transfers in either direction).

Fair value of investments in unlisted companies

For investments in unlisted companies where there is no readily available market pricing for the equity instruments, the fair value has been determined by applying valuation techniques in line with the generally accepted valuation guidelines 'International Private Equity and Venture Capital Valuation Guidelines (AVCAL)'.

Where recent transactions for the unlisted companies' equity have taken place, these equity transaction prices are used to value CSIRO's investment.

For unlisted companies that have not had any recent equity transactions, other AVCAL valuation techniques are used such as discounted cash flows and share of net assets.

In addition, independent valuations are performed as at reporting date for unlisted companies that are considered to have a material impact on CSIRO's investment portfolio.

Investments in special purpose entities are either valued at cost or share of net assets since a reliable estimate of fair value cannot be established. These entities have been set up primarily to gain access to research facilities/networks, or to provide services to owners. Hence, there is no 'active market' for these equity investments. CSIRO is a long-term shareholder and is unlikely to dispose of its interest in these investments.

(f) Credit risk

The Group is exposed to minimal credit risk as the majority of loans and receivables are cash or amounts owed by the Australian Tax Office in the form of a Goods and Services Tax refund.

The maximum exposure to credit risk is the risk that arises from potential default of a debtor. This amount is equal to the total amount of trade and other receivables of $102.6 million (2009 $166.8 million). The Group has assessed the risk of the default on payment and has allocated $1.021 million (2009 $1.6 million) to an allowance for impairment account.

The Group manages its credit risk by undertaking background and credit checks prior to allowing a debtor relationship. In addition, the Group has policies and procedures that guide employees to apply debt recovery techniques. The Group holds no collateral to mitigate against credit risk.

Note 33 Financial Instruments –Consolidated (cont)

(f) Credit risk (cont)

Credit risk of financial instruments not past due or individually determined as impaired – Consolidated

	Notes	Not Past Due Nor Impaired	Not Past Due Nor Impaired	Past due or Impaired	Past due or Impaired
		2010 $'000	2009 $'000	2010 $'000	2009 $'000
Cash at bank	6	23 053	89 187	-	-
Term deposits	6	208 240	75 500	-	-
Receivables for goods and services	7	74 110	74 711	4 481	9 748
Loans receivables	7	-	1 470	-	-
Other receivable	7	23 842	82 489	-	-
Investments	9	32 641	62 453	-	-
Total		**361 886**	**385 810**	**4 481**	**9 748**

Credit risk of financial instruments not past due or individually determined as impaired – CSIRO

	Notes	Not Past Due Nor Impaired	Not Past Due Nor Impaired	Past due or Impaired	Past due or Impaired
		2010 $'000	2009 $'000	2010 $'000	2009 $'000
Cash at bank	6	17 722	89 156	-	-
Term deposits	6	115 000	75 000	-	-
Receivables for goods and services	7	74 110	74 711	4 481	9 748
Loans receivables	7	-	1 470	-	-
Other receivable	7	22 547	82 478	-	-
Investments	9	32 641	62 453	-	-
Total		**262 020**	**385 268**	**4 481**	**9 748**

Note 33 Financial instruments (cont)

(f) Credit risk (cont)

Ageing of financial assets that are past due but not impaired for 2010 – Consolidated

	0 to 30 days $'000	31 to 60 days $'000	61 to 90 days $'000	90+ days $'000	Total $'000
Receivables for goods and services	2 390	691	375	1 025	4 481
Total	**2 390**	**691**	**375**	**1 025**	**4 481**

Ageing of financial assets that are past due but not impaired for 2009 – Consolidated

	0 to 30 days $'000	31 to 60 days $'000	61 to 90 days $'000	90+ days $'000	Total $'000
Receivables for goods and services	3 410	3 845	595	1 898	9 748
Total	**3 410**	**3 845**	**595**	**1 898**	**9 748**

Ageing of financial assets that are past due but not impaired for 2010 – CSIRO

	0 to 30 days $'000	31 to 60 days $'000	61 to 90 days $'000	90+ days $'000	Total $'000
Receivables for goods and services	2 390	691	375	1 025	4 481
Total	**2 390**	**691**	**375**	**1 025**	**4 481**

Ageing of financial assets that are past due but not impaired for 2009 – CSIRO

	0 to 30 days $'000	31 to 60 days $'000	61 to 90 days $'000	90+ days $'000	Total $'000
Receivables for goods and services	3 410	3 845	595	1 898	9 748
Total	**3 410**	**3 845**	**595**	**1 898**	**9 748**

(g) Liquidity risk

The Group's financial liabilities are payables, finance leases and other interest bearing liabilities. The exposure to liquidity risk is based on the notion that the Group will encounter difficulty in meeting its obligations associated with financial liabilities. This is highly unlikely due to Australian Government funding and internal policies and procedures put in place to ensure there are appropriate resources to meet its financial obligations.

The Group manages its budgeted funds to ensure it has adequate funds to meet payments as they fall due. In addition, the Group has policies in place to ensure timely payments are made when due and has no past experience of defaults.

Note 33 Financial instruments (cont)

(g) Liquidity risk (cont)

The following table illustrates the maturities for financial liabilities for 2010 – Consolidated

	On demand $'000	Within 1 year $'000	1 to 5 years $'000	> 5 years $'000	Total $'000
Finance lease liabilities	-	7 129	28 324	59 023	94 476
Trade creditors	-	93 742	-	-	93 742
Research revenue received in advance	-	99 904	-	-	99 904
Deposits	2 462	-	-	-	2 462
Other creditors	-	57 851	-	-	57 851
Total	**2 462**	**258 626**	**28 324**	**59 023**	**348 435**

The following table illustrates the maturities for financial liabilities for 2009 – Consolidated

	On demand $'000	Within 1 year $'000	1 to 5 years $'000	> 5 years $'000	Total $'000
Finance lease liabilities	-	6 574	24 379	55 370	86 323
Trade creditors	-	94 383	-	-	94 383
Research revenue received in advance	-	81 876	-	-	81 876
Deposits	5 687	-	-	-	5 687
Other creditors	-	62 339	-	-	62 339
Total	**5 687**	**245 172**	**24 379**	**55 370**	**330 608**

Note 33 Financial instruments CSIRO (cont)

(g) Liquidity risk (cont)

The following table illustrates the maturities for financial liabilities for 2010 – CSIRO

	On demand $'000	Within 1 year $'000	1 to 5 years $'000	> 5 years $'000	Total $'000
Finance lease liabilities	-	7 129	28 324	59 023	94 476
Trade creditors	-	93 742	-	-	93 742
Research revenue received in advance	-	100 386	-	-	100 386
Deposits	2 462	-	-	-	2 462
Other creditors	-	107 839	-	-	107 839
Total	**2 462**	**309 096**	**28 324**	**59 023**	**398 905**

The following table illustrates the maturities for financial liabilities for 2009 – CSIRO

	On demand $'000	Within 1 year $'000	1 to 5 years $'000	> 5 years $'000	Total $'000
Finance lease liabilities	-	6 574	24 379	55 370	86 323
Trade creditors	-	94 383	-	-	94 383
Research revenue received in advance	-	81 876	-	-	81 876
Deposits	5 687	-	-	-	5 687
Other creditors	-	62 319	-	-	62 319
Total	**5 687**	**245 152**	**24 379**	**55 370**	**330 588**

(h) Market risk

The Group holds basic financial instruments that do not expose the Group to certain market risks except for equity price risk for its available for sale equity investments. See Note 9.

Interest rate risk

The only interest–bearing items on the balance sheet are finance leases. They all bear interest at a fixed interest rate and will not fluctuate due to changes in the market interest rate.

Equity price risk

Equity price risk arises from changes in market prices of listed equity investments that the Group has designated as 'available for sale' financial instruments. See Note 9.

