School of Biological Sciences
and Biotechnology
ANNUAL RESEARCH
REPORT
2007
Front Cover:
Tagging and measuring a Freshwater Sawfish in the Fitzroy River with the Yiriman Rangers.
Photo: Dave Morgan

Page i:
West Australian seahorse *Hippocampus elongatus*.
Photo: John Huisman

Back Cover:
Wilt in plantation Eucalypt taken in Laos.
Photo: Bernie Dell

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OVERVIEW

I am pleased to present the Annual Research report for 2007 for the School of Biological Sciences and Biotechnology. This School has a proud track record in research and is a significant contributor to Murdoch University’s overall research productivity. The research embraces a broad spectrum of the biological sciences, from ecosystem function to organisms to cells to molecules. Research is undertaken on plants, algae, animals, bacteria, fungi, viruses and phytoplasma. There is productive collaboration with all levels of Government and with Industry, and there is strong Community involvement in some programs. The research has an applied focus that delivers effective outcomes not only to the needs of Western Australia but also to the Commonwealth and wider world communities. Broadly speaking, the research outcomes provide benefits in two areas. Firstly, to the agriculture, food and fibre sector which is a major industry and employer of people in regional areas of Australia. Secondly, to the conservation and management of Australia’s terrestrial, freshwater and marine biodiversity.

The School has four productive University Research Centres: State Agricultural Biotechnology Centre, Centre for Fish and Fisheries Research, Centre for Phytophthora Science and Management, and Centre for Rhizobium Studies. Staff also contributed to other research centres including the Centre for Organic Waste Management and the WA Centre for Comparative Genomics. The School is an active participant in four national Cooperative Research Centres (CRC for National Plant Biosecurity, CRC for Molecular Plant Breeding, CRC for Forestry, Environmental Technology CRC).

Key statistics for 2007 are:
- 91 refereed scientific papers.
- 64 new research grants worth $6.8 million.
- 10 PhD students completed their studies and a further 103 postgraduate students, mostly PhD, were enrolled.
- 29 Honours students completed their studies.

Some research highlights for 2007 are:
- Purchase of a single stage MALDI-TOF mass spectrometer – the first in Australia.
- The first successful trial eradication of Phytophthora cinnamomi from spot infections on the south coast of WA and in Tasmania.
- Sequencing of a key acid tolerant strain of Sinorhizobium medicae completed with the US based Community Sequencing Project.

Staff collaborated with research colleagues in many countries including Canada, Chile, Egypt, France, Germany, India, Indonesia, Japan, Myanmar, P.R. China, New Zealand, Portugal, Singapore, South Africa, Spain, Tanzania, Thailand, The Netherlands, UAE, UK, USA, Uruguay and Vietnam. The School actively promotes its research and in spite of fiscal constraints, presentations were made at over 30 National and International conferences.

I thank all Academic staff, Emeritus Professors, Leadership and other postdoctoral fellows, Adjunct staff, Technical and other staff, and research students for their contribution and commitment to research excellence in 2007. The School gratefully acknowledges our research sponsors and collaborators both in Australia and overseas. Without your support, the School would be unable to achieve its research goals. Lastly, I thank Ms Maria Waters for her untiring effort in bringing this Report to fruition.
Professor Rudi Appels
Molecular biology, chromosome structure and function in wheat and barley.

Dr Lars Bejder
Whale and dolphin conservation biology/conservation, animal social structure, evaluating anthropogenic impacts on cetaceans.

Professor Michael Borowitzka
Algal biotechnology; biofuels; intertidal and benthic ecology; algal blooms; symbiosis; algal physiology and ecology; coral reef ecology.

Dr Barbara Bowen
Response of plants and plant communities to fire; effect of ecosystem disturbance on plant/animal interactions; plant anatomy and histology.

Professor Stuart Bradley
Animal population and conservation biology; life-history strategies; population biology of seabirds; models and analysis techniques for populations.

Dr Lambert Bräu
Microbial plant growth promotion; plant-microbe interaction; biological nitrogen fixation; novel rhizobial inoculant technology; prokaryotic genetics; signal perception and transduction; stress response.

Dr Kate Bryant
Population and breeding ecology of small mammals; ecological genetics; evolution of life histories and mating systems of animals.

Dr Michael Bunce
Ancient DNA to study the evolutionary history of extinct/endangered species; techniques to isolate DNA from bone, sediments and other biological substrates; phylogenetics and forensics.

