

Faculty of Computing Health and Science

Research Unit Annual Report

RESEARCH UNIT NAME: Mine Water and Environment Research Centre

RESEARCH UNIT LEVEL (tick):

- Level I Research Group Level II Research Centre
 Level III Research Institute Centre of Excellence

YEAR:

BRIEF OVERVIEW (1-2 paragraphs outlining major activities conducted in past year)

2010 saw the successful commencement and award of a large number of research grants and much of the year's activity was devoted to servicing those grants. A large number of reports and papers were published and presentations were made at international conferences (10) however HR difficulties reduced the number of publications that were achieved below that originally expected at the start of the year. A major success from 2010 was the awarding of the International Mine Water Association 2012 congress to the team. This congress will be held at ECU in Bunbury in 2012.

MEMBERSHIP (Full Title of Researchers, including staff, research students, adjuncts in the past year)

A/Prof Mark Lund
Dr Clint McCullough
Dr Naresh Rhadhakrishnan
Dr Lu Zhao
Dr Sanitago Larranaga
Michelle Newport (Research Assistant)
Dr Eddie van Etten (Associate)
Dave Galeotti (MSc Student)
Niall Somesan (MSc Student)
William Phelps (MSc Student)
Nushan Nawartha Mudiyansele (Ph.D. Student)

NEW GRANTS (Identify Funding Body, Value of grant, Years funded, Chief Investigator, collaborators, title)

- Department of Water - Understanding Pit Lake Resources within the Collie Basin Dr C. MCCULLOUGH, A/Prof M. LUND & A/Prof A. HINWOOD - \$269,997 (1 year)
- Cumulative Environment Management Association (CEMA), Canada - End Pit Lakes Technical Guidance Document (Canada) - Dr C. MCCULLOUGH - \$8,000 (6 months)
- City of Perth - Point Fraser Monitoring and Evaluation Program A/Prof M. LUND & Dr C. MCCULLOUGH - \$592,075 (5 years)
- ACARP (Category 1) - Use and Water Quality Remediation of Acidic Coal Pit Lakes by Adjacent Aquaculture Dr C. MCCULLOUGH & A/Prof M. LUND - \$231,940 (18 months)
- ACARP (Category 1) Overcoming Limitations to Bulk Organic Bioremediation of Acid Coal Mine Lakes A/Prof M. LUND & Dr C. MCCULLOUGH - \$188,076 (2 years, started 2009)

- Rio Tinto - Rio Tinto Bioremediation: Scoping Study Proposal Dr C. MCCULLOUGH, A/Prof M. LUND, & Dr N. RHADHAKRISHNAN - \$82,500 (1 year)

PUBLICATIONS, REFERRED BOOKS, CHAPTERS, JOURNAL ARTICLES, CONFERENCE PAPERS, REPORTS

Galeotti, D. M.; McCullough, C. D. & Lund, M. A. (2010). Black-stripe minnow *Galaxiella nigrostriata* (Shipway 1953) (Pisces: Galaxiidae), a review and discussion. *Journal of the Royal Society of Western Australia* 93: 13-20.

Kumar, R. N.; McCullough, C. D. & Lund, M. A. (2011). How does storage affect the quality and quantity of organic carbon in sewage for use in the bioremediation of acidic mine waters? *Ecological Engineering*. DOI:10.1016/j.ecoleng.2011.02.021.

Kumar, N. R.; McCullough, C. D.; Lund, M. A. & Newport, M. (2011). Sourcing organic materials for pit lake remediation in remote mining regions. *Mine Water and the Environment*. DOI: 10.1007/s10230-011-0144-6.

Lund, M. A.; McCullough, C. D. & Galeotti, D. (2010). *Remediation of water quality and macroinvertebrate communities in an urban artificial lake affected by acid sulphate soils*. *Verhandlungen der Internationalen Vereinigung fur Limnologie* 32: 1,373-1,378.

McCullough, C. D. & Lund, M. A. (in press). Bioremediation of Acidic and Metalliferous Drainage (AMD) through organic carbon amendment by municipal sewage and green waste. *Journal of Environmental Management*.

McCullough, C. D. & Van Etten, E. J. B. (submitted). Ecological engineering of a novel lake district: new approaches for new landscapes.

McCullough, C. D.; Van Etten, E. J. B. & Lund, M. A. (submitted). Setting restoration goals for restoring pit lakes as aquatic ecosystems: a case study from south west Australia.