Sensitivity analysis

The Group's listed equity investments are listed on the Australian Securities Exchange (ASX). For such instruments classified as available for sale, a 10% increase in the ASX All Ordinary Index at the reporting date would have increased equity by $1 293 481 (2009 an increase of $3 560 000). An equal change in the opposite direction would have decreased equity by $1 293 481 (2009 a decrease of $3 560 000). The analysis is performed on the same basis for 2009.

Note 33 Financial Instrument (cont)

(h) Market risk (cont)

Currency risk

In accordance with Australian Government policy, the Group is prohibited from entering into foreign currency hedges.

The Group's exposure to foreign exchange risk on sales and purchases that are denominated in currencies other than Australian dollar is not considered material. At any point in time the Group's foreign currency risk exposure is not material.

Note 34 Reporting of Outcome

(a) Reporting of outcome

The Organisation's outputs contribute to a single outcome:

Innovative scientific and technology solutions to national challenges and opportunities to benefit industry, the environment and the community, through scientific research and capability development, services and advice.

(b) Net cost of outcome delivery

	Consolidated		CSIRO	
	2010	**2009**	**2010**	**2009**
	$'000	**$'000**	**$'000**	**$'000**
Total expenses	**1 183 137**	**1 180 897**	**1 333 113**	**1 180 849**
Income from non-governent sector				
Other external revenues:				
Sale of goods and rendering of services – to related entities	148 355	94 787	150 858	94 787
Sale of goods and rendering of services – to external entities	229 564	253 090	229 564	253 090
Interest	10 422	5 036	7 222	5 000
Net gains from sale of assets	-	17 163	-	17 163
Donations	103	-	103	-
Rents	8 562	7 387	8 562	7 387
Royalties	42 985	15 948	42 985	15 948
Net gains from sale of investments	-	8 449	-	8 449
Realisation of fair value gain reserve	3 866	-	3 866	-
Sale of primary produce	986	1 259	986	1 259
Other	14 528	231 658	15 090	231 647
Total other own-source income	459 371	634 777	459 236	634 730
Net cost of outcome delivery	**723 766**	**546 120**	**873 877**	**546 119**

Flagship Collaboration Fund

The Flagship Collaboration Fund is unique in CSIRO. The Fund provides research capability, sourced from the National Innovation System and internationally to help the National Research Flagships meet their goals.

During 2009–10, the Fund reached its most significant year of expenditure of $17 million. To date, $56 million has been disbursed and $96 million committed from the original $114 million provided by the Australian Government.

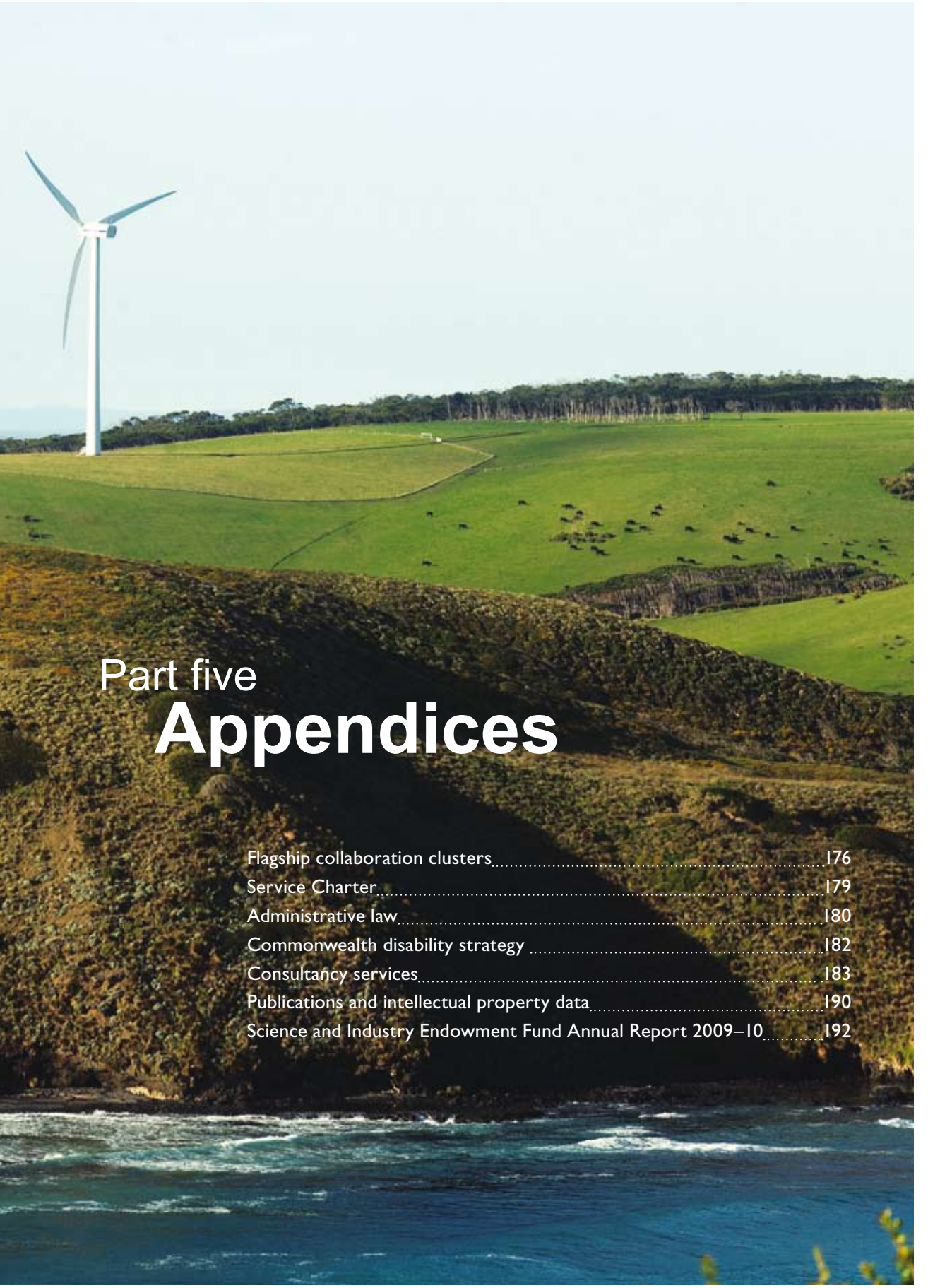
Four new research Clusters were approved during the year involving 12 national and four international universities which represented a $12.5 million three year investment, with matching investment from partners. Additionally, $1.4 million worth of new projects and Visiting Fellowships to universities was supported, as well as 25 student scholarships.

Early in 2010, a Cluster Science Day was hosted to bring together university Cluster Leaders to celebrate their work and achievements in support of the Flagships. Participants praised the Fund as a mechanism for encouraging collaborative research and providing university access to CSIRO and issues of national importance.

A review of the Fund was also undertaken early in 2010. An external expert review panel focused on strategic and operational aspects, including an intensive program of discussions with stakeholders. In its report, the panel strongly endorsed the scale up and continuation of the Fund to the effect of doubling the funding available to reach full potential. The panel was unanimous in agreeing that the broad objectives for the Fund remain critical for contributing to the National Research Flagships Program, building capability across the National Innovation System and building longer-term research collaborations. See Appendix 1, page 176 for information on our Flagship Collaboration Fund Clusters.

Dr Tom Hatton (Director, CSIRO Wealth from Oceans Flagship) speaking at the launch of the Coastal Collaboration Cluster at Cottesloe Surf Life Saving Club on 21 April 2010. Credit: Alana Blowfield

'Participants praised the Fund as a mechanism for encouraging collaborative research and providing university access to CSIRO and issues of national importance.'