Dr Treena Burgess
Fungal population genetics; molecular taxonomy; biosecurity; biology, pathology and control of woody plant pathogens; plant-microbe interactions; health of plantations and natural ecosystems; ectomycorrhiza and plant nutrition; histology.

Associate Professor Max Cake
Molecular mechanisms of hormone action and the role of hormones and growth factors in the biochemical development of the respiratory system.

Associate Professor Michael Calver
Ecology and ethology of predation (vertebrate and invertebrate); immunological methods of studying animal diets.

Emeritus Professor Pat Carnegie
Imunochemistry; immuno-parasitology; structure, metabolism and function of myelin proteins; DNA probes for species identification.

Dr Jennie Chaplin
Evolutionary biology and population genetics: in particular using molecular genetic markers to study the life-history strategies, population structures and phylogeography of fishes and invertebrates.

Dr Ralf Cord-Ruwisch
Industrial and environmental microbiology, development and optimisation of industrial processes, process modelling, biofuels, bioremediation, biological waste and water processing.

Professor Bernie Dell
Plant nutrition; plantation health; plantation silviculture; reforestation; mycorrhizal technology; truffles and other edible fungi; mycophagy.

Emeritus Professor Michael Dilworth
Physiology and biochemistry (particularly acid tolerance) of legume root nodule bacteria.

Associate Professor Judith Fordham
Juries and forensic evidence, juries and intimidation, the "CSI effect".

Dr Howard Gill
Taxonomy and systematics of fishes; biology of estuarine and native freshwater fishes; larval development, and ontogenetic and seasonal changes in the diet of fishes.

Professor Norm Hall
Fish population dynamics; fisheries stock assessment; fisheries modeling.

Associate Professor Giles Hardy
Biology, pathology, taxonomy and control
of woody plant pathogens; biological control of plant pathogens; plant-microbe interactions; mycorrhizal fungi; insect-fungal interactions; health and function of plantation and natural ecosystems.

**Professor John Howieson**
Rhizobial ecology; legume nodulation; agricultural systems.

**Dr John Huisman**
Taxonomy and systematics of marine macroalgae, particularly of tropical regions. Introduced marine plants.

**Mrs Carolyn Jones**
Immunology of infectious diseases; human parasitic diseases; characterization of antigens; immunological and molecular diagnostics.

**Professor Mike Jones**
Plant biotechnology in agriculture; genetic modification of plants; genetic modification of food; plant molecular biology; molecular plant pathology (viruses, nematodes, fungi); marker assisted breeding; molecular diagnostics.

**Professor Neil Loneragan**
Fisheries ecology; dynamics of invertebrate fisheries (particularly prawns); relationships between coastal habitats and fisheries production; stock enhancement of marine invertebrates and fish; marine biodiversity and conservation planning.

**Associate Professor David Macey**
Animal physiology; iron metabolism of humans and other animals; biomineralisation.

**Emeritus Professor Jen McComb**
Plant cell, organ and tissue culture of woody Australian species; breeding systems, salt tolerance and disease resistance of Eucalyptus; physiology of parasitic plants.

**Associate Professor Robert Mead**
Biology and biochemistry of fluoroacetate and other fluorinated pesticides; plant secondary compounds and plant/animal interactions; biochemistry of disease states, including molecular biological studies of prostate and breast cancer and of coronary heart disease in association with affiliated hospital research teams.

**Dr David Morgan**
Ecology of inland fishes of Western Australia; impacts of introduced fishes; fishways; salinisation; threatened fishes.

**Dr Phil O’Brien**
Development of molecular tests for detection of microbial pathogens. The mechanisms of host plant infection by Phytophthora. The mechanism of phosphite induced resistance of host plants to infection by Phytophthora. Molecular profiling of soil microbial communities.

**Dr Graham O’Hara**
Soil microbiology; biological nitrogen fixation; microbial ecology; physiology and genetics of Rhizobium.

**Professor Ian Potter**
Ecology of marine, estuarine and freshwater fish; the biology of lampreys including their life-cycles, ecology, phylogeny, cytogenetics and respiratory physiology.

**Dr Wayne Reeve**
Prokaryote genetics, molecular biology and physiology; genomics and proteomics; signal perception and transduction; stress response and virulence; biological nitrogen fixation.

**Professor Peter Rogers**
Fisheries management policy; fisheries adjustment and resource allocation; ecosystem approaches to fisheries management.

