



CENTRE FOR ECOSYSTEM MANAGEMENT



LEVEL II RESEARCH CENTRE

ANNUAL REPORT

2009

Faculty of Computing, Health and Science

OVERVIEW

The Centre for Ecosystem Management consists of 22 members from across ECU who have diverse research interests that fit into the broad themes of sustainability, biodiversity and health and ecology. In 2009 we welcomed a number of new members, mostly amongst the ranks of post doctoral and early career positions.

Despite all the changes experienced with the rebirth of the CEM after the marine members split off in 2008, members had an outstanding research year. Some \$0.91 million was spent on research during 2009. The magnitude of the research funding is a consequence of constructive engagement and research links between the researchers in the CEM and State, National and International government organisations and research agencies. Members of the CEM also continued to produce high quality outputs in the form of refereed papers (32), reports (12) and conference proceedings (5). The breadth of research interests in the CEM can be seen from the published outputs given later in this report. Centre members also made significant contributions to professional and community activities outside ECU. CEM members were invited to referee over 45 papers for national and international journals, were editors of 2 journals, sat on 4 editorial boards and contributed to 26 professional or advisory boards or committees. The breadth and scope of the contributions made by members of the CEM is remarkable and reflects the strong research culture of the Centre and its members. During the year 1 PhD student and 1 MSc student completed their studies under the supervision of CEM members.

This report acknowledges the continued high quality and quantity research efforts of the members of the CEM and we look forward to the growth and evolution of CEM especially in terms of its ability to contribute to the research standing of ECU.

MEMBERSHIP

Dr Dimity Boggs

Dr Rob Davis

Associate Professor Rod Giblett

Dr Andrea Hinwood

Associate Professor Adrienne Kinnear

Dr Naresh Kumar

Associate Professor Mark Lund

Dr Pascal Scherrer

Dr Bea Sommer

Dr Graham Thompson

Dr Lu Zhao

Dr Anna Callan

Associate Professor Ray Froend

Dr David Goodall

Associate Professor Pierre Horwitz

Dr Annette Koenders

Dr Kristina Lemson

Dr Clint McCullough

Emeritus Professor Harry Recher

Professor Will Stock

Dr Eddie Van Etten

Ms Esmee Webb

GRANTS

Impacts of Fire on Reptiles in King's Park	Botanic Parks	Davis
Mitigation of Impacts on Groundwater Dependent Vegetation	ARC/WaterCorp	Froend, Stock & Davies
Vegetation monitoring of ground water dependent ecosystems	DoW	Froend & Davies
Vegetation monitoring Swan Coastal Plain	DoW	Froend & Davies
Management Framework for Groundwater Dependent Vegetation	DoW	Froend
Eco-Hydrological Study - Gnangara Mound	DoW	Froend
Environmental Monitoring and Investigations for the Gnangara and Jandakot Mounds-Wetland Vegetation and End of Summer Monitoring	DoW	Froend
Establish Baseline Wetland Vegetation Monitoring for New Sites: Shallow Groundwater Systems Investigation of the Gnangara and Jandakot Groundwater Mounds	DoW	Froend & Wilson
Centre of Excellence in Ecohydrology	UWA	Froend
Ecophysiology Study of Riparian Vegetation	DECWA	Froend
Assessing Maternal Exposure to Persistent Toxic Substances and Adverse Birth Outcomes	ARC	Hinwood
Wetland Macroinvertebrates and Water Quality (Gnangara Mound)	DoW	Horwitz & Sommer
Australian Tourism in a Water Constrained Economy: Scoping Study - Research Agenda	LaTrobe	Horwitz
An investigation of aquatic macro invertebrate occurrence and water quality at Lake Chandala (2009)	DECWA	Horwitz
Surface and Interstitial Invertebrate Communities	DoW	Koenders & Horwitz
Midge and Related Research at Lake Joondalup	CityofWanneroo	Lund & McCullough
Overcoming Limitations to Bulk Organic Bioremediation of Acid Coal Mine Lakes	ACARP	Lund & McCullough
STCRC - Sustainable Resources Research Fellow	CRCTourism	Scherrer, Stock & Horwitz
Monitoring of Soil for Herbicide Residues in Urban Parks and Bushland Reserves	CityofJoondalup	Van Etten
Vegetation Study of the Mt Gibson Sanctuary	AWC	Van Etten