Part five

Appendices

Appendix 1: Flagship Collaboration Fund Active Clusters*

Round 1 clusters

Flagship	Cluster name	Cluster leader(s)	Other partners
Light Metals	Australian Partnership in Light Metals Research	Dr Colleen Bettles, Monash University	Australian Research Council Centre of Excellence, CAST Cooperative Research Centre (CRC)
Preventative Health	Detecting and preventing Alzheimer's disease	Professor David Ames, University of Melbourne	Edith Cowan University, Mental Health Research Institute, Neurosciences Australia
Wealth from Oceans	Human uses and impacts on Ningaloo reef	Professor Neil Loneragan, Murdoch University	Australian National University (ANU), Curtin University of Technology (CUT), Edith Cowan University, Sustainable Tourism CRC, University of Western Australia (UWA), University of Queensland (UQ)

Round 2 clusters

Flagship	Cluster name	Cluster leader(s)	Other partners
Food Futures	Redesigning grain polysaccharides	Professor Mike Gidley, UQ	University of Adelaide, University of Melbourne
Water for a Healthy Country	Advanced membrane technologies for water treatment	Professor Stephen Gray, Victoria University	University of New South Wales (UNSW), University of Melbourne, RMIT University, Monash University, UQ, CUT, University of South Australia, Murdoch University
Wealth from Oceans	Subsea pipelines for reliable and environmentally safe development	Professor Mark Cassidy, UWA	CUT, Flinders University, Monash University, University of Sydney, UQ

** Completed clusters are listed in previous annual reports.*

Round 3 clusters

Flagship	Cluster name	Cluster leader(s)	Other partners
Energy Transformed	The 'intelligent grid' – modelling distributed generation and interruptible load	Professor Stuart White, University of Technology Sydney	University of South Australia, UQ, CUT, Queensland University of Technology
Light Metals	Breakthrough technology for primary aluminium	Professor Geoff Brooks, Swinburne University	University of Auckland, University of Wollongong, UNSW, UQ
Preventative Health	The ASPREE healthy ageing cohort biobank	Professor John McNeil, Monash University	University of Melbourne, University of Tasmania, ANU, Ludwig Institute for Cancer Research

Round 4 clusters

Flagship	Cluster name	Cluster leader(s)	Other partners
Climate Adaptation	Human health and climate change adaptation	Professor Anthony Capon, ANU	University of Western Sydney, Curtin University, UQ, University of Melbourne, James Cook University, Queensland Institute of Medical Research, Ove Arup Pty Ltd
Climate Adaptation	Regional adaptation to climate change – a case study in south-east Queensland	Professor Jan McDonald, Griffith University	UQ, University of Sunshine Coast
Minerals Down Under	Future sustainability of Australia's mineral industry	Professor David Brereton, UQ	University of Technology Sydney, CUT, Central Queensland University, ANU
Minerals Down Under	Preconcentration and agglomeration to enhance heap leaching of nickel laterite	Professor John Ralston, University of South Australia	UQ, University of Melbourne, University of British Columbia
Future Manufacturing	Sensor systems for analysis of aquatic environments	Professor Justin Gooding, UNSW	Griffith University, CUT, Monash University, Flinders University, La Trobe University

Preventative Health	STroke imAging pRevention and Treatment (START)	Professor Geoffrey Donnan, University of Melbourne	National Stroke Institute, Brain Research Institute, Neurosciences Victoria, Melbourne Health
Wealth from Oceans	Institutional and social barriers to science impact (Coastal Cluster)	Professor David Wood, CUT	University of Adelaide, Deakin University, Flinders University, University of Sunshine Coast, University of Tasmania, University of Wollongong

Round 5 clusters

Flagship	Cluster name	Cluster leader(s)	Other partners
Water for a Healthy Country	Ecological Response to Altered Flow Regimes Cluster	Professor Stuart Bunn, Griffith University	To be confirmed^
Food Futures	Healthy complex cereal carbohydrates	Professor Geoff Fincher, University of Adelaide	University of Melbourne, University of Queensland, KTH University (Sweden).
Food Futures	Sex ratio and sterility for commercial animal production	Professor Michael Holland, UQ	To be confirmed^
Energy Transformed	Biological solutions for energy and greenhouse challenges	Professor Chris Easton, ANU	To be confirmed^

^ *Upon signing of final contract*

Appendix 2: Service Charter

CSIRO's Service Charter describes the standards of service we aim to deliver to our customers and our commitment to ensuring that these standards are maintained.

In summary:

- we believe our customers and partners are essential to our success
- we maintain relevance in our work through input from the public, government, industry and the research community
- we communicate with our customers in a courteous, helpful and professional manner
- we respect our customers' confidentiality
- we evaluate our services to ensure the highest standards.

Our full Service Charter is available on our website: www.csiro.au/servicecharter

CSIRO welcomes your feedback on our performance. Please contact the CSIRO officer with whom you have been dealing or CSIRO Enquiries who can direct your feedback to the relevant person.

CSIRO Enquiries:
Bag 10, Clayton South, VIC 3169

Phone: 1300 363 400
Fax: +61 3 9545 2175
Email: enquiries@csiro.au

Appendix 3: Administrative law

Freedom of information

The *Freedom of Information Act 1982* (FOI Act) provides the public with a general right of access to documents held by Australian Government agencies including CSIRO. The general right is limited by exceptions to protect essential public interests or the privacy or business affairs of those who give information to the agency.

The following information is provided in compliance with section 8 of the FOI Act:

- the functions and powers of CSIRO are set out on page 83
- information about CSIRO's procedures for external consultation can be found at www.csiro.au/SAC and www.csiro.au/FAC
- CSIRO holds the following categories of documents:
  - corporate records including documents relating to government, policy, finance, personnel, business development, commercialisation, communication, real property, intellectual property and education
  - business unit records including documents relating to scientific research and technology transfer
- members of the public may obtain access to scientific and technical publications from **CSIRO** PUBLISHING (www.publish.csiro.au). CSIRO administrative manuals are available from the Freedom of Information Officer.

Part V of the FOI Act confers a right to request amendment of a document to which lawful access has been granted, where the applicant claims that information in the document:

- relates to his or her personal affairs
- is incomplete, incorrect, out-of-date or misleading
- has been used, is being used, or is available for use by the agency or Minister for an administrative purpose.

In the year to 30 June 2010, CSIRO received 33 requests for information under the FOI Act and no requests for amendment in relation to documents provided under the Act.

Archives, privacy, administrative decisions

CSIRO maintains an archives collection which includes records dating from the establishment in 1926 of the Council for Science and Industrial Research, the predecessor of CSIRO. Certain CSIRO records are held by Australian Archives. Disposal arrangements for CSIRO records are made in accordance with the provisions of the Archives Act 1983. Access to records over 30 years old is provided in accordance with that Act.

The *Privacy Act 1988* provides for Information Privacy Principles and National Privacy Principles. During 2009–10, there was one investigation under section 36 of the *Privacy Act 1988* in relation to CSIRO, which is subject to determination.

The *Administrative Decisions (Judicial Review) Act 1977* (ADJR Act) enables a person aggrieved by certain classes of administrative decisions made by Australian Government agencies, including CSIRO, to obtain reasons for or to challenge those decisions. During 2009–10, CSIRO received no challenges or requests for statements of reasons under the ADJR Act.

Judicial decisions

During 2009–10, there were no judicial decisions or decisions of administrative tribunals that have had, or may have, a significant impact on the operations of CSIRO.

Reviews by outside bodies

During 2009–10, there were no reports on the operations of CSIRO by the Auditor-General (other than the report on the financial statements), a Parliamentary committee or the Commonwealth Ombudsman.

Contact

All enquiries under the above legislation (including FOI requests) should be directed to:

Freedom of Information Officer and Privacy Officer
CSIRO, PO Box 225, Campbell ACT 2602
Phone: 02 6276 6123
Fax: 02 6276 6437
Email: rosemary.caldwell@csiro.au

Appendix 4: Commonwealth disability strategy

For the purposes of the Commonwealth Disability Strategy (CDS), CSIRO's 'Role' is that of an 'Employer'.

Activities relevant to the Strategy form part of CSIRO's Workplace Diversity Plan. The plan responds to key diversity issues within the Organisation, areas for action are diversity leadership, indigenous employment, education and awareness raising, and selection and recruitment.