**Dr Peter Spencer**
Wildlife molecular ecology and taxonomy of Australian endemic species; wildlife forensics; invasive species and non-equilibrium genetics; development and application of DNA-based diagnostic tools.

**Dr Ravi Prakash Tiwari**
Molecular biology of stress tolerance; gene regulation; proteomic analysis; role of alternative sigma factors in stress tolerance; biological nitrogen fixation; microbial ecology.

**Dr Fiona Valesini**
Relationships between habitats and faunal assemblages in nearshore marine and estuarine waters; fisheries ecology; nearshore habitat classification.
Dr Mike van Keulen
Ecology and physiology of marine plants; biological hydrodynamics; seagrass transplantation; coral reef ecology; physiology of corals; organism-sediment interactions; marine ecology and trophic studies; remote sensing of marine habitats; marine biodiversity.

Emeritus Professor Ron Wooller
Ecology and behaviour of vertebrates, particularly the population biology of seabirds, and nectar-feeding birds and mammals; the regeneration strategies of banksia.

A Mardo (Antechinus flavipes leucogaster) being weighed and measured as part of study looking at the importance of grass-trees for this species.

Photo: Trish Fleming
**NEWS OF STAFF**

**Brightest police minds put to test**

A six-week intensive postgraduate certificate course in Criminal Investigations (Commercial Crime) challenged the inaugural group of 20 students, including 19 WA Police detectives and one Australian Securities and Investment Commission officer.

Associate Professor in Forensic Science, Judith Fordham, said the course tested the enforcement agencies’ brightest minds.

“They literally put their lives on hold over the six weeks to complete this course which is equivalent to a full semester of study in a subject degree,” Professor Fordham said.

“But in the end, if they pass, they will have expert knowledge of the laws pertaining to commercial crime and evidence and be able to pursue law studies to further their expertise.”

On successful completion, students will have an advanced, in-depth knowledge of the law of evidence and business law, including contracts, company law, partnerships, trusts and bankruptcy.

Associate Professor Fordham said the officers will be equipped to carry out their investigations more efficiently, professionally and knowledgeably than ever before, ensuring more successful prosecutions.

“This new course is Murdoch’s response to a community need which we’ve identified with the WA Police and other law enforcement agencies,” she said.

At the launch of the course, Police Acting Deputy Commissioner Wayne Gregson told the students the law was their tool box and it was vital they had access to the highest level of professional training.

“For me, the opportunities this course offers are very important because it builds on our investigative capacity,” he said.

Acting Deputy Commissioner Wayne Gregson, Inspector Arno Albrecht, Judith Fordham & Superindendent Ron Randall hit the law books.

Photo: Brian Richards
NEWS OF STAFF cont......

Professor Peter Rogers

In 2007 we welcomed Peter Rogers to the School of Biological Sciences and Biotechnology. Prior to joining Murdoch University, Peter was the Executive Director and CEO of the Department of Fisheries for a period of 15 years having extensive experience in fisheries management, policy development and implementation. His background in fisheries covers some 34 years in all aspects of management of commercial fisheries, recreational fishing, conservation and aquaculture. Peter has overseen a dramatic transformation of the Department and changes in approaches to management.

The introduction of cost recovery arrangements in 1995 within a program structure has facilitated a more commercial focus at a program level in the delivery of agencies services and in fisheries management. This has been complemented by adoption of ecological sustainable development and stronger integration of fisheries management across and between sectors.

Dr Rogers is a former chairman of the Western Australian Rock Lobster Industry Advisory Committee [RLIAC], which oversees the nation’s most valuable single species fishery. He was a member of RLIAC, the Western Australian Pearling Industry Advisory Committee, and the Australian Fisheries Management Forum prior to his retirement in 2006.

He has a Master of Business Administration and Bachelor of Science (Agric) Honours, both from the University of Western Australia and is a Fellow of the Australian Institute of Company Directors and holds an Honorary Doctorate in Science from Murdoch University.

Peter’s current role at Murdoch University focuses upon the initiation of new research opportunities within the Centre for Fish and Fisheries Research, particularly overseas, the further development of training opportunities and policy related research in the management of fisheries. He is also providing a business dimension to the Centre’s activities.

Murdoch’s spectrometer one of a kind in Australia

Developing disease resistance for new crops is just one of the benefits for agriculture delivered by WA’s first prOTOF 2000 mass spectrometer.

The only one in Australia and one of only 30 in the world, this new mass spectrometer has just been installed at Murdoch’s WA State Agricultural Biotechnology Centre (SABC).

