2005/2006 ANNUAL REPORT
and Final Report 1999-2006

Cooperative Research Centre for Tropical Rainforest Ecology and Management (Rainforest CRC)

Our Vision

Our vision is to see the rainforests of Australia managed and utilised in a scientifically sound and sustainable manner to yield economic and social benefits to the community while ensuring conservation of the unique cultural and natural features of the rainforest.

Our Mission

Our mission is to support the sustainable use, management and conservation of Australia's tropical rainforests through world-class research, training and technology transfer.

Our Objectives

For Regional Management… to create a management framework for ecologically sustainable management of rainforest regions.

For Regional Conservation… to provide a sound scientific basis for conservation and management of the rainforest's natural and cultural features.

For Rainforest Tourism… to assist in the development of a vibrant tourism industry that is in harmony with the rainforest resource on which its long-term existence depends.

For Indigenous Involvement… to promote Indigenous involvement in all facets of research and management, which will incorporate recognition and respect for Indigenous rights and interests.

For Rainforests Globally… to establish the Rainforest CRC as a model for delivery of rainforest research and sustainable management.

For Centre Management… to continue as a major national and international force well into the 21st Century.

Our Name and Logo

The Cooperative Research Centre for Tropical Rainforest Ecology and Management is abbreviated for convenience to *Rainforest CRC*. Our logo represents the unique courtship behaviour of the Riflebird, a well-known rainforest inhabitant.

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CRC AUSTRALIA

Established and supported under the Australian Government's Cooperative Research Centres Programme

Compiled by Shannon Hogan and Nigel Stork.

Aboriginal and Torres Strait Islander people are advised that this report may contain photographs of deceased persons.

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1. EXECUTIVE REPORT

This Annual Report signals the end of the Cooperative Research Centre for Tropical Rainforest Ecology and Management – otherwise known as the Rainforest CRC.

Although the so-called Wet Tropics Rainforests of North Queensland were inscribed on the World Heritage list in 1988, little was known about the biological diversity of the region, and the burgeoning tourism industry had little information. Furthermore, the new Wet Tropics Management Authority (WTMA), charged with the responsibility of developing policies that would lead to the protection of the Wet Tropics World Heritage Area, required a strong scientific basis for such policies. By the end of the first phase of the Rainforest CRC, we had developed a strong biodiversity knowledge base that supported the development of planning and conservation policy by agencies such as WTMA. In the second phase of the CRC, the range of stakeholders increased to include almost all of those stakeholders who had an interest in forested and former forested landscapes, including the tourism industry, local and State Government, natural resource management bodies and Indigenous groups. Today, it is difficult to identify any tropical forest region of the world that has such an in-depth knowledge and strong management base.

Throughout 2005/2006 all of our research projects have been winding up with a strong emphasis on the writing of publications, including research papers and technical reports. This has progressed well, in large part due to additional interim funding provided by the new Marine and Tropical Science Research Facility (MTSRF) through the Commonwealth Department of the Environment and Heritage (DEH). We would like to take the opportunity to acknowledge the support of the Commonwealth Government and thank staff of the DEH for their assistance.

We would also like to wish success to two new ventures that have in part stemmed from the Rainforest CRC and which we hope will fill the role that the Centre leaves. The first is the Tropical Landscapes Joint Venture – a research partnership between James Cook University and the CSIRO that is likely to develop and include other key players such as FNQ NRM Ltd. We congratulate Professor Steve Turton, former Deputy Chief Executive Officer of the Rainforest CRC, on his Professorial appointment and in becoming the inaugural Director. This joint venture will be located in the new Australian Tropical Forest Institute (ATFI), currently under construction on the Cairns campus of James Cook University. The funding for this new building has come from the Queensland Government's Smart State Fund and was the result of a funding application led by the Rainforest CRC. Since the success of that application there has been agreement between the CSIRO, Queensland Environmental Protection Agency and James Cook University to re-invest in and relocate the CSIRO Herbarium, with some additional funds, into ATFI. These new ventures will go a long way to ensuring that there is a strong continuation of the research and education legacy of the Rainforest CRC.

The second venture is the development of the MTSRF, which officially commenced operations on 1 July 2006. The MTSRF effectively takes over from the CRC Reef (which has also closed) and the Rainforest CRC, with funding from DEH for a four-year period. Its Chief Executive Officer, Dr Russell Reichelt, brings much experience from his similar role with CRC Reef.

Over the last ten or more years we have seen a changing landscape with different drivers and emerging stakeholders. Initial concerns that drove the first phase of the Rainforest CRC included understanding the biodiversity and ecosystem dynamics of the region, and preventing the emerging tourism industry from damaging the 'pristine' World Heritage Area. Since then, the negative and positive impacts of tourism have been better understood and management systems are now in place to monitor these. Weeds and feral animals continue to threaten the region, but in the last few years, most have come to recognise that climate change and global warming probably pose the greatest threat. In its final term, the Rainforest CRC built new partnerships with local and State Government and with the new natural resource management body. It also worked closely with the Indigenous community. These collaborations have resulted in many successes and these are highlighted elsewhere in this report.

The contribution that the research and training of the Rainforest CRC has made towards Australia's national research priorities is addressed more fully in the next section, our Exit Report. However, it would be fair to say that no other place in the tropical world has a greater research base for the management, conservation and sustainable use of its tropical forest landscapes. Quite simply, the research that the Rainforest CRC has completed is world class, evidenced by the high standard of both our technical reports and the high status of journals that are publishing our researchers' work. One publication that has yet to appear but should be mentioned is the book *Living in a Dynamic Tropical Forest Landscape*, which will summarise much of the findings of the Rainforest CRC research programs in a single volume, to be published in 2007 by Blackwell Publishing.

We wish to thank all of the Directors of the Rainforest CRC for their support and diligence in providing strategic direction. We would also like to pay tribute to former Directors of the Rainforest CRC and, in particular, to the inaugural Chair, Professor Ralph Slatyer. The Centre also received strong guidance from the Centre Visitor, Professor Henry Nix.

We acknowledge the advice provided by many international reviewers who took part in the numerous reviews of the Centre as part of its agreement with the Commonwealth. In this respect, we would like to thank staff of the Commonwealth Department of Education, Science and Training for their professionalism and support.

We wish to thank all of the Program and Project Leaders and other researchers who have driven our research agenda so strongly. We are proud of the two hundred postgraduate students who have been part of the Rainforest CRC. Finally, we thank our Headquarters staff for their endeavours in making the Rainforest CRC run smoothly, and in delivering successful communication outcomes.

Sir Sydney Schubert, Chair

Professor Nigel Stork, Chief Executive Officer

2. EXIT REPORT

In 1999, the Minister for Education, Science and Training announced that the Rainforest CRC was successful in seeking a second term of funding, and it is important to understand the background as to why the CRC Committee saw the refunding of the Centre as being so important. In the previous year, the Fifth Year Review panel had made the following comment:

"The Cooperative Research Centre for Tropical Rainforest Ecology and Management (CRC-TREM) was funded to establish world class research in rainforest ecology and in the transfer of research outcomes to users of research in conservation and management. In five years it has made remarkable progress towards achieving these objectives and has become one of the top three institutions of its kind in the world."

Although great progress had been made in meeting the research needs and aspirations of the region's stakeholders, much research was still needed for these to be fully realised. The new CRC had grown from its first phase structure of just five partners, with the Wet Tropics Management Authority identified as the key industry stakeholder, to now include stakeholders representing the tourism industry, State and local government, and conservation. The new Business Plan of 1999 reflected the various aspirations of the new stakeholders, and in the last seven years, the Rainforest CRC has gone a long way to meet these aspirations. This section summarises these achievements and the legacy of the Rainforest CRC.

2.1 ACHIEVEMENTS DURING THE FUNDING PERIOD

Biodiversity and Climate Change

The first phase of the Rainforest CRC saw a rapid increase in our knowledge of the distribution of biodiversity within Australia's Wet Tropics, with key studies undertaken on vertebrate distributions, montane faunas and the genetics of these populations. At the same time, modelling of the factors that result in the current distribution of different forest types was used to predict previous distributions of these forest types under different past and future climate scenarios. This work has taken a quantum leap forward in the last seven years with new predictions of how such vegetation communities and the distribution of vertebrates may change with increased temperature and changes in rainfall. The datasets developed are far ahead of anything else in the tropical world and have been used by the National Center for Ecological Analysis and Synthesis to test a variety of climate models. Further research is also showing that some arboreal mammal species are physiologically constrained and are affected by rising temperatures. This outstanding research by the Rainforest CRC is playing a critical role in the national and global debate on the impacts of climate change on tropical forests and their biota. (D. Hilbert, S. Williams, A. Krockenberger).

Tropical Forest Canopies

The Rainforest CRC has played a critical role in understanding the role of tropical forest canopies as an important interface between the biosphere and atmosphere. Three of the Centre's researchers contributed to a seminal article in *Science* (2003), which drew attention to the critical role that forest canopies play in so many aspects of forest and atmospheric sciences. The Centre has managed the Australian Canopy Crane, a unique national research facility providing access to the forest canopy and a platform for carbon, heat and water flux measurements. The canopy crane research site is recognised as a National *Long-Term Ecological Research Site*, one of only five in Australia. Research outputs from projects based at the crane site, published in high ranking journals, highlights aspects of flowering and fruiting phenology, pollination, forest microclimate, insect seasonality, inter-year variation in carbon sequestration and forest water use, and the tritophic interactions between ants, other insects and plants. Research has demonstrated the vulnerability of fragmented forest systems to long-term disturbance of reproductive processes, essential for the long-term success of remnant forest. As a direct result of their work, researchers have produced a land manager's guide to assist us to understand and monitor the reproductive ecology of individual tree species, enabling land managers to plan for the long-term reproductive viability of fragmented forests. (R. Kitching, S. Boulter, N. Stork, M. Liddell, S. Turton).

Landscape Restoration

Written by two of the Centre's researchers, a recent article in *Science* (2006) noted a global crisis in tropical landscape restoration:

"The current scale of deforestation in tropical regions and the large areas of degraded lands now present underscore the urgent need for interventions to restore biodiversity, ecological functioning and the supply of goods and ecological services previously used by poor rural communities. Traditional timber plantations have supplied some goods but have made only minor contributions to fulfilling most of these other objectives. New approaches to reforestation are now emerging, involving multi-species plantations and more strategic planting locations that offer the possibility of overcoming forest degradation and addressing rural poverty."

This area of research has been a major strength of the Rainforest CRC, particularly as many regions and countries are seeking a wide range of benefits from tree plantings. Notable aspects include the design of plantations for multiple uses and analysis of biodiversity and other benefits of different tree plantings. Another key element is the socio-economic aspects of farm-forestry. These studies are having a major impact within Australia and particularly in some of our near neighbours such as Vietnam and the Philippines. (C. Catterall, J. Kanowski, D. Lamb, P. Erskine, J. Herbohn, S. Harrison, G. Wardell-Johnson).

Managing and Monitoring Visitors

A separate project focused on the effects of visitation and use on Wet Tropics World Heritage Area recreation and tourism sites, as well as the impact the Area has on the daily life of the community. Research findings highlighted the importance of the World Heritage landscape in the lives of community residents and for visitors. Not only is the landscape providing the physical backdrop and 'view from the window' of many residents, it is integral to their quality of life and environment. Unlike the one-off tourist experience associated with visiting a distant National Park or World Heritage Area, the Wet Tropics World Heritage Area is an everyday, well-known extension of local residents' backyards or neighbourhood parks. The impacts of visitation and use of an icon World Heritage site on an Aboriginal community are substantial and largely diverse including loss of privacy, cultural and community disrespect, loss of individual and community control, and loss of amenity value and economic benefit. (J. Bentrupperbaumer, J. Reser).

Understanding Forest Processes

Research in this area demonstrated that upland forests obtain up to thirty percent of the water they use directly from clouds. 'Cloud stripping' is therefore an important part of the hydrological equation for our highly seasonal tropical forests. As the cloud base rises due to global warming, we can expect to see reduced water availability. This research has wide applicability to other tropical forests around the world. (D. McJannet, P. Reddell).

Frugivory and seed dispersal are vital forest processes that ensure the regeneration of tropical forests. Rainforest CRC researchers have revolutionised modelling of the impact of frugivory and vertebrate dispersal of seeds through intensive field studies. These models are now being used to examine the spread of invasive species of plants by animals such as the cassowary and feral pigs, and to examine how the loss of some key vertebrate species may change plant community composition. Little was previously known about a key frugivorous species, the Spectacled Flying Fox, and through this research we now have a better understanding of their numbers, movements and habitat requirements. (D. Westcott, A. Dennis, L. Shilton, M. Setter, J. Mitchell).

Remote Sensing

The Rainforest CRC has successfully developed techniques for mapping changes to tropical forest structure on a monthly basis, over the entire Wet Tropics, using freely available satellite image data sets. These techniques can be used by Wet Tropics management agencies, as well as other agencies working in the wet-dry tropics, to produce baseline maps and monitor change in environmental parameters recognised as *State of the Wet Tropics* environmental indicators. Other remote sensing and GIS studies have shown a net increase in some rainforests due to changes in farming practices reducing fire incidences. There has also been significant lateral migration of riparian forest cover due to river channel changes. A novel technique for measuring canopy connectivity across roads in the Wet Tropics has been developed and tested on the Kuranda Range road, potentially showing where tree planting can improve connectivity. (S. Phinn, A. Held, D. Gillieson, L. Searle).

Natural Resource Management and Planning

In the last six years, the management and funding for natural resource management across Australia has radically altered, with increased local responsibility now being placed on new 'catchment bodies'. The Rainforest CRC has played a critical role in planning and natural resource management by helping to establish a new regional body, FNQ NRM Ltd, and in helping to drive its operational framework, management plan and investment strategy. Many aspects of the approaches taken have been mirrored by other regional bodies, particularly with respect to water quality and run-off issues and Indigenous engagement. (G. McDonald, N. Weston, R. Hill).

Indigenous Interests and Engagement

A particularly new and exciting part of the Rainforest CRC has been our involvement with the Indigenous community, resulting in many research advances, most notably the delivery of an Aboriginal Cultural and Natural Resource Management Plan for the Wet Tropics. More importantly, this has resulted in a new partnership between Indigenous people and researchers, which is leading to increased engagement in research and management of natural and cultural resources. (S. Pannell, L. Larsen, G. McDonald).

Conservation Prioritisation

The conservation prioritisation group is internationally renowned for its theoretical and practical conservation research and has made many advances during the past seven years. This has facilitated the testing or development of a new generation of conservation planning tools and principles. New tools for modelling biodiversity and incorporating continuous forms of surrogates into conservation planning tools have been developed – GDM and ED – and await final testing in application case studies. Much of this is being put to practical use not only in Australia but elsewhere in Melanesia and Africa, particularly in partnerships with Conservation International and other organisations. (C. Margules, K. Williams).

Linear Infrastructure

The Rainforest CRC has become internationally renowned for its research evaluating impacts of linear infrastructure (roads, powerlines and walking tracks) in rainforests and how to reduce those impacts. The award winning Manual for Best Practice in Road Design in Tropical Forests, first written in the initial phase of the CRC, has been significantly revised with many amendments resulting from the field experiments and suggested changes in infrastructure design or other environmental improvements. (M. Goosem, S. Turton, D. Gillieson, R. Wilson, G. Chester).

Supplementary Funding: Catchment to Reef

The three-year Catchment to Reef program bridging run-off issues from catchments to the inner reef has taken a multi-pronged approach, including the development of simple methods that can be used by landholders to obtain an immediate estimate of loss of nutrients and sediments from their fields. Research shows the utility of biological indicators as measures of in-stream ecosystem health in the Wet Tropics, including measures of aquatic plant, invertebrate and fish diversity and community composition, as well as the distribution and abundance of alien species. Passive samplers at near-shore reef sites along the Wet Tropics coast have detected a number of agricultural herbicides (e.g. diuron, atrazine) in coastal waters of the Great Barrier Reef. Research is providing an improved capacity to process remotely sensed imagery from the Great Barrier Reef region to remove confounding effects and to better understand the limits on accurate interpretation these data. Substantial progress has been made towards providing a catalogue of genetic, physiological and ecological measures of changes in corals, biofilms and seagrasses in response to changing water quality. (R. Pearson, A. Arthington, J. Brodie, N. Connolly, B. Butler, K. Fabricius, M. Furnas)

2.2 IMPACTS OF RAINFOREST CRC RESEARCH

The research undertaken by the Rainforest CRC in the last seven years has had various tangible and intangible impacts. At the time of the creation of the Wet Tropics World Heritage Area, views of various components of the community were highly polarised either for or against World Heritage listing. Our research has helped to change these views with a high proportion of the community now aware and supportive of the World Heritage Area and the values for which it is protected.

Our research has had a major influence on the production of several major policy documents by the Wet Tropics Management Authority (WTMA), including their Research Strategy, Conservation Strategy, Nature Based Tourism Strategy and Walking Strategy. However, our impact is far more pervasive than this, with research affecting a range of other policy documents that are less visible. Particularly important in this respect is the new directions for research that WTMA is seeking for the future with the Marine and Tropical Science Research Facility. Similarly, Rainforest CRC research has impacted directly on the policies and on-ground activities of several State Government Departments, most notably the Environmental Protection Agency / Queensland Parks and Wildlife Service, Department of Primary Industries and Fisheries, Department of Main Roads and Department of Natural Resources, Mines and Water.

Protection of the Great Barrier Reef is a high priority for governments, and research supported by a Supplementary Grant from the Commonwealth Department of Education, Science and Training has helped to address issues concerning run-off from grazing and agricultural lands, monitoring run-off waters and in-shore reefs, looking at indicators of water health and where best returns in terms of water quality will be achieved through restoration work. There has been a large communication effort in this area, in large part with key partners such as the Great Barrier Reef Marine Park Authority.

Much of the research of the Rainforest CRC has had a much wider national and international impact, particularly highly innovative research on climate change and biodiversity, reforestation, forest canopies, natural resource management and planning, Indigenous engagement, seed dispersal modelling, linear infrastructure impacts and tropical freshwater studies.

At the community level, weeds and feral animals are ever-present problems and our research has helped to identify the scale of these problems and potential solutions, and has built strong relationships with cognate CRCs

dealing with invasive organisms. The Rainforest CRC has had very positive outcomes for cassowaries and other endangered species, control of feral pigs and deer, pond apple and other weeds, and amphibian diseases.

The Rainforest CRC has had a major impact on natural resource management and planning through its support of FNQ NRM Ltd, the natural resource management body for the Wet Tropics. A number of innovations that were developed for this new body, such as realistic water quality targets and a separate Indigenous natural resource management process have since been lauded by others.

2.3 LONG-TERM BENEFITS TO AUSTRALIA

There is no doubt that the longer-term benefits of our research and other activities will far outweigh the immediate benefits. The communication effort by the CRC Headquarters has been heavily loaded in its final years, with nearly thirty research reports, conference and workshop proceedings and best practice manuals published in just the last two years alone. These reports will take time to make an impact, particularly the best practice manuals. Scientifically, the Rainforest CRC has been exceptionally successful with over one thousand published papers and a sharp increase in high citation journals in the last three to four years.

Our most important legacy is the human resource, particularly of researchers in North Queensland. Many researchers have been able to develop their careers in tropical forest science with long-term support from the Rainforest CRC. With over two hundred postgraduate student completions, the Rainforest CRC must rank as one of the most successful postgraduate training CRCs in Australia. Many of these students have taken up positions as researchers or in industries associated with tropical forest landscapes. Maintaining this human and infrastructure capital has been assisted by the Queensland Government's investment in the new Australian Tropical Forest Institute (ATFI), to be located on the Cairns campus of James Cook University. During the planning phase for this second stage of the Rainforest CRC, the need was identified for a facility that might help bring researchers from different organisations together. It was the CRC that put the ATFI proposal together and funded its pre-development. We hope that it will grow and prosper.

3. CENTRE GOVERNANCE, STRUCTURE AND MANAGEMENT

The Cooperative Research Centre for Tropical Rainforest Ecology and Management (Rainforest CRC) is a research and education partnership, bringing together a range of experts in an exciting research portfolio.

3.1 THE COOPERATIVE PARTNERSHIP

Our partnership involves an outstanding multi-disciplinary team with expertise in the areas of conservation, research, land management, training and education.

The Rainforest CRC has twelve core partners:

- James Cook University
- The University of Queensland
- Wet Tropics Management Authority
- Queensland Tourism Industry Council
- Griffith University
- Alliance for Sustainable Tourism
- CSIRO Tropical Forest Research Centre
- Aboriginal and Torres Strait Islander Services
- The State of Queensland, participating as: Environmental Protection Agency, Queensland Parks and Wildlife Service, Department of Natural Resources and Mines and Department of Primary Industries and Fisheries.

3.2 ORGANISATIONAL CHART

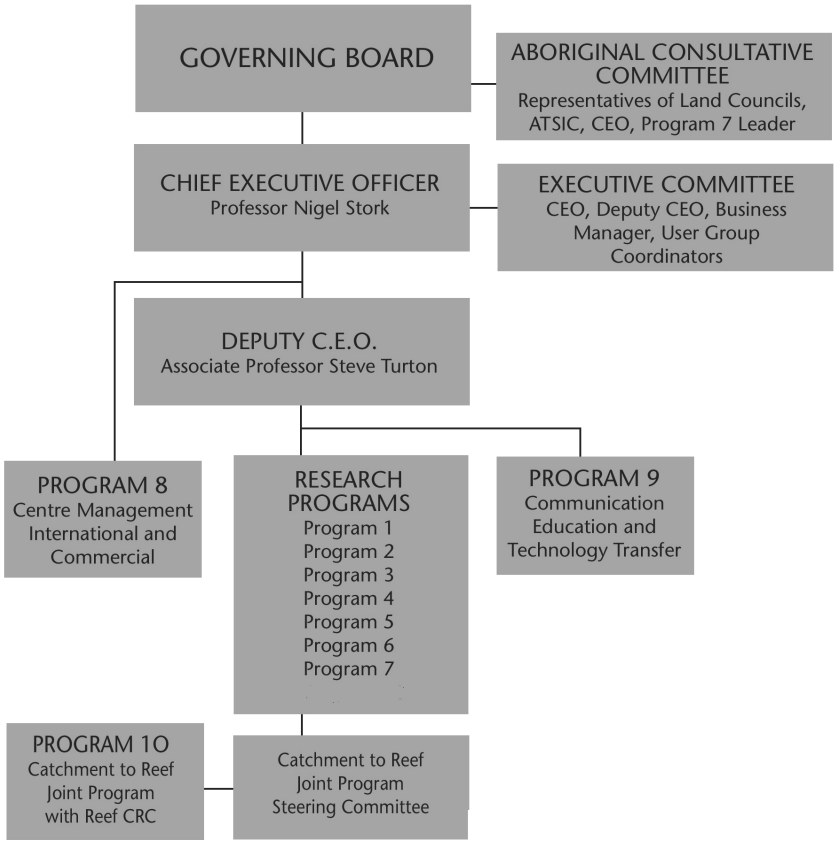

Figure 1: Organisational chart of the Rainforest CRC.

3.3 GOVERNING BOARD

The Governing Board of the Rainforest CRC comprises fourteen members, including an independent Chair, senior representatives from the Centre's core partners and key research user representatives, all of whom have experience in corporate governance or have commercial experience.

The Board governs all aspects of the Centre's operations including monitoring performance in relation to research needs; considering and if appropriate approving arrangements for Intellectual Property, Programs and Annual Budget; reporting to the Parties and the Commonwealth; and approving policy on all matters relating to the main Objectives and Mission.

The Board met in September and November 2005, and in February and June 2006. All meetings were held in Cairns, except for the February 2006 meeting, which was convened via teleconference.

Table 1: Members of the Governing Board and meeting attendance throughout 2005/2006.

Governing Board Member	Position	Attendance	Member Since
Sir Sydney Schubert	Independent Chair	4:4	2001
Professor Nigel Stork	Chief Executive Officer, Rainforest CRC	4:4	1995
Professor Norman Palmer[1]	Pro Vice-Chancellor (Research and International), James Cook University	4:4	1997
Professor David Siddle[2]	Deputy Vice-Chancellor (Research), The University of Queensland	4:4	2001
Dr Vicki Pattemore	Director, Office for Research, Griffith University	3:4	2003
Mr John Mullins	Director, Strategic Scientific Initiatives, Department of Natural Resources, Mines and Water	4:4	1999
Dr John Neldner	Senior Principal Botanist, Queensland Environmental Protection Agency	4:4	2004
Dr Brian Keating	Deputy Chief, CSIRO Sustainable Ecosystems	4:4	2003
Ms Josh Gibson	Acting Executive Director, Wet Tropics Management Authority	3:4	2004
Mr Daniel Gschwind	Chief Executive Officer, Queensland Tourism Industry Council	4:4	1999
Mr Phil Rist[3] **(to Feb 2006)**	Chief Executive Officer, Girrigun Aboriginal Corporation	1:3	2003
Ms Allison Halliday (from Feb 2006)	Aboriginal Rainforest Council	1:1	2006
Councillor Anne Portess	Mayor, Herberton Shire Council	0:4	2003
Mr John Courtenay	Member, Alliance for Sustainable Tourism	3:4	2003
Dr David Butcher	Chief Executive Officer, Greening Australia (New South Wales)	3:4	1996

[1] Professor Steve Turton attended in place of Professor Palmer in November 2005.
[2] Associate Professor John Mott attended in place of Professor Siddle in November 2005 and February 2006.
[3] Ms Allison Halliday attended in place of Mr Rist in February 2006.

3.4 EXECUTIVE COMMITTEE

The Executive Committee of the Rainforest CRC comprises the Chief Executive Officer, Deputy Chief Executive Officer, Business Manager, prior Deputy Chief Executive Officer (Research), two User Group Coordinators and Rainforest CRC Program Leaders.

The Executive Committee plays a consultative role to the Chief Executive Officer in the management of the Centre, and advises and assists with development of new research proposals, strategic and operational plans; formulation of budgets for Activities; development of policies; monitoring the progress of Programs and Projects; identifying staff and postgraduate student requirements and overall management of the Centre as the Governing Board may determine from time to time.

One meeting was held for the 2005/2006 reporting period (August 2005).

Table 2: Members of the Executive Committee and meeting attendance throughout 2005/2006.

Committee Member	Position	Attendance
Professor Nigel Stork (Chair)	Chief Executive Officer Rainforest CRC	1:1
Professor Steve Turton	Deputy Chief Executive Officer Rainforest CRC	1:1
Mr David Knobel	Business Manager Rainforest CRC	1:1
Dr Chris Margules	Program Leader, Tropical Landscapes CSIRO Sustainable Ecosystems	0:1
Mr Max Chappell	User Group Coordinator Wet Tropics Management Authority	1:1
Mr Andrew Solomon	User Group Coordinator Queensland Department of Natural Resources, Mines and Water	1:1
Professor Geoff McDonald	Leader Rainforest CRC Program 1	0:1
Dr David Hilbert	Leader Rainforest CRC Program 2	0:1
Professor Roger Kitching	Leader Rainforest CRC Program 3	0:1
Professor David Gillieson	Leader Rainforest CRC Program 4	1:1
Assoc. Professor Carla Catterall[1]	Leader Rainforest CRC Program 5	1:1
Dr David Westcott	Leader Rainforest CRC Program 6	1:1
Dr Sandra Pannell	Leader Rainforest CRC Program 7	1:1
Professor Richard Pearson[1]	Leader Rainforest CRC Program 10 (Catchment to Reef Joint Program with CRC Reef	0:1

[1] Dr John Kanowski attended in place of Associate Professor Catterall in August 2005.

3.5 RAINFOREST ABORIGINAL CONSULTATIVE COMMITTEE

The Rainforest Aboriginal Consultative Committee provides the Chief Executive Officer and Governing Board with advice concerning Indigenous issues and interests that relate to the activities of the Rainforest CRC.

The Committee provides advice concerning strategic directions in Program planning; Aboriginal interests, participation and collaboration across all research programs; and new and existing initiatives and proposals that are relevant to or impact on Aboriginal peoples.

No meetings of the Committee were convened during 2005/2006.

Table 3: Members of the Rainforest Aboriginal Consultative Committee.

Committee Membership	Position
Mr Phil Rist (Chair)	Chief Executive Officer Girringun Aboriginal Corporation
Mr Paul Durante	Project Coordinator North Queensland Land Council
Mr Graham Woibo	Cape York Land Council
Mrs Mary O'Shane	Aboriginal and Torres Strait Islander Commission
Mr Chris Roberts	Balkanu Cape York Development Corporation
Ms Frances Claffey	Central Queensland Land Council
Ms Allison Halliday	Aboriginal Rainforest Council
Ms Michelle Corcoran	Aboriginal Rainforest Council
Mr Russell Butler	Aboriginal Rainforest Council
Dr Sandra Pannell	Leader, Rainforest CRC Program 7 Aboriginal Research Facilitator
Professor Nigel Stork	Chief Executive Officer Rainforest CRC

3.6 ADMINISTRATIVE STAFF

Table 4: Rainforest CRC Headquarters staff and their positions.

Headquarters Staff	Position
Professor Nigel Stork	Chief Executive Officer
Professor Steve Turton	Deputy Chief Executive Officer (to October 2005)
Mr David Knobel	Business Manager
Ms Trish O'Reilly	Office Manager
Ms Shannon Hogan	Communications Officer (to December 2005) Communications Manager (from December 2005)
Ms Birgit Kuehn	Publications Officer
Mr Greg Kealy	Technical Officer (quarter time)
Dr Sandra Pannell	Leader, Program 7
Ms Annette Bryan	Project Officer (from August 2005)

4. MAJOR DEVELOPMENTS

4.1 AUSTRALIAN TROPICAL FOREST INSTITUTE

One of the strategic goals of the Rainforest CRC was to establish an entity that would co-locate researchers and other organisations with a range of tropical forest interests into one building to enhance collaboration. As a result, an application from the Rainforest CRC was successful in attracting funding from the Queensland Government's Smart State Research Facilities Fund in 2002 to develop the Australian Tropical Forest Institute (ATFI) on the Cairns campus of James Cook University (JCU). The new ATFI building will be completed in late 2006 / early 2007. The scope and focus of ATFI has grown significantly since receipt of the initial funding. Key additional elements include additional State Government support for agro-industry research, a new joint venture between JCU, the CSIRO and other organisations, and the relocation of the CSIRO Tropical Forest Herbarium to the Centre. These are discussed further below.

The main purpose of ATFI will be to encapsulate the potential offered by the region by creating a world-leading centre of 'tropical landscapes' research, knowledge brokering and management, through co-location, collaboration and regional partnerships. The objectives of ATFI reflect its unique role as a 'hub' of relevant research and development and its commercialisation opportunities (e.g. bio-industries) for the benefit of communities in the region. A core activity of ATFI (through such joint ventures) will be to attract funding and management research in the 'tropical landscapes' sector to generate relevant intellectual property. The ATFI will further support its core functions and objectives through forging relevant linkages (international, national and local), drawing top-calibre researchers and organisations and sharing benefits with the community.

Herbarium collections currently housed at CSIRO Atherton (part of the Australian National Herbarium, jointly owned and managed by CSIRO Plant Industry and the Commonwealth Department of the Environment and Heritage), the Queensland Environmental Protection Agency (EPA) at nearby Mareeba and James Cook University in Cairns, would come together in a single collection to be housed in ATFI. The resulting herbarium collection will provide a single location for tropical rainforest users, including the CSIRO and university researchers. In addition, the Queensland Government will transfer its four staff from the Herbarium currently at Mareeba to Cairns to help curate the combined Atherton and Mareeba collections.

The resulting $12.5 million Australian Tropical Herbarium Joint Venture will be a tenant in the new ATFI building and will be a separate entity within the ATFI. As a joint venture between the CSIRO, JCU and the EPA, the Herbarium will involve around ten personnel, who will manage a tropical plant collection, undertake biological research and support external uses such as species identifications. All three parties have now signed the Australian Tropical Herbarium Joint Venture involving the Commonwealth Department of Education, Science and Training, the EPA, JCU and the CSIRO. This joint venture is an excellent example of State and Commonwealth agencies working together to invigorate science capability in regional and tropical Australia.

The Tropical Landscapes Joint Venture (TLJV) is an unincorporated joint venture between JCU and the CSIRO, as a vehicle for developing a collaborative program of research to underpin the sustainable management of tropical landscapes, including the Wet Tropics World Heritage Area. The venture is being undertaken as one of several research initiatives within the ATFI, which aims to become a centre of excellence for tropical science and knowledge brokering through co-location, collaboration and regional partnerships.

4.2 MARINE AND TROPICAL SCIENCE RESEARCH FACILITY

Throughout the lifespan of the Rainforest CRC, the need to protect our public environmental assets has been well understood and research efforts have typically focused on providing appropriate information to facilitate conservation of the Wet Tropics World Heritage Area in North Queensland.

With the wind-up of the Rainforest CRC, the Australian Government has supported a new $40 million initiative, the Marine and Tropical Science Research Facility (MTSRF), to build upon the work conducted to date. Located in Cairns and Townsville and commencing July 2006 for four years, the MTSRF represents an exciting, world first opportunity to comprehensively address issues of concern for the sustainable use, management and protection of the Great Barrier Reef (GBR) and its catchments, tropical rainforests including the Wet Tropics World Heritage Area (WTWHA), and the Torres Strait, through the generation and transfer of world-class research and sharing knowledge.

Through MTSRF a range of research projects will be undertaken, targeted for public benefit and towards delivering useful products that support the health of these environmental assets. The research to be conducted through the Facility will support responsible parties in their endeavours to protect, conserve, sustainably use and manage North Queensland's public environmental assets. To achieve this, the MTSRF will build upon the knowledge base developed through the Rainforest CRC to ensure targeted, focused research is delivered to appropriate end-users and management agencies.

The MTSRF will also enable the continuation of research initiated by the Rainforest CRC investigating and developing an understanding of the influences of climate change on the delicate ecosystems of the Wet Tropics in an effort to improve the management of our impacts and mitigate any negative influences.

To achieve its vision, the MTSRF will plan, fund and coordinate the high quality, cross-disciplinary research for public good to:

- Ensure the protection, conservation, sustainable use and management of environmental assets of the Great Barrier Reef and its catchments, tropical rainforests including the Wet Tropics World Heritage Area and the Torres Strait;
- Foster an understanding of the interactions of North Queensland's natural environment with the social and economic aspects of North Queensland communities;
- Support the adoption of science-based knowledge in ecologically sustainable management policies and practices; and
- Facilitate capacity-building for sustainable environmental management and environmental management research, in partnership with the community, environmental managers, research institutions, industry and policy-makers.

The research to be conducted through the MTSRF will address information needs for the protection and sustainable use of our key environmental assets under the following Research Themes (identified in the MTSRF Research Investment Strategy):

1. Status of the ecosystems: understanding the condition, trend and interdependencies of environmental assets of the North Queensland region; developing methods to support ongoing regular assessment and reporting; and developing methods to identify priorities for action.
2. Risks and threats to the ecosystems: understanding the threats to, and their impacts on the environment and hence the North Queensland region, and developing options to mitigate them.
3. Halting and reversing decline of water quality: understanding the causes and effects of changing water quality and water resource use in North Queensland's coastal catchments; developing options for improving practices, reducing risks and mitigating adverse impacts; and developing ways to measure the effectiveness of regulation, management and other actions to halt and reverse declines. This goal supports the objectives of the Australian and Queensland Government's Reef Water Quality Protection Plan (Reef Plan).
4. Sustainable use and management of natural resources: understanding the current and potential industry and community uses of biodiversity and natural resources with respect to ecological, social and economic sustainability; and providing information and options to assist North Queensland managers, industries and communities to optimise the use of biodiversity resources and minimise adverse impacts of use where they occur.
5. Enhancing delivery: Increasing the relevance and adoption of research in policy development, management applications and use practices; supporting effective data exchange and adoption of data standards; funding the delivery of relevant reports in the public interest; providing system wide overviews through the integration of biophysical studies of the environmental assets of North Queensland and the integration of social and economic research into these; and providing access to data and knowledge for organisations and the public.

