

**Cooperative
Research
Centre for
*Freshwater
Ecology***

ANNUAL REPORT 1997-98

Abbreviations

ABRS	Australian Bureau of Resource Science
ACRLGS	Australian Centre for Regional and Local Government Studies
ACTEW	ACT Electricity and Water
ANZECC	Australia and New Zealand Environment and Consultative Committee
APA	Australia Postgraduate Awards
ARC	Australian Research Council
ASL	Australian Society for Limnology
AusRivAS	Australian River Assessment Scheme
AWQC (SA Water)	Australian Water Quality Centre
AWT	Australian Water Technologies
AWWA	Australian Water and Wastewater Association
BHERT	Business and Higher Education Round Table
CALM WA	Conservation and Land Management, Western Australia
CIT	Canberra Institute of Technology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSU-Riverina	Charles Sturt University Riverina
CRC-WMPC	CRC for Waste Management and Pollution Control
DIST	Department of Industry, Science and Tourism
DLWC	Department of Land and Water Conservation, NSW
EA	Environment Australia
EPA NSW	Environment Protection Authority, NSW
EPA Vic	Environment Protection Authority, Victoria
ERISS	Environmental Research Institute of the Supervising Scientist
FASTS	Federation of Australian Science and Technological Societies
FRDC	Fisheries Research Development Corporation
FRP	Filterable reactive phosphorus
GASS	Great Australian Science Show
GHD	Guthrie, Haskins and Daley (consultants)
GWT	Glenelg Waterways Team
IMEF	Integrated Monitoring of Environmental Flows
INPA	National Institute of Fisheries Research, Manaus, Brazil
LBL	Lower Basin Laboratory
LWRRDC	Land and Water Resources Research and Development Corporation
MDBC	Murray-Darling Basin Commission
MDFRC	Murray-Darling Freshwater Research Centre
MelbWat	Melbourne Water
MRHI	Monitoring River Health Initiative
NATA	The National Association of Testing Laboratories
NRHP	National River Health Program
NRMS	Natural Resource Management Strategy
NSWFRI	NSW Fisheries Research Institute
QDNR	Queensland Department of Natural Resources
RIVPACS	River Invertebrate Prediction and Classification Scheme
SKM	Sinclair Knight Merz
SoE	State of the Environment
TCM	Total Catchment Management
TISA	Taylor Integrated Sampler
UC	University of Canberra
UWRAA	Urban Water Research Association of Australia
UNE	University of New England
UWS	University of Western Sydney
WAMP	Water Allocation Management Plan
WSAA	Water Services Association of Australia
WSC	Water Studies Centre, Monash University

Contents

Chairman's Foreword	5	4 Research program	37
Director's Report	7	4.1 Flowing waters	41
1. Key Achievements	9	4.2 Standing waters and eutrophication	51
2. CRCFE Structure and Management	17	4.3 Floodplain and wetland ecology	57
2.1 Membership of the CRCFE	17	4.4 Water quality and ecological assessment	68
2.2 The Board	17	4.5 Urban water management	75
2.3 The Director and Deputy Director's	18	4.6 Fish ecology program	79
2.4 Organisation structure	19	5 Education	91
2.5 Research structure	19	5.1 Postgraduate education	91
2.6 Working groups	20	5.2 Undergraduate education	92
2.7 Planning for a 'new' life	21	5.3 School education	94
3 Cooperative Links	23	5.4 Community education	95
3.1 Internal cooperation	23	6 Application of Research	103
3.2 Cooperation with partners	25	6.1 Highlights	103
3.3 External collaboration	30	6.2 Strategy for technology transfer	105
3.4 International activities	33	6.3 Technical support to resource managers and other agencies	106
		6.4 Technical support to consultants	110
		6.5 Technical support to community groups	112
		6.6 Project reviews	113

7 Sharing Our Knowledge	115	9 Staffing and Administration	143
7.1 Public awareness	115	9.1 Specified personnel	143
7.2 Communicating through the media	116	9.2 Staff commencing and departing	143
7.3 CRCFE extension publications	117	9.3 Staff development	145
7.4 Web world	118	9.4 Awards	146
7.5 FASTS presidency	118	9.5 Grants held by CRC researchers	147
7.6 Communications summer student	119		
7.7 Workshops sponsored by the CRCFE	119	10 Performance Indicators	149
7.8 Other conferences and workshops	120	List of Tables	
8 Publications	121	2.1 Attendance at board meetings	18
8.1 Books/Chapters in books	121	3.1 Activities fostering internal collaboration	23
8.2 Refereed journals	122	3.2 Links with other CRCs	31
8.3 Other journals and conference proceedings	123	3.3 International visitors	33
8.4 Conference presentations	127	3.4 International links	34
8.5 Consultancies and reports	137	5.1 Postgraduate students	96
8.6 Extension publications	141		
8.7 Theses	141		

Chairman's Foreword



Life in the Cooperative Research Centre for Freshwater Ecology (CRCFE) continues to be both interesting and challenging. The next 12 months will be crucial to the future of the Centre. In addition to facing an imminent five-year review, the Centre must submit a proposal for another seven years of funding in a very competitive environment. Given the success of the CRCFE to date in delivering valuable research to the water sector I am confident that we will succeed.