It can be used to identify and map biomarkers in biology, from humans to plants, analyse diseases and identify pests, and its applications will provide major benefits in agricultural and biomedical research.
SABC Director, Professor Mike Jones, said the prOTOF 2000 was the world’s fastest and most accurate single stage MALDI-TOF mass spectrometer.

“This equipment has many applications in biotechnology, including high end protein analysis, biomarker discovery, molecular diagnostics, biosecurity and commercial testing,” he said.

“Its unique design allows it to accommodate different types of samples and identify their molecular sizes with remarkable accuracy”.

“Previously cell and tissue imaging was not possible, but now we can analyse tissues as well as extracts, which we will use, for example, to develop new forms of resistance by looking at host-pathogen interactions at a cellular level.”

**China wheat initiative**

Professor Rudi Appels, representing Agriculture Research WA, led a delegation to Shandong, China for an agreement to try and get Australian farmers to grow grades of wheat for which the Chinese will pay premiums, guaranteeing the market against the USA and Canada.

The group included the CSIRO’s Dr Matthew Morell and Murdoch’s Deputy Vice Chancellor (Research) Professor Jim Reynoldson and the Agriculture Department’s Dr Wujun Ma. “What we achieved is a formal commitment to build a virtual laboratory for research on wheat quality through three major Chinese institutions” Professor Appels said. The agreement was signed between Murdoch University, CSIRO, the China Academy of Agricultural Sciences (Beijing) and the Shandong Academy of Agricultural Sciences and Henan Academy of Agricultural Sciences.

An agreement was also reached with the Capital Normal University in Beijing for student exchanges with Murdoch University. The agreements are significant in providing a basis for the exchange of germplasm between China-Australia research laboratories, and the exchange in expertise in biotechnology, in particular at the level of post-graduate students.
AWARDS AND PRIZES

ACADEMIC AWARDS

Vice Chancellor’s Excellence in Teaching Award 2007
Dr. Barbara Bowen

Dr Barbara Bowen from the School of Biological Sciences and Biotechnology is an excellent example of the teaching - research nexus. Her involvement in collaborative projects such as woodland and forest health informs her high quality teaching. Barbara’s enthusiastic approach to teaching, along with a passion for her subject matter, engages and inspires students in the field of plant biology.

Vice-Chancellor’s Citation for Excellence in Enhancing Learning 2007
Associate Professor Robert Mead

Associate Professor Robert Mead

For sustained commitment to the academic support of students and for the development of innovative teaching materials that stimulate engagement and enhance understanding and learning.

Peter Benchley Award

Adjunct Research Associate, Brad Norman and his team were awarded a Peter Benchley Award for shark conservation. The awards created by the Shark Research Institute and presented in New York were created to ensure continuation of Peter Benchley’s shark conservation efforts. Peter Benchley was the writer of the fictional novel JAWS, which was later adapted into a movie that caused many people worldwide to develop a fear of sharks. Mr Norman received the award for Ecocean, the conservation group that developed a computer program that utilizes the natural body patterns of whale sharks to catalogue and track the global movements of individual sharks.

“I created the Ecocean Whale Shark Photo-identification Library in 1999, to record sightings and images of whale sharks world-wide,” Mr Norman said. “Using advanced technology, as adapted from that used in the Hubble Space Telescope, we are able to ‘map’ the markings on the skin of each whale shark to enable the accurate identification of individuals. Anyone swimming with a whale shark can record its photo and log their images at www.whaleshark.org, helping us to learn more about this elusive shark and its migratory patterns”. Members of the public can join Mr Norman on research expeditions between April and June each year in Exmouth.

Carrick Citation 2007

Associate Professor Robert Mead

For sustained commitment to the academic support of students and for the development of innovative teaching materials that stimulate engagement and enhance understanding and learning.
Ka Palapala Poʻokela Book Award

Hawaiian Reef Plants by Dr. John M. Huisman, Dr. Isabella A. Abbott and Dr. Celia M. Smith

_Hawaiian Reef Plants_ is an easy-to-use yet comprehensive guide on nearly all species of marine plants present in Hawaii accompanied by stunning photographs and illustrations. This scholarly book is beautifully written by Dr. John M. Huisman, Dr. Isabella A. Abbott and Dr. Celia M. Smith, three of the world’s leading marine botanists. It is valuable to experts and novices alike, and is a must-read for everyone interested in marine plants and the complex ecosystems in which they live.