The MTSRF brings into close partnership the scientific researchers and the end-users of the scientific results. It will inform the Australian people on the condition and trends in these internationally important environmental assets. It will answer questions being posed by government, industry and the public, and will produce knowledge across a range of disciplines including biological and physical sciences, economics and social science. Rather than allow these results to sit on the shelf, the MTSRF will put a major effort into enhancing the adoption of the results and communicating these to the public.

4.3 TROPICAL CYCLONE *LARRY*

Tropical Cyclone Larry, with maximum wind gusts of around three hundred kilometres per hour, crossed the Queensland coast at Innisfail as a Category 5 storm on the morning of 20 March 2006, causing extensive damage to ecosystems, production systems and human communities across a one hundred kilometre strip of coastal lowlands from Tully to Babinda, through to the Atherton Tablelands and beyond.

Both James Cook University and the CSIRO committed immediate resources to commence a rapid assessment of the ecological impacts of this extreme event, to be followed by ongoing monitoring of ecosystem recovery and the resilience of human communities affected by the cyclone. As a consequence of numerous CRC projects in the region impacted by Larry, we have excellent baseline data for a range of landscape types, including continuous forest, forest remnants, forest plantations and restoration plantings.

Rainforest CRC researchers have teamed up with the JCU/CSIRO Tropical Landscapes Joint Venture, led by Professor Steve Turton, to participate in an integrated research program that will:

- Undertake on-ground rapid assessments of the ecological impacts of the cyclone along its track from coast to hinterland;
- Undertake remotely sensed assessments of the cyclone's impact on the area, utilising aerial surveys and satellite imagery;
- Provide science input to management agencies with respect to immediate and short-term conservation issues that require rapid and ongoing responses, e.g. habitat losses for cassowaries at Mission Beach and tree-kangaroos on the Atherton Tablelands;
- Investigate the socio-economic impacts of the event on land-based production systems, tourism and service industries in the impact area and in the north Queensland region in general; and
- Investigate terrestrial ecosystem and human community resilience (long-term monitoring of recovery of ecosystems and linked human communities). This last activity will involve a working relationship with FNQ NRM Ltd, with the overall aim of developing a more resilient post-Cyclone Larry landscape in the event of any future severe cyclonic events.

Preliminary results are to be published in a theme issue of Austral Ecology in late 2007.

5. RESEARCH

5.1 RESEARCH ACTIVITIES AND ACHIEVEMENTS

Program 1 – Regional Planning and Management
Led by Professor Geoff McDonald, CSIRO Sustainable Ecosystems

Objective: *To apply innovative research to deliver the tools necessary for efficient planning and management at a range of scales, and links to other programs to provide a vital means of translating scientific research to assist the management and planning tasks of landowners, government decision-makers and developers.*

Project 1.1 – Wet Tropics Regional Planning and Management

Led by Professor Geoff McDonald, CSIRO Sustainable Ecosystems

Members of Project 1.1 finalised the Wet Tropics Regional Natural Resource Management (NRM) Plan and accompanying Regional Investment Plan in collaboration with FNQ NRM Ltd (the community-based NRM Board for the Wet Tropics) in 2004/2005. Researchers continued the close partnership with the NRM Board throughout 2005/2006 to facilitate the delivery of science into the regional NRM management planning process. This year saw the appointment of a senior planner, based at FNQ NRM Ltd, to oversee, coordinate and integrate the refinement of aspirational, resource condition and management action targets as set out in the NRM Plan. Focus was placed on the theory and practice of SMART catchment water quality targets, effective implementation through the emergent Reef Water Quality Partnership, and informed oversight of planning targets.

Importantly, the CSIRO and the new Marine and Tropical Science Research Facility recognise the value of the strong partnership between FNQ NRM Ltd, the Rainforest CRC and key stakeholders involved in the NRM process, and will provide increased funding to support the implementation through to 2009.

Project 1.2 – Regional State of the Wet Tropics Satellite-based Monitoring Information System

Led by Associate Professor Stuart Phinn, The University of Queensland

The results of Project 1.2 over the past five years represent a series of techniques that can be used by Wet Tropics management agencies, and other agencies working in the wet-dry tropics, to produce baseline maps and monitor change in environmental parameters that are recognised as *State of Wet Tropics* environmental indicators. In particular, the focus of Project 1.2 moved to vegetation cover at high temporal frequency (weekly-monthly) and vegetation vertical structure (yearly). The techniques have been developed to use both commercial and freely available image data sets within GIS and image processing software packages currently operated by Wet Tropics management agencies at local, State and Federal government levels.

Mapping and monitoring techniques have been developed for use from optical and all-weather active (Radar) imaging systems, covering vegetation cover change, vegetation structure change, fire scars and invasive weeds (Pond apple). These techniques provide the capability to map and monitor the condition of the Wet Tropics environment, i.e. they provide a basis for sustainable management of the region's resources. Workshops have been held in past years to transfer much of this methodology and experience to relevant agencies within the region.

This year, researchers focussed on assessing the error levels associated with image maps of vegetation cover, a major barrier to the use of their approach, as identified by the Program Support Group. An inter-agency workshop was conducted on this topic to ensure all government agencies in Queensland are using similar and best-practice approaches.

Program 2 – Functional Ecology and Global Change
Led by Dr David Hilbert, CSIRO Sustainable Ecosystems

Objective: *To identify and quantify (in biophysical terms) some of the key ecosystem services provided to the community by the north Queensland rainforest, and to develop and apply economic methodologies that can be used to value these services. The aim is to produce a framework within which the impacts on key ecosystem services from changing land use and climate can be evaluated and incorporated into regional planning.*

Project 2.2 – Water Regulation as an Ecosystem Device
Led by Dr David McJannet, CSIRO Land and Water

Catchments in the Wet Tropics region are complex systems involving different land uses and various types of vegetation. Rainforests often comprise a significant proportion of the vegetation cover, particularly in upper parts of catchments. Up until recently, little has been known about the hydrology of different forest types, in comparison to that of cleared or agricultural land. It is important to understand the water processes that occur in Wet Tropics catchments if we are to predict and plan for land use and possible climate changes on the water resources within the region. Comprehensive water balance measurements (e.g. rainfall, cloud interception, canopy interception and transpiration) were made at nine different rainforest sites across the Wet Tropics, resulting in the most extensive dataset available on Australian tropical rainforest hydrology, and one of the most comprehensive rainforest datasets of this type in the world.

Project 2.2 made some significant achievements during 2005/2006, particularly with respect to the publication of results. High quality measurements of tree water use, ground water fluctuations and climatic conditions were made at a number of sites from floodplains to montane rainforests. Favourable weather conditions resulted in the inundation of floodplain forest sites, enabling the collection of unique data sets. Despite major damage to equipment during Tropical Cyclone *Larry* in March 2006, opportunities exist to assess possible changes in local hydrology.

This project has highlighted the importance of matching forest type with local conditions – the ability of forests to act as filters for agricultural runoff, hence reducing pollutant loads to the Great Barrier Reef lagoon, is now being recognised. The project has made considerable contributions towards (a) documenting the 'water services' provided by the region's rainforests, i.e. catchment yield, cloud interception; (b) evaluating the impact of land use and climate change on catchment water yields, i.e. effects of rainfall intensity on canopy interception; (c) identifying possible implications of changes in regional and local hydrology on the long-term survival and conservation prospects for threatened forest types, e.g. cloud forests; and (d) evaluating the ecosystem services that floodplain forests provide in terms of filtering and regulating water quantity and quality.

Project 2.5 – Impacts of Climate Change on Rainforest Ecosystems and Biodiversity

Led by Dr David Hilbert, CSIRO Sustainable Ecosystems and
Dr Steve Williams, James Cook University

Outputs from Project 2.5 have had a substantial effect on the science and policy of climate change impacts on biodiversity. In the last year, researchers further developed a new predictive model, 'LIVES', for the distribution and potential habitats of Wet Tropics species using presence-only data. Focus was placed on comparing the predictions for the Grey-headed Robin from LIVES with BIOCLIM, DOMAIN and GLM under different climate change scenarios, and modelling its population dynamics in relation to temperature and precipitation based on predictive models from GLM. Similarly, comparisons were made between LIVES and BIOCLIM, DOMAIN and GLM using simulated data and bootstrap resampled datasets from the distribution data of the Golden Bowerbird. So far, these comparisons are revealing that these species may be under more threat than initially expected from habitat modelling alone. Project 2.5 also contributed to an international model comparison project to identify the strengths and weaknesses of various habitat-modelling methods, as used in climate change impact studies.

The monitoring and detection of climate change impacts will only be possible through the long-term monitoring of fauna and their environments. Project 2.5 has established a significant baseline data to support such impact assessment, and produced a book that details the current distributions of nearly two hundred vertebrate species within the Wet Tropics region. A number of other publications were completed, including work on predicting population declines in rainforest birds and statistical analyses and methods to detect climate change impacts. Research commenced and remains ongoing on ants, flying insects, leaf-litter invertebrates, net primary productivity and interactions between fire and climate change.

This project has received funding under the new arrangements of the Marine and Tropical Sciences Research Facility, and will remain ongoing for at least the next four years. Key objectives of this project, and progress to date, include:

- Determining the patterns of distribution and abundance in vertebrate and invertebrate communities across altitudinal and latitudinal gradients and to monitor these communities at long-term monitoring sites: Two permanent monitoring altitudinal transects were established on Mount Lewis and on the Atherton Tablelands and monitoring is in place. Two additional sites are being established to extend the latitudinal scope of this project.
- Producing accurate, robust models explaining spatial patterns of distribution and abundance of rainforest vertebrates and many species of invertebrates. The production of an atlas of the distributions and abundance of nearly two hundred Wet Tropics vertebrates, published by the Rainforest CRC in 2006, encompasses the first such outcomes of this project.
- Predicting the spatial extent and severity of global warming on individual species using predictive models. Predictions have been generated for many species and have shown that with an increase of just 1°C, we may lose a significant number of species from the Wet Tropics, and many species will lose more than fifty percent of their core habitat. Researchers have identified the twenty most vulnerable species to such an increase in global temperature. Further modelling has shown that thirty species of endemic vertebrate will be driven to extinction with an average increase of 3.5°C. Core refugial areas of the Wet Tropics, where rainforests will be most and least stressed by increasing global temperatures, have been identified and recommendations have been taken up by the Wet Tropics Management Authority, the Commonwealth and Queensland Governments and international bodies including the Intergovernmental Panel on Climate Change (IPCC), the IUCN and WWF.

Dr Steve Williams was successful in obtaining James Cook University Research Advancement Program funding to establish the Centre for Tropical Biodiversity and Climate Change based at James Cook University for studying climate change impacts on biodiversity. He was also awarded a Queensland Smart State Senior Fellowship for the next three years. Dr David Hilbert was invited to give the keynote address at the IUFRO Conference held in Cairns in August 2005.

The outputs of Project 2.5 have implications for the whole natural resource and ecosystem function of the Wet Tropics bioregion, and have been instrumental in placing climate change on the agenda of every management agency and environmental organisation in the region.

Program 3 – Canopy Processes and Dynamics
Led by Professor Roger Kitching, Griffith University

Objective: *To study the response of pollination systems to fragmentation within Wet Tropics rainforests using the Australian Canopy Crane Research Facility. Program 3 also studies the steady state of carbon, heat and water fluxes within a pristine rainforest using instrumental techniques and evaluates the diurnal and annual variations of these fluxes in response to changing climatic conditions.*

Project 3.1 – Floral Biology and Canopy Pollination in Fragmented Forests
Led by Professor Roger Kitching, Griffith University

Project 3.1 researchers have profiled the invertebrate visitors to some twelve species of canopy tree, vine and palm and studied in detail the pollination of a subset of species. Using this baseline information, they looked at the long-term viability of individual species by looking at the transport of pollen between individual trees. In order to do this, DNA material was collected from all individuals of two canopy tree species (*Syzygium sayeri* and *S. gustavioides*) found within five hundred metres' radius around the Australian Canopy Crane. A microsatellite library consisting of six loci from the species *S. sayeri* has been developed. By profiling the genetic variation of all individual potential paternal trees, the team have screened the fruit collected from the focal trees on the crane plot to determine the parent trees, and therefore the distance that pollen has been transported. Results for *S. sayeri* indicate that long-distance pollen transport is important for species reproduction.

The use of genetic techniques has given considerable insight into the true nature of pollen dispersal and the long-term success of individual trees and species in disturbed or fragmented systems. The method is, however still costly and variable in success (e.g. a microsatellite library could not be established for *S. gustavioides*).

Using an alternative approach to assessing the reproductive success of individual tree species in fragmented forests, Project 3.1 researchers sampled flower visitors to individuals of *Syzygium sayeri* and *Normanbya normanbyi* in forest fragments and adjoining continuous forest at four locations. The insect samples have been sorted to Order and are demonstrating the impact of fragmentation on flower visitors and the likely reproductive success of these plants. The result of this study showed that different insect assemblages visit flowers of isolated trees, or of those in fragmented forests, compared to flowers located within continuous forest.

Project 3.1 has demonstrated the vulnerability of fragmented forest systems to the long-term disturbance of reproductive processes essential for the long-term success of remnant forest. As a direct result of their work, researchers have produced a land manager's guide to assist in understanding and monitoring the reproductive

ecology of individual species. This will assist land managers to better understand and plan for the long-term reproductive viability of fragmented forests.

Project 3.2 – Net Ecosystem Exchange of Carbon, Heat and Water in a Tropical Rainforest

Led by Dr Michael Liddell, James Cook University

An ongoing research project since March 2001, the study of carbon, heat and water fluxes above and below the rainforest canopy has been the central task of Project 3.2 in order to advance the knowledge of these key indicators of ecosystem productivity.

In March 2006, the first five years' worth of flux data collection at the Australian Canopy Crane research facility at Cape Tribulation was completed. In contrast to large gaps in the data experienced in the early years of the project, 2005 provided a solid year of data collection.

Software development continued with the advancement of post-processing quality control code using Metlab, allowing the first set of reliable data to be generated for presentation at the international conference on climate effects on ecosystems, the 1st iLEAPS Science Conference held in Boulder, Colorado in January 2006.

Project 3.2 has contributed to our overall understanding of the effects of climate change on the sensitive rainforest ecosystems of North Queensland. The response of the rainforest to drought was captured remarkably well by the flux systems, clearly showing that the ecosystem was significantly stressed during a drought period, resulting in major changes in forest productivity. This quantitative measure of ecosystem stress will be useful to underpin both the environmental and economic (tourism) effects that climate change is going to have on rainforests in the region.

Program 4 – Rainforest Access: Managing and Monitoring Impacts
Led by Professor David Gilliesion, James Cook University

Objective: *To investigate the nature and consequences of visitation and usage on Wet Tropics rainforests and adjacent forest communities and to examine impacts on natural and cultural heritage values. Best practice guidelines for land managers, public utilities, the tourism industry and other stakeholders will provide vital information and tools for continued sustainable visitation and usage.*

Project 4.1 – Strategies for Sustainable Rainforest Visitation and Use

Led by Dr Joan Bentrupperbäumer, James Cook University

During its final year of funding, researchers of Project 4.1 focused their efforts on consolidating the extensive databases that were established during the course of the project, and producing a number of publications that address the key aspects of their long-term research into the psychosocial and biophysical impacts and changes arising from visitation and use in the Wet Tropics World Heritage Area.

A particular task this year was the analysis of community and visitor perspectives and experiences of their encounters with the Wet Tropics World Heritage landscape. This provided an overview of the thinking behind, and implementation of, a more psychological, transactional approach to the effects of visitation and use in protected area management, and enabled researchers to ascertain the impacts of visitation and use on local Indigenous communities within the Wet Tropics region. This information is now being published, and will feed into visitation management practices within the Wet Tropics World Heritage Area.

Project 4.1 has considered in detail the psychological, social, environmental and cultural issues associated with the interaction between indigenous and non-indigenous people and the environment. In the context of a World Heritage landscape, an important benefit of Project 4.1 is the provision for the 'people management' requirements of the World Heritage Area mandate to protect, conserve and present the Area and its values. Other important benefits include an understanding of the impacts and impacting processes underlying and mediating the behaviour and experiences of visitors and other users to Wet Tropics sites, through the exploration of the role, use and place meaning of the World Heritage Area in the life of the local community.

The site-level, community and long-distance walking track research conducted in Project 4.1 has produced a considerable database. Analysis and reporting of this information in different formats has provided critical information to various stakeholder groups including the environmental management agencies, tourism industry and Indigenous organisations throughout the Wet Tropics region. The site-level data has also been critical to the establishment of the Wet Tropics visitor monitoring program and is currently used for on-ground management and planning of recreation sites across the World Heritage Area.

Project 4.2 – Sustainable Roads, Powerlines and Walking Tracks

Led by Dr Miriam Goosem, James Cook University and Professor David Gillieson, James Cook University

Researchers of Project 4.2 this year continued work under the strategic alliance with the Queensland Departments of Main Roads. The provision of $400,000 in research funding by the Department in 2004/2005 saw several projects through to completion this year. PhD student Catherine Pohlman completed her assessment of the edge impacts of highways and powerlines on rainforest microclimate and vegetation, in comparison to those of a natural linear feature (a creek). Fragmentation of rainforest habitat through linear clearings, and edge effects on faunal and floral species composition, is a pan-tropical problem. Focussing on understorey microclimate in areas adjacent to linear clearings, in particular the effects of altered sunlight, temperature and humidity regimes on vegetation structure, composition and seedling dynamics, Catherine found that the understorey near the edges of highways and powerlines was brighter, warmer and drier than the forest interior. In contrast, the edges of a natural waterway did not cause elevated moisture stress, but did experience elevated light availability. Catherine has shown that by maintaining natural vegetation in artificial linear clearings, or retaining canopy over a clearing as much as possible, and reducing the amount of disturbance through clearing maintenance, abiotic edge effects can be reduced along with subsequent effects on rainforest vegetation.

Honours graduate, Greg Dawe, continued his research into the impacts of road noise on songbirds. He found that acoustic pollution from human activities, such as vehicular traffic, penetrates tropical rainforests to distances exceeding two hundred metres at both ground and lower-canopy level, with measurements recorded up to fifteen metres above the forest floor. Peak traffic noise levels at the edge of the forest can blanket the calls of some bird species. Some bird species avoid rainforest at the highway edge. Further analysis is required to determine whether traffic noise is the cause of these observations, or whether noise and other stimuli, such as the altered vegetation structure observed in Catherine Pohlman's study, are causing a cumulative effect. Analysis of bird song also suggests that some species may re-pitch their song to avoid traffic noise, which could cause problems for energy budgets and therefore general success of species. Suggestions for the mitigation of noise effects include noise barriers along roadsides and siting of road upgrades to ensure that current quiet areas remain quiet, and that new acoustic refugia be created for sensitive species.

PhD candidate Peter Byrnes continued his study on the impacts of traffic noise on medium-sized, ground-dwelling mammals such as the endemic Musky Rat Kangaroo. Peter's study examines the pressures that roads place on the day-to-day existence of animals in the Wet Tropics World Heritage Area, with particular consideration of alterations in movement patterns of the musky rat kangaroo. Peter's preliminary results demonstrated that with increased road size and traffic volume, the impacts on medium-sized mammal communities increase too, particularly their ability to go about their daily foraging movements, seasonal migration and permanent dispersal. Consequences could include fright-flight responses, avoidance and injury or death through collisions with motor vehicles. Peter's research sites were severely damaged by Tropical Cyclone *Larry* in March 2006, and consequently alternative sites were located and set up for further research.

Another impact of linear infrastructure not previously examined was piloted this year. Dr Robyn Wilson examined the distance that traffic headlights penetrated into the understorey and the distance they were still visible, and therefore potentially disturbing, to a rainforest animal. Headlights were found to penetrate to distances of about fifty metres through the understorey at one to two metres in height in flat areas. Such penetration was reduced, but not completely mitigated, at all heights above ground level by the presence of barriers 1,200mm high, however barriers of 800mm in height, similar to the height of concrete barriers already used along the edges and centre lines of many divided highways, did not reduce headlight penetration. Truck headlights were unaffected by barriers of these heights. Where vehicles travel down a sloping hill, distances over the canopy that may be affected by low beam extend to one hundred metres, and high beam extends to four hundred metres, potentially affecting canopy wildlife. Headlights must be considered a potential disturbance to fauna – head and tail lights can be discerned by human eyes to a distance of seventy to ninety metres within the forest understorey, possibly disturbing nocturnal species that are sensitive to humans and their movements. A second pilot study observed the fauna attracted to a streetlight and whether they were likely to move at vehicle collision height. Results so far suggest that some rainforest animals avoided the bright zone around streetlights when moving near the forest edge, thereby possibly needing to expend more energy for movements. Long chains of streetlights may result in barriers to road crossing for such light-avoiding species.

These observations were backed up by a project undertaken by Nigel Weston and Miriam Goosem, which re-surveyed transects previously used for road mortality analysis between 1989 and 1992. The survey recorded twelve microbats in the past year, similar to the seven, ten and six found in the earlier years. Similar trends in roadkill hotspots were found to the previous data, although two specimens of endangered frog, *Litoria rheocola*, were killed – the first records of road mortality for this species. Overall, roadkill of some rainforest species has increased, while other species are less prevalent in the mortality statistics.

Studies undertaken by Project 4.2 have led to the identification of several easily-assessed indicators to allow the monitoring of linear impacts, all of which are reported in best practice guidelines for planning, designing and managing roads in tropical rainforests, currently being reviewed by the Department of Main Roads.

Project 4.3 – Improving GIS Models of Ecological Impacts Using High Resolution Remote Sensing

Led by Professor David Gillieson, James Cook University

Using high resolution airborne and satellite imagery, Project 4.3 researchers are identifying powerline, road and stream corridors of far northern Queensland where changes in vegetation are taking place. While conventional satellite imagery can map land patches of about 3,000 square metres, researchers are utilising multispectral sensors with resolution of around one metre or less to enable them to map and identify small patches (ten to fifteen square metres) of land covers such as weeds, erosion or riparian vegetation to enhance monitoring of change and better focus on-ground investigation and amelioration.

The primary focus of Project 4.3 this year has been to produce scientific publications based on a range of analytical techniques that were developed to rapidly assess the ecological integrity and biodiversity value of riparian forests using high-resolution satellite imagery and digital aerial photography. The team's research was also presented at several major conferences, and emphasis was placed on developing project proposals that build on the results of Project 4.3, to be undertaken with funding from the Marine and Tropical Sciences Research Facility (MTSRF) in 2006/2007 and beyond.

Work on the rapid assessment of riparian forests in the Mossman area continued, however suffered considerable delays during heavy rainfall between February and April, when most of the field sites were underwater. Aerial photography mosaics were studied in 2004/2005, and this work was extended to 2005/2006 to incorporate high resolution IKONOS and hyperspectral ASTER imagery. It is expected that this work will be finalised during the second half of 2006. The effects of Tropical Cyclone *Larry* on the region's landscape provided several research opportunities to be undertaken in conjunction with the JCU/CSIRO Tropical Landscapes Joint Venture during 2006/2007. Cyclone-related tasks have direct relevance to Project 4.3, as much of the riparian forests in the Innisfail area have been adversely affected, along with powerline corridors in the Palmerston area.

Project 4.4 – An Economic Assessment of Tourism in the Wet Tropics World Heritage Area

Led by Professor Bruce Prideaux, James Cook University

A new project in 2005/2006, the objectives of Project 4.4 are to investigate the economic and financial values of tourism in the Wet Tropics World Heritage Area. The last estimation of the economic value of tourism and recreation within the Wet Tropics was undertaken in 1997. Project 4.4 aims to update and revise this estimate using calculations of visitor numbers and methods not previously available to researchers. New estimates will include a consideration of the flow-on impact, or the effect of linkages of these activities, with other industries to the local, regional and State economies including the direct and, where realistic, indirect or flow-on effects of those activities.

Several discussions and meetings were held in the first half of 2006 involving the Wet Tropics Management Authority, Tourism Tropical North Queensland, the Alliance for Sustainable Tourism, Skyrail (who will also provide a survey location for researchers), the Queensland Environmental Protection Agency (also a survey location) and a number of North Queensland tour operators and/or businesses. These communications remain ongoing while the survey is conducted.

Interviews of tourists were conducted at various locations within the Wet Tropics World Heritage Area and were also undertaken at the Cairns airport. A total of 861 visitors were surveyed during the survey period. Data has been analysed and a final report is now in preparation for publication in late 2006. Data analyses so far show some interesting figures. Two-thirds of the visitors surveyed (66.3%) were visiting Cairns for the first time, and half of the total visitors surveyed were couples. Kuranda is the most popular choice of places to visit, followed by Mossman Gorge, and 34.5% of all visitors surveyed. Nearly half of all respondents said it was important to visit the region's National Parks during their stay, and 82.9% of visitors said they would still visit the rainforests of the Wet Tropics even if they were not designated as a World Heritage Area. Calculation of the economic values of visitation are in progress.

The outcomes of Project 4.4 may enable Wet Tropics stakeholders and management agencies with opportunities to apply for funding to preserve, maintain and manage the World Heritage Area based on the financial value of the natural asset to the regional economy. This is of particular importance, considering much of the region and the associated industries that rely on the World Heritage Area suffered the impacts of Tropical Cyclone *Larry* in March 2006. The information provided by Project 4.4 will assist in developing action plans for the recovery of resources and industries in the cyclone-affected area.

Program 5 – Restoration Ecology and Farm Forestry
Led by Associate Professor Carla Catterall, Griffith University

Objective: *To develop techniques that enhance the biodiversity values at reforested and farm forestry sites. Program 5 aims to provide a sound scientific basis for decision making in reaching sustainable forest cover at catchment and regional levels through a balance of restoration and conservation.*

Project 5.1 – Restoration Techniques

Led by Dr David Lamb, The University of Queensland

Members of Project 5.1 have sought to develop techniques to restore forest communities onto cleared land. Two broad approaches have been followed – one approach has had a strict conservation focus in an attempt to restore biodiversity to former ecosystems; the other has focused on generating both conservation and commercial outcomes through the development of species-rich timber plantations. The research team has provided invaluable knowledge and resources to Australia's commercial timber industry through the development of reforestation methods that are economically suitable for landowners and farm foresters, as well as ecologically suitable for tropical landscapes. More important is the team's contribution to the science that supports the continued conservation of our natural resources and biodiversity.

The project has successfully drawn together and synthesised much of the work it initiated at the commencement of the Rainforest CRC. These reports and syntheses have been published in several books, book chapters and journal papers directed at both Australian restoration practitioners and international scientific audiences. Some postgraduate student projects remain to be completed, however all have completed the data collection phase and will be finalised within the next twelve months. The project has continued its collaboration with colleagues undertaking similar work in northern Vietnam (one of whom is a former CRC postgraduate student), where many of the techniques pioneered by Project 5.1 have been applied. The project has also made significant progress in developing a decision support tool for planning Forest Landscape Restoration.

A large amount of State and Federal Government funding was spent in the community in the 1990s to restore degraded landscapes and foster new plantation systems in north Queensland. It was thought these funds would generate social, economic, environmental and cultural benefits, however much of this money was wasted because too little was known about how to carry out the types of reforestation required. There is now little doubt that many areas that were reforested have failed or were unnecessarily expensive to plant. Project 5.1 has sought to develop the silvicultural methods needed to establish plantations able to achieve such objectives. It has also sought to monitor and document the vast "experiment" represented by the government-funded programs. The project has captured a lot of this information and made it publicly available such that future plantings – whether for social, economic, environmental or cultural reasons – will be more successful.

Project 5.2 – Biodiversity Values and Landscape Context in Reforestation

Led by Associate Professor Carla Catterall, Griffith University

Progress was made this year towards finalising and publishing results in all Project 5.1 subprojects, including the development and application of methods for quantifying the biodiversity values of reforestation; understanding the relative importance to biodiversity of local forest quality and configuration; understanding the role of animal-plant interactions in the management of regeneration dynamics; assessing trade-offs between biodiversity and production values in plantations; and synthesising information about revegetation projects.

Knowledge transfer was a major activity for Project 5.1 in 2005/2006. Researchers actively participated in conferences and seminars, presenting fourteen papers to scientific audiences throughout the year. Links with government and community stakeholders were maintained through participation in several workshops, six presentations at public venues, and collaborative work. The team's greatly improved understanding of processes that affect the development and role of rainforest biodiversity within different forms of vegetation was recorded in several syntheses, currently in press. A toolkit outlining a cost-effective and rapid, but rigorous, method for monitoring revegetation recovery during reforestation was published by the Rainforest CRC, along with a report o the nature and costs of rainforest reforestation activities in Australia. Eleven scientific papers were published, with another thirteen papers either submitted or in press. Three PhD projects are near completion with another project continuing. Project participants convened four symposia on restoration issues at two international conferences and one national conference.

Project 5.2 has made significant advances in understanding and monitoring how reforestation in rainforest landscapes results in improved biodiversity outcomes. It has also provided new knowledge of how ecological processes can be managed to improve biodiversity in regenerating rainforests, and of alternative techniques for restoring biodiversity to degraded landscapes. Provision of this information has both environmental and cultural benefits as it is helping landholders, community groups and conservation agencies to set priorities for biodiversity

restoration, and to monitor the outcomes of their actions. Furthermore, the project has also provided quantitative data on the nature and costs of reforestation projects, and on the trade-offs between investment in production and investment in biodiversity. This has social and economic benefits because it will assist landholders, investors, and regional planners to more efficiently invest their efforts towards planned environmental improvements.

Project 5.3 – Social and Economic Aspects of Reforestation

Led by Dr John Herbohn, The University of Queensland

Researchers of Project 5.3 this year focused much of their efforts on applying a substantial body of their research, undertaken through the Rainforest CRC since 1993, to developing a triple bottom line business case for the expansion of the hoop pine estate on the Atherton Tablelands. Research was supported by a grant from the Sustainable Regions Programme of the Commonwealth Department of Transport and Regional Services (DOTARS), which assists regional communities to address priority issues they themselves have identified. The Atherton Tablelands Sustainable Region was allocated funding of up to $18 million to June 2006. Local governments of the Region sought funding to examine the case for forest industry expansion with the assistance of Project 5.3 participants. A total of $250,000 funding was approved in January 2005 to develop a business plan for expansion of the timber resource on the Tablelands. Managed by the Herberton Shire Council, the project set out to:

- Identify the employment, economic development and environmental impacts of a hoop pine industry;
- Consider options as to the sources, types and levels of financial returns from investment in hoop pine plantations, including the development of a financially viable model that is attractive to investors and landowners;
- Develop a practical model as to industry structure, ownership, infrastructure and demand chain, that meets consumer requirements and market trends; and
- Identify policy settings required to foster a positive industry development environment.

The research and synthesis components of the study were completed in 2005/2006 and the first two milestone reports have been submitted. The final document, the business case, is due to be submitted in December 2006 and will be used by four local Tablelands shires to lobby State and Federal governments for funding to support the hoop pine expansion project.

In conjunction with the hoop pine expansion project, researchers undertook further research into landscape aesthetics associated with the establishment of plantations on the Atherton Tablelands. A survey was undertaken to examine visitors' attitudes to the hoop pine plantations on degraded pastureland on the southern tablelands. In total, 506 respondents were interviewed, of which 285 were classified as tourists and the remainder as local residents. The questionnaire contained a set of pairwise comparisons of distinct landscape scenarios for the tablelands and contingent valuation questions with respect to a hoop pine plantation option. The study revealed that visitors, or tourists, prefer the 'mixed rainforest' option to the hoop pine plantation option, and grazing land with plantation option (see Suh *et al.* 2006 in Chapter 11 List of Selected Papers and Other Publications).

Project 5.3 has now produced its sixth major revision of the Australian Farm Forestry Financial Model. The latest version was developed to incorporate grazing under native forestry systems, a common practice in southern and central Queensland. The model has been used in a variety of research applications by postgraduate and undergraduate students and was provided to several forestry development agencies (regional private forest development committees) in New South Wales, Queensland and Tasmania. These studies have included a series of case studies of existing forestry operations in Australia and Southeast Asia, and analyse prospective financial performance of plantations and farming systems based on research data. The model has been distributed to approximately fifty Australian landholders, and training workshops were held in northern and southeast Queensland. The model is mostly used on single occasions by landholders at the stage of planning and developing their plantations, however can also be used if required to prove the legitimacy of a farm forestry business.

Dr John Herbohn chaired a scientific panel at a conference in Galway, Ireland in June 2006 entitled 'Small-scale Forestry and Rural Development: The intersection of ecosystems, economics and society'.

Program 6 – Conservation Principles and Management
Led by Dr David Westcott, CSIRO Sustainable Ecosystems

Objective: *To determine spatial patterns in biodiversity and discover the processes that produce these patterns, with particular focus on rare species. The identification of geographical hotspots of rare species and examination of species resilience to human-induced climate change will establish levels of rarity for Queensland's rainforests and assist management by setting conservation priorities. Improved understanding of how rare species are affected by threatening processes and how geographical distributions are likely to change, forms the basis of overall Program 6 objectives.*

Project 6.2.1 – Ecology and Management of Wet Tropics Weeds

Led by Ms Melissa Setter, Department of Natural Resources and Mines

Weed invasion is recognised as a threatening process to the environment of the Wet Tropics. Rare and threatened species, or assemblages of species, may be threatened through degeneration or destruction of the ecosystem processes that support them. Our knowledge bank of the invasive processes of key weed species is continuing to develop which is enabling informed management practices to be put in place. Research into life-cycle characteristics, such as seed longevity and reproductive maturity, of harungana, hymenachne, siam weed and tobacco weed continued throughout 2005/2006, and monitoring will continue into 2006/2007 due to the long-term nature of this research.

Project 6.2.1 data on Class 1 weeds (i.e. weeds not commonly present in Queensland but, if introduced, would cause an adverse economic, environmental or social impact) was used to help direct the activities of several National Eradication Programs. National linkages with the Weeds of National Significance Pond Apple National Strategy Management Group were continued, with input into the Pond apple and Hymenachne Best Practice Management Manuals(commissioned by the National Strategy Groups) and the National Siam Weed Delimitation Program. Researchers provide regular research updates and highlights to the Far North Queensland Pest Advisory Forums; quarterly meetings involve many land managers, including local councils, the Environmental Protection Agency and private landholders. Much of the Project 6.2.1 research is initiated via requests for information from on-ground operators and managers who attend the meetings.

Project 6.2.1 has placed considerable focus on the ecology of Pond Apple (*Annona glabra*), a major environmental weed of North Queensland, affective mainly wetland ecosystems such as melaleuca and palm swamps, creeks, drains and coastal foreshores. A modelling exercise is currently investigating the significance of ocean dispersal of Pond Apple seeds, and the implications for management.

The exotic grass hymenache poses significant challenges for those faced with its management. This Weed of National Significance maintains a viable seed bank for in excess of six years, necessitating the need for a prolonged effort before control is achieved. The invasive harungana tree poses similar difficulties, with research finding that seeds in the soil exhibited 80% viability after six years.

The components of Project 6.2.1 weed ecology and management research will continue beyond the life of the Rainforest CRC with financial and in-kind assistance from the Queensland Department of Natural Resources, Mines and Water, Weeds CRC, national eradication programs and potential sources such as the Marine and Tropical Sciences Research Facility.

Project 6.2.2 – Diet and Trapping Strategies of Feral Pigs in the Wet Tropics World Heritage Area

Led by Dr Jim Mitchell, Department of Natural Resources and Mines

The presence of feral pigs in the Wet Tropics is a recognised threat to the region's environment. The control of feral pigs in rainforest conditions is complex and distinct from all other areas of Queensland. Control techniques exclusively for rainforest environments are poorly developed and restrictive in scope. This project has provided additional information on aspects of feral pig ecology and developing innovative control techniques that is vital for the continued development of effective management plans. Project 6.2.2 has further enhanced the effectiveness of control techniques specifically designed for rainforest conditions and is assisting in minimising feral pig impacts on threatened species and on the rainforest ecosystem.