Some of the CRCFE's achievements include:

- Development of innovative, risk-based methods for nutrients and sediments as an input to the new ANZECC water quality guidelines. The new guidelines include biological indicators and are based on seven ecosystem types—upland rivers, lowland rivers, lakes and reservoirs, wetlands, estuaries, and coastal and marine ecosystems.
- Urban Water Management Guidelines — research undertaken by the CRCFE as part of its Urban Water Management Program has identified a number of different pollutant transport, transformation and transfer pathways that characterise stormwater discharges. These findings have major implications for the selection and design of treatment measures.
- The AusRivAS models that have been developed for the National River Health Program are being used in water and natural resource agencies throughout Australia and are being trialed in Indonesia. New Zealand has also expressed strong interest in adopting the models.
- Prototype instrument developed for *in situ* measurement of bioavailable phosphorus—allowing rapid measurement at vastly reduced costs. This instrument, the portable flow injection analyser, is being assessed for its commercial potential.
- The Chaffey Dam project has provided new insights into the processes that drive algal growth in major reservoirs. It has also demonstrated that while artificial destratification does not eliminate blue-green algal blooms, it can reduce the growth of algae by significantly reducing the internal phosphorus load to the water column.
- The International River Health conference held at the University of Canberra, November 1997 attracted about 200 participants from within Australia and USA, New Zealand, England and South Africa.
- The Granite Creeks Landcare project is breaking new ground by studying the

ecosystem response to a major restoration program. The project is transferring scientific methods and findings to the community through the involvement of community groups.

- The report of the NSW Rivers Survey was completed and published during the year with the title *Fish and Rivers in Stress*. The report received considerable media coverage outlining the degraded state of many NSW rivers and was one of the factors that convinced the NSW Government to proceed with water reforms that are leading to a reduction in the amount of water extracted from some of the most stressed rivers. Following this report the NSW Government has now placed a ban on fishing for silver perch in NSW.
- The CRCFE has established a Lower Basin Advisory Committee to provide community links with the Mildura laboratory. The Committee, chaired by Mr Henry Tankard, has met twice and provided advice on the ongoing development of the Laboratory. The Lower Basin Laboratory is the CRCFE's response to the need to improve the knowledge on lowland rivers.

These initiatives bring to life our vision that the CRC for Freshwater Ecology exists to improve the condition of Australia's inland waters. Future generations will judge us in terms of our contribution to improving the condition of our inland waters.

During the year staff of the CRCFE have made significant achievements. Daryl Neilsen was a finalist in the Young Scientist of the Year Award. Barry Hart, who took on a significantly expanded role in managing the CRCFE's research portfolio, continued contributing to the Victorian Catchment Management Council. Professor Sam Lake received the Chairman's award for an outstanding scientific contribution to the CRCFE. The Director, Professor Peter Cullen, raised the profile of the CRCFE by becoming President of the Federation of Science and Technology Societies (FASTS). In that role Peter also became a member of the Prime Minister's Science Engineering and Innovation Council (PMSEIC). On behalf of the CRCFE I would like to wish Peter every success in these important roles.

In concluding I would like to thank my fellow Board members for their contribution during the year, and to the staff for their hard work and commitment which is making the CRCFE such a valuable asset for Australia's inland waters.



Dr John Langford
Chairman

Director's Report



Following our highly successful Third Year Review last year, the emphasis has been on finishing the research started at the beginning of the CRCFE, delivering the products to our partners and others, and developing the research agenda for the remainder of the CRC. At the same time we have been planning a further bid to extend our work with existing and prospective partners.

Ongoing government support for the CRC Program

The Government's announcement that it was maintaining its support for the CRC Program and would proceed with the scheduled selection round later this year was welcomed by the CRCFE. We can testify that the CRC Program is attracting international attention as a novel and effective way of bridging the gap between the producers and the users of knowledge.

The research program

Many CRCFE research projects have drawn to a conclusion during this year. Most have now been published in the scientific literature and presented at scientific conferences in Australia and overseas. As part of the review of our scientific work, the CRCFE brought Dr Colin Reynolds, one of the world's leading phytoplankton ecologists, to Australia to

review the work on the Chaffey Dam project. His report gave very important guidelines for the finalisation and analysis of the work, and he concluded his report in the following way:

"I feel grateful and privileged to have been exposed to the significant scientific achievements of the Chaffey projects and I am impressed by the high quality of the science invested in the work."

Dr Reynolds also presented seminars on algal management at Albury, Canberra and Melbourne, which were well attended by partners and others from the water industry.