**STUDENT PRIZES**

**AMGEN Australia Prize in Biotechnology**
The best aggregate score in BIO270 Biochemistry I, BIO371 Biochemistry II, BIO212 Genetic Engineering and BIO302 Molecular Biology II
Alison Louw

**Ann Osborn Memorial Prize in Biotechnology**
For the best Honours graduate in the Bachelor of Science in Biotechnology
En Ng

**Australian Biosearch Prize in Biochemistry**
The best academic performance in BIO371 Biochemistry II
Alison Louw
Chantelle Matthysen

**Emrys Grimley Memorial Prize in Biological Science**
For the best academic performance in BIO152 Cell Biology and BIO103 Environmental Biology, taken in the same year
Cherie Walker
Krista Mara Verlis

**EPA Prize in Conservation Biology**
For the graduate in the Bachelor of Science in Conservation Biology with the highest grade point average in core units
Kerryn McCann

**Natural Science Centre Prize in Plant Physiology and Pathology**
The best academic performance in BIO286 Plant Physiology and Pathology
Bryony Palmer

**Natural Science Centre Prize in Microbiology**
The best academic performance in BIO263 Microbiology 1
Cherie Heath

**Natural Science Centre Prize in Biochemistry**
The best academic performance in BIO270 Biochemistry I
Michael Macri
Helen Hunt

**Venture Capital Investments Prize in Biotechnology**
The best academic performance in BUS215 Business Feasibility and Management Concepts by a student enrolled in the Biotechnology major
Huijing Lin

**WA Fishing Industry Council Prize**
For the best academic performance in BIO205 Fish & Fisheries Biology
Dion Boddington

**WA Naturalists’ Club Serventy Memorial Prize**
For the best performance in the practical component in BIO157 Animal & Plant recognition
Nicole Shaw
Monique Barker

**Wildflower Society of WA (Murdoch Branch)**
For the best academic performance in BIO265 Plant diversity
Tegan Douglas
The activities of highly motivated and committed research students, postdoctoral fellows and staff have continued to be crucial to the Centre’s success. During 2007, four PhD theses were approved by Senate and a further five were submitted for examination. In addition, four Masters and five Honours theses were completed. The research areas of staff and students range widely and include population and community biology, biological oceanography, systematics, fisheries and ecosystem modelling, recreational fishing, marine protected areas, restocking, aquaculture, genetics and fish health.

The staff and students of the Centre have continued to publish a substantial number of papers in international journals (22), book chapters (5), provide detailed reports to their funding agencies (20) and present the results of their studies at conferences and workshops. A major achievement has been the compilation of a special volume of the international journal, Deep Sea Research, on the Leeuwin Current and its eddies, from studies completed on the National Research Facility, the RV Southern Surveyor. Centre researchers worked on a total of 50 projects, with external funding of about $1.6 million from a range of sources including Research and Development Corporations (particularly the Australian Fisheries Research and Development Corporation), Government Departments, Australian Research Council, National Heritage Trust Funds and the CSIRO.

Studies on the biology of a number of species on the west and south coasts of Western Australia were completed. During a study funded by the Australian Fisheries Research and Development Corporation (FRDC), the Western Blue Groper was found to be very long-lived (70 years) and to take a long time to reach maturity and change sex, characteristics which make this labrid potentially very vulnerable to fishing. Ecosystem modelling (funded by FRDC) has led to the development of new approaches for using data readily available for a number of fisheries to investigate the effects of fishing on trophic interactions. In addition, existing models (Ecopath/Sim) are being used in another FRDC project to understand interactions between species and how they are affected by fisheries on the west coast of Australia.

The first year of research on the Ningaloo reef, funded by the CSIRO Flagship Collaboration Fund, has been successful in collecting fine scale spatial data on marine habitats and reef use that will provide the basis for future conservation and development planning. A collaborative study with the...
Departments of Fisheries and of Environment and Conservation, Dr Jeremy Prince and the abalone industry produced data on the biomass and catches of three commercial species of abalone in sanctuary zones of the proposed Capes Marine Park in south-western Australia. These data are being used as the basis for negotiations on compensation to commercial fishers in the region due to the potential loss of income from the implementation of those sanctuary areas. Research on the dolphins of the Bunbury region (200 km south of Perth) commenced with studies of their biology, prey dynamics and genetics. An International Whaling Commission workshop on evaluating the effects of eco-tourism on cetacean populations world wide, has been attracted to Western Australia in 2008. The expertise on dolphins has also resulted in an invitation by the Department of Fisheries to investigate the issue of dolphin bycatch in the Pilbara finfish trawl fishery and how it might be further reduced.