An analysis of the diet of feral pigs is now complete, following several years' sampling of stomach contents. Within the Wet Tropics bioregion, feral pigs can be defined as generalist omnivores, preferring plant material. They will however, actively hunt small animals (both mammals and birds) and scavenge carcasses when the opportunity arises. A final report has been compiled, which discusses the implications of feral pig diet selection in the Wet Tropics region in relation to ecological impacts and the potential for development of improved control options.

A wide range of potential baits and attractants for use in trapping procedures has been tested. Extensive field trials have determined the frequency of visitations and palatability of 22 test attractants and trap bait materials in eleven field trials. Two hundred and fifty permanent bait stations were established over two hundred kilometres of transect lines. No trap bait substrate tested was more attractive or palatable then the standard of waste bananas, which support the trapping techniques currently in use. Interestingly, the traditional idea of bait substrates being used for toxic baits that can be freely distributed throughout this environment is probably no longer applicable because of non-target issues and the low encounter rate of pigs with bait material. A wide range of species consume any bait placed on the ground before pigs can get to it, and the nomadic movements of pigs explain their low encounter rate with bait material.

An offshoot of the diet research was the weed seed potential of feral pigs. Some weed seeds (Pond Apple) were held in the alimentary system of pigs for up to eight days; this will aid in the wide dissemination of the seeds. Although the majority of seeds were unviable due to the digestive process, a few were capable of germination. The feral pig has the potential to disseminate weed seeds throughout the Wet Tropics.

Research from Project 6.2.2 has contributed to a collaborative research project with the Invasive Animals CRC to develop new commercially available feral pig toxic bait. Field trials of this new bait material were unsuccessful and have demonstrated that bait development specifically designed for the Wet Tropics needs to be sustained. Similar work is being undertaken with the National Feral Animal Control Program. A range of toxins and bait delivery systems are being developed and tested in collaborative research projects.

Project 6.3.1 – Species and Processes at Landscape Scales: Are They Threatened?

Led by Mr Peter Latch, Queensland Parks and Wildlife Service and Dr David Westcott, CSIRO Sustainable Ecosystems

Project 6.3.1 is an amalgamation of two separate research projects (Projects 6.3.1 and 6.3.2) focusing on the ecology and management of Spectacled Flying Foxes, and the animal-mediated ecosystem process of seed dispersal.

The Spectacled Flying Fox project wound up field data collection on flying fox movement in early 2006; though automatic downloads from satellite tagged animals were received until mid-year. Region-wide monthly camp surveys continued, and as a consequence of Tropical Cyclone *Larry*, additional funding from the JCU/CSIRO Tropical Landscapes Joint Venture cyclone project will see the surveys continued until the end of June 2007. The remainder of 2005/2006 has seen a focus on data preparation, analysis and writing.

Much of the seed dispersal research undertaken in previous years was presented at the Fourth International Symposium/Workshop on Frugivores and Seed Dispersal, held in Brisbane in July 2005 and organised by members of Project 6.3.2 *Seed Dispersal: A Threatened Ecological Process*. The meeting hosted around 130 delegates from around the globe and was a major success for the Rainforest CRC and for seed dispersal research in Australia. Seed dispersal studies during 2005/2006 were focussed on data analysis and preparation of peer-reviewed papers.

Project 6.4 – Impacts of Climate Change on Australia's Rainforest Marsupial Folivores

Led by Dr Andrew Krockenberger, James Cook University

Project 6.4 set out to develop models that predict the distribution of rainforest marsupial folivores to assist researchers to forecast the effects of climate change and global warming on animals that are seriously threatened due to their particular habitat requirements and limited geographical range.

Researchers used the green ringtail possum (*Pseudochirops archeri*) as their model species and used empirical data to develop and test hypotheses about the importance of climatic extremes and plant defences in limiting the species' current and predicted future distribution in the face of climate change. The team were able to demonstrate the role of plant defences in determining feeding selectivity within a particularly complex nutritional environment, producing an analytical tool for future measurements of rainforest foliage nutritional characteristics (NIRS calibrations) and carrying out an assessment of the ecological techniques that are suitable for diet analysis in cryptic species.

The team can now demonstrate the strategies put in place by green ringtail possums when faced with thermal challenges. This information, along with the documented seasonal variations in such challenges and associated nutritional and water stresses, supported the development of a model of the species' distribution limits within the Wet Tropics. This is one of the first marsupial species for which a specific understanding of physiological interactions between climatic extremes and the nutritional environment has been explicitly related to the potential effects of climate change – the importance of climatic extremes and the complex interaction between plant, herbivore and environment, give the results of this project a far-reaching value. The concepts and model developed under Project 6.4 have improved our ability to make accurate predictions of the effects of future climate change, because they are based on clear and understood mechanisms.

The primary benefit of Project 6.4 is environmental – we have improved our ability to accurately predict the effects of climate change and global warming on threatened species or species with limited geographical distribution. Further, this study has substantially improved our knowledge of several aspects of the ecology of rainforest possums and the way that herbivores deal with a nutritionally complex environment. The importance of folivorous marsupials, particularly rainforest possums and tree-kangaroos, to the ecotourism industry of Far North Queensland is an indirect economic benefit to accurately predicting the effects of climate change and global warming, and hence improve sustainable management practices of Wet Tropics faunal resources.

Project 6.5 – Dynamic Models for Management

Led by Dr Chris Margules, CSIRO Sustainable Ecosystems

Project 6.5 entered a transitional year with a revised set of milestones negotiated with the new Department of the Environment and Heritage project managers. The majority of milestones under three objectives for the year were completed, as well as several additional initiatives. The three objectives focused on plant biodiversity in the Wet Tropics: 1) identification of biodiversity values and priority areas using the Wet Tropics flora; 2) biogeography of Wet Tropics flora; and 3) effectiveness of plant-based surrogates for biodiversity priority setting. A database of vascular plant locations was compiled from a range of sources within CSIRO and the Queensland Government. Supplementary botanical surveys were conducted across sixteen sites of the wet tropical coastal lowlands of the Tully-Murray River network, where gaps in knowledge are greatest. Vegetation ranged from intact rainforest to low melaleuca woodlands and revegetation areas. These sites yielded 1,109 plant species records. Species' range extensions and unusual records were vouchered amongst the 180 collections submitted to the CSIRO Plant Industry herbarium at Atherton and the Queensland Herbarium, Brisbane. These and previous surveys through past years of the Rainforest CRC have contributed to taxonomic knowledge with the discovery of new species, in addition to our understanding of distribution patterns for known species.

The compiled plant database was used to evaluate priority areas for plant biodiversity conservation in the Wet Tropics Bioregion. This preliminary analysis highlighted areas outside the existing World Heritage Area and other protected areas that potentially complement the existing set of conserved plant biodiversity. The case study demonstrated some of the principles of systematic conservation planning using a scenarios approach, and results will be published in the Rainforest CRC book (see Chapter 11 List of Selected Papers and Other Publications). A second case study has been developed to investigate the status of the Australian wet tropical rainforest biome and subtropical forests of eastern Australia as a global biodiversity hotspot. Project 6.5 analyses demonstrated that of over 8,000 species of vascular plants found in the tropical and subtropical forests of eastern Australia, at least 2,144 are endemic (c. 25%), exceeding the minimum threshold for globally significant plant endemism of 1,500 species. An analysis of the land use trigger is in progress. A descriptive analysis of the floristics and plant biodiversity of the rain forests of the Wet Tropics Bioregion will also be published in the book.

Spatial modelling tools for predicting species turnover and environmental classifications for taxonomic groups have continued to be developed through collaborations with the New South Wales Department of Environment and Conservation's GIS research Unit. Testing of the method, generalised dissimilarity modelling (GDM), was facilitated by funding through previous year's Rainforest CRC Project 6.5 to support software programming for model enhancements and a demonstration analysis of conservation priorities and gaps in protected area networks. Compiled plant locality records and environmental datasets for the Wet Tropics were provided to a working group at the University of California Berkeley as part of collaborative testing of alternative methods. The publication of this work found that the two community-based modelling approaches, GDM-SS model (single species version of the community-based GDM model) and MARS-COMM performed well compared with single-species approaches. The results demonstrate the effectiveness of the GDM method not only for generating classifications of species turnover, but also for predicting the distribution of individual species. This evaluation of the GDM method itself represents a significant science achievement and is a necessary precursor to testing surrogate effectiveness for conservation planning models. Through continuing collaboration with Simon Ferrier's team, we facilitated the development and testing of an important new predictive method that makes better use of data and knowledge than individual species models and previous approaches to vegetation modelling applied in the Wet Tropics. A second manuscript more fully describing the application of GDM with examples including the Australian Wet Tropics has been submitted for publication.

Program 7 – Aboriginal Collaboration and Capacity-Building in Research
Led by Dr Sandra Pannell, James Cook University

Objective: *The rainforest is a complex system of living Aboriginal cultures. Sustaining these cultures ensures recognition and respect for Aboriginal peoples' prior ownership and their intricate and vast knowledge of the rainforest. Program 7 works to ensure information is available to enable incorporation by agencies and industry of best management practices that are appropriately cultural, collaborative and capacity building for Aboriginal Traditional Owners in reciprocal relationships with others within the Wet Tropics region.*

Project 7.1 – Identification of Indigenous Cultural Values and Landscapes within the Wet Tropics World Heritage Area

Led by Dr Sandra Pannell, James Cook University

A new task in 2005/2006, Project 7.1 set out to identify Indigenous cultural landscapes and core values within the Wet Tropics World Heritage Area. In 1988, the Wet Tropics region of North Queensland was placed on the World Heritage List in recognition of its outstanding natural values. The nomination document briefly mentioned Aboriginal rainforest culture, however the cultural values of the Wet Tropics (Aboriginal and non-Aboriginal) were not considered in the listing process. Until recently, management of the World Heritage Area has focused almost entirely on the nominated natural values, sometimes to the detriment of the Area's cultural values and spaces.

Project 7.1 extends on the previous CRC-funded study into the 'Aboriginal Cultural Values of the Wet Tropics' undertaken by Dr Nicky Horsfall in 2002, which compiled existing, written information about the Indigenous cultural significance of the Wet Tropics World Heritage Area. Project 7.1 has aimed to complement and, in some instances, extend upon existing and proposal regional Indigenous research and protocols, such as the *Natural and Cultural Heritage / Landscape Management and Mapping Proposal for the Wet Tropics World Heritage Area for Rainforest Aboriginal People*; *Caring for Country and Culture: The Wet Tropics Aboriginal Cultural and Natural Resource Management Plan*; and *The Wet Tropics World Heritage Area Regional Agreement*. Listing the World Heritage Area on the new National Heritage List for its Indigenous cultural values, and re-nomination of the Area to acknowledge these values is identified as a key element in the 2005 Regional Agreement between the Wet Tropics Management Authority, Queensland Environmental Protection Agency, Commonwealth Department of the Environment and Heritage and Queensland Department of Natural Resources, Mines and Water. Identifying and acknowledging these values in planning and management of the Wet Tropics natural resource management region is also identified as a key strategy in *Caring for Country and Culture*.

The efforts of Project 7.1 resulted in a research report on World Heritage entitled 'Reconciling Nature and Culture in a Global Context: Lessons from the World Heritage List', published by the Rainforest CRC in May 2006. It also culminated in the preparation of a nomination document for the listing of the Wet Tropics region on the National Heritage List for its Indigenous cultural values, in conjunction with the Aboriginal Rainforest Council.

Project 7.3 – Technical Education and Training, and Participatory Domestication of Native Food Plants with the Ma:Mu Community

Led by Professor Roger Leakey, James Cook University and Ms Marianne Helling, Innisfail TAFE College

A key objective of Project 7.3 was to provide the necessary skills and qualifications for the Ma:Mu community to develop superior cultivars of bush tucker species for further multiplication, and to successfully operate a plant nursery and orchard enterprise. Throughout the past twelve months, 73 bush tucker samples were taken from parent trees, representing almost double the number of samples taken during the 2004/2005 funding period. A total of 113 collected samples from 31 different Wet Tropics plant species have been collected, and a total of 2,519 plants have been propagated and grown to planting size. Unfortunately, the specimens were not planted during the 2005/2006 wet season due to the onset of Tropical Cyclone *Larry*. Negotiations to secure land for tree planting were underway with the Ma:Mu community and the Johnstone Shire Council prior to the cyclone, however post-cyclone focus has been on cleaning up debris and rebuilding. Luckily, very few of the plant specimens were lost during the cyclone. To date, a suitable site for planting has not been established and the initial objectives of Project 7.3 have not eventuated. An alternative research site has been identified on privately-owned land, however the Ma:Mu community have not consented to its use. A benefit of this set back is the highlighting of some of the difficulties that can arise when attempting to domesticate native plants that are part of a very complex social system.

Program 10: *Catchment to Reef* Joint Program with CRC Reef
Led by Professor Richard Pearson, James Cook University

A three-year initiative of the Rainforest and Reef CRCs, Catchment to Reef began in 2003 and aimed to develop new tools to assess and monitor the health of catchments and inshore reefs of the Wet Tropics and Great Barrier Reef World Heritage Areas. As the program draws to a close (by September 2006), researchers from James Cook University, Griffith University, the CSIRO, the Queensland Department of Natural Resources, Mines and Water, and the Australian Institute of Marine Science are preparing to deliver the results of their work.

It is now accepted that the quality of water entering the Great Barrier Reef lagoon from Queensland's rivers has deteriorated since European settlement. Human activities have increased the levels of nutrients and sediments that run into rivers and threaten the health of waterways, wetlands and inshore reefs and seagrass beds.

The 2003 Reef Water Quality Protection Plan presents a framework for water quality monitoring and land management programs, as developed by the Commonwealth and Queensland Governments and the Regional Natural Resource Management Boards, to help reduce the decline in the health of Queensland's catchments and inshore waters.

The Catchment to Reef research will provide a sound scientific basis to new monitoring tools and guidelines, which will enhance and standardise existing monitoring programs, and make them more appropriate to the tropics. The Program will also identify alternative ways to measure the health of catchments and inshore reefs, and provide farmers and land managers with guidelines to help reduce the loss of sediment and nutrient into waterways.

With the closure of the Rainforest and Reefs CRCs in 2006, it is anticipated that the activities of the Catchment to Reef program will be further developed under a Water Quality theme within the new Commonwealth funded Marine and Tropical Science Research Facility (MTSRF). Three programs within the Water Quality theme will focus on catchment to reef connectivity (materials transport and health of the reef); water quality and ecological health within catchments; and integration of social, economic and biophysical aspects of resource management. This future research will build on the work of the current Catchment to Reef program, and the work undertaken by the Rainforest and Reef CRCs over the past decade.

Task 1 – Riparian Zone Performance: Tools and Protocols for Quality Assessment and Monitoring

Led by Mr Jon Brodie, James Cook University

Task 1 is contributing to our knowledge of the sources of pollutants in northern Queensland catchments and, more importantly, how these can be managed to reduce pollutant export to downstream environments. The loss of sediments and nutrients from the land into Wet Tropics streams varies under different land use and management regimes. Farmers and volunteers in the Tully/Murray, Meunga, Daintree and Barron catchments have been helping researchers from James Cook University, the Queensland Department of Natural Resources, Mines and Water and the CSIRO to collect water samples from streams and bores after heavy rainfall. By measuring concentrations of sediments and nutrients in streams from different land uses, researchers can compare losses from sugar cane and banana paddocks, pine plantations, grazing lands and urban areas. A comparison of losses from cane and banana plantings in the Tully/Murray and Barron catchments has shown the effect of differences in fertiliser application, soil exposure and slope of the land.

Banana paddocks generally have higher slopes and more bare ground than cane fields. Average loss of total nitrogen was higher in runoff from cane, whereas banana paddocks lost more total phosphorus and suspended sediments. By comparing losses under different land use and management, researchers will be able to recommend best management practices for a range of activities.

James Cook University researchers have demonstrated that the highest nutrient and suspended sediment levels in runoff occur at the rising stage of drainage flows from plantations, just before waters peak. While it is not easy to collect samples under flooding or similar conditions, it is a vital component of the research project, as samples taken during the falling stages of floodwaters may underestimate total nutrient loads. This sort of information has implications for timing of water quality monitoring in flood events, and feeds into testing the effectiveness of simple, low-cost water quality measuring techniques that can be used by farmers and landholders to accurately check the levels of contaminants in farm and plantation runoff. Results from Task 1 are already being used to

guide decisions on incentive payments to landholders for farm management actions to improve water quality in the Tully region.

A number of manuals are in preparation to help a range of community groups to understand water quality issues in northern Queensland and to participate in water quality monitoring in their local area. The first of these manuals, 'The Little Book of Nutrients' is now in draft form, while a second, 'Water Quality Monitoring in Tropical Queensland Catchments: The whys and wherefores' is in preparation. A manual that outlines water sampling procedures for Great Barrier Reef catchments is in the final stages of preparation.

Task 2 – Monitoring Tools for Water Quality Assessment

Led by Dr Barry Butler, James Cook University

The objective of Task 2 is to produce a manual, or set of manuals, that provide situation-specific guidelines and improved methods for the design and implementation of water quality monitoring programs in the wet tropical catchments of the Great Barrier Reef. Monitoring is required to assess the quality of our waterways, identify existing and emerging problems, evaluate the consequences of various anthropogenic land and water use practices, devise improved practices and assess the effectiveness of management measures. Further, monitoring needs to be undertaken at a range of spatial scales, commensurate with the different types of management practices that are currently employed.

Current monitoring practices involve the implementation of numerous ad hoc programs, in themselves involving a myriad of people and organisations that employ different approaches according to the budgets and resources at their disposal. Each individual program has the potential to yield information that is valuable to all managers and researchers in the Great Barrier Reef catchment, but for that potential to be realised, the data being collected must be compatible with other programs and each individual program must have a clear strategic basis. Task 2 aims to produce a manual that details the various strategies, tactics and compatible methods that can be employed in order to obtain meaningful data.

During the course of the project, it has become obvious that the Wet Tropics encompasses several sub-catchments that either behave similarly to systems in the wet-dry and dry tropics (e.g. the inland catchments of the Herbert River), or drain into the Great Barrier Reef via river systems that are dominated by dry catchment areas (e.g. the north-eastern catchments of the Burdekin River). These systems demand the adoption of very different monitoring regimes, so it has been necessary to expand the scope of the manual to encompass most of the water body types that occur throughout the Great Barrier Reef catchment and elsewhere in north-eastern Australia. A major focus of Task 2 has been to identify key differences in the ways that water quality monitoring must be carried out depending on whether the objective is to evaluate exports or assess instream health. The program designs and monitoring methods required to meet these two different objectives are often strikingly dissimilar. This will be a central theme of the manual.

Task 2 is primarily a desktop study involving review of information methods, however some laboratory and field work was conducted in order to test some of the new equipment and techniques that are being recommended in the manual. Fieldwork was carried out in conjunction with Tasks 1 and 3 in order to share resources and improve the outputs of the other Tasks. This work has been completed on schedule and the data gathered have been incorporated into relevant reports by both Tasks. The results of the various trials are discussed in the relevant sections of the manual, currently in preparation.

State agencies are at an advanced stage in the preparation of their own 'Community Waterway Monitoring Manual', a large and detailed, though more generic document that does not incorporate the more strategic and tactical elements of monitoring program designs that are the focus of Task 2. Nevertheless, there are many substantial overlaps so it is crucial that the Task 2 manual builds on the community manual without creating confusion or undue repetition.

Task 3 – River Health Assessment Tools

Led by Professor Angela Arthington, Griffith University

Wet Tropics streams and rivers support unique and diverse animal life that may provide clues to the health of waterways. In a healthy waterway bordered by natural riparian vegetation, there are clear patterns of change in freshwater animals along the natural gradient from upland forests to the coastal lowlands. This unique biodiversity is threatened by human activities in the landscape, upsetting natural ecological processes.

Researchers of Griffith University have shown that the natural patterns of diversity in freshwater fish are lost when a waterway is modified and degraded by loss of riparian vegetation and changes in stream habitat. Under these conditions, there are fewer fish species than expected and those missing have clearly been affected by the habitat changes. A simple model based on elevation and distance from the river mouth was used to predict fish community composition at individual sites within four creeks in the Russell and Mulgrave catchments of the Wet Tropics. Most sites in the Little Mulgrave, Behana and Woopen drainages contained most, if not all, species that were expected to occur, whereas the most degraded sites on lower Babinda Creek contained fewer species than

expected. Impacts due to loss of riparian vegetation and reduced habitat diversity along the waterways could be one reason why certain species are missing from lower Babinda Creek.

In the same paired catchment study in the Russell and Mulgrave catchments, James Cook University researchers have classified different stream reaches by the macro-invertebrate species they contain and their association with particular riverbed sediment sizes. Researchers compared sites with different degrees of impact, and were able to distinguish between natural changes in the presence of different 'water bugs' and changes resulting from reduced stream health. This is the first detailed study of macro-invertebrates in floodplain streams in the Wet Tropics, resulting in the discovery of several new species. The work has shown how different macro-invertebrate species are affected by changes in stream habitat as a result of changes in riparian vegetation. It has highlighted the importance of riparian vegetation in maintaining in-stream biodiversity.

A technical report titled 'Indicators of Ecosystem Health in Wet Tropics Streams' has been drafted and is due for completion by September 2006. Journal articles arising from field studies have been published or are in press.

Task 4 – Frameworks for Integrated Catchment Management

Led by Professor Angela Arthington, Griffith University

Throughout 2005/2006, Task 4 reviewed and collated past Rainforest CRC research and data that will be of value to the Marine and Tropical Science Research Facility program and broader initiatives in the Wet Tropics region. A GIS framework for a web-based atlas of fish and invertebrate distribution and ecological data has been developed at James Cook University. Compilation of fish data from Rainforest CRC research, QDPI Fisheries, the literature and other sources for input to the GIS and atlas is complete. The final shell and format of the atlas is ready for data input and test runs of access to maps. Good progress was made on an overview of methods for the assessment of aquatic biodiversity and the identification of conservation priorities in rivers, via a workshop with the Queensland Environmental Protection Agency (EPA) in 2004, and linkages to EPA work on wetland classification and priority identification in 2005/2006. Publications have provided new information on larval fishes in Wet Tropics streams and analysed the drivers of aquatic biodiversity and threats to aquatic systems and their biota in tropical systems. Two fundamental papers on drivers of fish biodiversity are in well-developed drafts.

The outputs of Task 4 have contributed greatly to the overall communications strategy of the Catchment to Reef program via scientific publications, journal papers, presentations to stakeholder groups and target audiences, meetings, workshops and conferences, print products, web-based resources and media coverage.

Task 5 – Advanced Technologies for Monitoring Water Quality in the Great Barrier Reef

Led by Dr Miles Furnas, Australian Institute of Marine Science

In response to efforts to reduce increased amounts of sediment, nutrients and other land-sourced pollutants entering Great Barrier Reef waters in terrestrial runoff, Task 5 seeks to develop and validate sensitive and cost-effective monitoring tools to assess marine water quality in nearshore waters. Structured as two PhD research projects, Task 5 is working to improve the performance of passive sampling and remote sensing technologies for monitoring reef water quality.

Because of the large size of the Great Barrier Reef ecosystem, the analytical challenges in properly measuring particular materials, and the sometimes-difficult conditions faced in collecting high quality environmental data, there is an ongoing need to continually develop and improve methods for water quality monitoring. In particular, it is essential that the validity of monitoring information determined using new and evolving technologies be rigorously and constantly validated to ensure a high level of confidence in the results by all stakeholders. Task 5 is focused on both improving the performance of passive sampling and remote sensing technologies for monitoring reef water quality and validating this performance for the benefit of stakeholders.

Deployments of passive samplers at nearshore reef sites along the Wet Tropics coast show that a number of agricultural herbicides (e.g. diuron, atrazine) can be detected in coastal waters at ng per litre concentrations (parts per trillion). Higher concentrations were measured in coastal waters adjacent to and in rivers draining catchments where there was extensive cropping activity, principally of sugarcane, which is the source of herbicide applications. While concentrations of herbicides in coastal waters are still relatively low, the experiments showed that they can be efficiently monitored using a passive sampling approach. Concurrent oceanographic modelling studies clearly show that materials carried in land runoff are retained near the coast for extended periods of time, primarily exposing coastal ecosystems to these chemicals. An additional and significant laboratory-based passive sampling experiment was carried out to evaluate sampling strategies and sampler efficiencies for measuring herbicide loads during brief concentration spike events as might occur during a flood event or in a river plume.

The large size of the Great Barrier Reef makes satellite remote sensing approaches attractive for broad-scale ecosystem and water quality monitoring. The remote sensing of phytoplankton chlorophyll concentrations provides an index of nutrient availability in marine waters. The usefulness of ocean colour remote sensing for quantitative chlorophyll measurements in coastal waters, however, is constrained by the confounding effects of suspended particulate matter, shallow depth and other materials in the water. This problem remains one of the

central issues in the remote sensing of coastal waters. Research being carried out in Task 5 is providing an improved capacity to process imagery from the Great Barrier Reef region to remove these confounding effects and to better understand the limits on accurate interpretation of remotely sensed imagery and data.

Task 6 – Condition and Trend Assessments for Coastal Marine Communities

Led by Dr Katharina Fabricius, Australian Institute of Marine Science

Coral reefs are exposed to runoff containing sediments, nutrients and pesticides from agricultural lands. Scientists of Task 6, based at the Australian Institute of Marine Science, are developing new tools for measuring exposure to pollutants in the marine environment. Researchers are investigating measures to detect stress and changes in abundances of key inshore organisms, such as corals and seagrasses, in response to changing water quality. The team are testing the use of 'biofilms', the fine coating of bacteria and microscopic organisms on sediments and artificial substrates, as a quick way to measure water quality condition. Biofilms are very responsive to changes in nutrients and fine sediments in the water, so a small sample of sediment may contain evidence of present and past exposure of a site to certain water quality conditions.

An experimental facility, built to manipulate exposure to controlled water quality settings, has been used extensively to assess the physiological responses of corals to altered light and turbidity regimes.

Experiments have shown that coral pigmentation could provide a useful and rapid measure of changes in water quality on nearshore reefs. The team found that the expression of certain genes in corals changes along gradients from poor to clean water, and the number of soft coral species that occur on reefs that are exposed to poor quality water is only half that of reefs in clean inshore waters. Experiments have demonstrated that corals become darker in colour in turbid nutrient-rich waters compared with the paler colour of corals in clean waters. This could have implications for coral bleaching, given that darker coloured corals warm up more than that of lightly coloured corals and differences in temperatures can be as much as 2°C is bright sunlight.

A field study to test the suitability of remote sensing to monitor and map tropical intertidal seagrasses has been completed by the University of Queensland and the CSIRO, and data are now being processed. The analysis of data on seagrass tissue nutrients and morphology and sediment nutrients has commenced. A subset of the proposed potential indicators used by Task 6 are now being trialled by the Reef Water Quality Protection Plan reef monitoring team.

Task 7 – Achieving Outcomes: Adoption of Tools Through Training of the Current and New Generation of Practitioners

Led by Professor Richard Pearson, James Cook University

Task 7 of Catchment to Reef deals with integrating and presenting the outcomes of Tasks 1-6, and is the critical link between the scientists involved in the Program and its end-users. The overall aims of Task 7 is to communicate and promote the uptake of the Program's findings to relevant stakeholders in an integrated fashion, and encourage its incorporation into policy and on-ground actions. The hierarchy of potential end-users includes technicians, managers, planners, policy-makers, educators and on-ground practitioners. The range of communication and extension activities being implemented is designed to cater for different interests and understanding, and to make the information accessible to all.

The Catchment to Reef Communication Framework aims to provide targeted communication, with management solutions, to the full range of end-users through products tailored for different interest levels. These products will be presented in the broader context of other water quality initiatives in Queensland, with the ultimate aim of encouraging behavioural change to help 'halt and reverse the decline in water quality in Great Barrier Reef catchments' by informed users, based on current science.

Following the resignation of the Communication Officer in 2005, the roles of the position were shared between two external consultants. Both appointments have been very successful, ensuring effective and regular liaison with landowners, natural resource management boards, community groups and other stakeholders, and the development of effective products and a delivery framework for Catchment to Reef information. The Program is well known in the North Queensland region, nationally and internationally, through the efforts of the communication team. A major product for the Program, an interpretive poster and accompanying booklet, had a print run of ten thousand copies each and most have been distributed via the Great Barrier Reef Marine Park Authority and through postal distribution to scientific groups, schools and catchment groups. The items were also distributed overseas by a Federal Government delegation who visited China.

Product development has proceeded very well and is due for completion by September 2006, following a delayed start to the Program in 2003. The communications team have a mature design in place for a CD-ROM that will house all of the Catchment to Reef reports and an accompanying explanatory booklet. Drafts of several of the reports are complete and the team expect to produce a first version of the kit in September.

Table 5: Milestones and/or outputs of Rainforest CRC research projects for 2005/2006.

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
PROGRAM 1 – REGIONAL PLANNING AND MANAGEMENT **Led by Professor Geoff McDonald, CSIRO Sustainable Ecosystems**				
Project 1.1 – Wet Tropics Regional Planning and Management Led by Professor Geoff McDonald, CSIRO Sustainable Ecosystems				
Policy Development	Refinement of water quality and biodiversity components that feed into the Wet Tropics Natural Regional Natural Resource Management (NRM) Plan 2004-2008.	• Yes. Implementation of the Draft Douglas Shire Water Quality Improvement Plan, June 2006, to provide long-term strategies for achieving reef water quality targets for the Daintree region. • Overseeing, coordinating and integrating of aspirational, resource condition and management action targets within the Wet Tropics NRM Plan. • Overseeing the development, implementation and ongoing refinement of alignment plans, ensuring the achievement of resource condition and management action targets. • Establishing and maintaining a State-wide policy partnership for developing and monitoring appropriate water quality targets across reef catchments. • Establishing and maintaining a regional water quality planning and monitoring alliance. • Utilising existing and secure additional resources to support and develop catchment-scale plans that include water quality targets. • Support plan implementation and effort alignment at the catchment scale. • Working with FNQ NRM Ltd at the State and National levels to establish a long-term policy and financial platform for the delivery of ecosystem service payments for landscape management. • Work will continue in 2006/2007 and beyond under the new MTSRF arrangements.		
	Completion of data layers specifying threats to the Wet Tropics region, and levels of protection provided by Wet Tropics statutory planning systems (delayed in 2004/2005 due to non-availability of data and gazetted plans).	No.	This project component could not be completed due to insufficient funding in the final year.	

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
	Combine threat and protection information layers with biodiversity assessments (delayed in 2004/2005 due to non-availability of data and gazetted plans).	No.	This project component could not be completed due to insufficient funding in the final year.	
Refereed Book Chapter	Book chapter completed for inclusion in Rainforest CRC book entitled 'Living in a Dynamic Tropical Forest Landscape'.	Yes. Book expected to be published in late 2006 / early 2007.		
Project 1.2 – Regional State of the Wet Tropics Satellite-based Monitoring Information System Led by Associate Professor Stuart Phinn, The University of Queensland				
Website	Completion of a MODIS vegetation index validation, and production of a subsequent demonstration website for the delivery of Wet Tropics vegetation index condition maps.	Yes. However, website could not be completed due to lack of resources.		
Technical Report	Technical report describing the capabilities of the MODIS satellite sensors for providing State of the Wet Tropics indicators.	Yes. A comprehensive technical report was completed and submitted to the Rainforest CRC for publication.	Due to time restrictions prior to 30 June 2006, the Rainforest CRC was not able to publish the report.	
Refereed Book Chapter	Book chapter completed for inclusion in Rainforest CRC book entitled 'Living in a Dynamic Tropical Forest Landscape'.	Yes. Book expected to be published in late 2006 / early 2007.		
Refereed Journal Papers	Three journal papers are in preparation on the use of optical and/or radar data for mapping and monitoring the Wet Tropics.	Yes. Papers will be ready for submission in 2006/2007.		
PROGRAM 2 – FUNCTIONAL ECOLOGY AND GLOBAL CHANGE **Led by Dr David Hilbert, CSIRO Sustainable Ecosystems**				
Project 2.2 – Water Regulation as an Ecosystem Device Led by Dr David McJannet, CSIRO Land and Water				
Research	Data analysis of the factors controlling forest water use on coastal lowlands (i.e. groundwater inundation, climatic variations), following measurements taken in 2004/2005 of the interactions between groundwater and forest water use in a Melaleuca forest, palm forest and a coastal dune rainforest.	Yes. Data analysis showed that the ability of these different forest types to endure periods of inundation reflects their distribution throughout the Wet Tropics. For example, Melaleuca forests were able to tolerate many months of complete saturation due to unique root adaptations.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Research	Analysis of palm tree water usage following installation of monitoring equipment in 2004/2005 at Euramo feather palm swamp.	Yes. The first figures of water use by feather palms was collected and analysed, suggesting that palms use similar amounts of water to trees of the same size. The monitoring equipment performed reasonably well, however power consumption needs to be addressed.		
Research	Development of techniques to scale palm tree water usage analyses up to overall forest water usage.	Yes. Scaling of palm tree water use from sample trees to the stand level was achieved through the use of stem size and water use relationships. Forest water use is achieved through extensive basal area datasets collected for each site.		
Research	Completion of measurements in coastal forest types; removal of monitoring equipment; and completion of database development phase.	Yes. Measurements were finalised, however much of the monitoring equipment was destroyed by Tropical Cyclone *Larry* in March 2006. Remaining equipment has now been removed from the monitoring sites, or will be, once access is re-established.		
Refereed Journal Papers	Five journal papers submitted, accepted or in press.	Yes. Five journal papers were submitted – three were accepted and two are in review. Three more publications are in preparation for submission in 2006/2007.		
Technical Report	A technical report on the methodology for estimating cloud interception inputs to tropical rainforest was published by CSIRO Land and Water. Another report on the site measurements and results has been accepted for publication by CSIRO Land and Water.	Yes.		
Refereed Book Chapter	Book chapter completed for inclusion in Rainforest CRC book entitled 'Living in a Dynamic Tropical Forest Landscape'.	Yes.		
Project 2.5 – Impacts of Climate Change on Rainforest Ecosystems and Biodiversity Led by Dr David Hilbert, CSIRO Sustainable Ecosystems and Dr Steve Williams, James Cook University				
Refereed Papers	Several key publications relating to climate change impacts on Wet Tropics biota.	Researchers have completed, submitted or published around fifteen key papers and book sections.		
Methodology	Development of methodology for the prediction of habitat distributions for present and future climatic conditions.	Yes, but remains ongoing with continuation of project funding over the following four years. Several publications finished relating to this topic.		
PROGRAM 3 – CANOPY PROCESSES AND DYNAMICS **Led by Professor Roger Kitching, Griffith University**				