Performance against the indicators issued by the Office of Disability is detailed in Table 5.1.

Table 5.1: Disability strategy performance

Performance indicator	Actions 2009–10
Employment policies, procedures and practices comply with the requirements of the *Disability Discrimination Act 1992.*	Policies and practices are reviewed annually. All CSIRO policies comply with the *Disability Discrimination Act 1992* and other relevant legislation. CSIRO is presently conducting a review of all policies as part of the implementation of the revised Policy Framework.
Recruitment information for potential job applicants is available in accessible formats on request.	All web authors comply with the Web Content Accessibility Guidelines. The establishment of a dedicated team of recruitment specialists ensures consistency of presentation and accessibility. Additional resources are available for staff and potential employees with hearing disabilities.
Agency recruiters and managers apply the principle of 'reasonable adjustment'.	CSIRO policy encourages managers to make reasonable adjustments to accommodate the needs of staff with a disability so that they can satisfy the inherent requirements of the job. CSIRO complies fully with the *Employment and the Disability Discrimination Act.*
Training and development programs consider the needs of staff with disabilities.	Development programs are conducted at venues that cater to the needs of participants with disabilities. Web training resources have been reviewed to ensure suitability for all staff, such as induction training delivered on-line and training for the implementation of the revised Code of Conduct.
Training and development programs include information on disability issues as they relate to the program.	There are various CSIRO supported programs which provide information on disability issues. Material on the CSIRO Intranet has been updated and includes information on diversity issues, such as new resources for the hearing impaired. During 2010, CSIRO will be introducing training courses for all staff and managers on a range of diversity related issues.
Complaints/grievance mechanisms, including access to external mechanisms, in place to address issues and concerns raised by staff.	CSIRO's values compass was introduced in 2009 to further evolve our culture and to support the execution of CSIRO's strategy. Two aspects of the compass that relate to this performance indicator are: Trust and Respect and Safety and Sustainability. CSIRO has well-developed and publicised internal mechanisms for resolving complaints both formally and informally. In the formal stages, matters involve investigation by an independent investigator. There is also scope to refer the matter to the Human Rights and Equal Opportunity Commission. There have been no instances of complaints based on disability issues. CSIRO is always striving to improve it practices and education to prevent staff grievances.

Appendix 5: Consultancy services

CSIRO's policy on selection and engagement of consultants is based on the principles of:

- value for money
- open and effective competition
- ethics and fair dealing
- accountability and reporting
- national competitiveness and industry development
- support for other Australian Government policies.

These principles are included within CSIRO's Procurement Policy and Procedures.

CSIRO engages individuals and companies to provide professional services, taking account of the skills and resources required for the task, the skills available internally and the cost-effectiveness of these options.

CSIRO spent $1,249,355 (including goods and services tax (GST)) on consultancies during 2009–10 ($736,652 in 2008–09). There were 35 consultancies let during the year with the total whole-of-life value of $2,282,903 (including GST) ($1,634,572 in 2008–09). Table 5.2 provides details of consultancy services let by CSIRO during 2009–10 with a contract value, GST inclusive, of $10,000 or more.

Notes to table:

Reason code	Reason for consultancy
IS	Need for independent study/evaluation.
PA	Need for professional assistance to manage and facilitate change and its consequence.
SS	Specialist skills were not otherwise available.
Procurement code	**Procurement method**
PM	An existing panel member – this category includes standing offers, common use arrangements and approved supplier panels.
OT	Tenders sought from the market place (Request for Proposal, Request for Tender, Expressions of Interest).
ST	Tenders being sought from suppliers who have pre-qualified through some form of previous competitive process.
RQ	Purchasing thresholds consistent with CSIRO's minimal standards.
EX	Exemption arrangement such as sole supplier, pre-eminent expertise or urgency and/or practicality.

Table 5.2: Consultancy services

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy $ (GST inclusive)	Reason for consultancy	Procurement method
2009/07/01	Stuart Anderson	Investigate the viability of the Australian Resources Research Centre (ARRC) precinct becoming a direct heat geothermal demonstration site.	27,500	IS	EX
2009/07/03	Phillip Wing	Advice to CSIRO's Commercial Executive Committee.	55,000	IS	EX
2009/08/01	Dr John Rolfe	Produce a report on the issues relating to public and private conservation of river systems in Northern Australia.	21,780	SS	EX
2009/08/02	Andrew Parker / Greg Sam	Provide strategy for managing release of CSIRO Performance.	44,000	IS	EX
2009/08/03	Dr Anthony Filmer	Provide advice on mining and exploration strategies.	10,000	SS	EX
2009/09/01	Australian Aerospace and Defence Innovations	Provide assistance and guidance in negotiations with the Department of Defence regarding technology applications	200,000	SS	EX
2009/10/01	Mal Bryce	(i) Assist with concluding the Interim Pawsey Centre Project Plan, including negotiation with key stakeholders (ii) Help conclude negotiations over the CSIRO/DIISR Pawsey Centre Funding Agreement.	35,000	IS	EX

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy $ (GST inclusive)	Reason for consultancy	Procurement method
2009/10/02	Eyal Halamish	Recruitment of Eyal Halamish to develop a social maturation curve on biodiversity for CSIRO.	55,000	SS	EX
2009/12/01	ACIL Tasman Pty Ltd (David Campbell)	Provided a report that articulates the rationale for investment in CSIRO and establishes an appropriate framework for evaluating the benefits delivered by that investment.	20,000	IS	EX
2009/12/02	IPS Australasia	Provide drilling cost estimates for Pawsey Centre/ARRC geothermal demonstration site component for CSIRO Education Investment Fund (EIF) proposal.	11,435	IS	EX
2010/02/01	Knowledge Teams International	Provide leadership coaching.	13,627	SS	EX
2010/02/02	Peter Veth	Develop protocol documents regarding an audit and repatriation of information and materials relevant to Indigenous people. Duration three months.	72,900	SS	EX
2010/02/03	Sarah Holcombe	Develop protocol documents regarding an audit and repatriation of information and materials relevant to Indigenous people. Duration three months.	18,350	SS	EX

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy $ (GST inclusive)	Reason for consultancy	Procurement method
2010/02/06	Adam Smith, Rob Mules and Warwick Sayers	Provide the design of a central Spatial Data Infrastructure to support the objectives of the Data Consolidation program and enhance the work of GIS analysts across the Organisation.	15,400	PA	RQ
2010/02/07	Geoff Ball	Identify strategic priorities for the new Food and Nutritional Sciences (FNS) Division. To assist the Chief (Dr Martin Cole) and the FNS Executive by conducting an initial assessment of key business areas including: finances, science capability and activities, external engagement, and outcome targets/Themes. Duration: five months	42,900	SS	EX
2010/02/08	Centre for International Economics	Investigate wheat quality research. Assemble both qualitative and quantitative research and analysis relating to wheat quality research.	60,000	IS	RQ
2010/02/09	PricewaterhouseCoopers	Provide an independent assessment of the maturity of CSIRO's Procurement function against industry standards and identification of process improvement of streamlining opportunities.	61,600	IS	ST

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy $ (GST inclusive)	Reason for consultancy	Procurement method
2010/02/10	Deloitte	Provide a range of internal audit services in collaboration with CSIRO Risk Assessment and Audit (RA&A), on a project-by-project basis, to complement and enhance the services currently provided by RA&A. Specifically, these will include information technology audits, as well as environmental and health and safety reviews.	200,000	IS	OT
2010/02/11	PricewaterhouseCoopers	Undertake review program to support CSIRO Functional Investment and Review Process and assessment of support services against best practice.	300,000	IS	OT
2010/02/12	Deloitte	Expert advice on/facilitation of CSIRO strategy development for 2011–15.	300,000	SS	OT
2010/03/01	PLAUT IT Australia	Conduct independent 'Health Check' on Business Warehouse implementation.	16,500	IS	OT
2010/03/03	Health 2 Organisations	Provide strategic communication services.	69,000	IS	EX
2010/03/04	Christine Charles	Develop a Mineral Futures Forum.	50,000	IS	EX