Studies in the field of sustainable aquaculture have continued to focus strongly on environmental impacts, such as secondary salinisation, eutrophication and the effect of exotic species on freshwater and estuarine ecosystems. In particular, research has continued on various aspects of aquaculture in the inland saline waters of Western Australia. These include environmental management of such aquaculture (funded by the Rural Industries Research Development Corporation) and developing a genetic approach to increasing the growth rates of suitable fish species for inland saline aquaculture and new production technologies to improve stocking densities. Studies are also continuing on the production of an environmental management system for aquaculture in disused mine lakes (funded by the Centre of Excellence for Sustainable Mine Lakes), determining the ramifications of the appearance of the Red claw crayfish *Cherax quadricarinatus* in the Kimberley, the risk posed to native fish by parasites imported with exotic fish species, and the use of fish parasites as bio-indicators of ecosystem health.

Freshwater research continues to be wide ranging and related to issues of sustainability of freshwater fish communities and aquatic ecosystems. These various activities include 1) examining the sustainability of groundwater and surface water extractions of drinking water sources, 2) assessing biodiversity values of aquatic ecosystems for a number of management plans, 3) determining the movements of the rare Freshwater Sawfish and Northern River Sharks by acoustic and satellite tracking, 4) determining the population biology of Freshwater Cobbler and Marron and population genetics of rare freshwater fishes, and 5) determining salinity tolerances of inland fishes to assess long term sustainability in the context of predicted climate change. These activities are funded from a number of sources such as the Water Corporation, Department of Water, Department of Environment, Water, Heritage and Arts and the South West Catchment Council.

The members of the Centre for Fish and Fisheries Research made major contributions to the development of the science directions for the WA Marine Science Institution, a funding initiative of the Western Australian government for marine science. Research on WAMSI funded projects will start in 2008.

In 2007, the research activities in the Centre were enhanced by the continued activities of two Murdoch Research Leader Fellows (Dr David Morgan – freshwater fish and crustaceans, and Dr Lars Bejder – ecosystem approaches to cetacean populations), who have had the funding for their fellowships from the University extended for two to three years. After many years at Murdoch University, three postdoctoral fellows have left to take up positions elsewhere. Dr David Fairclough has joined the WA Department of Fisheries, Dr William White the CSIRO (Marine and Atmospheric Research) in Hobart and Dr Rob Doupe has taken up a position at James Cook University. We thank them for their many and extensive contributions to the University and wish them success in their new positions. The Centre also welcomed six international PhD scholars to work in the areas of estuarine fish communities, ecosystem modelling, dolphin ecology, genetic relatedness with populations in adjacent regions, and prey dynamics, and economic instruments for sustainable coastal development.

During 2007, I have greatly appreciated the advice and guidance of many people in the Centre and of those outside the Centre at Murdoch, particularly Associate Professor Max Cake and Professors Andris
Biological Sciences & Biotechnology

NEWS OF CENTRES cont…..

Stelbovics and Jim Reynoldson. The activities and staff of the Centre have also received support and advice from a number of people in external organizations. Particular thanks are due to Peter Millington (Chief Executive Officer, Department of Fisheries), Frank Prokop (Executive Director of Recfishwest) and Richard Stevens (Research and Development Manager of the Western Australian Fishing Industry Council) for their continuing support and encouragement.

I would also like to express my gratitude to Professor Peter Rogers, who joined the Centre in 2007. He has been involved in developing strategic directions for the Centre in international research and a detailed business plan, initiatives that are crucial for the ongoing success of the Centre.

Potato Grouper *Epinephelus tukula.*
Photo: John Huisman
The Centre for Phytophthora Science and Management (CPSM), based in the School of Biological Sciences and Biotechnology at Murdoch University, is a world leader in Phytophthora plant diseases research, particularly *Phytophthora cinnamomi*. The Centre is founded on over 20 years of research excellence in the biology, ecology, epidemiology and management of the diseases caused by *P. cinnamomi*. This introduced soil-borne plant pathogen is recognised by the Australian and State Governments as a key threatening process to biodiversity because of its role in the destruction of native plant species, communities and habitats in southwest WA, a global biodiversity hotspot, and many other States in Australia. Future success in management of this threat to biodiversity will depend on science-based knowledge and new technologies. As the primary science provider CPSM works in partnership with the Department of Environment and Conservation (DEC), industry, Natural Resource Management (NRM) groups, and community-based interest groups to generate and communicate new knowledge and technologies to combat this threat. CPSM represents the first cohesive research effort against the threat and plays a central and vital role in effective management of Phytophthora Dieback in Western Australia.