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Project 3.1 – Floral Biology and Canopy Pollination in Fragmented Forests Led by Professor Roger Kitching, Griffith University				
Research	Completion of genetics analysis for one target tree species, including analysis of data and development of a draft manuscript.	A microsatellite library for six loci has been established for *Syzygium sayeri*. The DNA of some sixty potential 'father' trees is now complete, and the 'babies' (i.e. fruit from the focal trees) is being screened.	Some technical difficulties caused considerable delays in finalising the screening and draft manuscript.	Work is underway and a technical manuscript is due for completion by December 2006.
Refereed Journal Papers	Submission and publication of pollination biology manuscripts for two canopy species.	Pollination ecology of *Syzygium sayeri* was published in late 2005.	Pollination ecology of Normanbya normanbyi is not yet complete, having decided to undertake additional sorting of Diptera to family essential to strengthen the overall results.	Work is underway and should be complete by September 2006.
Book Chapter	Book chapter on pollination and phenology in the Wet Tropics completed for inclusion in Rainforest CRC book entitled 'Living in a Dynamic Tropical Forest Landscape'.	Yes. Book expected to be published in late 2006 / early 2007.		
Pollination Manual	Completion of a pollination manual for land managers for publishing by the Rainforest CRC.	Yes. 'Reproductive Biology and Pollination in Rainforest Trees: Techniques for a Community-level Approach' published in May 2006.		
Project 3.2 – Net Ecosystem Exchange of Carbon, Heat and Water in a Tropical Rainforest Led by Dr Michael Liddell, James Cook University				
Refereed Journal Paper	Publication of first major paper on eddy covariance measurements at Cape Tribulation – to be submitted by the end of 2005.	Paper in review on biomass measurements taken at the Australian Canopy Crane site. Publication of the first major paper on eddy covariance measurements has been delayed	Awaiting further code development (incorporation of a footprint model, which one reviewer has indicated is necessary for this complex site).	Anticipated publication July 2006.
Major Presentation	Presentation of project results at an international conference in the United States in January 2006.	Achieved – presentation made at the 1st iLEAPS Science Conference, held in Boulder, Colorado, 21-26 January 2006.		
PROGRAM 4 – RAINFOREST ACCESS: MANAGING AND MONITORING IMPACTS **Led by Professor David Gillieson, James Cook University**				
Project 4.1 – Strategies for Sustainable Rainforest Visitation and Use Led by Dr Joan Bentrupperbäumer, James Cook University				
Database Management	Consolidate, manage and store the extensive datasets that were established throughout the life of Project 4.1	Yes. Project 4.3 has prepared metadata records of visitor survey data collected by Project 4.1. Data will be stored with the Principal Investigator at James Cook University, Cairns.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
PhD Completion	Completion of a PhD project on long-distance walking tracks in the Wet Tropics.	Yes. Thesis submitted in June 2006 and is undergoing examination. Publications stemming from this research are under review, with further articles in preparation.		
Peer Reviewed Articles	Submission of book chapters, journal articles and a discussion paper on the outputs of Project 4.1 visitor and community surveys.	• Yes. A number of items have been submitted for publication. Selected items are listed in Chapter 11 List of Selected Papers and Other Publications. • A revision of the research report 'The Role of the Wet Tropics World Heritage Area in the Life of the Community' was finalised and published by the Rainforest CRC.		
End-user Collaboration	Preparation and provision of professional advice, data analyses and information to key stakeholder groups.	• Yes. Advice has been provided to the Wet Tropics Management Authority on a continual basis throughout Project 4.1 concerning the community survey and visitor monitoring system. • Advice also given to the tourism industry regarding the use of visitor sites within the World Heritage Area, and to the Mossman Gorge Aboriginal community about the use of the Mossman Gorge recreation site.		
Publish Best Practice Manual	Complete and publish a best practice manual for assessing the effects of visitation on Australian World Heritage Areas.	Yes. Three-volume Best Practice Visitor Monitoring System for the Wet Tropics World Heritage Area published by the Rainforest CRC and officially launched in conjunction with the Wet Tropics Management Authority in November 2005.		
Discussion Paper	Complete and publish a discussion paper on the visual assessment component of the Project.	Yes. Paper to be published by Rainforest CRC, entitled 'Measuring and monitoring landscape aesthetics and scenic amenity value in a World Heritage Area: A discussion paper'.		
Project 4.2 – Sustainable Roads, Powerlines and Walking Tracks Led by Dr Miriam Goosem, James Cook University and Professor David Gillieson, James Cook University				
Research	Continue evaluation of the effectiveness of faunal underpasses at East Evelyn and Mission Beach.	Monitoring of East Evelyn underpass for a five-year period is now complete. Traffic speed and volume data collected for Mission Beach.	Tropical Cyclone *Larry* prevented monitoring of Mission Beach underpass. This component of the project is being re-evaluated.	Discussions with Queensland Department of Main Roads.
PhD Completion	Submission of PhD thesis on the impacts of linear clearings on seed dynamics, microclimate and vegetation.	Yes. PhD thesis submitted at the end of June 2006.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
PhD Research	Completion of data collection and progression to write-up phase of PhD research assessing the impacts of linear clearings on medium-sized, ground-dwelling animals.	No.	Project encountered substantial set backs due to damage to research sites caused by Tropical Cyclone *Larry*.	Research sites were relocated to enable project to continue.
Research	Complete first phase of vehicle headlight impacts study. Complete analysis of roadkill on Kuranda Range road. Complete first phase of arboreal mammal overpass study.	First phase of vehicle headlight impacts study completed. Surveys of roadkill research sites completed. First phase of arboreal mammal overpass study completed.		
Research	Complete first phase of noise impact study.	Following completion of Honours project in 2004/2005, the study into the impact of traffic noise on song birds was extended and first phase completed.		
Best Practice Manual	Complete and submit Best Practice Manual for roads in Queensland to QDMR.	Yes.		
Project 4.3 – Improving GIS Models of Ecological Impacts Using High Resolution Remote Sensing Led by Professor David Gillieson, James Cook University				
Research	Complete field verification of powerline and riparian corridors, as part of a study into the vegetation changes that are taking place, and where.	No. However, Tropical Cyclone *Larry* enabled the team to acquire pre and post *Larry* radar and optical imagery.	Project was disrupted by continued wet weather. Tropical Cyclone *Larry* largely destroyed most research sites. The ongoing monitoring of regeneration and effects on fauna will continue as a component of the JCU/CSIRO Tropical Landscapes Joint Venture.	Project components will be completed in 2006/2007 as part of the new MTSRF arrangements and JCU/CSIRO Tropical Landscapes Joint Venture.
Workshop	Host a workshop on the preliminary results of image correction and rectification for high resolution airborne and satellite imagery used in Project 4.3.	Not carried out.		Still an option in 2006/2007 under new MTSRF arrangements.
Web-based Data Indexing	Completion of a web-based data index for the suite of Program 4 projects.	Visitor survey data from Project 4.1 was entered into metadata records. Some progress has been made towards entry of Project 4.2 data.		Completion of metadata entry for Projects 4.2 and 4.3 to be completed in later half of 2006.
Research	Complete an evaluation of edge effects in riparian vegetation for Mossman River catchment.	Satellite and aerial photography was acquired and processed. Field sites were established and surveys are underway.		Completion of Mossman River study to be completed under the new MTSRF arrangements.

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Refereed Journal Papers	Publication of analytical techniques developed in Project 4.3 using high-resolution satellite imagery and digital aerial photography.	Yes. Several papers were submitted for publication in Landscape Ecology, the *International Journal of Wildland Fire*, *Journal of Spatial Science* and *Pacific Conservation Biology*.		
Book Chapter	Book chapter on the applications of high resolution remote sensing in rainforest ecology and management completed for inclusion in Rainforest CRC book entitled 'Living in a Dynamic Tropical Forest Landscape'.	Yes. Book expected to be published in late 2006 / early 2007.		
Research Report	Completion of a report on applications of remote sensing in rainforest ecology and management for publishing by the Rainforest CRC.	Yes. 'Applications of High Resolution Remote Sensing in Rainforest Ecology and Management' published in June 2006.		
Project 4.4 – An Economic Assessment of Tourism in the Wet Tropics World Heritage Area Led by Professor Bruce Prideaux, James Cook University				
Visitor Survey	Conduct a survey of visitors to the Wet Tropics World Heritage Area.	Yes. A total of 861 visitors were surveyed at sites within the World Heritage Area and at Cairns airport.		
Data Analysis	Discuss methods and/or models for calculating the financial values of tourism to the Wet Tropics World Heritage Area with key stakeholders and participants of the study.	Yes. Communications remain ongoing while a final project report is in preparation.		
Research Report	Prepare and publish a report that summarises the current and up-to-date estimates of the value of the Wet Tropics World Heritage Area to the region's economy.	Yes. Report is in final stages of preparation and will be published in later half of 2006.		
PROGRAM 5 – RESTORATION ECOLOGY AND FARM FORESTRY **Led by Associate Professor Carla Catterall, Griffith University**				
Project 5.1 – Restoration Techniques Led by Dr David Lamb, The University of Queensland				
PhD Completion	Submission of a PhD thesis on wood quality assessment of plantation growth of *Flindersia brayleyana* (Anne Perry)	Laboratory work is now complete. Thesis yet to be finalised; due for submission in 2007.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
PhD Completion	Submission of a PhD thesis on the functional importance of biodiversity for carbon sequestration (Anna Richards)	Laboratory work is now complete. Thesis yet to be finalised; due for submission in 2007.		
PhD Completion	Submission of a PhD thesis on the effects of functional diversity of tree plantations on the restoration of soil fertility in degraded soils (Ilyas Siddique)	Laboratory work is now complete. Thesis yet to be finalised; due for submission in 2007.		
Masters Completion	Submission of a Masters thesis on the effects of underplanting with *Toona ciliata* in north Queensland (Mark Annandale)	Data analyses now complete. Enrolment upgraded to a PhD.		
Masters completion	Submission of Masters thesis on ideal plantation tree density for native timbers (Peter Lowther)	Thesis submitted and accepted.		
GIS-based Decision-making Tool for Forest Landscape Restoration	Completion of a beta version of a GIS-based landscape decision-making tool that is suitable for testing in the field.	Completed. Tool demonstrated at a meeting of the Global Partnership on Forest Landscape Restoration in the United States in May 2006. An ongoing project is to be funded in the future using external finances.		
Technical Report	Completion of a technical report on soil carbon in mixed species stands.	Data collection is complete. A draft report has been prepared.		
Technical Report	Completion of studies on some of the physiological attributes of contrasting farm forestry species, and production of a technical report on the final analyses.	Data collection is complete. A draft report has been prepared.		
Refereed Journal Papers	Complete and submit publications on competition indices, the functional importance of tree diversity and nutrition of trees grown in mixed plantations.	Papers have been submitted to journals. Several are now in press.		
Project 5.2 – Biodiversity Values and Landscape Context in Reforestation Led by Associate Professor Carla Catterall, Griffith University				
Sub-project: Quantifying Biodiversity Values of Reforestation (QBVR)				

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Refereed Journal Papers and Rainforest CRC Publications	• Publication of several papers on the biodiversity values of reforestation. • Publication of a biodiversity monitoring toolkit in collaboration with key stakeholders for publication by the Rainforest CRC.	• Five papers or book chapters published; one conference paper published. • Four book chapters in press. • 'Monitoring Revegetation Projects for Biodiversity in Rainforest Landscapes' published by the Rainforest CRC in June 2006. • Collaboration developed with FNQ NRM Ltd in areas relating to monitoring and evaluation of on-ground revegetation activities (application of techniques presented in monitoring toolkit) (Consultancy Agreement). • Three papers are still in review or in preparation and will be published post-CRC as part of the new MTSRF arrangements.		• Monitoring and evaluation research and its application, in conjunction with FNQ NRM Ltd, are planned and will be continued and extended under the new MTSRF arrangements.
Sub-project: Landscape Context – Vegetation Cover and Context, and their Relationships with Biodiversity Attributes				
Postgraduate Completions	Progress two Masters research projects to completion.	• Both Masters students have completed. • Two PhD research projects are in final stages and are due for completion by the end of 2006.		
Refereed Journal Articles	Publication of several papers on the effects of vegetation cover and context on rainforest biodiversity.	• Yes. Three papers published; one conference abstract published. Two papers are in press. • Two papers are still in review or in preparation and will be published post-CRC as part of the new MTSRF arrangements.		
Collaborations with Key Stakeholders	Continue ongoing interactions with key project stakeholders.	• Yes. Collaborative work continues with key stakeholders including FNQ NRM Ltd, Big Scrub Rainforest Landcare Group, Maroochy Shire Council and Byron Shire Council.		
Sub-project: Plant-animal Interactions in Regeneration Dynamics – Continued Progress and New Sub-project Design				
Refereed Journal Articles	Publish several further papers on plant-animal interactions in regeneration dynamics.	• Yes. One paper published; two Rainforest CRC *Issues in Tropical Forest Landscapes* papers published; one paper in press.		
Postgraduate Completions	Progress two Honours research projects to completion.	• Both Honours students have completed. • One PhD research project is nearing thesis submission; another still underway.	One PhD project was delayed due to personal illness.	Project will continue into 2006/2007.
Fact Sheet	Production of a user-focused fact sheet on rainforest regeneration in weedy regrowth.	• Yes. 'A New Role for Weeds in Rainforest Restoration?' published as Rainforest CRC *Issues in Tropical Forest Landscapes* paper.		
Sub-project: Reforestation Audit – A Wet Tropics Regional Directory				
Research Report	Finalise and publish a research report on rainforest restoration activities in the tropics and subtropics of Australia.	• Yes. 'Reforestation Activities in Australia's Tropics and Subtropics' published by the Rainforest CRC in June 2006.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Collaborations with Key Stakeholders	Continue ongoing collaborative work with FNQ NRM Ltd.	• Collaborations initiated in areas relating to monitoring and evaluation of outcomes of regional Natural Resource Management investment strategy, and State of the Environment reporting (Consultancy Agreement).		• Monitoring and evaluation research and its application, in conjunction with FNQ NRM Ltd, are planned and will be continued and extended under the new MTSRF arrangements.
Project 5.3 – Social and Economic Aspects of Reforestation Led by Dr John Herbohn, The University of Queensland				
Supply Chain Analysis	Completion of a supply chain analysis for the timber industry based on mixed species plantations, with a focus on hoop pine.	Literature review was completed and analysis is in preparation. Further data collection and fieldwork is required.		Research officer employed to undertake further data collection.
Financial Model	Further distribute the latest version of the Australian Farm Forestry Financial Model and undertake a study of the economics of plantations of high value cabinet timbers.	Yes. See Project 5.3 summary for overview.		
Reporting	Complete a report on the area available for the expansion of hoop pine on the Atherton Tablelands. Complete a report on the case study of landholders involved in farm forestry. Complete several papers to report the results of project activities.	Yes. Multiple publications were completed this year and further journal articles are expected to be submitted over the next year.		
Landscape Study	Complete a landscape aesthetics study investigating the impacts of forestry developments on the Atherton Tablelands.	Yes. Results of the study have been included in the Rainforest CRC publication, 'Sustainable Forest Industry Development in Tropical North Queensland'.		
PROGRAM 6 – CONSERVATION PRINCIPLES AND MANAGEMENT Led by Dr David Westcott, CSIRO Sustainable Ecosystems				
Project 6.2.1 – Ecology and Management of Wet Tropics Weeds Led by Ms Melissa Setter, Queensland Departments of Natural Resources, Mines and Water				
Seed Bank Longevity	Continue long-term seed longevity experiment following results from 2004/2005 showing that the selected species (harungana, hymenachne, siam weed and tobacco weed) still had viable seeds in seed banks.	• Yes. All 2005/2006 replicates were tested as scheduled. Viability is still high after six years' monitoring for hymenachne (21.5%) and harungana (80%). Tobacco weed was down to 7% after four years' monitoring. • Several species (including those mentioned above) still have viable seed, with scheduled testing times projected for several more years.		• Monitoring of this long-term ecological experiment will continue post-CRC until a full case study can be achieved.

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Reproduction and Seedling Survival Experiment	Continue long-term field experiment on the age of reproduction and seedling survival of pond apple (seedlings did not reach flowering age during the 2004/2005 research period).	• Pond apple reproductive age experiment monitoring continuing; flowering not yet reached two years after tagging. Anecdotal reports suggest flowering occurs at two years.		• Monitoring of this long-term ecological experiment will continue post-CRC until a full case study can be achieved.
Siam Weed Seed Banks	Continue monitoring of siam weed seed banks in coastal environments following 2004/2005 results showing that seedlings were still present at the research site.	• Objective of the experiment was to continue until zero recruitment was recorded for three consecutive years. • 2005/2006 monitoring of siam weed coastal environment study was completed. Seedlings were still present, so monitoring will remain ongoing.		• Monitoring of this long-term ecological experiment will continue post-CRC until a full case study can be achieved.
Hymenachne Shade Experiment	Continue long-term monitoring of hymenachne shade experiment.	• Following several years' monitoring in shady conditions, a reduction in biomass and seedling recruitment was apparent in plots that were shaded and sprayed.		• Monitoring of this long-term ecological experiment will continue post-CRC until a full case study can be achieved.
Eradication Experiment	Continue experiment to quantify the efforts required to eradicate a known population of siam weed.	• Monitoring of the recruitment of siam weed seedlings at Innot Hot Springs, Atherton Tablelands after the implementation of control activities continues. • A decline in the seed bank has been observed, while resources required to survey the study plot remains the same.		• Monitoring of this long-term ecological experiment will continue post-CRC until a full case study can be achieved.
Project 6.2.2 – Diet and Trapping Strategies of Feral Pigs in the Wet Tropics World Heritage Area Led by Dr Jim Mitchell, Queensland Department of Natural Resources, Mines and Water				
Research	Continue to refine feral pig management techniques following 2004/2005 field-testing of attractants in baits and traps.	• All eleven field trials are now complete, with twenty-two attractants and bait materials tested. • Novel control techniques were developed and tested. Results indicate that species-specific control techniques can be implemented, however the effectiveness of these techniques to control pig populations is low. Low encounter rates and nomadic pig movements cause low population control effectiveness.		
Research Report	Completion of a report on the outcomes of the attractants and baits study.	Analysis of field-testing results is now complete. Report is in preparation.		
Research Report	Completion of a report on the overall outcomes of Project 6.2.2 research.	Report completed on the diet of feral pigs, weed seed dissemination by feral pigs and the use of conditional avoidance technique.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Project 6.3.1 – Species and Processes at Landscape Scales: Are They Threatened? Led by Mr Peter Latch, Queensland Parks and Wildlife Service and Dr David Westcott, CSIRO Sustainable Ecosystems				
Flying Fox Forum	Continue with plans to form an operational flying fox forum.	No. However, focus is now being placed on this component of the overall project.	Delays were experienced in 2004/2005 due to low flying fox activity at fruit orchards during the fruiting season.	Focus for 2006/2007 under new arrangements with JCU/CSIRO Tropical Landscapes Joint Venture.
Review of Satellite Imagery	Undertake a final review of the availability of high resolution satellite imagery in relation to the project's spectacled flying-fox data.	Review completed. Currently, satellite imagery cannot be adequately matched with flying fox counts and survey dates.		
Satellite Tracking	Continue tracking of a further four flying-fox individuals using traditional radiotelemetry and an additional four animals using satellite telemetry.	Both the radio and satellite telemetry have been successfully completed and data is now being analysed.		
Recovery Plan	Complete and publish a Spectacled Flying Fox Recovery Plan.	Final draft is now complete and will be published by Queensland Parks and Wildlife Service.		
Project 6.4 – Impacts of Climate Change on Australia's Rainforest Marsupial Folivores Led by Dr Andrew Krockenberger, James Cook University				
Research	Complete water supplementation experiments. Determine the effects of high temperatures and water availability on free ranging green ringtail possums.	Yes. Lab components of this study have identified the thermal and water use strategy of green ringtail possums, and field measurements have allowed researchers to determine the seasonal peaks in nutritional / water stress to which the possums are subjected. This objective still requires results from analyses of water and oxygen tracers used in the field measurements before it can be finalised.		
Research	Undertake foliage analysis for components that limit water intake, and develop rainforest foliage nutritional characteristics (NIRS calibrations) for three tree species.	Yes. Successful in developing the first calibration relationships allowing measurement of nutritional characteristics of foliage from Australian rainforest trees by Near Infra-red spectroscopy – a powerful technique that will enable future measurements of nutritional quality of foliage to be made quickly and at a fraction of the cost of traditional chemistry.		
Research	Continue thermal conductance and insulation measures of GRTP.	Yes. Specimens have been collected and equipment constructed. Measurements are ongoing.		
Refereed Journal Papers	Submission and acceptance of technical manuscripts for publication on components of the work completed so far.	Yes. One manuscript has been published; another has been accepted subject to amendments; and two manuscripts are currently in circulation between authors.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Project 6.5 – Dynamic Models for Management Led by Dr Chris Margules, CSIRO Sustainable Ecosystems				
Database	Completion of a joint literature database relevant to conservation planning; complete analysis; and transfer technology.	Yes. The Endnote database contains journal articles (from 1980 onwards) about conservation planning, focusing on how conservation planning fits into land-use planning literature.		
Peer-reviewed Publications	Completion and submission of three peer-reviewed publications on optimising surveys, patterns of surrogacy and patterns of dissimilarity.	**Optimising surveys:** Funk, V. A, Richardson, K. S. and Ferrier, S. (2005) Survey-gap analysis in expeditionary research: where do we go from here? *Biological Journal of the Linnean Society* 85: 549–567. **Patterns of surrogacy:** Faith, D. P. and Williams, K. J. (2005) Phylogenetic diversity and biodiversity conservation. In: *McGraw-Hill Yearbook of Science and Technology*, p. 233-235 **Patterns of dissimilarity:** Elith, J., Graham, C. H., Anderson, R. P., Dudík, M., Ferrier, S., Guisan, A., Hijmans, R. J., Huettmann, F., Leathwick, J., Lehmann, A., Li, J., Lohmann, L. G., Loiselle, B. A., Manion, G., Moritz, C., Nakamura, M., Nakazawa, Y., Overton, J. M., Peterson, A. T., Phillips, S. J., Richardson, K. S., Scachetti-Pereira, R., Schapire, R., Soberón, J., Williams, S., Wisz, M. S. and Zimmermann, N. E. (2006) Novel methods improve prediction of species' distributions from occurrence data. *Ecography* 29: 129-151. Ferrier, S., Manion, G., Richardson, K. (2006 submitted/accepted) Using generalised dissimilarity modelling to analyse and predict patterns of beta-diversity in regional biodiversity assessment.		
Biogeographical Analysis	Completion of a biogeographical analysis of Wet Tropics flora.	Metcalfe, D. and Ford, A. (2006 in press) Floristics and plant biodiversity of the rainforests of the Wet Tropics. In: Stork, N. E. and Turton, S. M. (eds.) Living in a Dynamic Tropical Forest Landscape. Rainforest CRC.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Submission	Completion of a proposal for a 35th Global Hotspot – eastern Australian forests.	**Hotspot proposal:** plant endemism trigger confirmed; confirmation of land use trigger in progress. **Draft manuscript:** Authorship to be determined (2006 in preparation) The east-Australian tropical and subtropical forests – a global biodiversity hotspot? Affiliation to be confirmed.		
Metadata Management	Metadata and management of spatial data products.	A metadata inventory of spatial environment and planning data has been compiled for the Wet Tropics. These data have been listed in the CSIRO metadata search tool, CSE-meta.		
Wet Tropics Priority Areas	Completion of a preliminary identification of Wet Tropics biodiversity priority areas. Example of opportunity-cost trade-offs in scheduling biodiversity action in the Wet Tropics.	Williams, K. J., Margules, C. R., Pert, P. L., Ford, A. J. and Barrett, T. (2006 in press) A preliminary assessment of priority areas for plant biodiversity conservation in the Wet Tropics Bioregion. In: Stork, N. E. and Turton, S. M. (eds.) Living in a Dynamic Tropical Forest Landscape. Rainforest CRC.		
PROGRAM 7 – ABORIGINAL COLLABORATION AND CAPACITY-BUILDING IN RESEARCH **Led by Dr Sandra Pannell, James Cook University**				
Project 7.1 – Identification of Indigenous Cultural Values and Landscapes within the Wet Tropics World Heritage Area Led by Dr Sandra Pannell, James Cook University				
Desktop Study	Undertake a comparative assessment of the formulation of cultural values and landscapes across a number of World Heritage sites, nationally and globally. Formulate guidelines for understanding, identifying and protecting Indigenous values and spatial constructs within protected areas.	Yes. A detailed analysis of the process leading to the World Heritage listing of the Wet Tropics, and the extent to which this process recognised Indigenous values, was undertaken. The Rainforest CRC has now published the results of this comparative analysis of the way in which cultural and natural values, and a range of landscapes, are represented and protected through World Heritage inscription.		
Nomination Documentation	Prepare documentation to support listing of the Wet Tropics World Heritage Area on the new National Heritage List for its Indigenous cultural values and/or cultural landscapes.	Yes. A completed National Heritage List nomination document was provided to the Aboriginal Rainforest Council (ARC) at the beginning of July 2006 for review, however changes in personnel at the ARC means the review process may extend beyond the completion date of this Project.		
Project 7.3 – Technical Education and Training, and Participatory Domestication of Native Food Plants with the Ma:Mu Community Led by Professor Roger Leakey, James Cook University and Ms Marianne Helling, Innisfail College of TAFE				

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Education	Coordination of further TAFE College courses on the domestication of native food plants.	No.	Enrolments are in decline and new courses have not been pursued.	
Specimen Sampling	Continue to expand sampling of plant species identified as key bush food providers, with an aim of propagating 2,500 seedlings for replanting.	Yes. A total of 2,519 plants have been propagated and await planting, however planting has not yet commenced due to disagreement on suitable site and the consequences of Tropical Cyclone *Larry* in the immediate area.		
PROGRAM 10 – CATCHMENT TO REEF JOINT RESEARCH PROGRAM WITH CRC REEF RESEARCH CENTRE **Led by Professor Richard Pearson, James Cook University**				
Task 1 – Riparian Zone Performance: Tools and Protocols for Quality Assessment and Monitoring Led by Mr Jon Brodie, Australian Centre for Tropical Freshwater Research, James Cook University				
Sample Analysis	Analysis of water samples collected during the 2005/2006 wet season to test for suspended sediments, nutrients and pesticides.	• Yes. Sampling was concluded at sugar cane and banana cultivation plots in the Tully/Murray and Barron catchments, and at an urban lakes system site in Mareeba. • A comprehensive report is now in preparation that summarises and interprets four years' of results.		
Technical Report	Completion of a report on the results of analyses of water samples collected during the 2004/2005 wet season.	• Five reports of components of Task 1 are now in draft form and will be submitted for review. • A best practice paper is complete and another two papers are in preparation.	Technical reports and two manuals are due for completion for inclusion in the Catchment to Reef communications package.	
Technical Report	Completion of a report on water quality testing for landholders and key stakeholders involved in the study.	• Researchers are reporting directly to landholders involved in the study. • Results from Task 1 are also being used in the Tully Water Quality Improvement Plan process, which is currently in discussion with landholders of the Tully catchment.	Further input of results to planning processes in the Wet Tropics and Mackay Whitsunday regions is planned.	
Task 2 – Monitoring Tools for Water Quality Assessment Led by Dr Barry Butler, Australian Centre for Tropical Freshwater Research, James Cook University				
Water Quality Manual	Commence development of water quality guidelines for Great Barrier Reef catchments for incorporation in water quality monitoring manual.	Yes. Preparation of the manual is at an advanced stage however the date for completion has been extended to the end of 2006 to accommodate a late start to the program and attend to some last-minute issues.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Sampling Program	Completion of a sampling program and fieldwork with Tasks 1 and 3 by April 2006.	• Yes. The planned monitoring activities were completed on schedule. Results have been reported back to community volunteers. • Some setbacks were experienced due to Tropical Cyclone *Larry*.	Due to elevated stream flows in the aftermath of Tropical Cyclone Larry, it has not yet been possible to gain access to some of the in situ baseflow monitoring equipment being tested by Task 2. It may be a few more months before researchers can assess how well the equipment coped with the severe weather conditions.	
Book Section	Completion of Task 2 components for inclusion in Catchment to Reef best practice manual.	Yes. Completed and submitted for inclusion in May 2006.		
Task 3 – River Health Assessment Tools Led by Professor Angela Arthington, Griffith University				
Biological Indicators	Refinement of indicators for riparian and stream disturbance and ecological health for field testing and subsequent publication.	• Yes. Biological indicators were tested in field trials undertaken in several Wet Tropics catchments in June and July 2005. • Results of the trials are being incorporated in a technical report and several journal articles.		
Technical Report	Completion of sections for the River Health Protocols report and components for a best practice manual.	Yes. Technical report resulting from the field study in final stages of preparation, for completion by September 2006.		
Refereed Journal Papers	Publication of several journal articles on the use of biological indicators for stream health and disturbance.	Yes. Several papers were published in 2005/2006 and several others have been accepted.		
Task 4 – Frameworks for Integrated Catchment Management Led by Professor Angela Arthington, Griffith University				
Book Revision	Continue to update a dossier of issues and notes to update the book 'Freshwater Fishes of North-Eastern Australia' (released in 2004).	An ongoing task.		
Atlas	Development of a web-based GIS fish and invertebrate atlas for the Wet Tropics.	Yes. Atlas will be finished in late 2006.		
Collaborations with End-users	Ongoing provision of advice and assistance to the Queensland Environmental Protection Agency.	Yes. This component remains ongoing. Task 4 also contributed to a Workshop on Indicators of Stream Health at the Catchments to Coasts Conference in Cairns in July 2006 (Society of Wetland Scientists).		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Refereed Journal Papers	Complete and submit several journal articles for publication in 2006.	Yes.		
Technical Report	Completion of a report or journal article on the outcomes of a review of local, national and international approaches to the identification of river restoration priorities and strategies at a range of spatial scales in rivers.	Yes. This task is in progress and will be completed before the close of the Catchment to Reef program.		
Task 5 – Advanced Technologies for Monitoring Water Quality in the Great Barrier Reef Led by Dr Miles Furnas, Australian Institute of Marine Science				
Deployment of Passive Samplers Along the Wet Tropics Coast	• Complete laboratory-based measurements and analyses of passive samples collected to date. • Complete sampling in the Wet Tropics during a second wet season. • Complete laboratory-based bioindicator tests of pesticide extracts from passive samplers. • Substantial progress on data analysis and PhD thesis preparation. • Preparation of protocols for professional and non-professional users of passive samplers for community-based monitoring programs.	• All laboratory-based measurements and analyses have been completed, along with additional passive sampling. • A large component of the bioindicator testing has been completed. This work is ongoing. • Additional experiments were carried out to validate passive sampler performance during simulated flood events. • PhD thesis development is ongoing.	The passive sampling PhD project is progressing, with thesis submission expected in early 2007.	
Use of Ocean Colour Imagery	• Complete data processing for the Great Barrier Reef ocean colour atlas. Load imagery to a web-accessible retrieval and presentation system. • Development of local protocols for processing satellite imagery data.	• Data processing for the atlas is finished. Development of a presentation system is underway by other personnel with advice from Task 5 participants. • Development of local protocols underway as part of the PhD thesis writing process.		
Comparison of Historical Imagery with Historical Chlorophyll Data Sets	• Compare measured ocean colour (at sea level) with retrieved values from SeaWIFS and MODIS satellites and compare retrieved surface chlorophyll values with AIMS historical data sets. • Complete substantial analysis of data set and further progress PhD thesis development. • Develop algorithm recommendations for local changes to ocean colour.	• Ocean colour comparison underway as part of the PhD thesis writing process. A limited match-up analysis indicates good correlations between measured and predicted surface chlorophyll contents based on ocean colour spectra measured in the field. • Extensive additional ocean colour and in-water optical data were collected in January 2006 using underway sensors on R. V. Lady Basten. Data is now being analysed. • Data analysis and algorithm recommendations underway as part of the PhD writing process.		

Type of Milestone / Output	Description of Milestone / Output	Milestone / Output Achieved? If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons for Delays and/or Milestones Not Met	Strategies to Achieve Milestones
Task 6 – Condition and Trend Assessments for Coastal Marine Communities Led by Dr Katharina Fabricius, Australian Institute of Marine Science				
Coral Indicators	Complete laboratory and fieldwork on coral indicators.	Yes. More than 150 person days was spent in the field throughout 2005/2006 collecting data.		
Publications	Following data analyses, complete journal papers on coral physiology, water quality indicators in sediments and biofilms (laboratory and field aspects) and ecological and biodiversity indicators.	Yes. Six papers and a PhD thesis were submitted this year. Several presentations were given at the Rainforest meets Reef Joint Conference, the Erosion and Sediment Management Conference and at the Ocean Sciences Conference in Hawaii.		
Task 7 – Achieving Outcomes: Adoption of Tools Through Training of the Current and New Generation of Practitioners Led by Professor Richard Pearson, James Cook University				
Workshops	Coordinate Catchment to Reef scientists' workshops throughout 2005/2006 to facilitate information and knowledge sharing and further development of Catchment to Reef products.	Yes. Several workshops were held throughout the year, enabling different Task teams to discuss and benefit from each other's experiences and research outcomes. This enabled Task teams to align their research to meet the overall goals of the Catchment to Reef Program.		
Communications Strategy	Re-assess the validity of the Catchment to Reef Communications Strategy with the potential for a review.	Yes. The Communications Strategy was reviewed and revised by two external consultants following the resignation of the Communications Officer in 2005. This resulted in a new framework that allowed for maximum productivity in a minimal timeframe.		
Media Releases	Finalise and coordinate media releases scheduled for July and November 2005.	Yes. Media releases were prepared and distributed to advertise the major components of the program and progress made to date. Good coverage was received in North Queensland.		
Contribution to Annual Conference	Contribute to the Joint Annual Conference of the Rainforest CRC and CRC Reef, scheduled for November 2005.	Yes. Catchment to Reef scientists presented a number of papers, and contributed to several other major conferences during the 2005/2006 period.		

5.2 RESEARCH COLLABORATIONS

Table 6: Summary of research consultancies that continued or were commenced in 2005/2006.

Funding Agency	Project Details and Principal Researchers	Total Period of Contract	Amount 2005/2006
AgForests Queensland Limited	Modifications to the Australian Farm Forestry Financial Model **Dr John Herbohn (UQ)**	2005-2006	$12,540
CSIRO Sustainable Ecosystems	Evaluation of Invasive Species (Weeds) Outcomes of Regional Investment **Mr Nigel Weston (JCU)**	2005-2006	$11,570
FNQ NRM Ltd	Monitoring and Evaluation of Revegetation Works in the Wet Tropics **Associate Professor Carla Catterall (GU)**	2005-2006	$14,580
FNQ NRM Ltd	Delivery of Identified Components of Project CA4.1 Regional Investment Strategy Participatory Planning **Associate Professor Carla Catterall (GU)**	2005-2006	$49,256
FNQ NRM Ltd	Local Area Planning Approach to Mission Beach Cassowary Conservation – Stage 1: Framework **Mr Nigel Weston (JCU)**	2005-2006	$15,500
Herberton Shire Council	ATSRAC Hoop Pine Project **Dr John Herbohn (UQ)**	2005-2006	$218,182
Marine and Tropical Science Research Facility (DEH)	Interim Funding Agreement – via CRC Reef **Various researchers at JCU, CSIRO and GU**	2005-2006	$959,422
Maroochy Shire Council	Development of Project Design and Monitoring Program of Camphor Laurel Treatment Trial **Dr John Kanowski (GU)**	2005-2006	$2,000
Natural Heritage Trust	Catchment to Reef Research Project **Professor Richard Pearson (JCU)**	2005-2006	$250,000
Queensland Department of Main Roads	Kuranda Range Roads – Applying Research to Design **Professor Steve Turton (JCU)**	2004-2006	$289,174
Queensland Department of Main Roads	Mission Beach Roads – Monitoring Cassowary Population **Dr Miriam Goosem (JCU)**	2004-2006	$12,000
Queensland Department of Main Roads	East Evelyn Road Underpass – Monitoring Underpass Effectiveness **Dr Miriam Goosem (JCU)**	2004-2006	$29,272
Queensland Department of Main Roads	Best Practice Manual – Roads in a Tropical Forest **Mr Guy Chester (JCU)**	2004-2006	$16,000
Queensland Environmental Protection Agency	Wildlife Management Plan: Barron River Delta and Marlin Coast **Mr Guy Chester (JCU)**	2005-2006	$20,000
Wet Tropics Management Authority	Feral Deer Monitoring and Assessment Program **Dr Andrew Krockenberger (JCU)**	2005-2006	$25,500
Wet Tropics Management Authority	Lorentz World Heritage Area – Strategic Plan Preparation **Mr Guy Chester (JCU)**	2005-2006	$1,000
Total for 2005/2006			**$1,926,016**

Table 7: Examples of grants and awards reported by Rainforest CRC researchers throughout 2005/2006.