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy $ (GST inclusive)	Reason for consultancy	Procurement method
2010/04/19	Ernst & Young	Review capital funding requirements and associated treatments. Provide 10-year capital plan in support of the CSIRO Lapsing Program Review.	100,000	IS	ST
2010/04/20	ACIL Tasman Pty Ltd (Contact: David Campbell)	Identify and apply agreed methodologies to a range of CSIRO's activities to demonstrate the economic, environmental and social impacts of CSIRO in appropriate terms in support of the CSIRO Lapsing Program Review.	220,000	IS	OT
2010/05/01	Reflecta	Advise on MyCSIRO internet/ intranet usability.	11,265	SS	RQ
2010/05/02	Logica	Undertake Security Risk Assessment required for externally hosted vendor system.	32,868	IS	OT
2010/05/03	HBA Consulting	Provide specialist industrial relations advice to support the negotiation of the Canberra Deep Space Communication Complex Enterprise Agreement.	40,000	SS	EX
2010/05/04	Deloitte Touche Tohmatsu	Provide specialist evaluation services.	20,000	IS	OT

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy $ (GST inclusive)	Reason for consultancy	Procurement method
2010/06/01	Ogilvy Illumination	The Consultant will provide confidential and expert advice to assist in establishing a comprehensive set of benchmark measures and data in relation to community awareness and attitudes towards CSIRO.	92,533	IS	EX
2010/06/02	Dr Orlando Jimenez trading as RDG Consultant Ltd	Extensive understanding of the mining industry in Chile and background working with the Chilean Government.	42,045	PA	EX
Total value of consultancies below $10,000 (4 consultancies)			**$24,200**		
Total value of consultancies let during 2009–10			**$2,282,903**		

Appendix 6: Publications and intellectual property data

The number of publications produced by CSIRO reflects our contribution to, and hence ability to access, the world's knowledge base. CSIRO reports on four types of publications: journal articles, books/chapters, conference papers and technical reports as shown in Table 5.3.

Table 5.3: CSIRO publications by type (Programs 1 and 2)

Publication Type[a]	2005	2006	2007	2008	2009
Journal Articles	1,945	2,198	2,239	2,542	2,542
Books/ Chapters	238	227	234	363	237
Conference Papers	1,852	1,830	1,525	1,911	1,664
Technical Reports	620	676	613	145	216
Total	**4,655**	**4,931**	**4,611**	**4,961**	**4,659**
Number of Researchers	1,847	1,876	1,912	1,990	2,052
Citations per paper[b]	10.46	11.09	12.17	12.56	13.83
Total Publications / Researcher†	2.5	2.6	2.4	2.5	2.3

[a] *See glossary page 211 for definition of publication types.*
[b] *Data updated as of 1 May 2010 to cover a ten-year plus two-month period, 1 January 2000 – 28 February 2010.*

CSIRO actively manages the commercialisation of its intellectual property (IP) to promote uptake and application of the technology in ways that will maximise the benefit to Australia. CSIRO has a comprehensive IP Management Policy that includes information on IP ownership, IP protection, disclosure of information and procedures for managing IP via CSIRO Laboratory Notebooks. The output of IP in the form of inventions, patents, trademarks, plant breeder's rights and registered designs is shown in Table 5.4. For information on investing in CSIRO technologies go to: www.csiro.au/org/ps25.html

Table 5.4: CSIRO Intellectual property by type

IP Category[a]	Sub Category	2005–06	2006–07	2007–08	2008–09	2009–10
Patents	Current PCT applications	74	91	111	97	90
	Granted	2113	2067	1933	1625	1630
	Live Cases	4084	3922	3787	3710	3379
Inventions	Patent Families	780	734	741	743	712
	New	90	84	67	80	99
Trade Marks	Australian	281	287	291	265	263
	Foreign	91	104	113	130	114
Plant Breeders Rights	Australian	113	119	122	122	122
	Foreign	17	25	25	25	21
Registered Designs	Australian	2	3	2	2	2
	Foreign	12	12	11	10	10
New inventions / Researcher†		0.04873	0.04478	0.03504	0.04021	0.04676

[a] *IP categories are defined in the glossary on page 211.*

† *The definition of researcher has changed from the 2008–09 Annual Report. Previously researcher was defined as staff with a principal functional area of research scientist/engineer only. The inclusion of three other principal functional areas has lowered the results compared to those reported last year. However, the trend is the same.*

Appendix 7: Science and Industry Endowment Fund Annual Report 2009–10

Originally established by an Act of Parliament in 1926 with an appropriation of 100,000 pounds, the Science and Industry Endowment Fund (SIEF) has, since its inception, been providing funds to assist:

- persons engaged in scientific research
- the training of students in scientific research.

On 20 October 2009, CSIRO announced its intention to make a substantial gift of up to $150 million to SIEF for the purposes of scientific research. This donation will be used to assist Australian industry, further the interests of the Australian community and contribute to the achievement of Australian national objectives. This gift has given SIEF a renewed relevance to the scientific landscape in Australia, increasing the scale and scope of promoting scientific endeavours.

Following the gift of CSIRO funds, which to date includes two tranches of $50 million each, SIEF has been transformed into Australia's first philanthropic endowment fund in the field of general science.

For convenience, the Fund's Annual Report, including financial statements, is annexed to the CSIRO Annual Report and, for financial year 2009–10, the Fund's accounts are also consolidated with those of CSIRO under the relevant Australian Accounting Standard. The Fund remains a separately constituted trust for statutory purposes under the *Science and Industry Endowment Act 1926* (Act) with its own role and character distinct from CSIRO. As Trustee of the Fund, I am determined to ensure that Australia gets maximum benefit from the additional scientific research that has been made possible by the licensing of one of our most successful inventions.

The renewed SIEF was officially launched by Senator the Honourable Kim Carr who acknowledged the CSIRO scientists and management involved in the success of the wireless local area network (WLAN) technology, a success that made the substantial donation possible. The proceeds of the WLAN technology will be used to fund nationally important research which could not be funded in the normal course of CSIRO's business.

Senator Carr highlighted some of the distinguishing attributes of the trust fund, identifying it as the 'start of something significant and long-term' that would target resources at 'the really big questions' through funding 'special projects' and thereby 'extend our capacity to solve problems and improve lives'.

The first gift of funds was made on 15 October 2009 and marked by a signing ceremony conducted by Dr Megan Clark (Chief Executive, CSIRO), in her capacity as Trustee of SIEF, and Dr John Stocker (Chairman, CSIRO).

The second gift of funds was made on 6 January 2010. The third gift is anticipated to be made in the 2010–11 financial year.

Management and Governance of SIEF

Dr Megan Clark's role as Trustee of the SIEF arises under the *Science and Industry Endowment Fund Act 1926* that establishes SIEF. The Act mandates that the Trustee will be the Chief Executive of CSIRO from time to time. The Trustee is assisted in her role by the SIEF Advisory Council, which currently consists of:

- Professor Alan Robson (Chair), Vice-Chancellor, University of Western Australia
- Professor Margaret Shiel, CEO, Australian Research Council
- Professor Tom Spurling, Research Professor, Swinburne University
- Dr Ezio Rizzardo, Research Scientist and CSIRO Fellow
- Mr Nigel Poole, Executive Director Commercial, CSIRO.

The Advisory Council is supported in its functions by the Secretary, Ms Katrina O'Leary.

The Advisory Council's role is to provide independent advice and recommendations to the Trustee in relation to the making of grants and funding of proposals out of the assets of the SIEF.