PUBLICATIONS

Books and Book Chapters

- Horwitz P.** and Wardell-Johnson G. (2009) Cultural Conservation Biology. Chapter 26. In Environmental Biology (eds M. Calver, A. Lymbery, M. Bamford and J. McComb) Cambridge University Press.
- Horwitz P., Sommer B.** and **Froend R.** (2009) Biodiversity of wetlands and groundwater dependent ecosystems. Chapter 4 In Biodiversity values and threatening processes of the Gngangara groundwater system. Edited by B. Wilson and L.E. Valentine. Department of Environment and Conservation, Perth Western Australia.
- Horwitz P., Sommer B.** and **Hewitt P.** (2009) Wetlands: changes, losses and gains. Chapter 5 In Biodiversity values and threatening processes of the Gngangara groundwater system. Edited by B. Wilson and L.E. Valentine. Department of Environment and Conservation, Perth Western Australia.
- Koenders, A.** Adapting author (February 2009) Instructor's Manual for Biology, 1st Australian version by Campbell/Reece/Meyers. ISBN 9781442502222
- van Etten, E.J.B.** (2009). Fire in rangelands and its role in management, in Range and Animal Sciences and Resources Management, edited by V.R. Squires, in Encyclopedia of Life Support Systems (EOLSS), Developed under the Auspices of the UNESCO, Eolss Publishers, Oxford ,UK, [<http://www.eolss.net>]
- Wardell-Johnson G. and **Horwitz P.** (2009) The Science of Conservation Biology. Chapter 25. In Environmental Biology (eds M. Calver, A. Lymbery, M. Bamford and J. McComb) Cambridge University Press.

Journal Articles

- Blake D., Hinwood A.L. & Horwitz P.** (2009) Peat fires and air quality: Volatile organic compounds and particulates. Chemosphere 76: 419-423.
- Callan, A.C. & Milne E.** (2009) Involvement of the IGF system in fetal growth and childhood cancer: an overview of potential mechanisms. Cancer Causes and Control 20: 1783-1798.
- Canham C.A., Froend R.H. & Stock W.D.** (2009) Water stress vulnerability of four Banksia species in contrasting ecohydrological habitats on the Gngangara Mound, Western Australia. Plant, Cell and Environment 32: 64-72.
- Clemente C.J., **Thompson G.G.** & Withers P.C. (2009) Evolutionary relationships of sprint speed in Australian varanid lizards. Journal of Zoology 278: 270-280.
- Clemente C. J., Withers P. C. & **Thompson G.G.** (2009) Metabolic rate and endurance capacity in Australian varanid lizards (Squamata; Varanidae; Varanus). Biological Journal of the Linnean Society 97: 664-676.
- Craine J., Ballantyne F., Peel M., Zambatis N., Morrow C. & **Stock W.D.** (2009) Grazing and landscape controls on nitrogen availability across 330 South African savanna sites. Austral Ecology 34: 731-740.
- Craine J.M., Elmore A.J., Aidar M.P.M, Bustamante M., Dawson T.E., Hobbie E.A., Kahmen A., Mack M.C., McLauchlan K.K., Michelsen A., Nardoto G.B., Pardo L.H., Peñuelas J., Reich P.B., Schuur E.A.G., **Stock W.D.**, Templer P.H., Virginia R.A.,