Funding Agency	Project Link	Project and Principal Investigator/s	Amount	Project Duration
James Cook University Research Advancement Program	Project 2.5	Proposal for Centre for Tropical Biodiversity and Climate Change based at James Cook University **Dr Steve Williams**	$285,000 per annum	3 years
Norman Wettenhall Foundation	Project 5.2	Bird-plant interactions in rainforest fragmentation and restoration (two projects) **Assoc. Professor Carla Catterall *et al.***	$6,000	12 months
Griffith University Community Support Grants	Project 5.2	Development and distribution of community-accessible materials on the management of flying-fox camps in southeast Queensland **Dr John Kanowski *et al.***	$5,900	12 months
JCU/CSIRO Tropical Landscapes Joint Venture	Project 6.3.1	Flying foxes post-Cyclone *Larry* **Dr David Westcott *et al.***	$29,000	12 months
Queensland Department of Natural Resources, Mines and Water	Project 6.3.1	Biological invasions post-Cyclone *Larry* **Dr Dan Metcalfe *et al.***	$90,000	12 months
CRC for Australian Weed Management	Project 6.3.1	Weed impacts post-Cyclone *Larry* **Dr David Westcott *et al.***	$50,000	12 months
Conservation International	Project 6.5	Conservation International/CSIRO partnership for scientific support to the Melanesia Centre for Biodiversity Conservation **Dr Chris Margules *et al.***	$100,000	6 months; Jan-Jun 2006
CSIRO Water for a Healthy Country	Project 6.5	Floodplain renewal theme: Maximising biodiversity outcomes in landscape planning for water quality **Dr David Westcott *et al.***	$25,000	12 months; Jul 2005 to Jun 2006
Queensland Environmental Protection Agency	Catchment to Reef	Peer review of the Aquatic Biodiversity Assessment Mapping Method (AquaBAMM): A method for identifying conservation values of waterways **Professor Richard Pearson *et al.***	$7,000	1 week

5.3 INTERNATIONAL VISITORS

Rainforest CRC participants have a proven track record in collaboration with international scientists and researchers on work directly related to Centre projects. Example project links, research collaboration and duration of visits by international visitors are provided here.

Table 8: Examples of international experts and researchers with whom collaborative work was undertaken during 2005/2006.

Visitors	Project Link	Details	Duration of Visit
Dr Bruno Corbara University Blaise Pascal	Project 3.1	Discussion of options for running an IBISCA (Investigating the Biodiversity of Soil and Canopy Arthropods) project in Queensland	5 days
Professor Vojtech Novotny Czechoslovakian Academy of Sciences	Project 3.1	Preparation of a submission for an Australian Research Council collaborative project	5 days
Dr Huynh Duc Nhan Forest Research Centre, Vietnam	Project 5.1	Collaborative work and attendance at XXII IUFRO World Congress	2 weeks
Dr Edson Leite EMBRAPA, Brazil	Project 5.3	Visiting research fellow	12 months
Ms Julie Denslow USA Department of Agriculture	Project 6.2.1	Shared interest in tropical weeds, particularly melastomes	2 days
Dr Lisa Dabek Woodland Park Zoo, USA	Project 6.4	To participate in Tree-kangaroo ecology and conservation conference, organised by Project 6.4 researchers	1 week
Mr David Mitchell Conservation International Papua New Guinea	Project 6.5	Technology transfer and training, conservation planning methodology	6 weeks

6. COMMERCIALISATION AND UTILISATION

6.1 COMMERCIALISATION / UTILISATION STRATEGIES AND ACTIVITIES

Early in the second phase of the Rainforest CRC, the Governing Board agreed that it was unlikely that the Rainforest CRC would commercialise its intellectual property. Therefore, the efforts of the Rainforest CRC have focused on transmitting new knowledge to our stakeholders either directly through our Programs, Projects and partners, or through our communication efforts managed by Headquarters staff. A summary of communications achievements by participants and staff of the Rainforest CRC are outlined in Chapter 7.

6.2 INTELLECTUAL PROPERTY MANAGEMENT

A review was undertaken of all the Rainforest CRC projects in late 2005, resulting in a register of all projects and their products. The Governing Board reviewed these documents and agreed that there was no commercially viable intellectual property. A meta-database system produced by CSIRO Sustainable Ecosystems was adopted in 2006 and training was offered to all Program and Project leaders on the development of such systems. With the wind-up of the Rainforest CRC, responsibility for the maintenance of these meta-databases lies with the individual project host organisation, and all Rainforest CRC partners retain access rights to these databases in accordance with the 1999 Centre Agreement.

The Governing Board of the Rainforest CRC this year approved an agreement that the new Marine and Tropical Science Research Facility should be given access to the Rainforest CRC intellectual property for non-commercial purposes.

6.3 END-USER INVOLVEMENT AND IMPACT ON END-USERS

Table 9: Examples of end-user involvement in the activities of the Rainforest CRC.

Industry or other research users and the basis of their interaction (e.g. Core Participant)	**Type of activity and location of activity**	**Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)**
Project 1.1 – Wet Tropics Regional Planning and Management Led by Professor Geoff McDonald, CSIRO Sustainable Ecosystems		
Core Participants		
FNQ NRM Ltd	Major project partner and end user of regional planning and management processes.	Project 1.1 has provided scientific knowledge and policy to support regional natural resource management (NRM) planning and management within the Wet Tropics NRM region, including water quality targets and implementation activities.
Queensland State agencies in environment and natural resources management; local governments; industry groups	Research users	Of immediate and direct relevant to NRM in the Wet Tropics and Mackay regions.
Project 1.2 – Regional State of the Wet Tropics Satellite-based Monitoring Information System Led by Associate Professor Stuart Phinn, The University of Queensland		
Core Participants		
Queensland State Government agencies and similar agencies of the Northern Territory	Development of statistically robust and viable error assessment schemes for validating satellite image maps of environmental indicators.	Incorporation of appropriate error assessment programs as part of mapping programs conducted by State agencies. Sharing of data and knowledge on error assessment approaches.
Queensland Department of Natural Resources, Mines and Water	Multi-date trend detection mapping based on multi-date image data sets of selected environmental indicators.	Techniques for application to multi-date, long-time series image data to map trends in vegetation cover and kangaroo distribution.
Project 2.2 – Water Regulation as an Ecosystem Device Led by Dr David McJannet, CSIRO Land and Water		
Core Participants		

Industry or other research users and the basis of their interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)
Queensland Department of Natural Resources, Mines and Water	Research users	Input into Far North Queensland Water Strategy.
Project 2.5 – Impacts of Climate Change on Rainforest Ecosystems and Biodiversity Led by Dr David Hilbert, CSIRO Sustainable Ecosystems and Dr Steve Williams, James Cook University		
Core Participants		
National Center for Ecological Analysis and Synthesis	Collaborative research	Direct input into an international evaluation of predictive species distributions and biodiversity modelling.
Wet Tropics Management Authority, Commonwealth Government, Queensland Government, IUCN, WWF, IPCC	Uptake of management and policy recommendations	Informed decision making with respect to declining number of core refugial areas of rainforest in the face of global warming and climate change.
Project 3.1 – Floral Biology and Canopy Pollination in Fragmented Forests Led by Professor Roger Kitching, Griffith University		
Core Participants		
Global Canopy Programme / United Nations Environment Programme / Global Environment Facility	Collaborative research	Direct input into the design of an international program on 'whole forest observatories' in developing countries, based on installation of canopy cranes.
Project 3.2 – Net Ecosystem Exchange of Carbon, Heat and Water in a Tropical Rainforest Led by Dr Michael Liddell, James Cook University		
Core Participants		
OzFlux, FLUXNET	Knowledge and information sharing	Providing unique data on carbon and water balances of the rainforest surrounding the Australian Canopy Crane Research Facility. *OzFlux* is a network of micrometeorological flux stations located at various sites within Australia and New Zealand, and is part of two hundred global FLUXNET sites measuring the exchanges of carbon dioxide, water vapour and energy between terrestrial ecosystems and the atmosphere.
Project 4.1 – Strategies for Sustainable Rainforest Visitation and Use Led by Dr Joan Bentrupperbäumer, James Cook University		
Core Participants		
Wet Tropics Management Authority	User of tourism / visitation data	• Informed management policy. • Provision of up-to-date baseline data of tourism / visitation in the Wet Tropics. Research findings from visitor and community surveys continue to be incorporated into State of the Wet Tropics reporting and have informed Wet Tropics communication strategies.
Wet Tropics Management Authority, Queensland Environmental Protection Agency and Tourism Industry	Monitoring visitation to and use of recreation sites within the Wet Tropics World Heritage Area.	• Best practice management guidelines. • The Visitor Monitoring System (VMS) has brought together key stakeholders together in their consideration of managing and monitoring impacts of visitors to Wet Tropics sites. The VMS provides a clear set of best practice guidelines for monitoring visitation to World Heritage Area recreation sites.

Industry or other research users and the basis of their interaction (e.g. Core Participant)	**Type of activity and location of activity**	**Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)**	
Bamanga Bubu Ngadimunku (Mossman Gorge Aboriginal Community)	Ongoing collaboration regarding the community-based planning project and use of the Mossman Gorge recreation site.	Community Plan to support applications for funding to support, for example: • New housing and maintenance; • Design of a new community centre; • Grants for different work gangs covered by the CDEP; • Several members of the community receiving a trade (e.g. builder); and • Developing of housing committee and community-based building company.	To provide for social, economic, environmental and cultural needs of an Indigenous community living adjacent to the Wet Tropics World Heritage Area. Recommendations from the Mossman Gorge Aboriginal Community Plan have resulted in an 85% success rate for the community in applications for funding across a number of areas, including new housing and maintenance, a new community centre and opportunities to undertake a trade (employment opportunities).
Queensland Parks and Wildlife Service, Wet Tropics Management Authority, Tourism Industry		Best practice management guidelines	Provision of a comprehensive list of recommendations for management of long-distance Wet Tropics walking tracks.
Project 4.2 – Sustainable Roads, Powerlines and Walking Tracks Led by Dr Miriam Goosem, James Cook University and Professor David Gillieson, James Cook University			
Core Participants			
Queensland Department of Main Roads	Provision of advice and planning for future research	Ensuring best practice environmental outcomes of infrastructure upgrades. Planning of continuing research into less well-known impacts and mitigation strategies. Design of highways to provide best practice environmental outcomes.	Alterations to the design of the Kuranda Range road upgrade. Incorporation of research into best practice manuals for design, construction and operation of rainforest roads.
Queensland Environmental Protection Agency	Provision of advice and data	Use of data concerning road mortality of, and underpass use by the southern cassowary. Advice to Agency regarding road verge maintenance and underpass design.	Requirements for more information from proponents, decisions on maintenance practices in protected areas.
Powerlink Queensland	Provision of advice and planning for future research	Provision of advice regarding powerline clearing impacts and mitigation. Planning future research in other ecosystems and examination of impacts of powerlines on cyclone damage.	
Wet Tropics Management Authority	Provision of advice	Advice concerning linear infrastructure impacts and mitigation.	Alterations to the design of upgrades, requirements for further information.
Rainforest CRC Project 5.2	Discussion of habitat quality rapid assessment	Application to research on habitat quality in riparian vegetation and damage caused by Tropical Cyclone *Larry*.	
Commonwealth Department of the Environment and Heritage	Research progress feedback and provision of advice	Use of research to inform decisions on infrastructure upgrades, operation and maintenance.	Alterations to the design of upgrades, requirements for further information.
Project 4.3 – Improving GIS Models of Ecological Impacts Using High Resolution Remote Sensing Led by Professor David Gillieson, James Cook University			

Industry or other research users and the basis of their interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)
Core Participants		
Australian Taxation Office	Detection of illegal tobacco crops	Means of monitoring changes in vegetation using satellite remote sensing.
Wet Tropics Management Authority	Use of high resolution monitoring of vegetation changes along linear infrastructure clearings.	Potential for monitoring using remote sensing considered in *State of the Wet Tropics* reporting.
Queensland Department of Main Roads	Information for design review and future monitoring processes for Kuranda Range road, modelling of noise and headlight disturbance.	Potential of monitoring using remote sensing incorporate into Best Practice Manual.
Project 4.4 – An Economic Assessment of Tourism in the Wet Tropics World Heritage Area Led by Professor Bruce Prideaux, James Cook University		
Core Participants		
Wet Tropics Management Authority, Queensland Environmental Protection Agency, Tourism Queensland, Tourism Tropical North Queensland, Commonwealth Department of Industry, Tourism and Resources, relevant conservation groups and management agencies, Traditional Owners and key tourism industry organisations.	Use of survey methodologies	This project will update the financial value of tourism within the Wet Tropics World Heritage Area. It will also provide an assessment of the financial value of the natural asset to a regional economy.
Project 5.1 – Restoration Techniques Led by Dr David Lamb, The University of Queensland		
Core Participants		
Key stakeholders involved in collaborative research include Queensland Department of Primary Industries (Forestry); North Queensland Afforestation Association; Forest Research Centre of Vietnam; Global Partnership on Forest Landscape Restoration.		
Provision of advice to Central Queensland Farm Forestry Association.		
Project 5.2 – Biodiversity Values and Landscape Context in Reforestation Led by Associate Professor Carla Catterall, Griffith University		
Core Participants		
Maroochy Shire Council	Monitoring the outcomes of camphor laurel control treatments in southeast Queensland.	Written materials, advice and field training provided. Improved environmental management by local government.
Big Scrub Rainforest Landcare Group	Subtropics (northern New South Wales). Input into the Group's rainforest restoration manual, used as a guide to community-based rainforest regeneration activities.	Improvements in methods used by community, catchment management and landcare groups in on-ground rainforest restoration.
FNQ NRM Ltd	Wet Tropics. In collaboration with external bodies, review structural framework for monitoring of MATs (capacity building).	Helps to progress a regionally-coherent approach to on-ground natural resource management works and *State of the Environment* reporting by regional natural resource management organisation.

Industry or other research users and the basis of their interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)
FNQ NRM Ltd	Wet Tropics. Procedures for monitoring and evaluation of revegetation projects were developed in consultation with FNQ NRM Ltd staff. FNQ NRM Ltd facilitated meetings with community revegetators as part of a planned set of steps that will result in the adoption of the on-ground monitoring procedures later in 2006.	Significant steps taken towards adoption of best-practice monitoring methods for on-ground outcomes of revegetation. Part of this process has involved the production of a best practice manual for monitoring biodiversity outcomes of revegetation. Also tailored towards the needs to the regional natural resource management body.
FNQ NRM Ltd, Commonwealth Bureau of Rural Sciences, Land and Water Australia, Wet Tropics Management Authority, Queensland Department of Natural Resources, Mines and Water	In collaboration with FNQ NRM Ltd, four structured workshops were organised involving State and Commonwealth government staff.	Development of frameworks for reporting on regional natural resource assets and their condition, e.g. for *State of the Environment*, state of region and catchment reporting, and for evaluating progress towards Management Action Targets specified within the Wet Tropics Regional NRM Plan.
Project 5.3 – Social and Economic Aspects of Reforestation Led by Dr John Herbohn, The University of Queensland		
Core Participants		
Forest Research Insititute, Baden-Württemberg, Germany	Joint research undertaken with Dr Christoph Hartebrodt. This work applies and extends the forestry reporting and landholder typology research that Project 5.3 has undertaken over the past five years in the Rainforest CRC.	• Research on multi-dimensional performance measurement systems has influenced the development of these systems in three State Forest services in Germany. Research in ongoing. • Landholder typology work has already changed practices within Baden-Württemberg and further application of research is expected.
Ministry of Agriculture, Vietnam	Joint research into the prospect for utilising native tree species for timber production and biodiversity conservation in northern Vietnam.	Collaborative research with personnel based in Vietnam ministries to analyse existing survey data regarding the adoption of forestry by small-scale growers and to develop further survey instruments based on Project 5.3 research experiences in Australia, the Philippines and in Europe.
Private Forestry North Queensland and the Australian Forest Growers	Development of strategic forest industry development plans and a research program.	Both groups are key players involved in forestry development in the northern Queensland region. Regular meetings with and presentations to these groups has allowed Project 5.3 to ensure its research program is effectively communicated to those involved in development of sustainable forest industries and natural resource management in the region.
FNQ NRM Ltd	Development of strategic forest industry development plans.	FNQ NRM Ltd is an active group coordinating natural resource management research, policy and program development in the far northern Queensland region. Ongoing communications with this group ensures that they are fully aware of Project 5.3 research findings and that CRC research is complementing other research programs within the region.
Project 6.2.1 – Ecology and Management of Wet Tropics Weeds Led by Ms Melissa Setter, Queensland Departments of Natural Resources, Mines and Water		
Core Participants		
CSIRO, Weeds CRC and Queensland Department of Natural Resources, Mines and Water	Collaborative work on Melastome dispersal, particularly frugivorous dispersal of *Miconia calvescens.*	Modelling and on-ground monitoring of distribution of *Miconia calvescens*, particularly via frugivorous birds and animals. This work is helping the CSIRO to refine and test their frugivore dispersal models, and helping the Queensland Department to define and refine search areas for these weeds.

Industry or other research users and the basis of their interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)
Weeds CRC and Queensland Department of Natural Resources, Mines and Water	Collaborative work on the ecology of several Class One weeds, including *Miconia calvescens.*	Basic ecological information such as flowering times, age to reproduction, etc. is being found for several species.
Weeds CRC and Queensland Department of Natural Resources, Mines and Water		Project 6.2.1 is contributing seeds and information to a Weeds CRC PhD student who is studying laboratory-based accelerated aging process of seed.
Local Governments (Councillors and Weed Control Officers), Queensland Environmental Protection Agency, private landholders	Transfer of knowledge, provision of advice.	Project 6.2.1 regularly provides research updates and research highlights to the Far North Queensland Pest Advisory Forums. These quarterly meetings involve many land managers, including Local Councils, the Queensland Environmental Protection Agency and private landholders.
National Pond Apple Management Group	Participation in management group.	Project 6.2.1 participates in the group, which was set up to direct/assist the achievement of strategic goals in the management of pond apple on an Australia-wide basis.
Weeds CRC, Queensland Department of Natural Resources, Mines and Water, Local Government Authorities	Contribution to siam weed delimitation project	This project is defining the area in which siam weed occurs, including actively seeking new infestations, and compiling all existing reports. It will help to determine the extent of the weed, whether eradication is still a viable option, and how much this is likely to cost.
Project 6.2.2 – Diet and Trapping Strategies of Feral Pigs in the Wet Tropics World Heritage Area Led by Dr Jim Mitchell, Queensland Department of Natural Resources, Mines and Water		
Core Participants		
Invasive Animals CRC	Research collaboration	Cooperative research link for feral pig bait development. Information on acceptability of bait materials supplied to the Invasive Animals CRC. Information on bait development supplied to postgraduate students. Development of a prototype commercially-available feral pig bait suitable for the Wet Tropics. Students commencing studies with the Invasive Animals CRC obtained data from Project 6.2.2.
Far North Queensland Pest Advisory Forum	Information exchange	Information supplied on bait acceptability and bat/trapping stragegy.
Queensland Department of Natural Resources, Mines and Water	Information exchange	Information relevant to feral pig control techniques supplied to support current research projects. Alternative bait/trapping systems are being refined.
National Feral Animal Control Program	Research collaboration	Information relevant to feral pig bait delivery systems supplied to the Program to support current research projects.
Project 6.3.1 – Species and Processes at Landscape Scales: Are They Threatened? Led by Mr Peter Latch, Queensland Parks and Wildlife Service and Dr David Westcott, CSIRO Sustainable Ecosystems		
Core Participants		
Queensland Department of Natural Resources, Mines and Water	Dispersal kernel estimates for Melastomes to set eradication search areas.	Increased search areas found more established plants. A further collaborative research and eradication program has been established.
Queensland Parks and Wildlife Service	Flying-fox camp survey methodology	Queensland Parks and Wildlife Service seeks to use Project 6.3.1 methodology standard for flying-fox counts.
Growcom	Collaborative work	Involving members of Growcom in the project improves interaction between fruit growers and Project researchers.
Project 6.4 – Impacts of Climate Change on Australia's Rainforest Marsupial Folivores Led by Dr Andrew Krockenberger, James Cook University		
Core Participants		

Industry or other research users and the basis of their interaction (e.g. Core Participant)	Type of activity and location of activity	Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)
American Zoo and Aquiarists Associations Tree Kangaroo Conservation Program	Collaborative work	Progressing research and conservation of tree-kangaroos, extending scope of projects into Papua New Guinea.
Project 6.5 – Dynamic Models for Management Led by Dr Chris Margules, CSIRO Sustainable Ecosystems		
Core Participants		
Conservation International, Melanesia Centre for Biodiversity Conservation	Technology transfer and training.	Application of biodiversity significance and landscape planning trade-offs in the Province of Milne Bay, Papua New Guinea. A report prepared jointly by the CSIRO and Melanesia Centre for Biodiversity Conservation.
Conservation International, Melanesia Centre for Biodiversity Conservation	Development of methodology through case studies.	Proposal for defining candidate key biodiversity areas for the New Guinea high biodiversity wilderness using the biome restricted assemblage criterion. This investigates GDM and ED tools for identifying candidate areas of global biodiversity significance.
FNQ NRM Ltd	Input into Regional Investment Strategy for natural resource management (NRM) in the Wet Tropics	Biodiversity analysis and prioritisation objectives have fed into Regional Investment Strategy to inform future iterations of the Wet Tropics Regional NRM Plan.
WWF Australia	Systematic conservation planning approaches.	First Australian application of systematic conservation planning approaches in a market-based instrument, on-ground pilot.
Project 7.1 – Identification of Indigenous Cultural Values and Landscapes within the Wet Tropics World Heritage Area Led by Dr Sandra Pannell, James Cook University		
Core Participants		
Aboriginal Rainforest Council	Identification and listing of Indigenous cultural values for the Wet Tropics	Completion of a nomination document for the listing of the Wet Tropics on the National Heritage List for its Indigenous cultural values. Project 7.1 complements the DEH-funded cultural mapping project undertaken by the Aboriginal Rainforest Council and FNQ NRM Ltd.
FNQ NRM Ltd	Completion of key task	Project 7.1 has addressed one of the cultural and natural resource management actions identified in the Wet Tropics Aboriginal NRM Plan.
Project 7.3 – Technical Education and Training, and Participatory Domestication of Native Food Plants with the Ma:Mu Community Led by Professor Roger Leakey, James Cook University and Ms Marianne Helling, Innisfail College of TAFE		
Core Participants		
Ma:Mu Community	Information exchange	Knowledge of domestication of Indigenous bush tucker species, horticulture practices, and how plants grown in Project 7.3 can be used/sold.
James Cook University	Information exchange	JCU researchers initiated a bush tucker project and sandalwood project with a Cape York based Aboriginal community, using knowledge gained from Project 7.3.
External consultants	Information exchange	Examined the commercial and intellectual property constraints to bush tucker domestication through interviews with community members at Lockhart River.
Catchment to Reef Task 1 – Riparian Zone Performance: Tools and Protocols for Quality Assessment and Monitoring Led by Mr Jon Brodie, Australian Centre for Tropical Freshwater Research, James Cook University		
Core Participants		

Industry or other research users and the basis of their interaction (e.g. Core Participant)	**Type of activity and location of activity**	**Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)**	
FNQ NRM Ltd, Tully Floodplain Group, Commonwealth Department of the Environment and Heritage	Use of project results in Tully Water Quality Improvement Plan process.	Results are directly relevant to the development of water quality targets for the Tully area through assessment of the effects of management practices on water quality.	
CSIRO and Queensland Department of Natural Resources, Mines and Water	Great Barrier Reef Catchment Short-term Modelling Project.	Task 1 water quality assessment data used in modelling the sources of sediments and nutrients in Great Barrier Reef catchments.	
Catchment to Reef Task 2 – Monitoring Tools for Water Quality Assessment Led by Dr Barry Butler, Australian Centre for Tropical Freshwater Research, James Cook University			
Core Participants			
General community and volunteers associated with Task 2	Reporting on Task progress	Reported results back to community volunteers and conducted interviews to how they felt about the new methods and equipment they had been asked to trial.	
Catchment to Reef researchers from JCU, ACTFR and GU	Consultation	Ongoing consultation between Catchment to Reef Tasks in order to integrate the outputs of all water quality-related activities into a single coherent manual.	The production of a single comprehensive document that will ensure users can easily access all relevant information and advice.
Catchment to Reef Task 3 – River Health Assessment Tools Led by Professor Angela Arthington, Griffith University **Catchment to Reef Task 4 – Frameworks for Integrated Catchment Management** Led by Professor Angela Arthington, Griffith University			
Core Participants			
FNQ NRM Ltd	Monitoring frameworks; advice and information	• Jointly developed framework for biomonitoring of streams in the Wet Tropics. • Provided advice and attended presentations at the Landcare catchment group meetings.	
CSIRO	Data and Bioindicators	Provided data and ecosystem health indicators to use in socio-environmental models.	
Queensland Environmental Protection Agency	Information Transfer	Incorporation of atlas of invertebrates and fish into WetlandInfo program to be released by the Agency.	
Catchment to Reef Task 5 – Advanced Technologies for Monitoring Water Quality in the Great Barrier Reef Led by Dr Miles Furnas, Australian Institute of Marine Science			
Core Participants			
Great Barrier Reef Marine Park Authority (GBRMPA)		• Use of passive samplers for herbicide monitoring at coastal sites and in Great Barrier Reef catchment rivers. • Passive sampler technologies are being used as part of the Reef Plan Marine Monitoring Program. • Passive samplers were used as part of the Douglas Shire Water Quality Improvement Plan marine monitoring program.	
Curtin University		Use of ocean colour measurement instrumentation designed during previous AIMS studies at Ningaloo Reef and Torres Strait for ocean colour validation studies.	
Catchment to Reef Task 6 – Condition and Trend Assessments for Coastal Marine Communities Led by Dr Katharina Fabricius, Australian Institute of Marine Science			
Core Participants			
Great Barrier Reef Marine Park Authority	Design of marine benthic components of the Reef Water Quality Protection Plan.		

Industry or other research users and the basis of their interaction (e.g. Core Participant)	**Type of activity and location of activity**	**Nature and scale of benefits to end-users (e.g. increase in exports, productivity, employment, etc.)**
Catchment to Reef Task 7 – Achieving Outcomes: Adoption of Tools Through Training of the Current and New Generation of Practitioners Led by Professor Richard Pearson, James Cook University		
Core Participants		
Core end-users of water quality monitoring and other Catchment to Reef research outputs include: • The Commonwealth (Department of the Environment and Heritage; Great Barrier Reef Marine Park Authority); • Queensland State (Department of Natural Resources, Mines and Water; Department of Primary Industries and Fisheries; Environmental Protection Agency); • Local Governments; • Natural Resource Management (NRM) Boards; • Industry (Canegrowers; Growcom); • Research bodies (the CSIRO; James Cook University; Griffith University; the University of Queensland); and • Community groups (catchment groups; Trees for the Evelyn and Atherton Tablelands (TREAT)).		

7. COMMUNICATION AND KNOWLEDGE TRANSFER

Program 9 of the Rainforest CRC coordinates the Centre's communication, training and technology transfer activities, including internal and external communications, information and data collection for reporting, production of informative products including technical reports and best-practice manuals, organisation of events and coordination of research support funding for registered postgraduate students.

Undertaken by Rainforest CRC Headquarters staff, Program 9 this year focused its efforts on publishing twelve research reports, three best practice manuals and two workshop proceedings, as well as two editions of *Forest Matters*, the Centre newsletter, and two single topic *Issues in Tropical Forest Landscapes* papers. Two additional brochures were produced to raise awareness of Rainforest CRC protected area management research, which were forwarded to the IUCN for distribution through their network of protected area managers worldwide. Further, a glossy booklet that highlights the history of and key research achievements at the Australian Canopy Crane Research Facility was produced and distributed widely throughout our canopy research network. Program 9 also collates, publishes and distributes the Rainforest CRC Annual Report.

Efforts in 2005/2006 also included a revision of the Rainforest CRC and Australian Canopy Crane websites to update research information and make available over fifty research publications as PDF downloads. Our second joint conference with CRC Reef was coordinated by Program 9 staff and held in Townsville in November 2005. A number of media releases were coordinated and issued by Program 9, in addition to releases issued by Rainforest CRC researchers and partner organisations.

7.1 COMMUNICATIONS PROGRAM PUBLICATIONS AND PRODUCTS

For a list of refereed journal articles, books, book chapters, conference proceedings and unpublished items produced by researchers and other participants of the Rainforest CRC, see Chapter 11 List of Selected Publications.

Table 10: Items published by the Rainforest CRC Communications Program throughout 2005/2006.

Research Report Series	
December 2005	Vegetation Change Within the Wet Tropics of North Queensland: Mapping Changes with Landsat TM/ETM+ Imagery from 1988 and 1999 *K. Johansen and S. R. Phinn*
December 2005	The Wet Sclerophyll and Adjacent Forests of North Queensland: A Directory to Vegetation and Physical Survey Data *G. N. Harrington, M. G. Bradford and K. Sanderson*
January 2006	Rainforest Dieback Mapping and Assessment: 2004 Monitoring Report Including an Assessment of Dieback in High Altitude Rainforests *S. J. Worboys*
January 2006	Yamani Country: A Spatial History of the Atherton Tableland, North Queensland *S. Pannell with contributions from Ngadjon-Jii Traditional Owners*
March 2006	Pre-processing Methodology for Application to Landsat TM/ETM+ Imagery of the Wet Tropics *C. M. Bruce and D. W. Hilbert*
May 2006	Reconciling Nature and Culture in a Global Context? Lessons from the World Heritage List *S. Pannell*
June 2006	Weed Incursions Along Roads and Powerlines in the Wet Tropics World Heritage Area: The Potential of Remote Sensing as an Indicator of Weed Infestations *M. W. Goosem and S. M. Turton*
June 2006	The CSIRO Rainforest Permanent Plots of North Queensland: Site, Structural, Floristic and Edaphic Descriptions *Compiled and Edited by A. W. Graham*
June 2006	Rainforest Restoration Activities in Australia's Tropics and Subtropics *C. P. Catterall and D. A. Harrison*
June 2006	Applications of High Resolution Remote Sensing in Rainforest Ecology and Management *D. S. Gillieson, T. J. Lawson and L. Searle*
June 2006	The Role of the Wet Tropics World Heritage Area in the Life of the Community: A Survey of the North Queensland Community (Revised Edition) *J. M. Bentrupperbäumer and J. P. Reser*
Best Practice Manuals	
January 2006	Guide to Monitoring *Phytophthora*-related Dieback in the Wet Tropics of North Queensland *S. J. Worboys*

May 2006	Reproductive Biology and Pollination in Rainforest Trees: Techniques for a Community-level Approach *S. L. Boulter, R. L. Kitching, J. M. Zalucki and K. L. Goodall*
June 2006	Monitoring Revegetation Projects for Biodiversity in Rainforest Landscapes *J. Kanowski and C. P. Catterall*
Workshop Proceedings	
March 2006	Developing the Wet Tropics Aboriginal Cultural and Natural Resource Management Plan *Edited by L. Larsen and S. Pannell*
June 2006	Sustainable Forest Industry Development in Tropical North Queensland *Edited by S. R. Harrison and J. L. Herbohn*
Vertebrate Atlas	
May 2006	Vertebrates of the Wet Tropics Rainforests of Australia: Species Distributions and Biodiversity *S. E. Williams*
***Forest Matters* Newsletter**	
September 2005	Featured articles: – 'Zebra crossings' for animals make popular science; – Award for 'landmark' freshwater fish research; – Official launch of reforestation book that showcases a decade of research and lessons in reforestation.
March 2006	Featured articles: – New role for Deputy CEO; – Research response to Tropical Cyclone *Larry*; – Main Roads Stategic Alliance update; – Spectacled flying foxes: solutions for management.
***Issues in Tropical Forest Landscapes* Single topic papers**	
September 2005	A New Role for Weeds in Rainforest Restoration?
June 2006	Ecology and Management of Flying Fox Camps in an Urbanising Region
IUCN Research and Publication Brochures Prepared for distribution through the IUCN Protected Area Managers network	
January 2006	Supporting Protected Area Management, which highlighted: – Rainforest CRC climate change research appearing in *Nature* in January 2004; – The Wet Tropics Aboriginal Cultural and Natural Resource Management Plan; – The Catchment to Reef joint research program with CRC Reef; and – Two research reports relevant to protected area management.
February 2006	Towards Sustainable Roads and Powerlines, which highlighted: – Rainforest CRC research into the sustainable design, construction and maintenance practices of infrastructure in the Wet Tropics World Heritage Area; and – A list of recommended articles on sustainable roads and powerlines.
Miscellaneous Publications	
August 2005	The Australian Canopy Crane 1999-2005: Supporting World Class Canopy Research Glossy booklet highlighting research achievements stemming from the construction of a 48.5 metre tower crane in a section of tropical lowland rainforest a Cape Tribulation.
September 2005	2004/2005 Annual Report of the Rainforest CRC.

7.2 KNOWLEDGE TRANSFER

Selected examples of presentations made by Rainforest CRC researchers and postgraduate students. In addition, events held throughout the reporting period such as the *Rainforest meets Reef* Joint Conference with CRC Reef enabled many of the Centre's researchers and postgraduate students to present their work.

Table 11: Selected examples of presentations made by Rainforest CRC researchers and postgraduate students throughout 2005/2006.