As part of the same quality assurance program we established an international review panel to assess progress on the major experimental approach being undertaken on the Campaspe River in collaboration with Goulburn-Murray Water and the Land and Water Resources Research Development Corporation. A member of the Campaspe Review Committee, Professor James Gore from Columbus State University, Georgia, USA also presented river restoration workshops at Albury and Monash during his CRCFE sponsored visit to Australia. During the year Professor Barry Hart has taken on a new role as Deputy Director (Research) with responsibilities for the day to day management of the research program. Our project management system is now in place and is providing excellent information that is assisting in the effective management of the

Centre's research. We have spent much energy in developing the new research agenda for the remainder of the contract period of the CRCFE. The Board recognised that the special value we offered as a CRC was in working collaboratively on projects that comprised a range of scientific disciplines. Consequently the Board requested that more of our research effort be directed to larger, multidisciplinary projects. The first of these are now underway and are described in this report

Transferring our results

One of the big issues continues to be the need to deliver appropriate environmental flows in our rivers. The CRCFE has been active in providing advice through a number of expert panels. We have worked with CSIRO and the Murray-Darling Basin Commission to develop a handbook drawing together existing knowledge about biota and flows, and we are carrying out the large-scale experimental work on the Campaspe River in Victoria. We also collaborated with the NSW Environment Protection Authority and presented a well-attended seminar on the science behind the setting of river flow objectives in NSW.

During the year, the effort going into transferring the results of our research to the water industry has increased markedly. We have developed a series of Technology Transfer Plans, and are proceeding to implement them. We have appointed two staff to serve as knowledge brokers in the CRCFE to develop new approaches to this transfer challenge. One new member, Peter Cottingham, is located in the offices of a party to the CRCFE, Melbourne Water, and is able to provide advice on the ecological aspects of their day to day work. Another new approach has been the development of knowledge strategies, to assist land and water agencies in identifying their needs for research and information about the natural resources they manage.

The CRCFE also released a book called *Living on Floodplains* which was commissioned to integrate the floodplain and wetland research that had been underway in the CRCFE. *Living*

on Floodplains has been distributed to more than 1500 stakeholders, including industry organisations, government agencies, catchment management and Landcare groups, other scientists and the media, and is on sale at a number of outlets. The book, which was co-published by the Murray-Darling Basin Commission, has received a very positive response. Comments from reviewers included:

"Perhaps this is the way most publishing on scientific topics should go, a narrative on the latest research with an eye to public support written in clear, simple English."

(Leonie Kennedy, *Canberra Times*,
24 March 1998)

"...one of those rare publications which deliver vital scientific information in a user-friendly format..."

(C Davis, *Water*, March/April 1998).

This year has seen a maturing of the CRCFE. Research staff are gaining confidence and trust in working collaboratively, and are starting to appreciate the excitement and creativity that can result from the challenging of assumptions and the interactions from people who bring a different perspective and skills. We are learning to manage these processes, and provide organisational support to assist them.

It has been another busy and exciting year for the CRCFE and I thank the Board for the guidance and support, and in particular our Chair Dr John Langford whose wisdom and support has been fundamental to our achievements. I also thank all the staff and students of the CRCFE for their contributions, their energy and enthusiasm, and their unfailing good spirits.



Prof Peter Cullen
Director

Chapter I



Key Achievements

Flowing waters

- Discovered that both disturbance and constant flow conditions may alter the diversity of the macroinvertebrate fauna of upland streams. Constant flow conditions but not disturbance significantly alter the species composition of stream stones. In determining environmental flows, water management agencies should not plan long periods of unnatural constant flow.
- Key constructed to the larval stages of three shrimp species common to lowland rivers in south-eastern Australia.
- Demonstrated that the same flow disturbance can have distinctly different impacts in rivers of similar hydrology and geomorphology. Therefore, hydrological, or geomorphological groupings may not be appropriate models for flow management.
- Developed software to calculate hydrological descriptors for flow regimes that may be used by researchers and water managers.
- Developed a hydrological classification of river flow regimes for 145 selected rivers in south-eastern Australia.
- In planning environmental flow regimes and in-stream restoration, direct measurements rather than equation-driven estimates of bed movement need to be made.
- Described a new genus of Caenid mayfly and three new species and four new species of Baetidae.
- The Victorian EPA now only permit the use of rotenone for the eradication of pest species that threaten native fauna or in properly designed scientific studies necessary for the conservation of native species. Methods have been modified to minimise the impact on non-target fauna.
- Developed a novel technique for sampling natural communities on snags.
- Shown that the fish fauna of the highly regulated Campaspe River is severely degraded and dominated by small native and large alien species, such as carp and redfin perch.
- Shown that some fish species spawn during a range of conditions, however, others spawn only during the warmer, low-flow times.
- Work on the Thredbo River has improved our understanding of the impact of nutrients in Australian alpine streams, enabling managers to set more appropriate effluent disposal guidelines for sewage treatment plants in these areas.

Standing waters and eutrophication

- Recently completed studies of Chaffey Dam provide new insights into the nutrient processes that drive the formation of algal blooms in major reservoirs.
 - Destratification reduced the internal phosphorus load by 85% but had no effect on the depth of the surface mixed-layer. Light limitation of algal biomass is only feasible if this layer is sufficiently deep that the phytoplankton cannot return to the surface layer effectively.
 - The Peel River supplies at least half of the filterable reactive phosphorus (FRP) load to the reservoir. FRP accumulation in the hypolimnion was the major determinant of the following year's algal biomass but did not impact on species dominance.
 - Most of algal biomass was either motile or positively buoyant and therefore unlikely to be light-limited from spring through autumn as they always remain above the seasonal thermocline due to their motility or buoyancy.
 - Desiccation of dam sediments decreases the capacity of sediments to take up P, and to release P under anoxic conditions.
- Developed a protocol for algal sampling for Australian rivers for the Monitoring River Health Initiative. Manual produced following extensive consultation with natural resource management agencies throughout the country. The National Association of Testing Laboratories (NATA) anticipates using the manual as the basis for its accreditation of algal analysing laboratories.
- New equipment has been developed for sampling phytoplankton in rivers.