Van Etten, E.J.B., McCullough, C.D. and Lund, M.A. (submitted) How precisely do we need to match topsoil to site for successful restoration of post-mining environments? – a case study from wetland margins in South-Western Australia,

Book Chapters

Kumar, N. R., McCullough, C.D. & Lund, M.A. (in press). Pit lakes in Australia. In: *Acidic Pit Lakes - Legacies of surface mining on coal and metal ores*. (Ed W. Geller & M. Schultze). Springer, Berlin, Germany.

Research Reports

Hinwood, A. L.; Heyworth, J.; Tanner, H. & McCullough, C. D. (2010). *Mine Voids Management Strategy (II): Review of potential health risks associated with Collie pit lakes*. Department of Water Project Report MiWER/Centre for Ecosystem Management Report 2010-11, Edith Cowan University, Perth, Australia. 111pp. Unpublished report to Department of Water.

Kumar, R.N., McCullough, C.D. and Lund, M.A. (2010). *Overcoming limitations to bulk organic bioremediation of acid coal mine lakes*. Report number 2010-17, by Mine Water Environment Research

Group/Centre for Ecosystem Management, Edith Cowan University, Perth, Australia. Unpublished report to Australian Coal Association Research Program (ACARP).

Kumar R. N.; McCullough C. D. & Lund M. A. (2010). *Scoping Study for Bioremediation of Rio Tinto Pilbara iron Pit Lakes Aquatic Environments*. Report number 2010-13. Mine Water Environment Research Group/Centre for Ecosystem Management, Edith Cowan University, Perth, Australia. Unpublished commercial-in-confidence report to Rio Tinto Pty Ltd.

McCullough, C. D. & Lund, M. A. (2010). *Mine Voids Management Strategy (IV): Conceptual Models of Collie Basin Pit Lakes*. Department of Water Project Report MiWER/Centre for Ecosystem Management Report 2010-12, Edith Cowan University, Perth, Australia. 95pp. Unpublished report to Department of Water.

McCullough, C. D. & Lund, M. A. & Zhao, L. Y. L. (2010). *Mine Voids Management Strategy (III): A Monitoring Strategy for Pit Lakes and Connected Waters*. Department of Water Project Report MiWER/Centre for Ecosystem Management Report 2010-2, Edith Cowan University, Perth, Australia. 90pp. Unpublished report to Department of Water.

Müller, M.; Eulitz, K.; McCullough, C. D. & Lund, M. A. (2010). *Mine Voids Management Strategy (V): Water Quality Modelling of Collie Basin Pit Lakes*. Department of Water Project Report MiWER/Centre for Ecosystem Management Report 2010-10, Edith Cowan University, Perth, Australia. 95pp. Unpublished report to Department of Water.

Somesan, N.; McCullough, C. D. & Lund, M. A. (2010). Do contemporary ephemeral wetland successional models describe development of macroinvertebrate assemblages in seasonal wetlands? Mine Water and Environment Research Centre/Centre for Ecosystem Management Report 2010-03 Edith Cowan University, Perth, Australia. Unpublished report to Kemerton Silica Sand Pty Ltd. 27pp.

van Etten, E. & McCullough, C. D. (2010). *A scoping report for environmental impacts of planned pit dewatering on Eagle-Head Lake*. Report number 2010-01. Centre for Ecosystem Management/Mine Water Environment Research Centre, Edith Cowan University, Perth, Australia. Unpublished commercial-in-confidence report to Minesite Environmental Pty Ltd.

HIGHER DEGREE BY RESEARCH LOAD (list name of candidate and degree type)

Dave Galeotti (MSc Student)

Niall Somesan (MSc Student)

William Phelps (MSc Student)

Nushan Nawartha Mudiyansele (Ph.D. Student)

HIGHER DEGREE BY RESEARCH COMPLETIONS (List name, degree, title of thesis)

NA

VISITORS AND COLLABORATIONS (List the organisation's name and short summary of the nature of the collaboration. Separate into local, national and international)

COMMUNITY ENGAGEMENT ACTIVITIES AND LINKAGES (Provide a brief overview of any significant activity)

FUTURE PLANS AND DIRECTION (Provide an overview)

Currently with Clint McCullough at 0.2FTE and with Mark Lund as HoS (SNS) our capacity for 2011 is greatly reduced. However we aim to submit another ACARP grant proposal, attend IMWA 2011 (4 refereed conference publications) and Mine Closure 2011 (1 refereed publication) lead and contribute a Workshop on Mine Closure (contributing chapters will form a book from the proceedings).

DATE OF NEXT FORMAL REVIEW

2012