- Welker J.M. & Wright I.J. (2009) Global patterns of foliar nitrogen isotopes and their relationships with climate, mycorrhizal fungi, foliar nutrient concentrations, and nitrogen availability. *New Phytologist* 183: 980-992.
- Cross B.C.S., McKibbin C., **Callan A.C.**, Roboti P., Piacenti M., Rabu C., Wilson C.M., Whitehead R., Flitsch S., Pool M.R., High S. & Swanton E. (2009) Eeyarestatin I inhibits Sec61-mediated protein translocation at the endoplasmic reticulum. *Journal of Cell Science* 122: 4393-4400.
- Davis W.E. Jnr & **Recher H.F.** (2009) Use of native cherry (*Exocarpos aphyllus*) (Santalaceae) by birds in the Great Western Woodlands, Western Australia. *W. A. Naturalist* 26: 278-283.
- Doody J.S., Roe J., **Mayes P.** & Ishiyama L. (2009) Telemetry tagging methods for some freshwater reptiles. *Marine and Freshwater Research* 60: 293-298.
- Goodall D.W.** (2009) The further 'ascent' of Man. *The Biologist* 56: 229-232.
- Goodall D.W.** (2009) Human evolution – Where to from here? *Rendiconti Lincei-Scienze e Naturali* 19: 359-381.
- Horwitz P.**, Rogan R., Halse S., Davis J. & **Sommer B.** (2009) Wetland invertebrate richness and endemism on the Swan coastal Plain, Western Australia. *Marine and Freshwater Research* 60: 1006-1020.
- Kumar R.N.** & Nagendran R. (2009) Fractionation behavior of heavy metals in soil during bioleaching with *Acidithiobacillus thiooxidans*. *Journal of Hazardous Materials* 169: 1119-1126.
- Kingsford R.T., Watson J., Lundquist C., Venter O., Hughes L., Johnston E., Atherton J., Gawel M., Keith D., Mackey B., Morley C., Possingham H., Raynor B., **Recher H. F.** & Wilson K. (2009) Major conservation policy issues for biodiversity in Australia, Melanesia, Micronesia, New Zealand and Polynesia. *Biological Conservation*: 23: 834-840.
- Neil L.L., **McCullough C.D.**, **Lund M.A.**, Evans L.H. & Tsvetnenko Y. (2009) Toxicity of acid mine pit lake water remediated with limestone and phosphorus. *Ecotoxicology and Environmental Safety* 72: 2046-2057.
- Parkes M.W. & **Horwitz P.** (2009) Water, ecology and health: ecosystems as settings for promoting health and sustainability *Health Promotion International* 24: 94-102.
- Recher H.F.**, Lunney D. & Matthews A. (2009) Small mammal populations in a eucalypt forest affected by fire and drought. I. Long-term patterns in an era of climate change. *Wildlife Research* 36: 143-158.
- Scherrer P.**, Alonso A. & Sheridan L. (2009) Expanding the destination image: wine tourism in the Canary Islands. *International Journal of Tourism Research* 11: 451-463.
- Schultz M.B., Smith S.A., **Horwitz P.**, Richardson A.M.M., Crandall K.A. & Austin C.M. (2009) Evolution underground: A molecular phylogenetic investigation of Australian burrowing freshwater crayfish (Decapoda: Parastacidae) with particular focus on *Engaeus* Erichson. *Molecular Phylogenetics and Evolution* 50: 580-598.
- Short M.**, Smith F.P. & **Van Etten E.** (2009) Oil mallees provide foraging habitat for the Western Pygmy Possum (*Cercartetus concinnus*) in the wheatbelt of Western Australia. *Ecological Management & Restoration* 10: 233-235.

- Smith A., **Scherrer P.** & Dowling R. (2009) Impacts on Aboriginal Spirituality and Culture from Ecotourism in the Kimberley Coastal Waterways. *Journal of Ecotourism* 8: 82-98.
- Sommer B.** & **Horwitz P.** (2009) Macroinvertebrate cycles of decline and recovery in the Swan Coastal Plain (Western Australia) wetlands affected by drought-induced acidification. *Hydrobiologia* 624: 191-203.
- Staver A.C., Bond W.J., **Stock W.D.**, Van Rensburg S. & Waldram M. (2009) Browsing and fire interact to suppress tree density in an African savanna. *Ecological Applications* 19: 1909-1919.
- Thompson G.G.** & Thompson S.A. (2009) Comparative temperature in funnel and pit traps. *Australian Journal of Zoology* 57: 311-316.
- Thompson S.A. & **Thompson, G.G.** (2009) A case for in-situ management of Western Ringtail Possums, *Pseudocheirus occidentalis*, in development areas. *Journal of the Royal Society of Western Australia* 92: 269-276.
- Thompson S.A., **Thompson G.G.** & Finlayson G.R. (2009) Range extensions for the Barking Gecko, *Nephruros milii* (Squamata: Gekkonidae). *Journal of the Royal Society of Western Australia* 92: 27-29.
- Umada S., Kawanishi T., Hayashi Y., Hamano H., Kawarasaki S., Aikawa S., Takahashi N., Egashira Y., Tanouchi H., Kojima T., **Kinnear A.** & Yamada K. (2009) Effects of different mobilities of leaf and woody litters on litter carbon dynamic in arid ecosystems in Western Australia. *Ecological Modelling* 220: 2792-2801.
- Valentine L.E.** & Schwarzkopf L. (2009) Effects of Weed-Management Burning on Reptile Assemblages in Australian Tropical Savannas. *Conservation Biology* 23: 103-113.
- van Etten E.J.B.** (2009) Inter-annual Rainfall Variability of Arid Australia: greater than elsewhere? *Australian Geographer* 40: 109-120.
- van Etten E.J.B.**, & Vellekoop S.E. (2009) Response of fringing vegetation to flooding and discharge of hypersaline water at Lake Austin, Western Australia. *Hydrobiologia* 626: 67-77.
- Wilson D., **Stock W.D.** & Hedderson T. (2009) Historical nitrogen content of bryophyte tissue as an indicator of increased nitrogen deposition in the Cape Metropolitan Area, South Africa. *Environmental Pollution* 157: 938-945.