International Conference and Workshop Presentations			
Presenter/s	**Theme**	**Event**	
McJannet, D. Project 2.2	Steamy jungles (Two seminars)	Presented to miscellaneous researchers and scientists at Reading University and the Centre for Ecology and Hydrology, both in the UK	Jan 2006
Hilbert, D. Project 2.5	Modelling the influence of climate on forests and biodiversity of a diverse tropical region	Keynote Address to IUFRO Conference, Cairns	Aug 2005
Williams, S. Project 2.5	Climate change impacts on rainforest vertebrates	Seminars presented to climate change researchers and scientists, Smithsonian Tropical Research Institute, Panama City and Barro Colorado Island	Oct 2005
Kitching, R Project 3.1	Pollination at the top	Association of Tropical Biology and Conservation, Leipzig, Germany	Jul 2005
Liddell, M. Project 3.2	Fluxes at Cape Tribulation: Drought in an Australian Tropical Landscape	1st iLEAPS Science Conference, Boulder, Colorado	Jan 2006
Pohlman, C. Project 4.2	Internal fragmentation in the rainforest: edge effects of highways, powerlines and watercourses on tropical rainforest understorey microclimate, vegetation structure and seedling regeneration	Association of Tropical Biology and Conservation Conference, Brazil	Jul 2005
Goosem, M. *et al.* Project 4.2	Underpasses and rope bridges: Connectivity for tropical rainforest wildlife	International Conference on Ecology and Transportation, San Diego	Jul 2005
Erskine, P. *et al.* Project 5.1	Who decides how tropical rainforest landscapes are rehabilitated?	Symposium on Tropical Rainforest Rehabilitation and Restoration, Sabah	Jul 2005
Lamb, D. Project 5.1	Forest landscape restoration	World Conference on Ecological Restoration, Zaragoza, Spain	Sept 2005
Lamb, D. Project 5.1	Restoring degraded landscapes or building resilience	World Conference on Ecological Restoration, Zaragoza, Spain	Sept 2005
Lamb, D. *et al.* Project 5.1	Forest landscape restoration: a GIS decision-making tool	Global Partnership on Forest Landscape Restoration, Petropolis, Brazil	Apr 2005
Kanowski, J. *et al.* Project 5.2	Frugivores and plant recruitment in different types of reforestation in cleared rainforest landscapes of tropical and subtropical Australia	Fourth International Workshop / Symposium on Frugivores and Seed Dispersal, Brisbane	Jul 2005
Moran, C. *et al.* Project 5.2	Differences between frugivores in diet selection have implications for seed dispersal in a fragmented subtropical rainforest landscape of eastern Australia	Fourth International Workshop / Symposium on Frugivores and Seed Dispersal, Brisbane	Jul 2005
Neilan, W. *et al.* Project 5.2	Frugivorous birds and rainforest regeneration in camphor laurel-dominated subtropical regrowth	Fourth International Workshop / Symposium on Frugivores and Seed Dispersal, Brisbane	Jul 2005
Catterall, C. *et al.* Project 5.2	Reforestation for biodiversity recovery: opportunities and limitations	IUFRO Conference, Brisbane	Aug 2005
Nakamura, A. *et al.* Project 5.2	Development of soil and litter arthropod assemblages in rainforest restoration	IUFRO Conference, Brisbane	Aug 2005
Catterall, C. *et al.* Project 5.2	How does reforestation affect biodiversity? Pattern and process in Australian rainforest landscapes	First DIVERSITAS Open Science Conference, Mexico	Nov 2005

Harrison, S. *et al.* Project 5.3	Financial performance of timber plantations utilising native tree species in Northern Vietnam	Presented to personnel from the Ministry of Agriculture and Rural Development, Vietnam as well as personnel from various international development agencies. Bai Bang Forestry Research Centre, Vietnam	Feb 2006
Harrison, S. *et al.* Project 5.3	Smallholders attitudes to timber plantations utilising native tree species in Northern Vietnam	Presented to personnel from the Ministry of Agriculture and Rural Development, Vietnam as well as personnel from various international development agencies. Bai Bang Forestry Research Centre, Vietnam	Feb 2006
Harrison, S. *et al.* Project 5.3	Developing a business case for expansion of plantation forestry in Tropical North Queensland, Australia	Small-scale Forestry and Rural Development Conference, Galway, Ireland	Jun 2006
Setter, M. *et al.* Project 6.2.1	Animal dispersal of pond apple, a weed of tropical Australian wetlands	Fourth International Workshop / Symposium on Frugivores and Seed Dispersal, Brisbane	Jul 2005
Shilton, L. Project 6.3.1	Delayed gut-passage in fruit bats: Reasons to reinterpret the revegetation of Krakatau	Fourth International Workshop / Symposium on Frugivores and Seed Dispersal, Brisbane	Jul 2005
Parsons, J. *et al.* Project 6.3.1	Spatial and temporal patterns of resource use by Spectacled Flying Foxes	Australasian Bat Society Conference, Auckland	Apr 2006
Shilton, L. *et al.* Project 6.3.1	Population dynamics of the Spectacled Flying Fox; Habitat use and conservation requirements of the Spectacled Flying Fox; Far North Queensland Flying Fox Forum	Australasian Bat Society Conference, Auckland	Apr 2006
Dennis, A. *et al.* Project 6.3.1	Seed dispersal at community and landscape scales: Incorporating functional classifications of dispersers and fruit into the study of an ecological process.	Fourth International Workshop / Symposium on Frugivores and Seed Dispersal, Brisbane	Jul 2005
Wells, J. *et al.* Project 6.3.1	Seed dispersal and natural regeneration of secondary rainforests in the Wet Tropics	Fourth International Workshop / Symposium on Frugivores and Seed Dispersal, Brisbane	Jul 2005
Westcott, D. *et al.* Project 6.3.1	Where do all the seeds go? Estimating the dispersal curves generated by a community of frugivores	Fourth International Workshop / Symposium on Frugivores and Seed Dispersal, Brisbane	Jul 2005
Cameron, S. *et al.* Project 6.5	Identification of candidate Key Biodiversity Areas based on globally significant assemblages of species: a case study from the New Guinea Wilderness	Project proposal presented by Susan Cameron at the Melanesia CBC Management Team meeting, Jayapura, Papua Indonesia	Sept 2005
Williams, K. *et al.* Project 6.5	Milne Bay Corridor Planning – a systematic conservation planning approach to opportunity cost trade-offs.	Pilot project progress presented by Susan Cameron at the Melanesia CBC Management Team meeting, Jayapura, Papua Indonesia	Sept 2005
Cameron, S. *et al.* Project 6.5	A comparison of iterative and terminal stage procedures addressing multiple opportunity cost constraints in systematic conservation planning	Society for Conservation Biology 20th Annual Meeting, San Jose, California	June 2006
Pannell, S. Project 7.1	World Heritage as a global public good? Case studies from Komodo National Park, Eastern Indonesia and the Wet Tropics of North Queensland	Twelfth International Symposium on Society and Resource Management, Vancouver	Jun 2006
Connolly, N. *et al.* Catchment to Reef	Nutrient enrichment of a detrital food web in a tropical rainforest stream	PLPF IV 2005, Toulouse, France	Jul 2005
Shaw, M. *et al.* Catchment to Reef	Toxicological effects of organic pollutants in passive sampler extracts on integral life stages and functions of coral reef biota	SETAC Europe 16th Annual Meeting, The Hague	May 2006
Pearson, R. *et al.* Catchment to Reef	Influence of consumer and resource species richness on stream ecosystem function	North American Benthological Society Annual Conference, Anchorage, Alaska	Jun 2006

Connolly, N. *et al.* Catchment to Reef	Equilibrium dynamics drive the productivity/diversity relationship of stream invertebrates inhabiting leaf litter packs	North American Benthological Society Annual Conference, Anchorage, Alaska	Jun 2006
Local, State and National Presentations			
Presenter/s	**Theme**	**Event**	
Turton, S. Relevant to Program 1	Towards sustainable tropical forest landscapes in northeast Australia: Opportunities and challenges	Institute of Australian Geographers Conference, Armidale	Jul 2005
Phinn, S. *et al.* Project 1.2	Mapping and monitoring Wet Tropics rainforest vegetation condition and structure	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Hilbert, D. Project 2.5	Overview and recommendations from the *National Biodiversity and Climate Change Action Plan*, Research and Information Gaps Workshop (June 2005)	The Great Greenhouse Gamble: A conference on the impacts of climate change on biodiversity and natural resource management, Sydney	Sept 2005
Hilbert, D. Project 2.5	Species habitat modeling in conservation biology and climate change impact studies: issues and new advances	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Li, J. *et al.* Project 2.5	How do species respond to climate warming along an elevation gradient? A case study using the Grey-headed Robin (*Heteromyias albispecularis*)	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Kitching, R Project 3.1	The forest canopy	Presented to Landcare, natural resource management managers and landholders at the Big Scrub rainforest Landcare Day	Sept 2005
Young, N. Project 4.1	Presentation of PhD research into long-distance walking tracks	Presentation to staff of Queensland Parks and Wildlife Service and Hinchinbrook Island ferry operators	Sept 2005
Young, N. Project 4.1	Presentation of PhD research into long-distance walking tracks	Presentation to staff of Wet Tropics Management Authority, Cairns	Nov 2005
Bentrupperbäumer, J. *et al.* Project 4.1	Does it matter whether visitors know that the site they are visiting is in a World Heritage Area?	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Goosem, M. *et al.* Project 4.2	Faunal connectivity and restoration priorities for remnant riparian rainforest in coastal far north Queensland	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Dawe, G. Project 4.2	If a car passes by a forest – do the critters care? An examination of the effects of highway noise disturbance in a North Queensland rainforest	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Goosem, M. *et al.* Project 4.2	Barrier effects of powerline clearings on rainforest microclimate and vegetation structure	Powerlink seminar series presentation	Nov 2005
Goosem, M. *et al.* Project 4.2	Effectiveness of road underpasses for rainforest fauna	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Byrnes, P. *et al.* Project 4.2	The impact of roads on the movement of medium-sized ground-dwelling mammals in the Wet Tropics World Heritage Area	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Pohlman, C. *et al.* Project 4.2	Internal fragmentation in the rainforest: Edge effects of highways, powerlines and watercourses on tropical rainforest understorey microclimate and vegetation structure	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Goosem, M. Project 4.2	Roads as a conduit for invasive species in tropical rainforest	Presentation to Commonwealth Department of the Environment and Heritage national workshop on road impacts	May 2006
Erskine, P. *et al.* Project 5.1	Managing competition in a mixed species plantation	Seminar to researchers and farmers Southern Cross University	Aug 2005
Erskine, P. *et al.* Project 5.1	Tree species diversity and ecosystem function: can multi-species plantations generate greater productivity?	Seminar to researchers and farmers Southern Cross University	Aug 2005

Lamb, D. *et al*. Project 5.1	Negotiating trade-offs between stakeholders in forest landscape restoration	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Siddique, I. *et al.* Project 5.1	Nitrodgen use and cycling in mixed tree plantings of contrasting functional composition on degraded land in southeast Brazil	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Kanowski, J. Project 5.2	Turning camphor laurel forest into rainforest 1.	Big Scrub rainforest Landcare Day	Sept 2005
Neilan, W. Project 5.2	Turning camphor laurel forest into rainforest 2.	Big Scrub rainforest Landcare Day	Sept 2005
Kanowski, J. *et al.* Project 5.2	Biodiversity values of reforestation in cleared rainforest landscapes	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Moran, C. *et al*. Project 5.2	Frugivores and seed dispersal in fragmented rainforest	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Kanowski, J. *et al.* Project 5.2	Large-scale restoration of cleared rainforest landscapes in tropical and subtropical Australia	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Moran, C. *et al*. Project 5.2	Functional overlap among frugivores and the maintenance of seed dispersal potential in a fragmented rainforest landscape	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Fine, N. *et al.* Project 5.2	Effects of fragmentation on seed predators and plant recruitment in remnant rainforests of the Big Scrub region	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Nakamura, A. *et al.* Project 5.2	Re-colonisation of soil and litter arthropods in rainforest restoration: do different restoration practices matter?	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Roberts, B. *et al.* Project 5.2	What characterises flying fox camps in southeast Queensland?	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Catterall, C. Project 5.2	What affects the biodiversity outcomes of rainforest restoration?	EnviTE Environmental Restoration Confrence	May 2006
Kanowski, J. Project 5.2	Toolkit for monitoring revegetation projects for biodiversity in rainforest landscapes	EnviTE Environmental Restoration Confrence	May 2006
Emtage, N. Project 5.3	Rural landholder and regional profiling and typologies for natural resource management	Socio-economic researchers seminar series including participants from the CSIRO, the University of Queensland, Queensland Department of Natural Resources, Mines and Water, Queensland Department of Primary Industries and Fisheries, Queensland University of Technology and Griffith University	Sept 2005
Harrison, S. *et al.* Project 5.3	Prospects for expansion of the hoop pine plantation estate	Presentation to TREAT (community group, Trees for the Evelyn and Atherton Tablelands), Queensland Parks and Wildlife Service Nursery, Lake Eacham	May 2006
Emtage, N. Project 5.3	Prospects for expansion of the hoop pine plantation estate	Presentation to combined meeting of the Australian Forest Growers far north Queensland group and the Private Forest North Queensland committee, Kairi	May 2006
Ferraro, P. *et al.* Project 6.1	Population structure and taxonomic status of the mahogany glider, *Petaurus gracilis*	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Setter, M. Project 6.2.1	Pond apple ecological research	Eighth Queensland Weeds Symposium	Jul 2005
Setter, M. Project 6.2.1	Ecology of Wet Tropics weeds (project report)	Presentations to the Far North Queensland Pest Advisory Forum (three meetings)	Aug 2005 Nov 2005 Feb 2006
Mitchell, J. Project 6.2.2	Feral pig research (Three separate seminars given)	Presentations to students of the University of Queensland and James Cook University	Jul 2005
Mitchell, J. Project 6.2.2	The saga of Eric the feral pig	Rainforest meets Reef Joint Conference, Townsville	Nov 2005

Shilton, L. *et al.* Project 6.3.1	Conservation management of Spectacled Flying Foxes	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Westcott, D. *et al.* Project 6.3.1	Threats to landscape processes: Ecology and conservation in a changing tropical Australia	Australian-German Workshop on Biodiversity, Canberra	Mar 2006
Shilton, L. Project 6.3.1	Satellite tracking Spectacled Flying Foxes	Progress report for Earthwatch Institute (Europe) Vodafone Group Foundation Grant	Mar 2006
Wells, J. *et al.* Project 6.3.1	Seed dispersal and the diversity plant ecological traits in regenerating rainforests	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Krockenberger, A. Project 6.4	Global change, local impacts	JCU Public Lecture for National Science Week, JUTE Theatre, Cairns	Sept 2005
Krockenberger, A. Project 6.4	Habitat requirements of Lumholtz's tree-kangaroos in a rainforest fragment on the Atherton Tablelands	Ecology and Conservation of Tree-Kangaroos: Current Issues and Future Directions Conference, Atherton Tablelands	Nov 2005
Coombes, K. Project 6.4	Aging tree-kangaroos using tooth wear	Ecology and Conservation of Tree-Kangaroos: Current Issues and Future Directions Conference, Atherton Tablelands	Nov 2005
Krockenberger, A. Project 6.4	Predicting the responses of marsupial folivores to climate change in the rainforests of northern Australia from metabolic and ecological data: How important are extremes?	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Krockenberger, A. Project 6.4	Developing mechanistic models of the effects of climate change on vertebrates: case studies from rainforest and reef	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Williams, K. Project 6.5	Evaluating strategies for biodiversity planning and management – Wet Tropics	Presentation on project progress to FNQ NRM Ltd and associates	Sept 2005
Mitchell, D. *et al.* Project 6.5	Defining areas for species conservation in Melanesia. A planning outcomes experience from Milne Bay, Papua New Guinea	ESA 2005 (Annual Meeting of the Ecological Society of Australia), Brisbane	Dec 2005
Faith, D. *et al.* Project 6.5	How large-scale DNA barcoding programs can boost conservation planning for overall biodiversity: Phylogenetic diversity (PD) analysis linked to the Barcode of Life Database (BoLD)	Invited presentation to the combined conferences of the Australian Entomological Society, Society of Australian Systematic Biologists, Invertebrate Biodiversity and Conservation, held at Australian National University, Canberra	Dec 2005
Pannell, S. Project 7.1	Indigenous values and the World Heritage Convention	Presentation to the Aboriginal Rainforest Council, Cairns	Oct 2005
Leakey, R. Project 7.3	Enhancing the sustainability of agriculture in far north Queensland	Cairns Next Wave Sustainability Event and FNQ Competitive Advantage: Business Sustainability, organised by National Centre for Sustainability, Swinburne University	Apr 2006
Pearson, R. Catchment to Reef	Catchment to Reef – two parts of a continuum	OzWater National Conference, Townsville	Oct 2005
Rayner, T. *et al*. Catchment to Reef	Climate change impacts on freshwater fishes of the Wet Tropics	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Brodie, J. Catchment to Reef	Sources and fate of terrestrially derived nitrogen in the Great Barrier Reef	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Arthington, A. *et al.* Catchment to Reef	Sentinels of change: a test of biological monitoring in Wet Tropics streams	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Connolly, N. *et al.* Catchment to Reef	Diversity in adversity: invertebrates weather impacts in streams	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Connolly, N. *et al*. Catchment to Reef	Colonisation and mobility of stream invertebrates inhabiting leaf litter packs	Australian Society of Limnology Annual Conference, Hobart	Nov 2005

Burrows, D. *et al.* Catchment to Reef	Fish tolerance to low dissolved oxygen and its importance as a determinant and indicator of aquatic ecosystem health	Australian Society of Limnology Annual Conference, Hobart	Nov 2005
Slivkoff, M. Catchment to Reef	Ocean colour remote sensing for waters of the Great Barrier Reef	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Fabricius, K. *et al.* Catchment to Reef	Water quality specific indicators to assess and monitor the health, status and trends in nearshore marine ecosystems	Rainforest meets Reef Joint Conference, Townsville	Nov 2005
Brodie, J. Catchment to Reef	Losses of nitrogen from sugar cane cultivation in Tully, Mackay and Burdekin	Workshop: Nitrogen in the sugar industry, CSIRO, Brisbane	May 2006
Brodie, J. Catchment to Reef	Comparing sediment, nutrients and pesticides in the Tully, Burdekin and Pioneer Riveres	Fitzroy River Symposium, North Keppel Island	Jun 2006
Butler, B. Catchment to Reef	Assessing the dissolved oxygen status of aquatic habitats in Australia's dry and wet-dry tropics	Catchments to Coasts, Society of Wetland Scientists Conference, Cairns	Jul 2006
Arthington, A. *et al.* Catchment to Reef	Fish, ecological connectivity and river health in the Wet Tropics	Catchments to Coasts, Society of Wetland Scientists Conference, Cairns	Jul 2006
Connolly, N. *et al.* Catchment to Reef	Invertebrates as monitors of river health in the Wet Tropics	Catchments to Coasts, Society of Wetland Scientists Conference, Cairns	Jul 2006
Pearson, R. Catchment to Reef	Catchment to Reef: Setting the scene for improved environmental outcomes in the Great Barrier Reef catchment	Catchments to Coasts, Society of Wetland Scientists Conference, Cairns	Jul 2006

Table 12: Examples of Rainforest CRC research featured in radio, television and print media throughout 2005/2006 (in chronological order).

Radio			**Content/Title**
Project 3.2	BBC Science	May 2006	Rainforests theme
Project 4.2 (Faunal underpasses and overpasses)	ABC Local News	Oct and Nov 2005	Coverage on erection of faunal canopy bridges across the Palmerston Highway
Project 5.2 (Featured Billie Roberts, Honours candidate, Griffith University)	ABC Radio, Brisbane	Feb 2006	Urban flying fox camps
	ABC Radio Far North	Feb 2006	Relocation of flying fox camps
Project 6.4 (Featured Dr Andrew Krockenberger, James Cook University)	4AM (Mareeba) and 4CA FM (Cairns)	Sept 2005	Global warming to have major effect on local environment over the next century
	ABC Radio North Queensland	Sept 2005	Predicted losses of fauna and flora under global warming
	ABC Radio Far North	Dec 2005	Future of green ringtail possum under global warming
Catchment to Reef (Featured Professor Richard Pearson, James Cook University, program leader)	ABC Radio Far North	July 2005	Water quality field work undertaken in creeks and streams south of Cairns during field work period in June and July 2005
Television			**Content/Title**
Project 2.5 (Global climate change)	ABC 'Catalyst'	Apr 2006	Climate change and microhylid frogs – the tipping point
Project 4.2 (Faunal underpasses and overpasses)	WIN News	Oct 2005	Coverage on erection of faunal canopy bridges across the Palmerston Highway
	ABC 'Catalyst'	Apr 2006	
Project 4.2 (Roadkill in the Wet Tropics)	WIN News	Oct 2005	Coverage on Project 4.2 research into numbers of roadkill of rainforest mammals in Wet Tropics
Project 5.2 (Featured Billie Roberts, Honours candidate, Griffith University)	Channel 10 'Totally Wild'	Feb 2006	Fruit bat rehabilitation
	Channel 10 (documentary)	Feb 2006	"Living in the colony"
Catchment to Reef (Featured Professor Richard Pearson, James Cook University, program leader)	Seven Local News	July 2005	Water quality field work undertaken in creeks and streams south of Cairns during field work period in June and July 2005
Print			**Content/Title**
Program 3 and features Romina Rader, PhD candidate	The Cairns Post	Sept 2005	"Bird's eye view of our rainforest"
Program 3	The Australian	Sept 2005	"Positive climate change for tropical science research"
Project 4.2 (Faunal underpasses and overpasses)	The Cairns Post	Aug 2005	"Road warrior"
	The Cairns Post	Oct 2005	"Bridging the gap for high-wire critters"
	The Innisfail Advocate	Oct 2005	"Catalyst TV crew arrives"
Climate change impacts (Featured Dr Steve Williams and Dr David McJannet (Program 2), Professor Steve Turton and Dr Michael Liddell (Program 3), Dr Andrew Krockenberger and Luke Shoo (Program 6)	The Age	Nov 2005	"The rainforest: climate change icons under threat"
Project 4.1 (Visitor monitoring survey for the Wet Tropics World Heritage Area)	The Tablelands Advertiser	Nov 2005	"Monitoring system developed for tropics"
	The Tully Times	Nov 2005	"New monitoring system for visitors in wet tropics"
	The Cairns Post	Nov 2005	"Operators join fight"
Program 3	The Townsville Bulletin	Mar 2006	"Stripped rainforest in trouble"

Program 3	The Age	Apr 2006	"Talking 'bout regeneration" (Discussion article about the effects of Tropical Cyclone *Larry* on the north Queensland community and environment.)
Program 3	The Canberra Times	Apr 2006	"We need to talk about Larry" (Discussion article about the effects of Tropical Cyclone *Larry* on the north Queensland community and environment.)
Program 6 (Featured Karen Coombes, PhD candidate, James Cook University)	The Courier Mail	Jan 2006	"Rare tree kangaroos under pressure"
Program 6 (Featured Dr Andrew Krockenberger; climate change impacts)	The Courier Mail	Jan 2006	"Global warming takes its toll on tropical species"
Catchment to Reef (*Rainforest meets Reef* Joint Conference)	The Townsville Bulletin	Nov 2005	"Climate change a hot topic at forum"
Catchment to Reef (Freshwater research in regional creeks and rivers)	The Cairns Post	Jul 2005	"Research into river health"
Catchment to Reef (Freshwater research in regional creeks and rivers)	The Innisfail Advocate	Jul 2005	"River study"
Popular Press			**Content/Title**
Project 4.2	Interface – Queensland Transport and Main Roads Magazine	Nov 2005	"Spotlight on fauna aerial bridge under trial"
Program 7 and Program 1 (Wet Tropics Aboriginal Cultural and Natural Resource Management Plan)	ECOS	Jul 2005	"A new vision for regional management: The Wet Tropics Aboriginal Plan"
	Institute News – AIATSIS Magazine	Jul 2005	"Wet Tropics NRM Collaboration"
Program 4, Program 6 (Featured Professor Steve Turton, Dr Miriam Goosem, Dr Robyn Wilson, Dr Andrew Dennis)	Wildlife Australia Magazine	Winter 2006	Articles on the effects of Tropical Cyclone *Larry* on Wet Tropics fauna:
			"Cyclones: part of life in the tropics"
			"Notes on a fruit famine"
			"Research and recovery"
			"Why did the cyclone cross the road?"

Table 13: Milestones and/or outputs for Rainforest CRC communications and knowledge transfer activities throughout 2005/2006.

Type of Milestone and/or Output	Description of all 2005/2006 Milestones and/or Outputs including past milestones which have not been met (and date)	Achieved? Yes/No	If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons why milestones and/or outputs have not been achieved	Strategies to achieve milestones which have not been met
Major Conference	*Rainforest meets Reef* Joint Conference with CRC Reef Research Centre held in Townsville, November 2005.	Yes.	• Two hundred delegates attended the three-day meeting. • Six conference session themes reflected collaborative research solutions to environmental challenges in the tropics. • No major conferences planned for 2006.		
Conference and Meeting Sponsorships	• Sponsor of *Fourth International Symposium / Workshop on Frugivores and Seed Dispersal* held in Brisbane, July 2005. • Major sponsor of and secretariat to *Tree-Kangaroo Ecology and Conservation Conference* held on the Atherton Tablelands, November 2005. • Sponsor of *ESA 2005*, the Annual Meeting of the Ecological Society of Australia, held in Brisbane, December 2005.	Yes.	• Production of Book of Abstracts for Frugivores and Seed Dispersal Conference. • Secretariat for Tree-Kangaroo Conference including delegate registrations. • Provision of two postgraduate student prizes for *ESA 2005* Conference.		
Publications (Communications Program)	Continued production of publications including technical reports, workshop proceedings, best practice manuals, newsletters and *Issues in Tropical Forest Landscapes* papers.	Yes.	• A total of seventeen hard copy items were published by the Rainforest CRC Communications Program, including: – 12 research reports; – 3 best practice manuals; – 2 workshop proceedings; and – an atlas of vertebrate distributions in the Wet Tropics. • Two issues of *Forest Matters*, the Rainforest CRC glossy newsletter, were produced in September 2005 and March 2006. • Two editions of *Issues in Tropical Forest Landscapes* papers were produced: – *A New Role for Weeds in Rainforest Restoration?* – *Ecology and Management of Flying Fox Camps in an Urbanising Region.* • Compilation, design and publishing of 2004/2005 Rainforest CRC Annual Report.		

Type of Milestone and/or Output	Description of all 2005/2006 Milestones and/or Outputs including past milestones which have not been met (and date)	Achieved? Yes/No	If achieved, progress during 2005/2006 and planned activities for 2006/2007	Reasons why milestones and/or outputs have not been achieved	Strategies to achieve milestones which have not been met
Publications (Communications Program)	Contribute to publishing of scientific books.	Yes.	• Major Publications budget component set aside for production of Rainforest CRC book entitled *Living in a Dynamic Tropical Forest Landscape*, edited by Nigel Stork and Steve Turton, which includes papers from a diverse range of Rainforest CRC scientists covering all of the eight research programs. To be published in 2006/2007 by Blackwell Publishing. • Contribution of $10,000 towards production of a series of IUCN best practice Protected Area manuals, and produced two A4 flyers for distribution to IUCN readership network providing information about Rainforest CRC research and available publications. • Contribution of $5,000 towards cost of production of Fourth International Symposium / Workshop on Frugivores and Seed Dispersal proceedings, to be published by CABI Publishing in late 2006.		
Promotional Material	Publish Australian Canopy Crane magazine in time for Crane Open Day in September 2005 and for distribution at the *Rainforest meets Reef* Joint Conference in November 2005.	Yes.	• 1000 copies published and distributed through Rainforest CRC networks, at the Australian Canopy Crane Open Day and *Rainforest meets Reef* Joint Conference. • Copies also sent to key international research and collaborative contacts, and to major funding providers of the Australian Canopy Crane Research Facility.		
Website Maintenance	Ensure regular updating of Rainforest CRC and Australian Canopy Crane websites, particularly Latest News, Media Releases and Publications pages.	Yes.	• Rainforest CRC Homepage refreshed to allow for more simpler design elements and access to core website components. • Australian Canopy Crane website refreshed and updated to include details of recent research projects and outcomes. • Regular updating maintained; research reports and other publications uploaded on a regular basis.		

8. AUSTRALIAN CANOPY CRANE RESEARCH FACILITY

Richard Cooper

Events at the Australian Canopy Crane were this year overshadowed by the death of our crane driver, Mr Richard (Dick) Cooper, on 9 January 2006. His death is subject to an investigation by Queensland Workplace Health and Safety, who have yet to produce a final report. It appears that Dick fell from the top of the crane where he was working. Dick, who had previously spent more than thirty years driving cranes for industry, was very well known among the canopy research community for his enthusiasm for his job and for his willingness to help. His death is a significant loss to the Rainforest CRC. Operations at the crane site were shut down by the crane company Board and James Cook University while safety protocols were reviewed by the National Safety Council of Australia. The Council's recommendations have now been implemented and the facility will be re-opened as of 8 August 2006.

Canopy Crane Report 1999-2005

A report covering research and training at the Australian Canopy Crane was published in late 2005 and is available for download from the canopy crane website.

8.1 RESEARCH

Research at the canopy crane is at a pivotal point now that related Rainforest CRC projects are in their wind-up phase. A new project, *Climate change: scaling from leaves to ecosystem*, which is being led by James Cook University personnel, Dr Michael Liddell in collaboration with Dr Paul Nelson, Dr Peter Franks and Professor Nigel Stork, has received funding from the Marine and Tropical Sciences Research Facility for four years subject to an annual review. The funding will provide for a full-time research officer to be based at the crane facility. This project will improve our understanding of the factors influencing the variability in carbon and water fluxes from the rainforest and model net primary productivity in tropical lowland rainforests. Another important aspect of this project is an investigation of how invertebrate populations fluctuate in relation to local climatic variables and ecological processes, e.g. plant pollination, herbivory and decomposition.

Professor Roger Kitching (Griffith University) and Dr Antonio Nobre (Instituto Nacional de Pesquisas da Amazônia (INPA), Brazil) will commence a new project at the canopy crane in early 2007 to investigate the interactions between forest biodiversity and 'volatile organic compounds' (VOCs) produced by plants. Biodiversity and VOCs is one of the key projects as part of the United National Environment Programme and the Global Environment Facility (UNEP/GEF) funded 'Whole Forest Observatory' Program (see below) and this will be trialled first at the Australian Canopy Crane.

National Aspects

The Department of Education, Science and Technology has identified the development of a terrestrial ecosystem research network as a high priority area for future funding as part of the National Collaborative Research Infrastructure Strategy (NCRIS) Strategic Roadmap. The aim of the terrestrial ecosystem research network would be to integrate the collection of data on Australia's terrestrial ecosystems, including data on water, soils and biodiversity, to enable the development of a holistic ecosystem perspective. It would seek to build on significant past and present initiatives and investments. Present discussions indicate that there is strong support to build on existing Long-Term Ecological Research (LTER) sites in Australia of which the canopy crane site is involved. Funding for LTER is likely to be received in 2007.

Global Canopy Programme and Whole Forest Observatories

Six years ago the international canopy community gave their support to the establishment of the Global Canopy Programme (GCP) based in the United Kingdom. Professors Roger Kitching and Nigel Stork have played pivotal roles in guiding the development of the GCP. One such development is the concept of 'whole forest observatories', and this is growing nationally and internationally. The GCP has submitted its second phase 'whole forest observatory' proposal to the UNEP/GEF for funding for a US $18 million program to establish canopy cranes in five developing countries. Subject to approval of the program by UNEP/GEF, the GCP will hold its first meeting for the Program in November 2006 in Cairns and at the Australian Canopy Crane facility. Plans to further progress the facility as Australia's whole forest observatory are also proceeding. A first proposal to the Queensland Smart State Fund to establish two Smithsonian style 25-hectare plots (one next to the canopy crane) was submitted in December 2005 however was unsuccessful. Professor Kitching has also led international canopy training courses in Brazil and Malaysia during the past twelve months.

New Ventures

The first Earthwatch Expedition using the Australian Canopy Crane will commence in February 2007. Earthwatch is an international organisation that coordinates volunteers from all around the world to work on and assist with key projects. Two expeditions of two weeks each are proposed for the canopy crane, and Professors Steve Turton and Nigel Stork will coordinate the projects.

In a separate venture, Earthwatch and Voyages are involved in discussions with canopy crane personnel regarding the establishment a 'scientist in residence' project, with the possibility of two PhD students being based at the Australian Canopy Crane facility. The project is in the early stages of discussion but it is likely we will jointly seek Australian Research Council Linkage funding to support the students' projects.

8.2 FUNDING

The Australian Canopy Crane has been successful in attracting funding from the Vincent Fairfax Family Foundation, the John T Reid Charitable Trusts and an anonymous donor, made available through James Cook University. This substantial funding over two years is an enormous boost for the crane facility and is helping to cover the costs of maintaining the crane, drivers and some of the research from 2005 to 2008.

9. EDUCATION AND TRAINING

Funding of postgraduate student projects continued this year with two rounds of the Research Support Scheme completed, along with a number of Travel Bursaries granted.

Round 14 of the Research Support Scheme (covering the period from September 2005 to June 2006) invested $56,138 in eighteen postgraduate research projects:

Following confirmation from the Governing Board, a special round of Research Support Scheme funding (Round 15, covering the period from March 2006 to February 2007) was offered in March 2006. Round 15 saw a further investment of $61,700 into postgraduate research projects.

Travel Bursaries were offered to postgraduate students to travel to places where significant opportunities exist for them to network with researchers of high international standing such as international conferences, master classes or collaborative projects. A total of $17,871 was made available to postgraduate students to support conference travel, including a contribution of $5,345 from the Catchment to Reef Joint Research Program budget.

Table 14: Summary of postgraduate projects that received funding support in Round 14 of the Research Support Scheme.

Student	University	Project Title
Peter Byrnes (PhD)	JCU	Impacts of roads on medium-sized, ground-dwelling rainforest mammals in the Wet Tropics World Heritage Area
Susan Cameron (PhD)	UC Davis	Dynamic models of ecological and evolutionary processes in the Australian Wet Tropics
Niall Connolly (PhD)	JCU	The productivity / diversity paradox: Does the effect of resource availability on spatial structure confound the productivity / diversity relationship at local scales?
Paul Ferraro (MSc)	JCU	Taxonomic status and population structure of the Mahogany Glider
Leisa Fisher (Honours)	JCU	Mother-infant communication and behaviour of the Spectacled Flying Fox
Paul Godfrey (PhD)	GU	Influence of flow seasonality on the recruitment ecology of fishes in a lowland Wet Tropics river
Kim Hauselberger (PhD)	JCU	Ecology and environmental interactions of Wet Tropics microhylids, and their responses to the amphibian chytrid fungus
James Hill (PhD)	JCU	Defining eco-physiological strategies of drought tolerance in rainforest seeds and seedlings
Katie Jones (PhD)	JCU	Dietary selectivity in a rainforest possum: The effect of climate change on the interaction between plant toxins and foliage intake
Melinda Laidlaw (PhD)	UQ	The determinants of vegetation pattern in Australian subtropical rainforests
Robert Lwanga (MAppSci)	UQ	Tourists' attitudes to changes in landscape aesthetics due to plantation establishment on the southern Atherton Tablelands
Romina Rader (PhD)	JCU	The influence of fragmentation on disperser assemblages in the Wet Tropics
Terry Reis (PhD)	GU	Taxon surrogacy in rainforests across a gradient of habitat modification
Ilyas Siddique (PhD)	UQ	Effects of community composition on plant functional responses to nitrogen and phosphorous limitation in soils of contrasting fertility
Collin Storlie (MSc)	JCU	The effects of moisture seasonality on microhylid frog abundance and phenology
Brett Taylor (Honours)	GU	The process of decomposition and biodiversity of leaf litter along an altitudinal transect in subtropical rainforest
Paul Thuesen (PhD)	JCU	Divergence with gene flow: The role of predation and sexual selection on a freshwater fish (*Pseudomugil signifier*)
Patricia Turner (MappSci)	JCU	Implications of intraspecific competition between *Carlia rubrigularis* and effects of ecological stress on individual morphology in a narrow rainforest revegetated corridor system

Table 15: Summary of postgraduate projects that received funding in Round 15 of the Research Support Scheme.

Student	University	Project Title
Peter Byrnes (PhD)	JCU	Impacts of roads on medium-sized, ground-dwelling rainforest mammals in the Wet Tropics World Heritage Area
Niall Connolly (PhD)	JCU	The productivity / diversity paradox: Does the effect of resource availability on spatial structure confound the productivity / diversity relationship at local scales?
Paul Ferraro (PhD)	JCU	Conservation genetics of the Mahogany Glider (*Pteropus gracilis*)
Samantha Fox (PhD)	JCU	Population structure in the Spectacled Flying Fox, *Pteropus conspicillatus*: A study of genetic and demographic factors
Paul Godfrey (PhD)	GU	Influence of flow seasonality on the recruitment ecology of fishes in a lowland Wet Tropics river
Brett Goodman (PhD)	JCU	Ecomorphology, performance and reproductive output in saxicolous and terrestrial skinks
Cath Moran (PhD)	GU	Vertebrate frugivores and rainforest seed dispersal in a fragmented subtropical Australian rainforest landscape
Thomas Rayner (PhD)	JCU	The trophic ecology of freshwater fishes of an Australian rainforest river
Ilyas Siddique (PhD)	UQ	Effects of community composition on plant functional responses to nitrogen and phosphorous limitation in soils of contrasting fertility
Collin Storlie (MSc)	JCU	The effect of climate change on endemic Australian Wet Tropics microhylid frogs, *Cophixalus ornatus* and *Cophixalus monticola*
Paul Thuesen (PhD)	JCU	Divergence with gene flow: The role of predation and sexual selection on a freshwater fish (*Pseudomugil signifier*)
Yvette Williams (PhD)	JCU	Determinants of rarity in microhylid frogs
Nigel Young (PhD)	JCU	Biophysical impacts and psychosocial experiences associated with visitor use of selected long-distance walking tracks within the Wet Tropics region of Queensland

Table 16: Summary of postgraduate students who received Travel Bursaries in 2005/2006.

Student	University	Travel Bursary Details
Sandra Abell (PhD)	JCU	Sandra was invited to work on her truffle species identification at the National Botanic Gardens and CSIRO Sustainable Ecosystems in Canberra in July 2006. Assisted by Dr Jim Trappe, an international truffle expert based at Oregon State University, Sandra worked to identify the species of truffles in her collection, adding weight to her thesis and providing additional data for potential publications.
Niall Connolly (PhD)	JCU	Niall received Travel Bursary funding and matching funding from the Catchment to Reef Joint Program to attend the 54th Annual Meeting of the North American Benthological Society, held in Anchorage, Alaska in June 2006. Niall presented a paper describing his research outcomes at a special session focussed on tropical stream ecology.
Anna Koetz (PhD)	JCU	The CRC provided funding for Anna to attend and present at the 3rd Biennial Australasian Ornithological Conference in Blenheim, New Zealand in December 2005, and to attend the 24th International Ornithological Conference in Hamburg, Germany in August 2006. At both events, Anna presented findings from her research into the causes and evolutionary consequences of song dialects in the endemic rainforest bird, the Chowchilla.
Richard Pauku (PhD)	JCU	A Travel Bursary enabled Richard to attend a Pacific Islands Agroforestry Workshop in Tonga in September 2005, where he presented his research into the domestication of indigenous fruit and nut trees for agroforestry in the Solomon Islands.
Thomas Rayner (PhD)	JCU	Tom received funding to visit Alaska in September 2005 to attend and present at the American Fisheries Society Annual Meeting. Following the conference, Tom presented a seminar on his research findings at the Universities of British Columbia and Hawaii.
Luke Shoo (PhD)	GU	Following submission of his PhD thesis in April 2005, Luke sought funding to present the results of his research at the *Global Change in Mountain Regions* international conference held in Scotland in October 2005. During his trip, Luke also visited Professor Chris Thomas, a leading researcher in the field of the ecological and evolutionary impacts of human activities on biological systems. Professor Thomas is based at the University of York, UK.