CPSM has the following mission:

Through a coordinated program of management and research, and in partnership with industry, government and community, the Centre will provide science, management and training to underpin the amelioration of the threats posed by *Phytophthora*.

CPSM has enjoyed 4 years of steady growth under the direction of Associate Professor Giles Hardy. The Centre has been an excellent performer with income totalling $5.1M, an average of $1.3M/year. On the 1st July, 2007, Rex Baker (former Alcoa Executive and current Chair of MERIWA) accepted the invitation to Chair the CPSM Board and officially took up the appointment for the maximum of one
term (3 years).  2007 proved to be another industrious year for the Centre, and while the Centre lost its Manager, it leaves open a position for a Business Manager to lead the Centre in future years of growth.

During 2007, CPSM staff and students were involved in more than 30 active projects, with research income of over $3.3M. The main funding bodies were; Department of Environment, Water, Heritage and the Arts (DEWHA), Department of Environment and Conservation, Alcoa Australia, and the ARC. The group was comprised of 3 Postdoctoral Research Associates and 8 PhD students, while 3 Honours students joined the Centre for 2007. The breakdown of projects according to broad programs of study is as follows;

- Biology, ecology, taxonomy and epidemiology of *Phytophthora* spp. 10
- Development of disease management options 14
- Conservation, biodiversity and ecosystem restoration 4
- Detection and diagnosis 6

We have made significant progress on a 3 year project funded by the Australian Government Department of Environment and Water Resources (formerly the Department of Environment and Heritage) due to be completed in May 2008 entitled “Induced resistance of Australian native vegetation to *Phytophthora cinnamomi*”. This project is comprised of four subprojects:

- Eradication of *P. cinnamomi* from spot infections in native plants in Western Australia;
- Eradication of *P. cinnamomi* from spot infection in native plants in Tasmania;
- Physiological status of the plant and efficacy of phosphite; and
- Enhancing the efficacy of phosphite with the addition of other chemicals.

One of the 2007 highlights has been the excellent results achieved in the eradication projects where novel methods of control and localised spot eradication of the pathogen has been more successful than any previous attempt. Methods for the localised eradication of *P. cinnamomi* are being applied to protect areas of high conservation value from encroaching infestations in Fitzgerald River National Park. Additionally, investigation into the use of sticking agents and other chemicals to increase uptake of phosphite into plants has shown some improvement which will result in better protection for native and horticultural species. Physiological responses of native plants to drought, water logging and fire have been investigated and by the term of the project we will have sound knowledge of when best to apply phosphite in light of these stress events.

*Phytophthora cinnamomi* threatens biodiversity by killing Australia’s native vegetation and its dependent biota. The indirect effects of *P. cinnamomi* in terms of botanical impact through the loss of vertebrate and invertebrate pollinators, and loss of canopy and litter cover have yet to been determined. We are trying to determine if the pathogen is having a detrimental and long-term impact on fauna. Photo: Bill Dunstan
In 2007, the CPSM Diagnostic facility entered a proof of concept phase for the PCR diagnostic protocols for detecting *Phytophthora cinnamomi* from soil. Two thousand soil samples were analysed by Nested PCR and the results compared to traditional detection protocols carried out by either CPSM or independently by the Vegetative Health Service diagnostic laboratory of DEC. This process identified the sampling size, which was limited to 1 g of soil, as the primary limitation of the DNA based detection protocols. Subsequent work has focussed on the development of extraction protocols to allow greater volumes of soil to be tested. In addition, a real time PCR assay has been developed to supersede the nested protocol which is time-consuming and involves a higher risk of cross contamination. If fully commercialised, this would be the only facility in Australia with the capacity to undertake high throughput, regular, routine and affordable molecular diagnostics of *Phytophthora*. During this process we engaged with stakeholders including DEC, Alcoa Australia, Worsley Australia and Southern Gateway Alliance to develop a reliable molecular method to diagnose whether *P. cinnamomi* is present or absent in soils. Land managers including DEC and NRM groups, the Dieback Working Group and private consultants require accurate *Phytophthora* occurrence maps are critical to informing risk assessments, and critical for the effective deployment of management options, which each of these groups must undertake in the management of *P. cinnamomi* in their respective jurisdictions. Stakeholder contribution to the development and optimisation of a new, robust, cost-effective diagnostic tool provides advances in research capabilities, and gives the end-users ownership of the technology and encourages its adoption. Molecular diagnostics will be made available to all stakeholders through CPSM. These tools will be expanded upon in future integrated research at the Centre.