Floodplain and wetland ecology

- Research has greatly increased our understanding of the importance or floodplain-river interactions, particularly with regard to the following findings:
 - Maximum biodiversity in floodplain systems can be achieved only with a mix of permanent and temporary billabongs.
 - Different reaches of regulated rivers are affected differently by hydrological management (seasonal flow inversion, changes in hydrograph shape, peak depression, levees). Management for wetland heterogeneity needs to take these longitudinal differences into account.
 - The presence of planktivorous fish may modify macroinvertebrate community structure through competition with invertebrate predators.
 - Winter/spring flooded billabongs support more plant species than those flooded in summer. This may be because summer floods, by filling the billabong during the period of maximum evaporation, comparatively reduce the annual range of water levels.
 - A mix of flooding times potentially supports maximum zooplankton biodiversity (by favouring different species), but a preponderance of winter/spring floods may maximise plant diversity by maximising water level variability.
- As a result of environmental flows work in the Murray-Darling Basin, the CRCFE is now, as part of an independent panel, advising the Barwon-Darling River Management Committee on the setting of river flow objectives.
- A fully resolved 'family tree' has been produced for the side-necked turtles of Australia, South America, Africa and Madagascar using mitochondrial and nuclear gene sequences.



Snowy River...the site of Honours work to determine the effects of regulating the river.
Photo: Karen Markwort

- Research conducted in the Snowy Mountains has demonstrated that frogs that lay their eggs in clear, alpine pools are at considerable risk from elevated levels of ultraviolet B radiation as a result of ozone depletion.

Water quality and ecological assessment

- Assisted in the development of innovative, risk-based national guidelines for nutrients and sediments (ANZECC) to assist managers in assessing the health rivers and to identify rehabilitation measures.
- The AusRivAS models are now being used by agencies across Australia and their application in Indonesia is being trialed. These models provide managers with a means of assessing the health of rivers in a fast, cost-effective and standardised way, allowing priorities to be set for rehabilitation programs.
- AusRivAs models provide a powerful tool for assessing broad scale effects of landuse types on water quality. This has been tested on a large (600 site) data set in forestry areas of northern California. This has shown that even sites that would not normally be assessed as impacted would improve if the pressure of the landuse were removed.
- Seasonal AusRivAS models developed for the resort areas of the Kosciuszko National Park, and now used routinely, have been found to be much faster and more sensitive than traditional methods of biological assessment of water quality.
- The First National Assessment of River Health sampling for the ACT region has shown that the adverse effects of drought are similar to organic enrichment because low flows allow a build up of organic material similar to organic enrichment from sewage effluent or intensive agriculture.
- A prototype instrument has been produced for *in situ* measurement of bioavailable phosphorus, advancing our ability to measure bioavailable nutrients.
- A modified 'iron-strip' procedure for measuring 'bioavailable P' has been developed which provides acceptable results with reduced demands on labour and time.
- Evidence that invertebrates are not a good indicator for nutrient problems in large, turbid lowland rivers of south-eastern Australia. These findings have assisted in the development of nutrient guidelines.

Urban water management

- Guidelines, developed as a part of the Urban Water Management Program, will enable informed choices for managing urban waterways.
- Studies of pollution control ponds in three cities provide new insights into the nutrient processes that drive urban ponds.
 - Non-point source discharges are typically high in suspended solids, having a capacity for rapid adsorption of nutrients, metals and organics, and their removal via sedimentation of the particles from the water column.
 - Nutrient (P) limitation commonly prevails in lowland and urban systems, with strong bonding of P onto Fe associated with particles.
 - Nutrients, metals and organics in the sediments of pools, ponds, wetlands and lakes are susceptible to remobilisation as a result of the high reducing conditions following the deposition of organic material during flow storm events.
 - Urban ponds, wetlands and lakes having elevated turbidity are highly susceptible to thermal stratification under hot summer and calm wind conditions. Stratification suppresses the normal transfer of oxygen from the water surface to the sediments, exacerbating sediment-reducing conditions.
 - The volume of ponds or wetlands relative to the volume of catchment discharge is the primary determinant, in

the first instance, of pollution interception within the pond or wetland. The level of interception during storm discharge is also influenced by the concentration of pollutants in the pond or wetland immediately before the storm. The lower the pre-event in-pond concentration, the greater the interception during event flow conditions. The in-pond concentration is primarily a function of dry weather flow days post the previous event, and the in-pond adsorption, sedimentation and biological uptake efficiency.

- Re-mobilisation of pollutants from sediments as a result of sediment reduction can substantially reduce the net pollutant interception performance of ponds and wetlands. The leakage rate is a function of the areal loading rates of organic material on ponds and wetlands.
- We have demonstrated potential returns to the Albury community through education on the advantages of low-P laundry detergent and a resulting saving in level of sewage treatment required.
- Profiles of water quality, hydrology, habitat and macroinvertebrate and diatom taxa have been established for urban waterways. Both macroinvertebrates and diatoms are sensitive indicators of changes in hydrology and water quality associated with land use change.
- Primary variables best explaining differences in taxa richness and diversity are electrical conductivity and nutrients.
- To improve stream health in urban waterways the replacement of in-stream habitat is not always enough. In many locations urban stream health is limited by many factors operating together, including hydrology, water quality and in-stream and riparian habitat.