As contemplated at the time of the initial gift of funds, CSIRO has entered into a Services Agreement with SIEF, to provide SIEF with the necessary support it will require in order to properly manage the funds, including administering the applications process, financial management, oversight of projects, publicity and contracts. This Services Agreement was entered on the 15 October 2009 and marked with a signing ceremony between Dr Megan Clark (as Trustee of SIEF) and Mr Mike Whelan, CSIRO Deputy Chief Executive.

Application of Funds

CSIRO has attached a number of conditions to the gift of funds which establishes how the Trustee determines how to apply funds from the SIEF assets.

In particular, CSIRO specified $10 million to be applied to expand research to the CSIRO Information and Communication Technologies (ICT) Centre Wireless Laboratory (in recognition of the source of the gifted funds), $2 million to endow a Professorial Chair at Macquarie University in wireless communications, and $7.5 million to establish scholarships and fellowships with a focus on ICT, Mathematics and Engineering to be known as the John Stocker Postdoctoral Fellowships and Scholarships.

Implementation of these programs is underway and it is anticipated that funding for these purposes will be applied during the 2010–11 financial year.

Additional projects will be selected for funding by the Trustee on the recommendation of the Advisory Committee throughout 2010–11 in accordance with the broad strategic objectives of the SIEF, as well as specifically identified Special Purpose Areas.

Signing of the Deed of Gift between CSIRO and SIEF on 15 October 2009. Seated: Signatories Dr John Stocker (Chairman, CSIRO) and Dr Megan Clark (Chief Executive, CSIRO and Trustee of SIEF). Left to right: Mr Mike Whelan, Professor Ian Chubb, Professor Tom Spurling, Ms Katrina O'Leary, the Honourable John Kerin, Mr Terry Healy, Dr Terry Cutler, Ms Mary Boydell, Dr Eileen Doyle, Mr Douglas Rathbone, Mr Nigel Poole and Dr Alastair Robertson. Credit: Simon Bayliss

Signing of the Services Agreement between the SIEF Trustee, Dr Megan Clark (at right) and CSIRO, represented by Mr Mike Whelan. Credit Simon Bayliss

Building SIEF into the Future

The launch of the renewed SIEF not only marks a major milestone in the history of Australian scientific endeavour, but heralds a new era in Australia's approach to the funding of science.

Inspired by the best tradition of philanthropic action, such as that of the United States of America, in the words of Senator Carr, 'the time has come for us to build our own tradition of private support for research that serves the public good'.

The renewed SIEF represents the crucial first step in establishing Australia's own culture of philanthropy, and the SIEF's vision for the future has been precisely articulated by the Minister for Innovation, Industry, Science and Research as follows:

'We want the Science and Industry Endowment Fund to become a great national resource, augmented by donations from industry and other benefactors who share our passion for science and our faith in its ability to make the world a better place.'

The SIEF Advisory Council, left to right: Professor Tom Spurling, Dr Ezio Rizzardo, Professor Alan Robson, Professor Margaret Shiel, Mr Nigel Poole and Ms Katrina O'Leary (Secretary). Credit: Simon Bayliss

Australian National
Audit Office

INDEPENDENT AUDITOR'S REPORT

To the Trustee of Science and Industry Endowment Fund

I have audited the accompanying financial report of the Science and Industry Endowment Fund which comprises the Statement by Trustee, Statement of Comprehensive Income for the year ended 30 June 2010, the Balance Sheet as at 30 June 2010, Statement of Changes in Equity and Cash Flow Statement for the year ended on that date, and Notes to and forming part of the Financial Statements including a Summary of Significant Accounting Policies.

The Trustee's Responsibility for the Financial Report

The Trustee of the Science and Industry Endowment Fund is responsible for the preparation and fair presentation of the financial report in accordance with Australian Accounting Standards (including the Australian Accounting Interpretations). This responsibility includes establishing and maintaining internal controls relevant to the preparation and fair presentation of the financial report that is free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor's Responsibility

My responsibility is to express an opinion on the financial report based on my audit. I conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. These Auditing Standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial report is free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial report. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial report, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial report in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of

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accounting policies used and the reasonableness of accounting estimates made by the directors, as well as evaluating the overall presentation of the financial report.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Independence

In conducting my audit, I have complied with the independence requirements of the Australian National Audit Office, which incorporates the requirements of the Australian Accounting Profession.

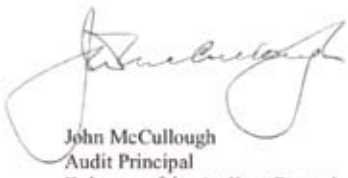
Auditor's Opinion

In my opinion, the financial statments of the Science and Industry Endowment Fund:

(i) have been prepared in accordance with the Australian Accounting Standards (including the Australian Accounting Interpretations); and

(ii) give a true and fair view of the matters required by Australian Accounting Standards (which include the Australian Accounting Interpretations) including the Science and Industry Endowment Fund's financial position as at 30 June 2010 and of its financial performance for the year ended on that date.

Australian National Audit Office



John McCullough
Audit Principal
Delegate of the Auditor-General

Canberra
27 August 2010

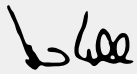
SCIENCE AND INDUSTRY ENDOWMENT FUND
STATEMENT BY TRUSTEE

In our opinion, the attached financial statements for the year ended 30 June 2010 have been prepared based on properly maintained financial records and in accordance with Australian Accounting Standards and other mandatory financial reporting requirements in Australia, and give a true and fair view of the financial position of the Fund as at 30 June 2010 and of its performance for the year then ended.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Fund will be able to pay its debts as and when they become due and payable.

Megan Clark
Trustee of the Science and Industry Endowment Fund

25 August 2010



David Toll
Acting Chief Financial Officer of CSIRO as service provider to the Science and Industry Endowment Fund

18 August 2010

SCIENCE AND INDUSTRY ENDOWMENT FUND
STATEMENT OF COMPREHENSIVE INCOME
For the year ended 30 June 2010

	Notes	2010	2009
EXPENSES		**$**	**$**
Scientific research grants	8	2 533 025	18 817
Gift fund establishment fees		203 489	-
Gift fund services fees		354 464	-
Audit fees		7 000	-
Bank fees		31	29
In-kind expenses:			
– advertising and approval fees	4	4 419	4 340
– accounting, secretarial and audit	4	-	6 420
Total expenses		**3 102 428**	**29 606**
LESS:			
REVENUE			
Gift income		150 000 000	-
Interest		3 198 744	33 742
In-kind contributions received	4	4 419	10 760
Total revenue		**153 203 163**	**44 502**
Net surplus		**150 100 735**	**14 896**
Other comprehensive income		-	-
Total comprehensive income		**150 100 735**	**14 896**

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
BALANCE SHEET
As at 30 June 2010

	Notes	2010 $	2009 $
ASSETS			
Current Assets			
Cash	5	98 569 482	527 313
Sundry debtors		50 000 000	-
Interest receivable	6	1 854 002	11 281
GST receivable		298 400	-
Prepayments	8	482 398	-
Total current assets		**151 204 282**	**538 594**
TOTAL ASSETS		**151 204 282**	**538 594**
LIABILITIES			
Current Liabilities			
Accrued expenses	7	564 953	-
Total current liabilities		**564 953**	**-**
TOTAL LIABILITIES		**564 953**	**-**
NET ASSETS		**150 639 329**	**538 594**
EQUITY			
Contributed equity		200 000	200 000
Accumulated surpluses		150 439 329	338 594
TOTAL EQUITY		**150 639 329**	**538 594**

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
STATEMENT OF CHANGES IN EQUITY
For the year ended 30 June 2010

	Accumulated Surpluses		Contributed Equity		Total Equity	
	2010 $	2009 $	2010 $	2009 $	2010 $	2009 $
Balance as at 1 July	**338 594**	**323 698**	**200 000**	**200 000**	**538 594**	**523 698**
Net surplus	150 100 735	14 896	-	-	**150 100 735**	**14 896**
Closing balance at 30 June	**150 439 329**	**338 594**	**200 000**	**200 000**	**150 639 329**	**538 594**

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
CASH FLOW STATEMENT
For the year ended 30 June 2010

	Notes	2010 $	2009 $
OPERATING ACTIVITIES			
Cash received			
Gift receipts from CSIRO		100 000 000	-
Interest received		1 356 023	40 108
Total cash received		**101 356 023**	**40 108**
Cash used			
Payments to grantees		3 015 423	18 817
GST paid		298 400	-
Bank fees paid		31	29
Total cash used		**3 313 854**	**18 846**
Net cash provided by operating activities	9	**98 042 169**	**21 262**
Net increase in cash held		98 042 169	21 262
Cash at the beginning of the reporting period		527 313	506 051
Cash at the end of the reporting period		**98 569 482**	**527 313**

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
For the year ended 30 June 2010

Note 1 Summary of Significant Accounting Policies

1.1 Basis of Preparation of the Financial Statements

The financial report is required by section 10 of the *Science and Industry Endowment Act 1926* and is a general purpose financial report that has been prepared in accordance with Australian Accounting Standards, Australian Accounting Interpretations, and other authoritative pronouncements of the Australian Accounting Standards Board.