Yong Tang (PhD)	GU	Yong will attend the annual meeting of the Association for Tropical Biology and Conservation, to be held in Kunming, China in July 2006. Yong hopes the meeting will provide a platform to present his research on the maintenance and dynamics of the rainforest's edge and intends to mingle with scientists within his field.

Table 17: Milestones and/or outputs for Rainforest CRC education and training activities throughout 2005/2006.

Type of Milestone and/or Output	Description of all 2005/2006 milestones and/or outputs including past milestones which have not been met (and date)	Achieved? Yes/No	If achieved, progress during 2005/2006 and planned activities in 2006/2007
Competitive Student Funding Round 14	Undertake Round 14 (September 2005) of the Research Support Scheme.	Yes.	• A total of $56,138 was awarded to support eighteen postgraduate research projects. • Round 14 was to be the final competitive funding round offered to Rainforest CRC postgraduate students, however it was decided that a special round of funding (Round 15) be offered in March 2006 to carry forward continuing students beyond the life of the Rainforest CRC. • A total of $61,700 was awarded to support thirteen postgraduate research projects in Round 15 (March 2006).
Travel Bursary	Continue the award of Travel Bursaries until close of Rainforest CRC in June 2006.	Yes.	A total of $17,871 was made available for postgraduate conference travel, including a contribution of $5,345 from the Catchment to Reef Joint Research Program budget.
Student Conference Prizes	Offer student oral and poster presentation prizes at Rainforest meets Reef Joint Conference (Nov 2005)	Yes.	• Four cash prizes (first place and runner up for both oral and poster presentations) totalling $1,400 was awarded in conjunction with CRC Reef. • Rainforest CRC provided sponsorship for student prizes at 2005 annual meeting of the Ecological Society of Australia (*ESA 2005*).
Forest Matters Newsletter	Continue to publish articles about postgraduate research projects in *Forest Matters* newsletter on a regular basis.	Yes.	Articles about postgraduate research projects appeared in both the September 2005 and March 2006 editions of *Forest Matters*.
Media Coverage	Continue assistance with media distribution of student research and outcomes.	Yes.	Several media releases were issued in second half of 2005, however PR tasks were ceased in 2006 to allow completion of a number of Communications tasks prior to the close of the CRC in June 2006.

Table 18: Summary of completed/submitted and ongoing PhD, Masters and Honours projects for 2005/2006.

PhD Theses Submitted / Degree Conferred			
Student Name (Affiliation) (Start Date)	**Title of Project**	**Supervisor/s**	**Funding Provider**
Kay BRADFIELD (JCU) (Pre Rainforest CRC)	Ecological Characteristics of Declining Frogs in North Queensland	A Prof R Alford (JCU) Dr L Schwarzkopf (JCU)	
Averil COOK (UQ) (Pre Rainforest CRC)	The Economics of Developing Long Distance Walking Tracks in North Queensland Conferred Nov 2005	Dr S Harrison (UQ) Dr J Asafu-Adjaye (UQ)	
Gaynor DOLMAN (UQ) (Feb 2000)	Evolution and Conservation of Herpetofauna in the Wet Tropics Rainforests of Australia Submitted Feb 2006	Dr J Austin (UQ) Prof C Moritz (UC Berkeley) Prof H Possingham (UQ)	• F. G. Meade Scholarship • National Science Foundation
Samantha FOX (JCU) (Mar 2002)	Population Structure of the Spectacled Flying Fox, *Pteropus conspicillatus*: A Study of Genetic and Demographic Factors Submitted Feb 2006	Dr D Blair (JCU) Dr M Waycott (JCU) Dr J Luly (JCU) Dr D Westcott (CSIRO)	• Australian Postgraduate Award (Industry) • Queensland Fruit and Vegetable Growers • CSIRO University Grant • Queensland Smart State Funding • Bat Conservation International • Rainforest CRC Research Support Scheme
Conrad HOSKIN (UQ) (Jul 1999)	The roles of historical isolation and ecological gradients in generating reproductive isolation in the Wet Tropics Submitted 2006	A Prof H McCallum (UQ) Dr J Austin (UQ) Prof C Moritz (UC Berkeley)	• Australian Postgraduate Award • National Science Foundation • Rainforest CRC Research Support Scheme
James MOLONEY (JCU) (Pre Rainforest CRC)	The Effects of Habitat Fragmentation on Bird Communities in a Naturally Disturbed Environment: The Wet Tropics Lowlands Submitted Feb 2006	Prof R Pearson (JCU) Dr A Lewis (JCU)	• Australian Postgraduate Award
Adnan MOUSALLI (UQ) (Pre Rainforest CRC)	Surrogates and distribution of biodiversity in wet forests of south-east Queensland Conferred Nov 2005	Prof C Moritz (UQ) A Prof H McCallum (UQ)	
Richard PAUKU (JCU) (Mar 2002)	Domestication of Indigenous Fruit and Nut Trees for Agroforestry in the Solomon Islands Submitted Nov 2005	Prof R Leakey (JCU) A Prof P Gadek (JCU)	• ACIAR Scholarship • Rainforest CRC Research Support Scheme • Rainforest CRC Top-Up Scholarship

Catherine POHLMAN (JCU) (Feb 2002)	Changes in Microclimate Regimes and Plant Community Dynamics of Rainforest/Powerline Corridor Boundaries, Natural Linear Barriers and Areasof Natural Disturbance Submitted June 2006	Prof S Turton (JCU) Prof D Gillieson (JCU) Dr M Goosem (JCU)	• Australian Postgraduate Award • Rainforest CRC Research Support Scheme • Rainforest CRC Top-Up Scholarship • Powerlink Queensland
Chris PRATT (JCU) (Mar 2002)	The Environmental Fate of Traffic-derived Metals in a Section of Wet Tropics World Heritage Area (WTWHA), Far North Queensland (FNQ) Conferred June 2006	Dr B Lottermoser (JCU)	• Australian Postgraduate Award • Rainforest CRC Top-Up Scholarship
Matthew PYE (JCU) (Feb 2001)	Genetic Diversity and Divergence Within and Among Natural Populations of Araucaria in Eastern Australia Conferred Feb 2006	A Prof P Gadek (JCU)	• Australian Postgraduate Award • JCU Tropical Biology • Rainforest CRC Top-Up Scholarship
Michael Guo-Zhang SONG (UQ) (Nov 2001)	The patterns of regeneration of tree species in a subtropical rainforest Submitted 2006	Dr D Yates (UQ) Dr D Doley (UQ)	• Rainforest CRC Research Support Scheme
Yvette WILLIAMS (JCU) (Aug 1999)	Determinants of Rarity in Microhylid Frogs Submitted 2006	Dr C Johnson (JCU) A Prof R Alford (JCU) Dr M Waycott (JCU)	• Australian Postgraduate Award
Nigel YOUNG (JCU) (Mar 2003)	Biophysical Impacts and Psychosocial Experiences Associated with the Use of Selected Long Distance Walking Tracks in the Wet Tropics Region of Queensland Submitted June 2006	Prof S Turton (JCU) Dr J Bentrupperbäumer (JCU) Prof D Gillieson (JCU)	• Atherton Tableland Environmental Scholarship • Rainforest CRC Research Support Scheme

Masters Theses Submitted / Degree Conferred

Student Name (Affiliation) (Start Date)	Title of Project	Supervisor/s	Funding Provider
Anthony ADKINS (JCU)	Density and Home Range of Forest-dependent Birds in Rainforest Remnants of the Atherton Tablelands Conferred May 2006	Dr B Congdon (JCU)	• JCU Tropical Biology • Rainforest CRC Research Support Scheme
Andrea PULLO (JCU) (Jul 2002)	Effect of Isolation on the Composition of Soil Seed Banks on the Atherton Tableland, Northeast Queensland, Australia Conferred Dec 2005	Dr P Gadek (JCU) Mr N Tucker (Biotropica) Dr W Edwards (JCU)	• Rainforest CRC Research Support Scheme
Amy SMITH (JCU) (Feb 2004)	The Effects of a Flagship Species on People's Intentions to Behave Environmentally Conferred Aug 2005	Dr J Bentrupperbäumer (JCU) Dr E Harding (JCU)	• Rainforest CRC Research Support Scheme

Patricia TURNER (JCU) (Jul 2005)	Effects of narrow revegetated corridor conditions on Scincidae morphology and behaviour Submitted May 2006	Dr M Goosem (JCU)	• Rainforest CRC Research Support Scheme

Honours Theses Submitted / Degree Conferred

Student Name (Affiliation) (Start Date)	Title of Project	Supervisor/s	Funding Provider
Naima FINE (GU) (Jul 2004)	Effects of fragmentation on seed predators and plant recruitment in remnant rainforests of the Big Scrub Conferred 2006	Dr J Kanowski (GU) A Prof C Catterall (GU)	• Rainforest CRC Research Support Scheme • GU Funding • Patience Thoms Honours Scholarship
Leisa FISHER (UQ) (Nov 2004)	Vocalisations and behaviour of the Spectacled Flying Fox (*Pteropus conspicillatus*) Conferred 2006	Dr D Westcott (CSIRO) Dr P Murray (UQ) Dr L Shilton (CSIRO)	• UQ Funding • Rainforest CRC Research Support Scheme
Jennifer PARSONS (JCU) (Jul 2004)	Cycles of Resource Use in the Spectacled Flying Fox (*Pteropus conspicillatus*) in Relation to Landscape Context Conferred Mar 2006. Awarded first class Honours.	Dr C Johnson (JCU) Dr S Robson (JCU) Dr D Westcott (CSIRO)	• Rainforest CRC Research Support Scheme • JCU Funding
Billie ROBERTS (GU) (Jul 2004)	Habitat characteristics of flying-fox camps in south-east Queensland Conferred Sept 2005	A Prof C Catterall (GU) Dr J Kanowski (GU) Dr L Hall (Independent)	• Rainforest CRC Research Support Scheme • GU Funding

PhD Studies in Progress

Student Name (Affiliation) (Start Date)	Title of Project	Supervisor/s	Funding Provider
Sandra ABELL (JCU) (Mar 2003)	The Ecology of Hypogeous Fungi: Principle Food Resource of the Endangered Species *Bettongia tropica* Along a Wet to Dry Gradient of Sclerophyll Forest	A Prof P Gadek (JCU) Dr C Pearce (JCU) Dr B Congdon (JCU)	• Faculty Teaching Scholarship • Rainforest CRC Research Support Scheme
Mark ANNANDALE (UQ) (Pre 1999)	Assessing the effects of underplanting with *Toona ciliata* in north Queensland	Dr D Yates (UQ) Dr R Keenan (BRS) Dr A Snell (QFRI)	• QFRI
Frederic BEAULIEU (UQ) (Mar 2001)	Biodiversity of mites (Acari) in rainforests	Dr D Walter (UQ) Dr H Proctor (GU) Prof R Kitching (GU)	• FCAR Grant (Govt of Quebec, Canada) • Rainforest CRC Research Support Scheme
Peter BYRNES (JCU) (Feb 2003)	The Impact of Roads on Ground Dwelling Rainforest Mammals in the Wet Tropics World Heritage Area	Prof S Turton (JCU) Dr M Goosem (JCU) Dr A Dennis (CSIRO)	• DVC University Scholarship • Rainforest CRC Research Support Scheme
Ainsley CALLADINE (JCU) (Feb 2000)	Evolution and Biogeography of the Australian Loranthaceae	A Prof B Jackes (JCU) A Prof P Valentine (JCU)	• JCU School Support • ASBS Hansjörg Eichler Scientific Research Fund 1999
Niall CONNOLLY (JCU) (Pre Rainforest CRC)	The Productivity/Diversity Paradox: Does the Effect of Resource Availability on Spatial Structure Confound the Productivity/Diversity Relationship at Local Scales?	Prof R Pearson (JCU) A Prof D Coomans (JCU)	• Rainforest CRC Research Support Scheme

Anthony DELL (JCU) (Pre Rainforest CRC)	Community ecology of intermittent streams	A Prof R Pearson (JCU) A Prof R Alford (JCU)	
Paul GODFREY (GU) (Oct 2004)	The Influence of Flow Seasonality on the Recruitment Ecology of Fishes in a Lowland Wet Tropics River	Prof A Arthington (GU) Dr B Pusey (GU) Prof R Pearson (JCU)	• Rainforest CRC Catchment to Reef Scholarship • Rainforest CRC Research Support Scheme
Brett GOODMAN (JCU) (May 2002)	Ecomorphology, Microhabitat Occupation and Life History Traits in Eugongylus Skinks	Dr A Krockenberger (JCU) Dr L Schwarzkopf (JCU) Dr S Hudson (UQ)	• Doctoral Merit Research Scheme • JCU Grant • Rainforest CRC Research Support Scheme
Peter GRIMBACHER (GU) (Feb 2001)	Beetle Assemblage Responses to Rainforest Deforestation and Reforestation	Prof R Kitching (GU) A Prof C Catterall (GU)	• Griffith University Scholarship • Rainforest CRC Top-Up Scholarship
Mark HARRINGTON (JCU) (Jan 03)	Towards an Understanding of the Origins of the Australia Flora: Evolutionary History of the Australian Hopbushes (Dodonaea)	A Prof P Gadek (JCU) Dr W Edwards (JCU)	• Australian Postgraduate Award • Rainforest CRC Research Support Scheme
James HILL (JCU) (Jul 2004)	Investigating Mechanisms for Plant Co-existence Within a Tropical Lowland Rainforest	Dr W Edwards (JCU) Dr A Krockenberger (JCU)	• Rainforest CRC Research Support Scheme • JCU Funding
David JEFFREYS (UQ) (Apr 2002)	Application of a multi-objective decision support system (MODSS) for the evaluation of farm forestry viability	Dr J Herbohn (UQ) Dr S Harrison (UQ) Dr O Bosch (UQ)	• Rainforest CRC Research Support Scheme
Katherine JONES (JCU) (Mar 2003)	Dietary Selectivity in the Rainforest Possum *Pseudochirops archeri*: The Effect of Climate Change on the Interaction Between Plan Toxins and Foliage Intake	Dr A Krockenberger (JCU) Dr B Congdon (JCU) Dr C Johnson (JCU)	• JCU Postgraduate Research Scholarship • Rainforest CRC Research Support Scheme
Liana JOSEPH (UQ) (Mar 2002)	Effective monitoring and management of rare and threatened birds of Australian tropical and sub-tropical forests	Prof H Possingham (UQ) Dr S Williams (JCU) Dr S Garnett (QPWS)	• Australian Postgraduate Award • Rainforest CRC Top-Up Scholarship
Anna KOETZ (JCU) (Jul 2003)	Cultural and Genetic Divergence of a Rainforest Endemic, the Chowchilla, *Orthonyx spaldingii*	Dr B Congdon (JCU) Dr D Westcott (CSIRO) Dr C Johnson (JCU)	• JCU Postgraduate Research Scheme • Rainforest CRC Research Support Scheme
Melinda LAIDLAW (UQ) (Feb 2001)	The determinants of small-scale vegetation patterns in Australian sub-tropical rainforest	Dr D Yates (UQ) Dr B McDonald (Queensland Herbarium) Dr K Richardson (UQ) Dr G Wardell-Johnson (UQ)	• Australian Postgraduate Award • Rainforest CRC Research Support Scheme • Rainforest CRC Top-Up Scholarship
Sherry MARCHAND (ANU) (Jun 2001)	Land Management Negotiations in the Wet Tropics World Heritage Area	Dr F Merlan (ANU) Dr J Finlayson (Anthropos) Dr S Pannell (JCU)	• Rainforest CRC Research Support Scheme
Stephen McKENNA (GU) (Mar 2002)	Regeneration dynamics in rainforest fragments	A Prof C Catterall (GU) Dr G Wardell-Johnson (GU) Dr J Kanowski (GU)	• Australian Postgraduate Award • Rainforest CRC Research Support Scheme

Jeff MIDDLETON (JCU) (Mar 2003)	The Effects of Rainfall Seasonality on the Distribution and Abundance of Leaf Litter Foraging Rainforest Vertebrates in the Wet Tropics	A Prof S Turton (JCU) Dr S Williams (JCU) Dr D Hilbert (CSIRO) Dr I Lawler (JCU)	• JCU Funding • Rainforest CRC Research Support Scheme • Earthwatch • Queensland Smart State Funding
Cath MORAN (GU) (May 2000)	Frugivorous birds and bats and rainforest seed dispersal in a fragmented landscape	Dr C Catterall (GU) Dr R Green (GU) Dr M Olsen (Independent)	• Australian Postgraduate Award • Rainforest CRC Research Support Scheme
Akihiro NAKAMURA (GU) (Feb 2002)	Restoration of the litter fauna under restoration protocols	A Prof C Catterall (GU) Prof R Kitching (GU) Dr A House (QFRI)	• GU Postgraduate Research Scheme • Rainforest CRC Research Support Scheme • Queensland Smart State Funding • GU Tuition Fee Scholarship
Claudia OLLENBURG (GU) (Mar 2004)	Economics of rural land use: agriculture, tourism and conservation	Prof Ralf Buckley (GU) Dr Carl Cater (GU) Prof Trevor Mules (GU)	• International Postgraduate Research Scheme • GU Postgraduate Research Scheme • Rainforest CRC Research Support Scheme
Anne PERRY (UQ) (Pre Rainforest CRC)	Wood quality assessment of plantation growth of *Flindersia brayleyana*	Dr D Doley (UQ) Dr D Yates (UQ)	• Australian Postgraduate Award
Thomas RAYNER (JCU) (Feb 2003)	The Trophic Ecology of Freshwater Fishes of an Australian Rainforest River	Prof R Pearson (JCU) Dr B Pusey (GU)	• Australian Postgraduate Award • Rainforest CRC Research Support Scheme • Rainforest CRC Top-Up Scholarship
Anna RICHARDS (UQ) (July 2002)	The functional importance of biodiversity for carbon sequestration	Dr S Schmidt (UQ) A Prof D Lamb (UQ) Dr R Dalal (DNRM)	• Australian Postgraduate Award • Greenhouse Accounting CRC • Rainforest CRC Research Support Scheme
Ilyas SIDDIQUE (UQ) (Jul 2003)	Effects of functional diversity of tree plantations on the restoration of soil fertility in degraded soils	A Prof D Lamb (UQ) Dr S Schmidt (UQ)	• International Postgraduate Research Scheme • UQ Postgraduate Research Scheme • NASA Planetary Biology Internship Program
David SMORFITT (UQ) (Jan 2001)	Economic cost of feral pig control	Dr S Harrison (UQ) Dr J Herbohn (UQ) Dr C Tisdell (UQ)	• HECS Scholarship
Yong TANG (GU) (Mar 2003)	Comparative study of the gap regeneration of tropical rainforests of Australia and South China	Prof R Kitching (GU) Dr J Zalucki (GU)	• International Postgraduate Research Scheme • GU Postgraduate Research Scheme • Rainforest CRC Research Support Scheme
Paul THUESEN (JCU) (Aug 2005)	Divergence with Gene Flow: The Role of Predation and Sexual Selection on a Freshwater Fish (*Pseudomugil signifier*)	Dr B Congdon (JCU) Prof R Pearson (JCU)	• Australian Postgraduate Award • Rainforest CRC Research Support Scheme

Jessie WELLS (UQ) (Jun 2001)	Spatial ecology of plant regeneration in secondary rainforests of the Wet Tropics	Prof H Possingham (UQ) Dr D Hilbert (CSIRO)	• UQ Postgraduate Research Scheme • CSIRO Sustainable Ecosystems Postgraduate Research Scheme

Masters Studies in Progress

Student Name (Affiliation) (Start Date)	Title of Project	Supervisor/s	Funding Provider
Paul FERRARO (JCU) (Feb 2005)	Taxonomic Status and Population Structure of the Mahogany Glider	Dr J Winter (QPWS) Dr J Norman (Museum Victoria) Dr C Johnson (JCU) Dr P Latch (QPWS)	• Rainforest CRC Research Support Scheme • Natural Heritage Trust • Inkind – Queensland Parks and Wildlife Service • Inkind – Museum Victoria
Lynne JONES (JCU) (Feb 2003)	Genetic structuring within disjunct populations of *Idiospermum australiense*	A Prof P Gadek (JCU)	• Rainforest CRC Research Support Scheme
Collin STORLIE (JCU) (Feb 2006)	The effect of moisture seasonality and quantity on microhylid abundance and phenology	Dr S Williams (JCU) Dr R Alford (JCU)	• Rainforest CRC Research Support Scheme

Honours Studies in Progress

Student Name (Affiliation) (Start Date)	Title of Project	Supervisor/s	Funding Provider
Silvie MORAVEK (JCU) (Jan 2003)	An Environmental History of the Grassy Balds in the Bunya Mountains National Park, Queensland: Implications for Management	Dr J Luly (JCU)	

Suspended Studies / Withdrawn from Degree

Student Name (Affiliation) (Start Date)	Title of Project	Supervisor/s	Funding Provider
Michael COX (UQ) (Pre Rainforest CRC) *Discontinued Sept 2005*	Queensland forest product export potential	Dr S Harrison (UQ) Dr M Quayle (QUT)	
Kim HAUSELBERGER (JCU) (Jun 2004) *Suspended Studies*	Declining Amphibian Populations of North Queensland and Ecuador	A Prof R Alford (JCU) Dr L Schwarzkopf (JCU) Dr S Williams (JCU)	• JCU Funding • Rainforest CRC Research Support Scheme
Rasheda KEANE (UQ) (Jul 2003) *Suspended Studies*	Analysis of long-term supply of timber on the Atherton Tablelands	Dr J Herbohn (UQ) Dr G Slaughter (UQ)	• Rainforest CRC Research Support Scheme
Romina RADER (JCU) (Apr 2005) *Suspended Studies*	The Impact of Fragmentation on Seed Dispersal	Dr W Edwards (JCU) Dr D Westcott (CSIRO) Dr A Dennis (CSIRO)	• JCU Scholarship • Rainforest CRC Research Support Scheme
Matthew SHAW (UQ) (Pre Rainforest CRC) *Discontinued Sept 2005*	Parasitic mites: influence of the nest	Dr D Walter (UQ) Dr S Barker (UQ)	• UQ Postgraduate Research Scholarship
Jane SKRANDIES-MARTIN (UQ) (Jan 2000) *Suspended Studies*	The influence of structure and condition of riparian buffers on water quality in tropical catchments	Dr S Phinn (UQ) Dr D Hilbert (CSIRO) Dr R Pearson (JCU)	• UQ Funding • Rainforest CRC Research Support Scheme
Kim STEPHENSEN (JCU) (Feb 2003) *Withdrawn from Degree*	Invertebrate Diversity in Restored Tropical Ecosystems	Dr J Seymour (JCU) Mr N Tucker (BioTropica)	• Rainforest CRC Research Support Scheme

10. PERFORMANCE MEASURES

Three types of Key Performance Indicator are considered in reporting the Centre's overall progress during the reporting period:

a) Outputs: To enhance the contribution of long-term scientific and technological research and innovation to Australia's sustainable economic and social development;
b) Process: To enhance the transfer of research outputs into commercial or other outcomes of economic, environmental or social benefits to Australia; and
c) Outcomes: To enhance collaboration among researchers, between researchers and industry or other users, and to improve efficiency in the use of intellectual and other research resources.

Table 19: Technology transfer through major conferences, workshops and meetings during 2005/2006.

	Attendance	Person Days
Symposium – Roles of Animal Seed Dispersers in Revegetation, July 2005	70	70
Symposium – Frugivory and Seed Dispersal in Fragmented Landscapes, July 2005	60	60
Symposium – Large Scale Restoration, Dec 2005	100	100
Fourth International Workshop/Symposium on Frugivores and Seed Dispersal, July 2005	130	910
Australian Canopy Crane Open Day, Sept 2005	50	25
Ecology and Conservation of Tree-Kangaroos Conference	90	270
Rainforest meets Reef Joint Conference with CRC Reef	230	690

Table 20: Total number of major events since 1999.

		Attendance	Person Days
2005/2006	7 major events	730	2,125
2004/2005	17 major events	786	1,306
2003/2004	8 major events	308	338.5
2002/2003	17 major events	511	1,117
2001/2002	20 major events	834	1,111
2000/2001	22 major events	590	853
1999/2000	26 major events	792	1,673

Table 21: Technology transfer through services and products since 1999.

Service or Product	1999/ 2000	2000/ 2001	2001/ 2002	2002/ 2003	2003/ 2004	2004/ 2005	2005/ 2006	Total
Information Sheets	6	10	7	6	0	0	0	**45**
Newsletters	4	3	3	3	2	2	2	**19**
Issues in Tropical Forest Landscapes Series	0	0	0	2	1	0	2	**5**
Brochures	1	0	1	2	2	2	2	**10**
Display/Posters	0	0	2	3	1	0	3	**9**
Technical and Research Reports Published	1	3	5	5	6	8	17	**45**
Electronic Products	0	1	1	2	0	0	1	**5**
Conference Presentations	44	55	62	67	72	75	94	**469**
Public Presentations	54	48	47	46	38	52	49	**334**

Table 22: Contracts and consultancies involving Rainforest CRC participants since 1999 (summary).

	Number of Consultancies	Number of Agencies Involved	Total Value
2005/2006	16	10	$1,926,016
2004/2005	23	15	$812,667
2003/2004	25	14	$890,660
2002/2003	16	9	$398,141
2001/2002	19	11	$387,465
2000/2001	15	10	$402,325
1999/2000	10	5	$428,255

Table 23: Participation in Rainforest CRC research projects since 1999 (summary):

	% Projects with >1 participant	% Projects with national collaborations	% Projects with inter-national collaborations
2005/2006	100	40	15
2004/2005	100	40	25
2003/2004	100	40	15
2002/2003	100	40	15
2001/2002	100	30	15
2000/2001	100	10	5
1999/2000	100	10	5

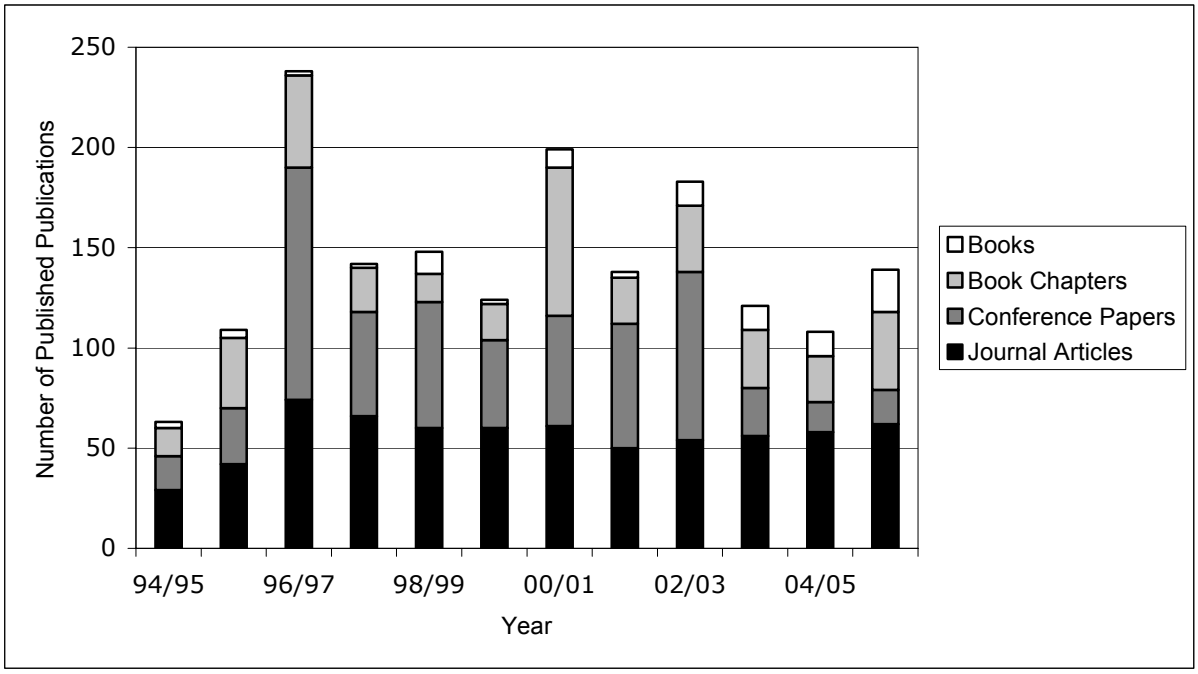

Figure 2: Total number of research publications by participants of the Rainforest CRC since 1993.

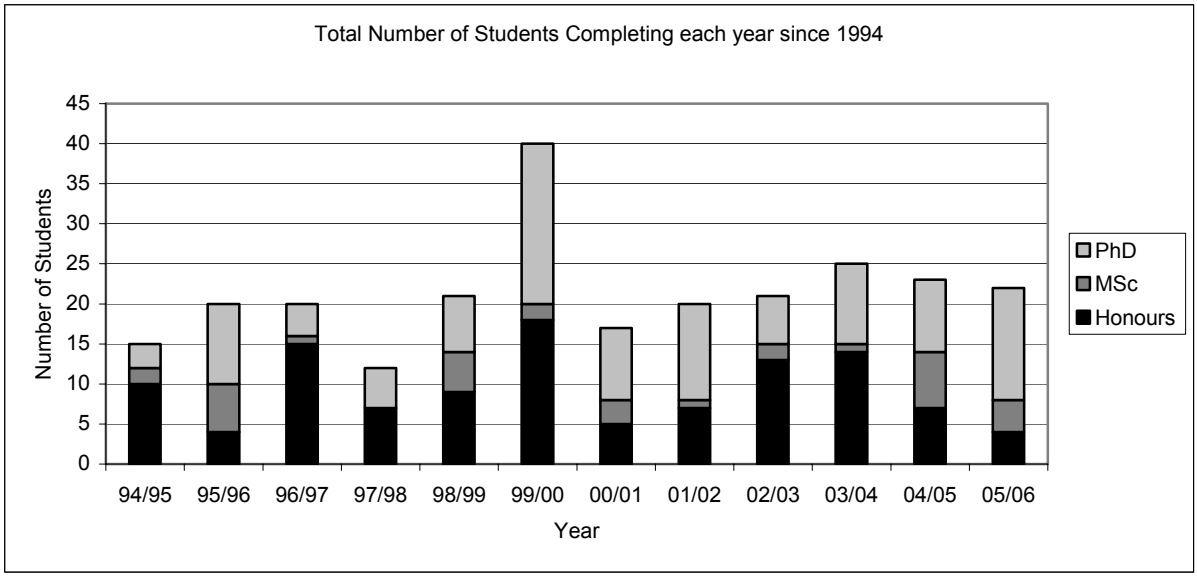

Figure 3: Total number of postgraduate student completions each year since 1994.

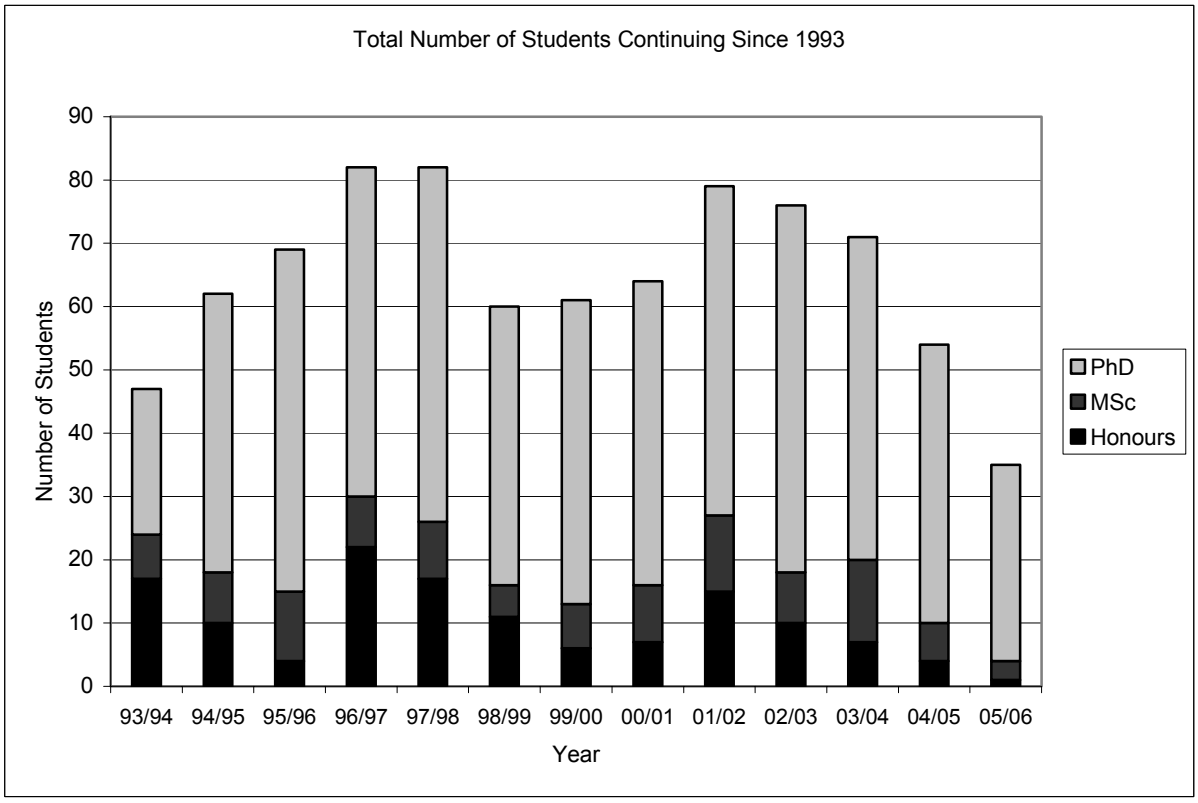

Figure 4: Total number of continuing postgraduate student projects each year since 1993.

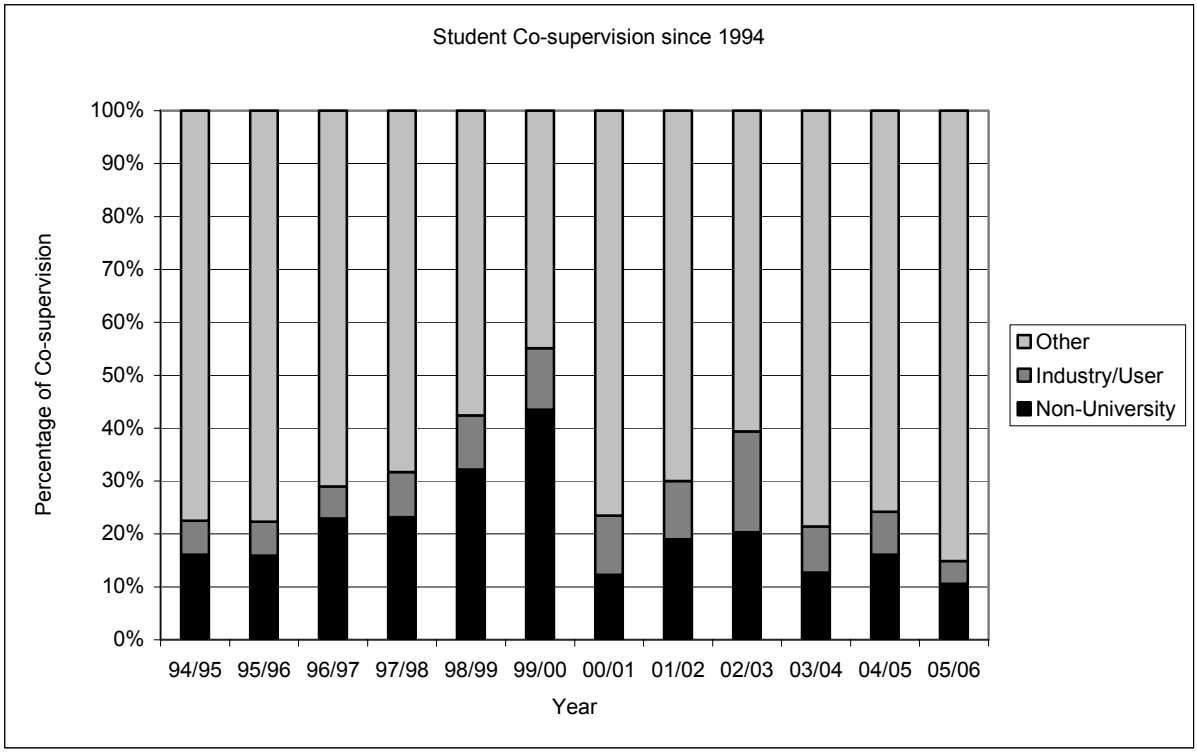

Figure 5: Student co-supervision statistics since 1994.