- Amount of impervious area was a good predictor variable for macroinvertebrates in urban areas (ie. more impervious area results in less biodiversity) and nutrients were a good predictor variable for diatoms (ie. more nutrients resulted in a change to the diatom community).

Fish ecology

- Completed research has clearly demonstrated the impact of river regulation on recruitment and migration of native fish, and successful invasion by exotic species
- Compelling evidence that NSW rivers are degraded and their fish communities are stressed and declining with rapid loss of biodiversity.
- Significant new understanding of the ecology of freshwater fish, especially:
 - The present status of native fish including 11 threatened species, and identifying Murray cod, freshwater catfish and short-finned eels as once-abundant species that now needing careful monitoring.
 - Carp are the dominant fish species of inland rivers, present at all sites below 500 metres altitude and with population densities up to one fish per square metre of river. Carp do better in areas more disturbed by agricultural development.
 - There is substantial seasonal variation in fish distribution, with greater abundance and species richness in warmer months, but little evidence of interannual variation.
 - Diseases and parasites are common, with up to 25% of some fish species showing visible abnormalities.
- The fish-based Index of Biotic Integrity has been developed and implemented for monitoring environmental quality in NSW rivers.
- Recruitment success of native fish species is influenced more by large-scale geographic and climatic factors than by small-scale habitat factors.

- Chemicals commonly used in agricultural areas lower the thermal tolerance of native fish juveniles, and may contribute to summer fish kills apparently unassociated with chemical use.
- New fishways have been completed at Cooma (Murrumbidgee R.), Theresa Park (Camden, Nepean R.) and Brays Park (Tweed R.).

Education

- Twelve students completed their postgraduate theses.
- Twenty students presented papers and posters at the Australian Society for Limnology's annual conference.
- The algal sampling protocol for Australian rivers has been adopted by Prof Peter Tyler, Deakin University, for use in undergraduate teaching.
- PhD students Sabine Schreiber and Michael Shirley attended the four-day CSIRO-BHERT program at the Melbourne University Business School.
- Sue Nichols, employed by the CRCFE while undertaking her undergraduate degree, took out the University of Canberra's Eric Best Memorial prize for best overall performance in Resource, Environmental and Heritage Science.
- Sixteen students undertook the Catchment Management Curriculum at University of Canberra in 1997 and 18 in 1998.
- Twelve students participated in the CRCFE's 1997/98 summer scholarship scheme.
- Twenty-five year 11 science students attended the MDFRC-Rotary Summer School in Albury.
- More than 25 schools in Albury/Wodonga have been introduced to freshwater environments through billabong and river field trips.

Technology transfer

- Field studies of mortality in tadpoles of the endangered Corroboree frog have led to a program of pool construction and population augmentation through captive rearing. The program is being conducted jointly by the NSW National Parks and Wildlife Service and the University of Canberra.
- AusRivAS web site and predictive models are up and running and training courses run for the ACT Government, ACTEW, Department of Land and Water Conservation and private consultants.
- About 200 research, water and natural resource managers, community group representatives and students attended the international conference, *What is River Health?*, held at the University of Canberra during November. The conference proceedings are being prepared for publication in the international journal, *Freshwater Biology*.
- Edited proceedings from the First Australian Diatom Workshop and organised Second Australian Diatom Workshop. Presented a diatom identification course for industry.
- The NSW Rivers Survey, conducted under the Fish Ecology Program, has been influential in guiding the Government's NSW Water Reforms.
- Negative effects of river flow alteration on native fish populations, and positive effects on carp have been identified, and have been used to develop NSW Water Reforms.
- Developed a protocol for algal sampling for Australian rivers for the Monitoring River Health Initiative. Manual produced following extensive consultation with natural resource management agencies through the country. The National Association of Testing Laboratories (NATA) anticipates using the manual as the basis for its accreditation of algal analysing laboratories.

- The algal sampling protocol for Australian rivers has been quoted extensively in Water Quality Guidelines developed for phytoplankton in rivers.
- Five identification guides to aquatic invertebrates produced. More than 100 students, researchers and consultants attended the MDFRC's 10th annual taxonomic workshop held in February.
- The CRCFE has made a major contribution to scientific policy development through the Director's role as president of the Federation of Scientific and Technological Societies.
- Distribution of the publication *Living on Floodplains*, produced in collaboration with the MDBC, to more than 1500 stakeholders representing community groups, local government, the water industry and the general public.
- Production of a training video for AusRivAS methods and data analysis. Presented by comic Vince Sorrenti. 400 copies produced and distributed.
- Urban Water Pollution Control Pond Design Guidelines have been finalised for publication. A pollution control pond and wetland model has been developed, and is undergoing validation and testing.
- The technology transfer capacity of the CRC for Freshwater Ecology has been increased through the appointment of two staff.
- Technology transfer strategies developed for major projects.