The financial statements have been prepared on an accrual basis and are in accordance with the historical cost convention. No allowance is made for the effect of changing prices on the results or the financial position.

Assets and liabilities are recognised in the Balance Sheet when and only when it is probable that future economic benefits will flow and the amounts of the assets or liabilities can be reliably measured.

Revenues and expenses are recognised in the Statement of Comprehesive Income when and only when the flow or consumption or loss of economic benefits has occurred and can be reliably measured.

1.2 Cash

For the purpose of the Statement of Cash Flows, cash includes cash at bank and deposits at call. They are readily convertible to cash.

1.3 Revenue

Interest revenue is recognised on a proportional basis taking into account the interest rates applicable to the financial assets.

1.4 Resources Received Free of Charge

Services received free of charge are recognised as gains when and only when a fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense.

1.5 Financial Instruments

Accounting policies for financial instruments are stated in Note 10.

Note 2 Principal Activity

The Fund was established under the *Science and Industry Endowment Act* 1926 with the Trustee of the Fund being the CSIRO Chief Executive. An appropriation of 100 000 pounds was received at the time the fund was established. The funds were invested and have subsequently earned interest over time.

The principal activity of the Science and Industry Endowment Fund is to provide assistance to persons engaged in scientific research and in the training of students in scientific research.

New Gift October 2009

In October 2009, Senator Carr announced a gift of $150 million to be donated by CSIRO to the Science and Industry Endowment Fund. The gift is intended to be used for scientific research for the purposes of assisting Australian industry, furthering the interests of the Australian community or contributing to the achievement of Australian national objectives. The gift was made subject to the terms of a Deed of Gift between the Trustee and CSIRO dated 15 October 2009.

As at 30 June 2010, $100 million had been received. The third and final instalment of $50 million will be received in financial year 2010/11.

Note 3 Contingencies and Commitments

No contingent liabilities exist as at 30 June 2010.

Schedule of Commitments	**2010**	**2009**
BY TYPE	**$**	**$**
Grants payable	13 717 600	-
Total grants payable	**13 717 600**	**-**

Note 4	**Estimated value of resources provided free of charge by CSIRO or ANAO are as follows:**		
	– accounting and secretarial services	-	3 420
	– advertising and approval fees	4 419	4 340
	– financial statement audit services provided free of charge by the Auditor-General	-	3 000
	Total	**4 419**	**10 760**

Note 5	**Cash** (current)	
	Cash at bank	5 329 911	27 313
	Deposits – at call	93 239 571	500 000
	Total	**98 569 482**	**527 313**

Note 6	**Receivables** (current)	
	Interest receivable	1 854 002	11 281
		1 854 002	**11 281**
	Gross receivables are aged as follows:		
	Not overdue	**1 854 002**	**11 281**

Note 7	Accrued expenses	2010 $	2009 $
	Establishment costs	203 489	-
	Service fee under Services Agreement with CSIRO	354 464	-
	Audit fee	7 000	-
	Total	**564 953**	**-**

Note 8	Scientific research grants		
	CREST Program awards	31 423	18 817
	CSIRO ICT Centre grants	2 984 000	-
	Less*: prepaid research grants*	(482 398)	-
	Total	**2 533 025**	**18 817**

Note 9	Cash Flow Reconciliation		
	Reconciliation of operating surplus to net cash from/(used by) operating activities:		
	Operating surplus/(deficit)	150 100 735	14 896
	Changes in assets and liabilities		
	(Increase)/decrease in receivables	(52 141 121)	6 366
	(Increase)/decrease in prepayments	(482 398)	
	Increase/(decrease) in payables	564 953	-
	Net cash from/(used by) operating activities	**98 042 169**	**21 262**

Note 10 Financial Instruments	2010	2009
10A: Categories of Financial Instruments	**$**	**$**
Financial Assets		
Cash	98 569 482	527 313
Sundry Debtors	50 000 000	-
Interest Receivable	1 854 002	11 281
Total financial assets	150 423 484	538 594
Financial liabilities		
Supplier Payables	564 953	-
Total financial liabilities	564 953	-

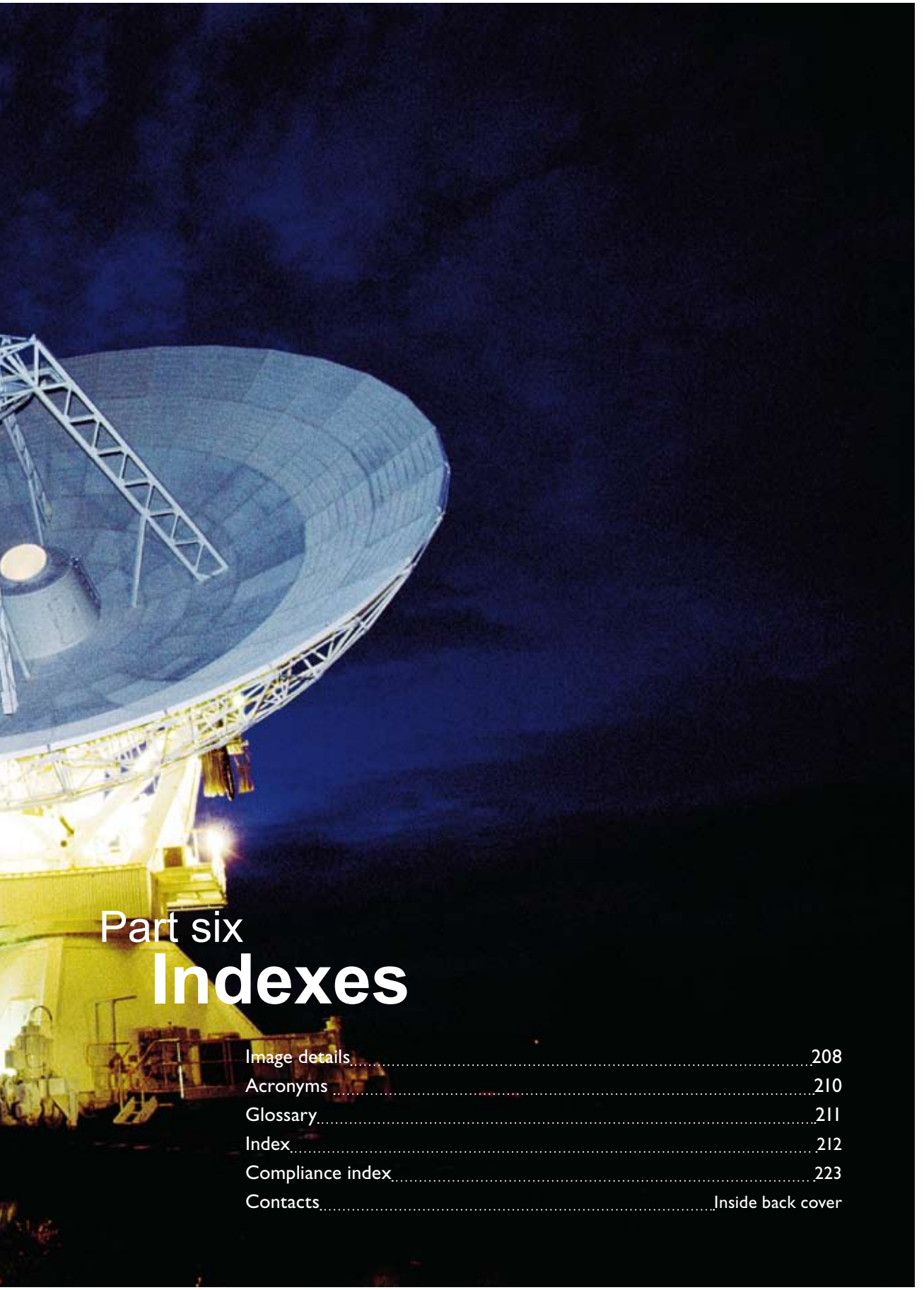
The net value of the financial assets are their carrying amounts.