Refereed Conference Proceedings

- Froend R.H.**, **Sommer B.** and Pettit N. E. (2009) Phreatophytic vegetation response to climate change and groundwater drawdown on the Swan Coastal Plain of Western Australia. *HydroEco 2009: 2nd International Multidisciplinary Conference on Hydrology and Ecology*, Vienna, Austria, April 2009
- Chapman, K.**, **Horwitz, P.**, **Scherrer, P.** & Northcote, J. (2009) Tourism research to tourism practice: The need for adaptive institutions in Western Australia's Ningaloo region. In: J. Carlsen, M. Hughes, K. Holmes & R. Jones (Eds.) *Proceedings of the 18th Annual CAUTHE Conference – See change: tourism and hospitality in a dynamic world*. 10-13 February 2009, Fremantle, Australia. ISBN 1 86308 152 6.
- Kumar, R.N.**, **McCullough, C.D.** & **Lund, M.A.** (2009) Water resources in Australian mine pit lakes. *Proceedings of AUSIMM Water in Mining 2009*, 15-17 September 2009.

Australasian Institute of Mining and Metallurgy (AUSIMM), Perth, Australia, 247-252.

Scherrer, P., Northcote, J. & Macbeth, J. (2009) Because numbers do matter – Refining the Sustainable Visitor Capacity framework. 15th International Symposium on Society and Resource Management: Meet old and new worlds in Research, Planning, and Management (ISSRM 2009).

Scherrer, P., Smith, A.J. & Dowling, R.K. (2009) Expedition cruising in Australia: proactive steps towards change for sustainability. In: J. Carlsen, M. Hughes, K. Holmes & R. Jones (Eds.). Proceedings of the 18th Annual CAUTHE Conference – See change: tourism and hospitality in a dynamic world. 10-13 February 2009, Fremantle, Australia. ISBN 1 86308 152 6.

Reports

van Etten E.J.B., McCullough C.D. & Lund M.A. (2009) Evaluation of Post-mining Rehabilitation at the Kemerton Silica Sands Project in November 2008. Centre for Ecosystem Management Report 2009-2, Edith Cowan University, Perth, Australia. 47pp. Unpublished commercial-in-confidence report to Kemerton Silica Sands Pty Ltd.

Sommer B., Horwitz P. & Hewitt P. (2009) Impact of Acid Sulfate Soils on freshwater ecosystems of southwest WA. Final Report to the WA Department of Water. CEM Report No. 2009-03. Edith Cowan University, Joondalup.

Wilson J., Inostroza K., & **Froend R.** (2009) Establishment of Wetland Vegetation Monitoring for New Sites – Shallow Groundwater System Investigations – 2009. Gngangara and Jandakot Mounds. A report to the Department of Water, CEM report no. 2009 - 5. Edith Cowan University, Joondalup.

Cullinane T., Wilson J., & **Froend R.** (2009) End of Summer Assessment of Condition of Gngangara and Jandakot Criteria Groundwater Dependent Ecosystems. A report to the Department of Water. CEM report no. 2009 - 6. Edith Cowan University, Joondalup.

Cullinane T., Wilson J., & **Froend R.** (2009) End of Summer Assessment of Condition of Gngangara and Jandakot Criteria Groundwater Dependent Ecosystems. A report to the Department of Water. CEM report no. 2009 - 7. Edith Cowan University, Joondalup.

Cullinane T., Wilson J., & **Froend R.** (2009) Wetland Vegetation Monitoring 2008 – Survey of Gngangara Wetlands. A report to the Department of Water. CEM report no. 2009-08. Edith Cowan University, Joondalup.

Wilson J., & **Froend R.** (2009) Wetland Vegetation Monitoring Jandakot Wetlands 2008 Survey. A report to the Department of Water. CEM report no. 2009-09. Edith Cowan University, Joondalup.

Finn H, **Stock W.D.** & Valentine L. (2009) Pines and the ecology of Carnaby's black-cockatoos (*Calyptorhynchus latirostris*) in the Gngangara Sustainability Strategy study area. A report to Forest Products Commission. CEM report no. 2009-10. Edith Cowan University, Joondalup.