Dave Tiller, EPA Victoria, kick sampling for macroinvertebrates in a Victorian river as part of that State's monitoring efforts for the National River Health Program. *Photo: Freshwater Sciences, EPA Vic*



Paddy's River at Tanner's Flat. The ACT in drought, summer 1997-98. *Photo: Karen Markwort*

Chapter 2

CRCFE Structure and Management



Photo: John Hawking

The management strategy of the CRC for Freshwater Ecology is designed to ensure that the 'sum' of our research and educational activities is greater than its individual parts. This is achieved by building on the synergies that exist in its member organisations and facilitating cooperation between staff across both sites and programs.

2 Membership of the CRCFE

The Cooperative Research Centre for Freshwater Ecology was formally established in July 1993 under the Commonwealth Government's CRC Program. It is an unincorporated joint venture between the following organisations:

- ACT Government
- ACTEW Corporation
- CSIRO Land and Water
- Environment Protection Authority, Victoria
- Goulburn-Murray Water
- La Trobe University
- Melbourne Water
- Monash University
- Murray-Darling Basin Commission
- Murray-Darling Freshwater Research Centre
- NSW Fisheries
- Primary Industries and Energy, Department of Southern Rural Water
- Sydney Water Corporation
- University of Canberra
- Wimmera-Mallee Rural Water

The Murray-Darling Freshwater Research Centre's Lower Basin Laboratory is a collaborative venture between:

- CRC for Freshwater Ecology
- Lower Murray Water
- Sunraysia Rural Water Authority

2.2 The Board

The CRCFE is governed by a Board comprising the following members at June 30, 1998.

- Dr John Langford (Chairman),
Executive Director, Water Services
Association of Australia
- Professor Peter Cullen, (Director),
Professor of Resource and Environmental
Science, University of Canberra
- Dr Colin Adrian,
Executive Director, Environment ACT
- Professor Allan Cripps,
Dean of Applied Science, University of
Canberra
- Professor Ron Davies,
Dean of Science, Monash University
- Mr Ron Dennis,
Chief Executive, Albury-Wodonga
Development Corporation
- Mr Paul O'Connor,
Director of Research, The Office of
Conservation, NSW Fisheries
- Professor John Lovering,
President, Murray-Darling Basin Commission

Professor Nancy Millis,
University of Melbourne
Dr Graham Harris, Chief,
CSIRO Land and Water
Mr Ross Young, General Manager,
Waterways and Drainage, Melbourne Water

During the reporting period, the following changes were made to the CRCFE Board, at the request of the relevant partners:

Dr Graham Harris replaced Dr Geoff Pickup as the CSIRO Land and Water representative.

Mr Paul O'Connor replaced Dr Rick Fletcher as the NSW Fisheries representative.

Table 2.1
Attendance at board meetings

	13 Nov 1997	2 April 1998	12 June 1998
Dr John Langford	+	+	+
Professor Peter Cullen	+	+	+
Dr Colin Adrian	+	+	
Professor Allan Cripps	-		
Ms Anne McMahon	+	+	+
Professor Ron Davies	+	+	
Mr Ron Dennis	+	+	+
Dr Graham Harris	+	-	-
Dr Richard Davis			+
Professor John Lovering	+	-	+
Professor Nancy Millis	-	-	+
Mr Paul O'Connor	+	+	
Mr Ross Young	-	+	+
Mr Kevin Wood	+		



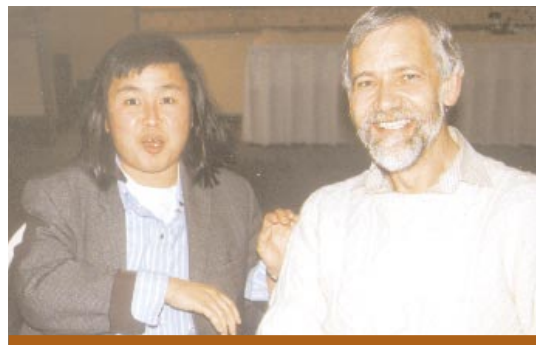
Staff member, NSW Fisheries, Mat Allanson, and University of Canberra students Patrick Driver and Kylie Peterson at the CRCFE annual staff meeting held in Albury during June.

2.3 The Director and Deputy Directors

The Director, Professor Peter Cullen, carries executive responsibility for managing the Centre within the policy framework established by the Board. Two deputies support him-Professor Barry Hart, Director of the Water Studies Centre at Monash University, is responsible for coordinating and implementing the research program; and Dr Terry Hillman, Director of the Murray-Darling Freshwater Research Centre (MDFRC) at Albury. Together the Director, Deputy Directors and Business Manager form the CRCFE's Executive Committee.