Table 24: Educational incentives for postgraduate research students since 1999.

Year	Initiative	No. of Students	Total Investment
2005/2006	Research Support Scheme	31	$117,838
	Top-Up Scholarship for APA Holders	2	$3,000
	Travel Bursary	7	$17,871
2004/2005	Research Support Scheme	24	$79,333
	Top-Up Scholarship for APA Holders	3	$7,500
	Travel Bursary	4	$8,809
2003/2004	Research Support Scheme	28	$104,424
	Top-Up Scholarship for APA Holders	7	$21,000
	Travel Bursary	3	$9,000
2002/2003	Research Support Scheme	24	$65,649
	Top-Up Scholarship for APA Holders	6	$18,000
	Travel Bursary	2	$6,000
2001/2002	Research Support Scheme	28	$90,041
2000/2001	Aboriginal Postgraduate Scholarship	2	$36,000
	Research Support Scheme	27	$79,950
	Supplementary Scholarship	7	$21,000
1999/2000	Research Support Scheme	32	$122,529
	Supplementary Scholarship	7	$21,000

11. LIST OF SELECTED PUBLICATIONS

Selected journal articles, books, book sections and conference proceedings published in 2005/2006, and selected unpublished items, are listed in this Chapter. Examples of media coverage and popular articles are listed in the Section 7.2 Knowledge Transfer.

Rainforest CRC participants are noted in upper case.

Books and Published Reports

ARTHINGTON, A. H., E. Baran, *et al.* (2006). Water Requirements of Floodplain Rivers and Fisheries: Existing Decision-support Tools and Pathways for Development. Comprehensive Assessment of Water Management in Agriculture. Cairo, Worldfish Centre: 59.

BENTRUPPERBAUMER, J. and J. P. RESER (2006). The Role of the Wet Tropics World Heritage Area in the Life of the Community: A Survey of the North Queensland Community. Cairns: Cooperative Research Centre for Tropical Rainforest Ecology and Management.

BOULTER, S. L., R. L. KITCHING, *et al.* (2006). Reproductive Biology and Pollination in Rainforest Trees: Techniques for a Community-level Approach. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

BRUCE, C. M. and D. W. HILBERT (2004). Pre-processing Methodology for Application to Landsat TM/ETM+ Imagery of the Wet Tropics. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

CATTERALL, C. P. and D. A. HARRISON (2006). Rainforest Restoration Activities in Australia's Tropics and Subtropics. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

ERSKINE, P. D., D. LAMB, *et al.* (2005). Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species, Rural Industeries Research and Development Corporation, Canberra.

GILLIESON, D., T. LAWSON, *et al.* (2006). Applications of High Resolution Remote Sensing in Rainforest Ecology and Management. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management.

GOOSEM, M. W. and S. M. TURTON (2006). Weed Incursions Along Roads and Powerlines in the Wet Tropics World Heritage Area: The Potential of Remote Sensing as an Indicator of Weed Infestations. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

GRAHAM, A. W. (2006). The CSIRO Rainforest Permanent Plots of North Queensland: Site, Structural, Floristic and Edaphic Descriptions. Cairns, CSIRO and Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

HARRINGTON, G. N., M. G. BRADFORD, *et al.* (2005). The Wet Sclerophyll and Adjacent Forests of North Queensland: A Directory to Vegetation and Physical Survey Data. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

HARRISON, S. R. and J. L. HERBOHN (2006). Sustainable Forest Industry Development in Tropical North Queensland. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

Johansen, K. and S. R. PHINN (2005). Vegetation Change Within the Wet Tropics of North Queensland: Mapping Changes with Landsat TM/ETM+ Imagery from 1988 and 1999. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

KANOWSKI, J. and C. P. CATTERALL (2006). Monitoring Revegetation Projects for Biodiversity in Rainforest Landscapes. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management.

LAMB, D., I. SIDDIQUE, *et al.* (2005). Tropical forest restoration experiences. Encyclopedia of Life Support Systems (EOLSS). Oxford, UNESCO EOLSS Publishers.

LARSEN, L. and S. PANNELL (2006). Developing the Wet Tropics Aboriginal Cultural and Natural Resource Management Plan. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

PANNELL, S. (2005). Yamani Country: A Spatial History of the Atherton Tableland, North Queensland. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

PANNELL, S. (2006). Reconciling Nature and Culture in a Global Context? Lessons from the World Heritage List. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

Welcomme, R. L., C. Bene , *et al.* (2006). Predicting the water requirements of river fisheries. Wetlands as an Ecological Resource, Ecological Studies Springer. 1 and 2.

WILLIAMS, S. E. (2006). Vertebrates of the Wet Tropics Rainforests of Australia: Species Distributions and Biodiversity. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

WORBOYS, S. J. (2006). Rainforest Dieback Mapping and Assessment: 2004 Monitoring Report Including an Assessment of Dieback in High Altitude Rainforests. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

WORBOYS, S. J. (2006). Guide to Monitoring *Phytophthora*-related Dieback in the Wet Tropics of North Queensland. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

Book and Report Sections

BENTRUPPERBAUMER, J. M. (2005). Human Dimension of Wildlife Interactions. Wildlife Tourism. D. Newsome, R. K. Dowling and S. Moore. Clevedon, England, Channel View Publications: Chapter 3.

Bonell, M., S. Bruijnzeel, *et al.* (2005). Forests, water and people: an emerging view. Forests - Water - People in the Humid Tropics. M. Bonell and S. Bruinjnzeel, Cambridge University Press: 906-925.

Bower, H. and J. KANOWSKI (2005). Enhancing Rainforest Restoration for Rainforest Fauna. Subtropical Rainforest Restoration, 2nd edition. Bangalow, Big Scrub Rainforest Landcare Group: 68-72.

BRISTOW, M., P. D. ERSKINE, *et al.* (2005). Species Performance and Site Relationships for Rainforest Timber Species in Plantations in the Humid Tropics of Queensland. Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species. P. D. ERSKINE, D. LAMB and M. BRISTOW. Canberra, Rural Industries Research and Development Corporation: 84-100.

CATTERALL, C. P., J. KANOWSKI, *et al*. (2005). Trade-offs Between Timber Production and Biodiversity in Rainforest Plantations: Emerging Issues and an Ecological Perspective. Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species. P. D. ERSKINE, D. LAMB and M. BRISTOW. Canberra, Rural Industries Research and Development Corporation: 206-202.

COX, M. (2006). Domestic and Export Marketing of Araucaria Timber. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC: 155-162.

DENNIS, A. J., G. Lipsett-Moore, *et al.* (2005). Seed predation, seed dispersal and habitat fragmentation: does context make a difference in tropical Australia. Seed Fate: Predation, dispersal and seedling establishment. P.-M. Forget, J. E. Lambert, P. E. Hulme and S. B. Vander Wall, CAB Interational: 117-135.

ERSKINE, P., D. LAMB, *et al.* (2005). Reforestation with Rainforest Trees: Challenges Ahead. Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species. P. D. ERSKINE, D. LAMB and M. BRISTOW. Canberra, Rural Industries Research and Development Corporation: 264-272.

FAITH, D. P. and K. J. WILLIAMS (2005). Phylogenetic diversity and biodiversity conservation. McGraw-Hill Yearbook of Science and Technology: 233-235.

HARRISON, S. R. (2006). Exploring the Potential for Forest Industry Development in North Queensland. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.: 1-8.

HARRISON, S. R. (2006). An Integrated Approach to Examining Obstacles to and Options for Forest Industry Development. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.: 17-30.

HARRISON, S. R., J. HERBOHN, *et al.* (2005). Economic Issues and Lessons Arising from the Community Rainforest Reforestation Program. Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species. P. D. ERSKINE, D. LAMB and M. BRISTOW. Canberra, Rural Industries Research and Development Corporation: 245-262.

HARRISON, S. R. and J. L. HERBOHN (2006). Developing a Business Case for Forestry Expansion: Concept and Method. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.

HARRISS, C. and D. G. GILLIESON (2006). Potential of remote sensing in the monitoring of weed infestations along powerline corridors. Weed Incursions Along Roads and Powerlines in the Wet Tropics World Heritage Area: The Potential of Remote Sensing as an Indicator of Weed Infestations. M. W. GOOSEM and S. M. TURTON. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.: 27-49.

HERBOHN, J., N. EMTAGE, *et al.* (2005). The Importance of Considering Social Issues in Reforestation Schemes. Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species. P. D. ERSKINE, D. LAMB and M. BRISTOW. Canberra, Rural Industries Research and Development Corporation: 224-244.

HERBOHN, J. L. (2006). Potential Financial Returns from Hoop Pine and an Assessment of the Likely Impacts of Various Support Measures on Landholder Willingness to Plant. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.: 123-134.

KANOWSKI, J., C. P. CATTERALL, *et al.* (2005). Rainforest timber plantations and animal biodiversity in tropical and subtropical Australia. Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species. P. ERSKINE, D. LAMB and M. BRISTOW. Canberra, Rural Industries Research and Development Corporation.

KANOWSKI, J., C. P. CATTERALL, *et al.* (2006). Biodiversity Futures Under Alternative Forest Industry Scenarios in North Queensland. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.: 103-122.

KANOWSKI, J., C. P. CATTERALL, *et al.* (2006). Impacts of Broadscale Timber Plantations on Biodiversity in Cleared Rainforest Landscapes of North Queensland. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management.

Keenan, R., D. Doley, *et al.* (2005). Stand Density Management in Rainforest Plantations. Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species. P. D. ERSKINE, D. LAMB and M. BRISTOW. Canberra, Rural Industries Research and Development Corporation: 141-160.

KIKKAWA, J. (2006). Reforestation and biodiversity in the Asia-Pacific region. Plantation Technology in Tropical Forest Science. K. Suzuki, K. Ishii, S. Sakurai and S. Sasaki. Tokyo, Springer-Verlag: 247-263.

KILLIN, D. R. (2006). Expanding the Araucariaceae Estate on the Southern Atherton Tablelands. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.: 37-58.

KITCHING, R. L., D. Bickel, *et al.* (2005). Guild Analyses of Dipteran Assemblages: A Rationale and Investigation of Seasonality and Stratification in Selected Rainforests. The Evolutionary Biology of Flies. D. K. Yeates and B. M. Wiegmann. New York, Columbia University Press.

LAMB, D. (2005). Restoring Tropical Moist Broad-Leaved Forests. Beyond Planting Trees: Restoring Forests and their Functions in Landscapes. S. Mansourian, D. Vallauri and N. Dudley. New York, Springer Verlag: 291-297.

LAMB, D. (2005). Identifying site-level options. Restoring Forest Landscapes: an introduction to the art and science of forets landscape restoration. J. Rietbergen. Yokohama, International Tropical Timbers Organisation: 71-80.

LAMB, D. (2005). Scenario modelling to optimise options. Restoring Forest Landscapes: an introduction to the art and science of forest landscape restoration. J. Rietbergen. Yokohama, International Tropical Timbers Organisation: 117-124.

LAMB, D., D. N. Huynh, *et al.* (2005). Designing Mixed-Species Plantations. Reforestation in the Tropics and Subtropics of Australia Using Rainforest Tree Species. P. D. ERSKINE, D. LAMB and M. BRISTOW. Canberra, Rural Industries Research and Development Corporation: 129-140.

MACZKOWIACK, R. (2006). A case-based study of private landholders who have planted trees. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC: 59-70.

Mansourian, S., D. LAMB, *et al.* (2005). Overview of technical approaches to restoring tree cover at the site level. Beyond Planting Trees: Restoring Forests and their Functions in Landscapes. S. Mansourian, D. Vallauri and N. Dudley. New York, Springer Verlag: 241-249.

PEARSON, R. G. (2005). Biodiversity of the Freshwater Invertebrates of the Wet Tropics Region of Northeastern Australia: Patterns and Possible Determinants. Tropical Rain Forests: Past, Present and Future. E. Bermingham, C. W. Dick and C. Moritz. Chicago and London, University of Chicago Press.

RESER, J. P. and J. M. BENTRUPPERBAUMER (2005). The Psychosocial Impacts of Visitation and Use in World Heritage Areas: Researching and Monitoring Sustainable Environments and Encounters. Handbook of Sustainability Research. W. L. Filho. London, Peter Lang Scientific Publishers: 235-263.

Schneider, C. and S. E. WILLIAMS (2005). Effects of Quaternary Climate Change on Rainforest Diversity: Insights from Spatial Analyses of Species and Genes in Australia's Wet Tropics. Tropical Rainforests: Past, Present and Future. E. Bermingham, C. W. Dick and C. Moritz. Chicago, Chicago University Press.

SHOO, L., S. E. WILLIAMS, *et al.* (2006). Predicting and detecting impacts of climate change on montane rainforest birds in the Australian wet tropics. Global change in mountain regions. M. F. Price, Sapiens Publishing, UK: 205.

STORK, N. E., S. R. HARRISON, *et al.* (2006). Biodiversity conservation and sustainable management of forests: Socio-economic problems with farm forestry of rainforest timber production in North Queensland. Plantation Technology in Tropical Forest Science. K. Suzuki, K. Ishii, S. Sakurai and S. Sasaki. Tokyo, Springer-Verlag: 265-281.

SUH, J., R. LWANGA, *et al.* (2006). Visitor Attitudes to a Proposed Hoop Pine Plantation Establishment on the Southern Atherton Tablelands. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.: 135-146.

TURTON, S. M. and N. E. STORK (2006). Tourism and Tropical Rainforests: Opportunity or Threat? Emerging Threats to Tropical Forests. W. F. Laurance and C. A. Peres, University of Chicago Press.

TURTON, S. M. and N. E. STORK (2006). Towards sustainable tropical forest landscapes in far north Queensland: opportunities and challenges in and beyond the Wet Tropics. Queensland Geographical Perspectives. I. R. W. Childs and B. J. Hudson, Royal Geographical Society of Queensland: 169-188.

VENN, T. J. (2006). Economic Performance of Timber Utilisation Policies that Generate Employment and Income for Wik People on Cape York Peninsula. Sustainable Forest Industry Development in Tropical North Queensland. S. R. HARRISON and J. L. HERBOHN. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management. Rainforest CRC.: 77-96.

WILLIAMS, S. E. and D. W. HILBERT (2006). Climate Change as a Threat to the Biodiversity of Tropical Rainforests in Australia. Emerging Threats to Tropical Forests. W. F. Laurance and C. A. Peres, University of Chicago Press.

WILLIAMS, S. E., G. Langham, *et al.* (2006). Macroecology in the mountains of the Australian wet tropics: The impacts of global climate change on rainforest biodiversity. Global change in mountain regions. M. F. Price, Sapiens Publishing, UK: 203.

Journal Articles

ARTHINGTON, A. H., S. E. Bunn, *et al.* (2006). The challenge of providing environmental flow rules to sustain river ecosystems. Ecological Applications 16(4): 1-10.

BEAULIEU, F., D. E. Walter, *et al.* (2006). "Mesostigmatid mites (Acari: Mesostigmata) on rainforest tree trunks: arboreal specialists, but substrate generalists?" Experimental and Applied Acarology 39: 25-40.

BOULTER, S. L., R. L. KITCHING, *et al.* (2006). "Family, Visitors and the Weather: Patterns of Flowering in Tropical Rain Forests of Northern Australia." Journal of Ecology 94(2): 369-382.

BOULTER, S. L., R. L. KITCHING, *et al.* (2005). "Any Which Way Will Do: The Pollination Biology of a Northern Australian Rainforest Canopy Tree (*Syzygium sayeri*; Myrtaceae)." Biological Journal of the Linnean Society 149: 69-84.

Boyero, L. and R. G. PEARSON (2006). "Intraspecific Interference in a Tropical Stream Shredder Guild." Marine and Freshwater Research 57(2): 201-206.

BRODIE, J., K. E. FABRICIUS, *et al.* (2005). "Are increased nutrient outputs responsible for more outbreaks of crown-of-thorns starfish? An appraisal of the evidence." Marine Pollution Bulletin 51: 266-278.

Canonico, G., A. H. ARTHINGTON, *et al.* (2005). "The effects of introduced tilapias on native biodiversity." Aquatic Conservation: Marine and Freshwater Ecosystems 15: 463-483.

Carnus, J.-M., J. Parotta, *et al.* (2006). "Planted forests and biodiversity." Journal of Forestry 104: 65-77.

CATTERALL, C. P., J. KANOWSKI, *et al.* (2005). "Reforestation for biodiversity recovery: opportunities and limitations." International Forestry Review 7: 308.

Dudgeon, D., A. ARTHINGTON, *et al.* (2006). "Freshwater biodiversity: importance, threats, status and conservation challenges." Biological Reviews 81(2): 163-182.

Eastwood, R., R. L. KITCHING, *et al.* (2005). "Behavioural observations on the early stages of Jamides celeno (Cramer) (Lycaenidae) at Cat Tien National Park, Vietnam: an obligate myrmecophile?" Journal of the Lepidopterists' Society 59: 219-222.

Eastwood, R., N. E. Pierce, *et al.* (2006). "Do ants enhance diversification in lycaenid butterflies? Phylogeographic evidence from a model myrmecophile, *Jalmenus evagoras*." Evolution 60: 315-327.

EDWARDS, W. and A. KROCKENBERGER (2006). "Seedling Mortality Due to Drought and Fire Associated with the 2002 El Nino Event in a Tropical Rain Forest in North-East Queensland, Australia." Biotropica 38(1): 16-26.

Elith, J., C. H. Graham, *et al.* (2006). "Novel methods improve prediction of species' distributions from occurrence data." Ecography 29: 129-151.

EMTAGE, N., J. L. HERBOHN, *et al.* (2006). "Landholder typologies used in the development of natural resource management programs in Australia: a review." Australian Journal of Environmental Management 13(2): 79-94.

Endler, J. A., D. A. WESTCOTT, *et al.* (2005). "Animal Visual Systems and the Evolution of Color Patterns: Sensory Processing Illuminates Signal Evolution." Evolution 59(8): 1795-1818.

Endler, J. A., D. A. WESTCOTT, *et al.* (2005). "Innovation and signal efficiency affect the outcome of sexual selection in bowerbird signal design but elaboration does not." Evolution 59: 1795-1818.

ERSKINE, P. D., D. LAMB, *et al.* (2005). "Growth performance and management of a mixed rainforest tree plantation." New Forests 29: 117-134.

FABRICIUS, K. E. (2006). "Effects of irradiance, flow and colony pigmentation on the temperature microenvironment around corals: implications for coral bleaching?" Limnology and Oceanography 51: 30-37.

FABRICIUS, K. E. and D. McCorry (2006). "Changes in octocoral communities and benthic cover along a water quality gradient in the reefs of Hong Kong." Marine Pollution Bulletin 52: 22-33.

FORD, A. J., L. A. Craven, *et al.* (2005). "*Backhousia enata* A. J. Ford, L. A. Craven and J. Holmes (Myrtaceae), a new species from north-eastern Queensland." Austrobaileya 7(1): 121-127.

Funk, V. A., K. RICHARDSON, *et al.* (2005). "Survey-gap Analysis in Expeditionary Research: Where Do We Go From Here?" Biological Journal of the Linnean Society 85(4): 549-567.

GILLIESON, D. (2006). "Learning from the tropics: Biological and geomorphological processes. A commentary on Michael F. Thomas's 'Lessons from the tropics for a global geomorphology'." Singapore Journal of Tropical Geography 27: 131-133.

Graham, C. H., C. Moritz, *et al.* (2006). "Habitat history improves prediction of biodiversity in a rainforest fauna." Proceedings of the National Academy of Science 103: 632-636.

GRIMBACHER, P. S., C. P. CATTERALL, *et al.* (2006). "Beetle species' responses suggest that microclimate mediates fragmentation effects in tropical Australian rainforest." Austral Ecology 31: 458-470.

Hajkowicz, S. and G. MCDONALD (2006). "The Assets, Threats and Solvability (ATS) Model for Setting Environmental Priorities." Journal of Environmental Policy and Planning 8(1): 87-102.

Harrington, L., K. E. FABRICIUS, *et al.* (2005). "Synergistic effects of diuron and sedimentation on photosynthetic yields and survival of crustose coralline algae." Marine Pollution Bulletin 51: 415-427.

HARRINGTON, M. G., P. A. GADEK, *et al.* (2005). "The Potential for Predation Induced Somatic Embryogenesis in Storage Cotyledons." Oikos 111(2): 215-220.

HARRISON, S. R. and J. L. HERBOHN (2005). "Relationship between farm size and reforestation activity: Evidence from Queensland studies." Small-scale Forest Economics, Management and Policy 4(4): 471-484.

HAUSMANN, F., C. P. CATTERALL, *et al.* (2005). "Effects of Edge Habitat and Nest Characteristics on Depredation of Artificial Nests in Fragmented Australian Tropical Rainforest." Biodiversity and Conservation 14(10): 2331-2345.

Hero, J.-M., S. E. WILLIAMS, *et al.* (2005). "Ecological traits of declining amphibians in upland areas of eastern Australia." Journal of Zoology (Lond) 267: 221-232.

HOSKIN, C. J., M. Higgie, *et al.* (2005). "Reinforcement Drives Rapid Allopatric Speciation." Nature 437: 1353-1356.

KANOWSKI, J., T. REIS, *et al.* (2006). "Factors Affecting the Use of Reforested Sites by Reptiles in Cleared Rainforest Landscapes in Tropical and Subtropical Australia." Restoration Ecology 14(1): 67-76.

KENNARD, M. J., B. D. Harch, *et al.* (2006). "Accurately defining the reference condition for summary biotic metrics: a comparison of four approaches." Hydrobiologia Available online April 2006.

Kennard, M. J., B. J. PUSEY, *et al.* (2006). "Utility of a multivariate modelling method for prediction of freshwater fish assemblages and evaluation of river health." Hydrobiologia Available online April 2006.

Kroon, F. J., P. L. Munday, *et al.* (2005). "Aromatase pathway mediates sex change in each direction." Proceedings of the Royal Society of London: B 272: 1399-1405.

LAMB, D., P. D. ERSKINE, *et al.* (2005). "Restoration of Degraded Tropical Forest Landscapes." Science 310: 1628-1632.

Lane, M. B. and G. McDONALD (2005). "The Limits to Community-based Environmental Planning: Operational Dilemmas and Practical Remedies." Journal of Environmental Planning and Management 48(5): 709-731.

Lane, M. B. and G. MCDONALD (2005). "Community-based Environmental Planning: Operational Dilemmas, Planning Principles and Possible Remedies." Journal of Environmental Planning and Management 48(5): 709-731.

LEAKEY, R. B. (2005). "Domestication of non-wood forest products: The transition from common property resource to crop." Non-Wood News 12: 22-23.

LEAKEY, R. R. B., Z. Tchoundjeu, *et al.* (2005). "Agroforestry Tree Products (AFTPs): Targeting Poverty Reduction and Enhanced Livelihoods." International Journal of Agricultural Sustainability 3: 1-23.

MARRINAN, M. J., W. EDWARDS, *et al.* (2005). "Resprouting of saplings following a tropical rainforest fire in north-east Queensland, Australia." Austral Ecology 30: 817 - 826.

MCDONALD, G. and B. Roberts (2006). "SMART Targets for Great Barrier Reef Catchments." Australian Journal of Environmental Management 13(2): 95-107.

NAKAMURA, A., C. P. CATTERALL, *et al.* (2005). "Development of soil and litter arthropod assemblages in rainforest restoration." International Forestry Review 7: 326.

Negri, A., C. Vollhardt, *et al.* (2005). "Effects of the herbicide diuron on the early life history stages of coral." Marine Pollution Bulletin 51: 370-383.

NEILAN, W., C. P. CATTERALL, *et al.* (2006). "Do frugivorous birds assist rainforest succession in weed dominated oldfield regrowth of subtropical Australia?" Biological Conservation 129: 393-407.

Paull, D., G. Banks, *et al.* (2006). "Monitoring the environmental impact of mining in remote locations through remotely sensed data." GeoCarto International 21(1): 33-42.

PAULUS, B., P. A. GADEK, *et al.* (2006). "Successional Patterns of Microfungi in Fallen Leaves of *Ficus pleurocarpa* (Moraceae) in an Australian Tropical Rain Forest." Biotropica 38(1): 42-51.

Piper, S. D. and C. P. CATTERALL (2006). "Is the conservation value of small urban eucalypt forest remnants limited by elevated nest predation?" Emu 106: 119-125.

PUSEY, B. J., D. BURROWS, *et al.* (2006). "Translocation and spread of piscivorous fishes in the Burdekin River, north-eastern Australia." Biological Invasions Available online January 2006.

RESER, J. P. and J. M. BENTRUPPERBAUMER (2005). "What and Where are Environmental Values? Assessing the Impacts of Current Diversity of Use of 'Environmental' and 'World Heritage' Values." Journal of Environmental Psychology 25: 125-146.

Rowley, J. J., T. S. RAYNER, *et al.* (2005). "New Records and Invasive Potential of the Poeciliid Fish *Phalloceros caudimaculatus*." New Zealand Journal of Marine and Freshwater Research 39(5): 1013-1022.

SHOO, L. P., S. E. WILLIAMS, *et al.* (2005). "Potential decoupling of trends in distribution area and population size of species with climate change." Climate Change Biology 11: 1469-1476.

SHOO, L. P., S. E. WILLIAMS, *et al.* (2006). "Detecting climate change induced range shifts: where and how should we be looking?" Austral Ecology 31: 22-29.

SMORFITT, D., S. R. HARRISON, *et al.* (2005). "Potential Economic Implications for Regional Tourism of a Foot and Mouth Disease Outbreak in North Queensland." Tourism Economics 11(3): 411-430.

SMORFITT, D., S. R. HARRISON, *et al.* (2006). "Development of short-term cost curves and derivation of long-term decision curves for portable sawmills used in milling mixed species in North Queensland, Australia." Australian Forestry 70(2): 223-232.

TURTON, S. (2005). "Book Review: Tropical Forests and Global Atmospheric Change." Austral Ecology 30: 708-709.

TURTON, S. (2005). "Book Review: La Nina and Its Impacts: Facts and Speculation." Geographical Research 43(3): 333-334.

TURTON, S. M. (2005). Managing environmental impacts of recreation and tourism in rainforests of the Wet Tropics of Queensland World Heritage Area. Geographical Research 43: 140-151.

WESTCOTT, D. A., J. BENTRUPPERBAUMER, *et al.* (2005). "Incorporating disperser movement and behaviour patterns into models of seed dispersal." Oecologia 146(1): 57-67.

Williams, P., J. Kemp, *et al.* (2005). "Post-fire plant regeneration in montane heath of the Wet Tropics, north-eastern Queensland." Proceedings of the Royal Society of Queensland 112: 63-70.

Wolanski, E., K. E. FABRICIUS, *et al*. (2005). "Fine sediment budget on an inner-shelf, coral-fringed island, Great Barrier Reef of Australia." Estuarine and Coastal Shelf Science 65: 153-158.

Magazine and Newsletter Articles, and Other Items

CONNOLLY, N., R. Kelley, et al. (2005). Catchment to Reef - an interpretive poster and booklet. Cairns, Cooperative Research Centre for Tropical Rainforest Ecology and Management / CRC Reef Research Centre.

NEILAN, W., C. P. CATTERALL, *et al.* (2005). A new role for weeds in rainforest restoration? Cairns, Rainforest CRC.

ROBERTS, B., J. KANOWSKI, *et al.* (2006). Ecology and management of flying fox camps in an urbanising area. Cairns, Rainforest CRC.

Rout, T., K. J. WILLIAMS, *et al*. (2005). Conservation Planning Literature Database.

Theses

ADKINS, A. (2005). Density and Home Range of Forest-dependent Birds in Rainforest Remnants of the Atherton Tablelands. MSc Thesis. Cairns: James Cook University, Australia.

FINE, N. (2005). Effects of Fragmentation on Seed Predators and Plant Recruitment in Rainforest Remnants of the Big Scrub. BSc (Honours) Thesis. Brisbane, Australia, Griffith University.

PULLO, A. (2005). Assessment of Soil Seed Bank Diversity and Accumulation in Selected Revegetated Plots on the Atherton Tablelands. MSc Thesis. Cairns, Australia, James Cook University.

ROBERTS, B. (2005). Habitat Characteristics of Flying Fox Camps in South-east Queensland. BSc (Honours) Thesis. Brisbane, Australia, Griffith University.

Conference Papers

BYRNES, P. (2005). Roads and mammal movement: implications for dispersal and foraging behaviour. Rainforest meets Reef: Joint Conference of CRC Reef and Rainforest CRC, Townsville, Australia, CRC Reef Research Centre.

BYRNES, P. and M. GOOSEM (2005). The impact of roads on the movement of medium-sized, ground-dwelling mammals in the Wet Tropics World Heritage Area. ESA 2005, Brisbane, Australia, Ecological Society of Australia.

Cameron, S. E., K. J. WILLIAMS, *et al.* (2006). A comparison of iterative and terminal stage procedures addressing multiple opportunity cost constraints in systematic conservation planning. Conservation Without Borders, San Jose, California, Society for Conservation Biology 20th Annual Meeting.

DAWE, G. (2005). If a car passes by a forest - do the critters care? An examination of the effects of highway noise disturbance in a North Queensland rainforest. Rainforest meets Reef: Joint Conference of CRC Reef and Rainforest CRC, Townsville, Australia, CRC Reef Research Centre.

GOOSEM, M. and S. BUSHNELL (2005). Effectiveness of road underpasses for rainforest fauna. ESA 2005, Brisbane, Australia, Ecological Society of Australia.

GOOSEM, M., T. LAWSON, *et al.* (2005). Faunal connectivity and restoration priorities for remnant riparian forest in coastal Far North Queensland. Rainforest meets Reef: Joint Conference of CRC Reef and Rainforest CRC, Townsville, Australia, CRC Reef Research Centre.

GOOSEM, M., N. WESTON, *et al.* (2005). Effectiveness of rope bridge arboreal overpasses and faunal underpasses in providing connectivity for rainforest fauna. 2005 International Conference on Ecology and Transportation, Raleigh, NC, Centre for Transportation and the Environment, North Carolina State University.

GOOSEM, M., N. WESTON, *et al.* (2005). Underpasses and rope bridges: connectivity for tropical rainforest wildlife. International Conference on Ecology and Transportation, San Diego, United States of America.

HARRISON, S. R., J. L. HERBOHN, *et al.* (2006). Developing a business case for expansion of plantation forestry in Tropical North Queensland, Australia. Small-scale Forestry and Rural Development Conference, Galway, Ireland.

HERBOHN, J. L. (2006). Small-scale Forestry - is it simply a smaller version of industrial (large-scale) multiple use forestry? Small-scale Forestry and Rural Development Conference, Galway, Ireland.

MCDONALD, G. (2005). Adaptive management of diffuse-source pollution in Great Barrier Reef catchments. American Collegiate Schools of Planning Conference, Kansas City.

Mitchell, D. K., K. J. WILLIAMS, *et al.* (2005). Defining areas for species conservation in Melanesia. A planning outcomes experience from Milne Bay, Papua New Guinea. Ecological Society of Australia Annual Meeting, Brisbane.

POHLMAN, C. (2005). Internal fragmentation in the rainforest: edge effects of highways, powerlines and watercourses on tropical rainforest understorey microclimate, vegetation structure and seedling regeneration. Association of Tropical Biology and Conservation, Uberlandia, Brazil.

POHLMAN, C. (2005). Internal fragmentation in the rainforest: edge effects of highways, powerlines and watercourses on tropical rainforest understorey microclimate, vegetation structure and seedling regeneration. Rainforest meets Reef: Joint Conference of CRC Reef and Rainforest CRC, Townsville, Australia, CRC Reef Research Centre.

POHLMAN, C., S. M. TURTON, *et al.* (2005). Internal fragementation in the rainforest: edge effects of highways, powerlines and watercourses on tropical rainforest understorey microclimate and vegetation structure. ESA 2005, Brisbane, Australia, Ecological Society of Australia.

Roebeling, P. C., I. Bohnet, *et al.* (2005). Landscapes Toolkit for triple-bottom-line assessment of land use scenarios in Great Barrier Reef catchments. MODSIM 2005 International Congress on Modelling and Simulation, Modelling and Simulation Society of Australia and New Zealand.

WESTON, N., R. WILSON, *et al.* (2005). Over the top: helping Herbie (and Rocky et al.) cross the road. Rainforest meets Reef: Joint Conference of CRC Reef and Rainforest CRC, Townsville, Australia, CRC Reef Research Centre.

Technical Reports (Unpublished)

BRADFORD, M., D. A. WESTCOTT, *et al.* (2005). Terrestrial biodiversity of the wet tropics floodplains of North Queensland: Introduction to a reference database, CSIRO Water for a Healthy Country National Research Flagship Technical Report.

Gole, C., M. Burton, *et al.* (2005). Auction for Landscape Recovery: Investigating New Approaches National Market-based Instruments Pilot Program. Perth, WWF Australia.

KANOWSKI, J. (2005). North Maroochy Camphor Treatment Trial: Design and Monitoring Program. Maroochydore**:** 11pp.

LEAKEY, R. B. (2005). Agricultural Sustainability in FNQ: Boom or Bust? A Global Perspective.

MCJANNET, D. L. and J. S. Wallace (2006). Methodology for estimating cloud interception inputs to tropical rainforest, CSIRO Land and Water.

PHINN, S., P. SCARTH, *et al.* (2006). An Introduction and Validation of MODIS Products for Environmental Monitoring in Tropical Far-North Queensland, Cooperative Research Centre for Tropical Rainforest Ecology and Management.

12. SPECIFIED PERSONNEL

Table 25: List of Rainforest CRC specified personnel 2005/2006.

Title and Name	Contributing Organisation	Role	Total Working Time in Rainforest CRC
Professor Nigel Stork	Rainforest CRC	Chief Executive Officer	100%
Professor Steve Turton	Rainforest CRC	Deputy Chief Executive Officer (to October 2005)	100%
Professor Geoff McDonald	CSIRO	Leader, Program 1	30%
Dr David Hilbert	CSIRO	Leader, Program 2	65%
Professor Roger Kitching	Griffith University	Leader, Program 3	40%
Professor David Gillieson	James Cook University	Leader, Program 4	60%
Associate Professor Carla Catterall	Griffith University	Leader, Program 5	50%
Dr David Westcott	CSIRO	Leader, Program 6	75%
Dr Sandra Pannell	Rainforest CRC	Leader, Program 7	100%
Professor Richard Pearson	James Cook University	Leader, Program 10 (Catchment to Reef Joint Program)	40%
Ms Shannon Hogan	Rainforest CRC	Communications Manager	100%
Mr David Knobel	Rainforest CRC	Business Manager	100%

13. FINANCIAL INFORMATION

Financial information submitted separately via online MDQ.

14. AUDITOR'S CERTIFICATE

Auditor's certificate submitted separately via online MDQ.