Cullinane T., Wilson J. & **Froend R.** (2009) End of Summer Assessment of Selected Shallow Groundwater System Sites - Gngangara and Jandakot Mounds. A report to the Department of Water. CEM report no. 2009 - 11. Edith Cowan University, Joondalup.

- Boyd T.C. & **Froend R.H.** (2009) Ecophysiology of southern Australian riparian vegetation. A literature review for the Department of Environment and Conservation. CEM report no. 2009-12. Edith Cowan University, Joondalup.
- van Etten E.J.B., McCullough C.D. & Lund M.A.** (2009) Riparian Vegetation Characteristics of Seasonal Wetlands in Kemerton, South-West Australia. Centre for Ecosystem Management Report 2008-17, Edith Cowan University, Perth, Australia. 65pp. Unpublished commercial-in-confidence report to Kemerton Silica Sands Pty Ltd.
- Kinnear A., Boyce M., Sparrow H., Middleton S. & Cullity M.** (March, 2009) ALTC FINAL REPORT: Diversity: A longitudinal study of how student diversity relates to resilience and successful progression in a new generation university

Non Refereed Papers/Proceedings/Editorials

- Boles, W.B. and **Recher, H.F.** (2009) Obituary: James Allen Keast 15 November 1922-8 March 2008. *Emu* **109**: 272-274.
- Ehrlich, P.R. and **Recher, H.F.** (2009) The future of conservation in Polynesia. *Pacific Conservation Biology* **15**: 2-3.
- Recher, H.F., Calver, M.C. and Saunders, D.A.** (2009) Communication and the publication process. *Pacific Conservation Biology* **15**: 77-79.
- Recher, H.F.** (2009) Assuming responsibility. *Pacific Conservation Biology* **15**: 150-152.
- Recher, H.F.** (2009) Good luck. *Pacific Conservation Biology* **15**: 230-231.

HIGHER DEGREE STUDENTS

The following PhD and Masters students were supervised by members of the Centre –

* Completed 2009

PhD

- David Blake** - *P Horwitz/W Stock/M Boyce*. Fire induced hydro-biogeochemical responses in wetland sediments of the northern Swan Coastal Plain.
- John Bunn** – *P Horwitz/A Koenders*. Mechanisms affecting the replacement of *Cherax tenuimanus* (Smith 1912) by *Cainii* Austin 2002 from the Margaret River.
- Quinton Burnham** – *A Koenders/P Horwitz*. Biogeography of the Australian burrowing freshwater crayfish genus *Engaewa* (Decapoda : Parastacidae).
- Caroline Canham** – *R Froend/W Stock*. Phreatophyte root growth dynamics and relationships between growth phenology, plant water relations and groundwater.
- Zoe Car** – *P Horwitz*. Seeing with other eyes: Exploring western scientific and indigenous environmental knowledge.
- Jeffry Cargill** – *W Stock/E van Etten*. Fate of *Eucalyptus marginata* seed from canopy-store to emergence in the northern jarrah forests of Western Australia: a comparison between spring and autumn burns in shelterwood (retained overstorey) treatments.
- ***May Carter** – *P Horwitz*. Urban design, contact with nature and population health.
- Kelly Chapman** - *P Horwitz/G Syme*. Research knowledge transfer in Ningaloo.

Graham Fulton – *P Horwitz/T Perkins*. The nesting ecology of an endangered woodland avifauna.

Chatchai Intatha - *P Horwitz/ A Hinwood*. Community capacity and coastal erosion in the Upper Gulf of Thailand.

Pat Karatna – *P Horwitz*. Mangrove forest communities in south-eastern Thailand.

Craig Pentland – *A Kinnear*. Behaviour and population dynamics of translocated populations of the black-flanked rock wallaby, *Petrogale lateralis lateralis*.

Malarvili Ramalingam – *A Hinwood/M Boyce*. Maternal exposure to metals and contribution of environmental sources

MSc

Jessica Allia – *W Stock/L Valentine*. Seasonal use of pine cones by Carnaby's Cockatoo on the Gnaragara.

Muriel Bertuch – *E van Etten*. Mulga (*Acacia aneura* F.Muell.Ex Benth.) death adjacent to haul roads in the northern Goldfields.

Rob Campbell – *P Horwitz*. Perceptions of soil health in the Bremer River Catchment.