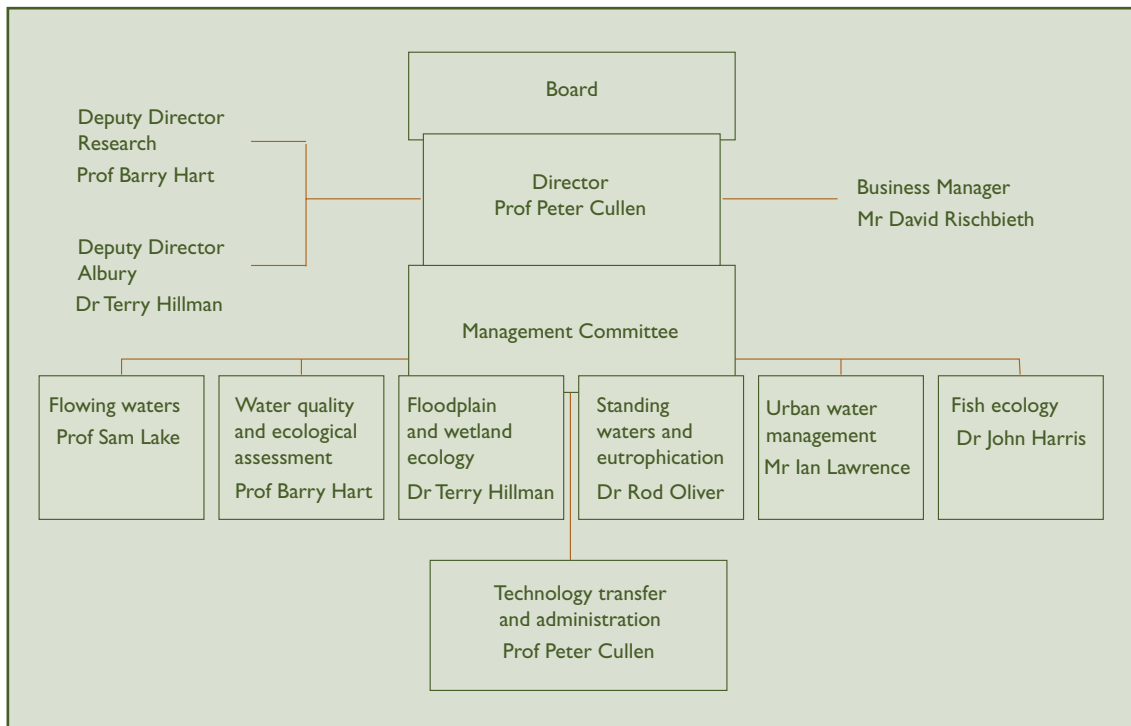


Sam Lake (left) took out the prestigious Chairman's Award, presented by John Langford at the Centre's annual meeting in June. The Award is in recognition of significant contribution to the CRC for Freshwater Ecology. Darren Baldwin was the recipient of the previous Chairman's Award, which was presented at the September meeting of the CRCFE.



The annual staff meeting-bringing staff and students together in a social environment. Lor-wai Tan and Phil Suter.

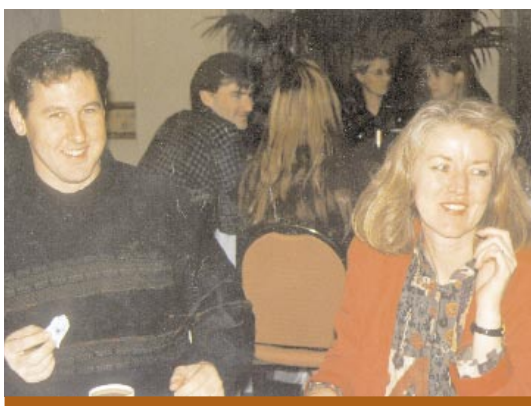
2.4 Organisational structure



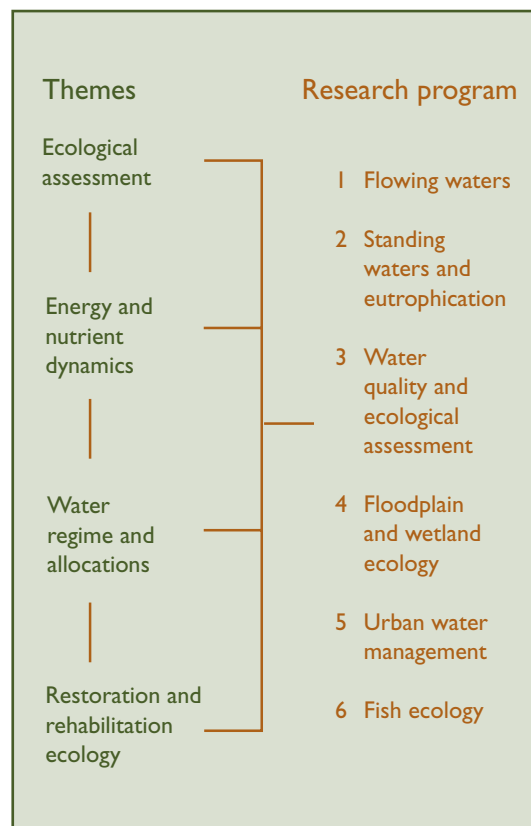
2.5 Research structure

Four over-arching themes can be identified through the Centre's six research programs.

These same themes also unify the Centre's new Integrated Project Portfolio, which commenced early this year, the emphasis of which is on interdisciplinary and cross-site research.



Algae researcher Jason Sonneman from the Water Studies Centre at Monash catches up with MDFRC librarian Estelle Oliver at the CRCFE's annual dinner held in Albury.