10B: Credit risk
SIEF is exposed to minimal credit risk as financial assets represent cash and short term deposits held at reputable Australian financial institutions and receivables from the CSIRO. For the purpose of this note GST receivables are not disclosed as financial instruments as they do no meet the definition of a financial assets. SIEF has assessed the risk of default on payment to be nil as of 30 June 2010 (2009: nil).

10C: Liquidity risk
SIEF's financial liabilities are supplier payables. The exposure to liquidity risk is based on the notion that SIEF will encounter difficulty in meeting its obligations associated with financial liabilities. This is highly unlikely due to funding that is in place and internal policies and procedures to ensure that there are appropriate resources to meet its financial obligations.

10D: Market risk
SIEF holds basic financial instruments that do not expose SIEF to any market, currency or other price risk.

10E: Interest rate risk
SIEF maintains an operating bank account and short term deposits which are subject to short term interest rates. Funds are maintained in term deposits for short periods. In 2009/10 the average return on cash and short term deposits was 5.54% (2009: 6.64%).



Part six
Indexes

Image details

Page ii–iii	©Sue Brown
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Acronyms

AAHL	Australian Animal Health Laboratory
ACBRF	AAHL Collaborative Biosecurity Research Facility
ACCESS	Australian Community Climate Earth-System Simulator
ADJR Act	*Administrative Decisions (Judicial Review) Act 1977*
ANAO	Australian National Audit Office
ANIC	Australian National Insect Collection
ANFC	Australian National Fish Collection
ANH	Australian National Herbarium
ANSTO	Australian Nuclear Science and Technology Organisation
ANU	Australian National University
ANWC	Australian National Wildlife Collection
APSIM	Agricultural Production System Simulator
AQIS	Australian Quarantine Inspection Service
ARRC	Australian Resources Research Centre
ASKAP	Australian Square Kilometre Array Pathfinder
ATNF	Australia Telescope National Facility
CAC Act	*Commonwealth Authorities and Companies Act 1997*
CASS	CSIRO Astronomy and Space Science
CDS	Commonwealth Disability Strategy
CRC	Cooperative Research Centre
CREST	Creativity in Science and Technology
CSIR	Council for Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSIROSEC	CSIRO Science Education Centre
CUT	Curtin University of Technology
DAFF	Department of Agriculture, Fisheries and Forestry
EFT	Equivalent Full-Time
EMC	Executive Management Council
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ERA	Ecological risk assessment
ESD	Ecologically Sustainable Development
ESS	Environmental Sustainability Strategy
ET	Executive Team
ETF	Energy Transformed Flagship
FNS	Food and Nutritional Sciences
FOI Act	*Freedom of Information Act 1982*
GCC	Global Corporate Challenge
GHG	Greenhouse Gas Emissions
GPUs	Graphics processing units
GRA	Global Research Alliance
HSE	Health, Safety and Environment
HSMA	Health and safety management arrangements
ICT	Information and Communication Technologies
IEEE	Institute of Electrical and Electronics Engineers
IES	Indigenous Engagement Strategy
IMOS	Integrated Marine Observing System
IP	Intellectual Property
IT	Information Technology
JCU	James Cook University
KPI	Key Performance Indicator
LRE	Leading the Research Enterprise
LTIFR	Lost Time Injury Frequency Rate
MNF	Marine National Facility
MTFR	Medical Treatment Frequency Rate
NCAP	Nissan Casting Australia Pty Ltd
NCRIS	National Collaborative Research Infrastructure Strategy
NEHTA	National E-Health Transition Authority
NIS	National Innovation System
NRPs	National Research Priorities
NSW	New South Wales
QFA	Quadrennium Funding Agreement
QLD	Queensland
RAM	Rotated Arc Mixer
R&D	Research and development
SA	South Australia
SAC	Sector Advisory Council
SIEF	Science and Industry Endowment Fund
SIR Act	*Science and Industry Research Act 1949*
SKA	Square Kilometre Array
TCP	Transformational capability platforms
UNSW	University of New South Wales
USQ	University of Queensland
US	United States
UWA	University of Western Australia
VIC	Victoria
WA	Western Australian
WAGCOE	Western Australian Geothermal Centre of Excellence
WLAN	Wireless Local Area Networks
XRD	X-ray diffraction
XRF	X-ray fluorescence

Glossary

Intellectual property

Inventions: This is the number of inventions where one or more patent/applications are current. Accordingly an invention might include a granted patent that is near the end of its life (e.g. 20 years), or it might include a provisional patent application that has only recently been filed. Furthermore, one invention might relate to a patent application in one country only, or it might relate to over 20 patents/applications in different countries covering the one invention.

New inventions: This is the number of new inventions where an application (normally an Australian provisional application) is filed for the first time to protect that invention. A major implication of filing that provisional application is that it provides the applicant with an internationally recognised priority date. A small percentage of CSIRO's new inventions are filed as US provisional applications.

PCT applications: International PCT (Patent Cooperation Treaty) applications are a 'temporary' phase in any international patenting process and these have a life span of 18 months. This type of application is very common in major international corporations and is used by CSIRO when it considers its invention may have wide commercial application. In view of the 18-month time span, it is reasonable to approximate that two-thirds of the reported number were filed in the previous 12 month period.

Granted patents: Once a patent application has been examined and satisfies various patentability criteria it becomes a granted patent. It remains a granted patent until the end of the patent period (normally 20 years) provided renewal fees are paid.

Live patent cases: A live patent case is where either a patent application or a granted patent exists. It does not include cases that have lapsed, expired or been withdrawn.

Applications may include provisional applications, PCT applications, and applications pending in Australia or foreign jurisdictions.

Publications

Journal articles: Includes journal articles and other items published as part of a journal (for example, an editorial or book review).

Conference papers: Includes published conference papers, abstracts or edited proceedings.

Technical reports: Includes individually authored chapters as well as whole reports that are subject to peer review and usually publicly released.

Books and chapters: Includes monographs, complete or individual chapters, usually published by a commercial publisher.

Student supervision and sponsorship

Sponsored students: Students are deemed to be sponsored if they receive a full or partial scholarship paid from CSIRO funds to pursue a research project leading to a PhD or Honours/Masters degree. This excludes CSIRO employees, whose study expenses are considered to be 'training and development'.

Supervised students: Students are deemed to be supervised if they have a CSIRO staff member appointed officially by the University as the supervisor for their research project. Normally, CSIRO staff are joint supervisors in conjunction with a university academic.

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CSIRO Enquiries provides a single point-of-contact for industry, teachers and students, the research community and the general public.

With a mandate to provide information, guidance and referrals, CSIRO Enquiries responds to over 35,000 inbound enquiries each year.

It also supports the outreach activities of the Organisation through custodianship of an extensive stakeholder database and provision of outbound e-communication services and online event RSVP.

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