***Stephen Danti** – *A Kinnear*. The influence of different silvicultural treatments on saproxylic beetles in southwest forests of Western Australia.

David Galeotti – *C McCullough/M Lund*. Biology and habitat requirements of Blackstriped Jollytail.

Victoria Lazenby – *A Hinwood*. Personal exposure of children to formaldehyde

Heather McQueen – *A Hinwood*. Estimating prenatal exposure to glyphosate formulations using maternal exposure assessment techniques - a preliminary investigation.

William Phelps - *M Lund/B. Sommer/C McCullough*. Structural characterization of suspended detrital floc in the Yanchep Wetland suite, Swan Coastal Plain, Western Australia.

Marie Raphael – *A Hinwood*. Defining appropriate options for post-closure land-use of Tamala Park: A community participation process

Ryan Sawyer - *C McCullough/M Lund*. The impact of acid sulfate soils on water quality treatment in a constructed urban stormwater treatment wetland in Gwelup, Western Australia.

Kelly Sheldrick – *W Stock*. Managing the over abundance of Acacias in Jarrah forest rehabilitation.

Niall Somesan - *C McCullough/M Lund*. Can macroinvertebrate community development in seasonal wetlands be predicted by hydrology alone?

Meenu Vitarana – *W Stock /A Hinwood*. Lichens as pollution biomonitors in the Collie Region.

VISITORS AND COLLABORATIONS

Strong local collaborations were maintained during 2009 with Bush Heritage Australia and the Western Australian Herbarium. International collaborations during 2009 included an existing research agreement with Seikei University, Japan and a new agreement with George Mason University from the US. Individual members of the CEM also collaborated with a wide range of local and international colleagues and many of these relationships are productive and have resulted in multi-authored papers which are given in the publication outputs section.

COMMUNITY ENGAGEMENT ACTIVITIES AND LINKAGES

Editorial Responsibilities

Pacific conservation Biology – HR
EcoHealth – PH
Austral Ecology- WS
Plant and Soil – WDS
African Journal of Range and Forage Science – WDS
Plant Ecology – RH

Refereed papers for the following journals

Journal Toxicology and Environmental Health – AH
Journal of Applied Ecology (X2) – WS
Austral Ecology- WS
Plant and Soil (x3) – WS
Australian Journal of Botany – WS
Journal of Fish Biology – PH
Pacific Conservation Biology – EvE
Amytornis, WA Journal of Ornithology – RD
Journal of Materials Processing Technology – NR
Journal of the Royal Society of Western Australia – ML, AK
Journal of Arid Environments (x2) – WS
Mine Closure 2009 Proceedings Reviews (x4) – WS
Science of the Total Environment - AH
International Journal of Environmental Health Research – AC
International Journal of Wildland Fire – HR
Agriculture Ecosystems & Environment – HR
Diversity and Distributions – HR
Wildlife Research – HR
Environmental Management - RF
Ecology (X2) – WS
Plant Ecology and Diversity – WS
Pacific Science – WS
EcoHealth – PH
Journal Health and Place – PH
The Western Australian Naturalist – RD
Oecologia – WS
Ecology Letters – WS
Journal of Ecology – WS
EMU (x3) - HR
Global Change Biology - HR
Ecography- HR
Australian Zoologist - HR
Ecohydrology (x2) - RF
Hydrogeology Journal - RF

FUTURE PLANS AND DIRECTION

- The current focus of CEM is to promote research in three broad areas, biodiversity science, ecosystem health and sustainability studies. The long-term intention is to have a strong environmental and sustainability focus at ECU that has national and international recognition. To achieve its goal the CEM will:
 - Assist with the organisation of a weekly seminar series for members, postgraduate students and visitors on topics related to the activities of the CEM.
 - The Centre will organise an annual one-day postgraduate seminar for its affiliated postgraduate students.
 - The CEM will continue to foster post-doctoral appointments to promote early career researchers at ECU.
 - The CEM will continue to foster post-graduate student research through allocating resources to the School of Natural Science to support post graduate student projects and conference travel. The CEM will continue to support visiting scholars and speakers.
 - Members of the CEM will continue to strengthen research links, collaborations and engagement with government agencies, industry and non-governmental organizations active in the environmental field.
 - The CEM will continue to collate all information related to research performance of its members.
 - The CEM will continue to maintain a website that promotes the activities of members of the centre.
 - The CEM will assist in the synthesis of materials and information required for the ERA process.

DATE OF NEXT FORMAL REVIEW

September 2010