Working groups

CRC Computer Users Committee

The CRC Computer Users Committee advises the Director, Program Leaders and Management Committee on:

- a. priorities for acquisition of hardware, software and training across the CRC, and advice on whether network or stand-alone capacity is appropriate for particular software.
- b. work priorities for the specialist computer staff employed or contracted by the CRC.

Membership:

Mr Paul Blackman, University of Canberra (Chair)
Dr Peter Gehrke, NSW Fisheries
Dr Gerry Quinn, Monash University
Dr David Williams, University of Canberra

Most CRCFE sites are now using Lotus Notes to communicate with staff and students across sites. In addition to email, Lotus Notes is being used for project management to facilitate reporting of CRCFE projects. The *Publications* reported in this year's annual report, for example, were generated using Lotus Notes.

With Lotus Domino as the new CRCFE Web server, our Web site has taken on a new look. The server provides instant access to most Lotus Notes databases over the Web. These databases include:

Ripples and *Watershed* publications
The *NSW Rivers Survey* report
Media announcements
CRCFE timetable of events

Taxonomic Steering Group

The role of this committee is to coordinate and promote taxonomic activities within the CRC.

Membership:

Dr Richard Marchant, Museum of Victoria (Chair)
Mr John Hawking, MDFRC
Dr Jane Grows, MDFRC
Ms Alena Glaister, Monash University
Assoc Prof Richard Norris, University of Canberra

The main activity in the last year has been organising and staging the 10th annual taxonomic workshop at the Murray-Darling Freshwater Research Centre. Five new identification guides were presented to an audience of more than 100, consisting of students, researchers and consultants. The workshops presenters included Mark Harvey and Jane Grows, who dealt with water mites (Hydracarina), Jenny Davis with water pennies (Psephenid beetles) and Chris Watts with other water beetles (Dytiscid and Hydrophilid). Presenting work on caddisfly larvae were David Cartwright (Polycentropodid, Glossosomatid, Dipsuedopsid and Psychomyiid) and Jean Jackson (Calocid, Conoesucid and Helicophilid). These workshops have become a major venue for disseminating taxonomic information to a wide range of non-specialist users. Their continued popularity is testimony to the importance of the underlying research that makes production of the guides possible.

Sediment Working Group

This group advises the Director, Program Leaders, Project Leaders and other staff of the CRC on:

- a. techniques and approaches for the study of sediment-nutrient interactions.
- b. coordination of sediment research activity across the programs.

Membership:

Assoc Prof Bill Maher, University of Canberra (Chair)
Dr Ron Beckett, Monash University
Dr Darren Baldwin, MDFRC
Mr Ian Lawrence, ACT Government

Members of the sediment working group and other interested scientists spent a considerable time in the previous year developing the integrated project *Sediment-nutrient processes* for funding by the CRC for Freshwater Ecology. This project, led by Dr Ron Beckett, seeks to determine the rates of the principle processes responsible for the exchange of phosphorus both to and from the sediments. Ultimately, this information can be used in a model that will predict the magnitude of P exchange from a given sediment.

Associate Projects Committee

Advises the Management Committee on:

- a. whether to accept a project that has been submitted as in-kind research.

Membership:

Dianne Flett, University of Canberra
(Chair)
David Rischbieth, MDFRC
Sam Lake, Monash University
Terry Hillman, MDFRC
John Harris, NSW Fisheries

This committee meets about three-four times a year to review all new in-kind research projects being undertaken by CRC researchers, including their science, allocated resources and management. The committee also reviews components being added to existing in-kind projects and post-graduate projects.

Intranet Implementation Committee

This group advises the Director, Program Leaders, Project Leaders and other staff of the CRC on:

- a. the implementation of Lotus Notes;
- b. strategic direction and organisational and technical issues arising from the implementation.

Membership

Dianne Flett, University of Canberra
(Chair)
David Rischbieth, MDFRC
Ian Lawrence, ACT Government
Paul Blackman, University of Canberra
Simon Hogan, University of Canberra
Gerry Quinn, Monash University
(outgoing)
Peter Cottingham, Melbourne Water
(incoming)

Lotus Notes has been installed at most CRCFE sites and staff training courses have been conducted.



On a less serious note, nominations run hot for the Director's Award that is given out to the individual who has excelled in bringing mirth to the Centre's other staff and students, usually at the cost of some embarrassment to themselves. Chris Walsh, this year's recipient, receives his award from Peter Cullen.

Photo: Karen Markwort

2.7 Planning for a new 'life'

Much effort and energy has gone into planning a proposal for a new CRC for Freshwater Ecology.

A 'rebid' workshop was held at Cammeray Waters near Melbourne during March, which was attended by about 30 representatives from existing and prospective partner organisations. The workshop identified four broad, interconnected themes that might be addressed by a reincarnation of the CRC for Freshwater Ecology: environmental flows, assessing river health, aquatic restoration and conservation ecology. This workshop was followed by a planning meeting on June 11, which was attended by parties that had or were close to committing to a new CRCFE. The meeting was aimed at ensuring all parties were familiar with the CRC Program and its requirements as well as providing preliminary ideas on the research, education and technology transfer agendas.

To date 14 organisations have indicated a strong interest in joining a new CRC for Freshwater Ecology.



Photo: Freshwater Sciences, EPA Vic