The Centre’s partnership with the CRC for National Plant Biosecurity has resulted in a range of projects dealing with biosecurity threats posed by *Phytophthora* spp. Two projects, of 3 year duration, commenced in 2007, to investigate the detection of *P. ramorum* and *P. kernoviae* in post-entry quarantine material, and the susceptibility of Australian plant species to *P. ramorum*. *P. ramorum*
has the potential to have a significant impact on the nursery, horticulture and forestry industries, and become a major ecological threat in areas with susceptible hosts and conducive climates. Preliminary screening studies in the US (CRC and DEWHA funded PhD student) indicate that a number of key Australian plant species are susceptible to *P. ramorum*.

New projects that commenced in 2007 include:

- The classical and molecular taxonomy and pathogenicity testing of *Phytophthora*;
- The introduction, transmission and spread of plant pathogens in plant nurseries using *Phytophthora* as a model;
- The long term survival of *P. cinnamomi* in black gravel soils on mining leases in the jarrah forest;
- The susceptibility of Australian plant species to *P. ramorum*;
- A review of the distribution of *P. cinnamomi* in regional South Australia for the Native Vegetation Council of South Australia;
- Identification of reptile species of management concern in rehabilitated bauxite mine sites;
- Development of management guidelines to maximise the persistence of all reptile species in rehabilitated mine sites by assessing the impacts of thinning and burning and the number of habitat piles on reptile species in rehabilitated mine sites;
- The assessment and reduction of inoculum potential for the construction of Phytophthora Dieback-free roads for Alcoa;
- Investigation of the *Eucalyptus tetradonta* decline in Gove NT; and
- The epidemiology of *P. cinnamomi* using molecular technology.

A 12 month visit by Dr Thomas Jung from Bavaria, Germany, has provided opportunities for members of CPSM to develop new methods of isolating *Phytophthora* species from soil. Dr Jung will also provide students with training in classical methods of *Phytophthora* identification. He will work on an Alcoa funded project in late 2008.

CPSM was selected as a potential supplier of training in *Phytophthora* Dieback management to NRM. CPSM has since entered into further discussions with the Dieback Working Group, MurdochLINK and A/P Scott Gardner (Director Postgraduate and Professional Education at Murdoch University) about the development of nationally accredited training program in Phytophthora Dieback within CPSM.

Six members of CPSM attended the 4th IUFRO meeting on Phytophthora diseases in natural ecosystems held in California, USA. Prior to the meeting, an extensive 6 day field trip was organised to view a number of different *Phytophthora* diseases between Oregon and California. This included visiting sites impacted upon by *Phytophthora ramorum* the cause of ‘Sudden Oak Death’ (SOD), and forest sites where eradication had been trialled. *P. ramorum* has a wide host range, and like *P. cinnamomi* in Western Australia, it has the potential to have an enormous impact on ecosystem function and health. Unlike *P. cinnamomi*, it is spread by aerial dissemination of spores, making quarantine and hygiene methods very challenging. A number of new collaborations have been established from this meeting and these are currently being developed.

A number of projects were completed in 2007 including;

- 3 PhD and 3 Honours student submitted their theses.
- Management of rehabilitated bauxite mines to accelerate the return of vertebrate fauna; funded by ARC and Alcoa Australia.
- The efficacy of Phytoclean for the wash down of vehicles and footwear.
- The potential use of DTox (polysulphide) in soil and foliage to prevent disease or the spread...
of the pathogen.

- The impact of plant disease and cross disturbances on guilds of mammals in Southern Australian ecosystems.
- A study of the effect of *P. cinnamomi* on the abundance of honey possum at Cape Riche WA.

The Centre has continued to build upon its body of knowledge and expertise and remains the focal point for the co-ordination and integration of *Phytophthora* related research. The Centre is primed for new prospects and challenges in 2008, and is well placed to capitalise on its multi-faceted and integrated approach to generating knowledge that will underpin novel *Phytophthora* control options. Membership and active participation in a range of national and WA initiatives provides the opportunity for the Centre to respond directly to the needs of management, and the direct translation of research outputs to improved on-ground management. We are very appreciative of the collective effort made by all associated groups and individuals who have contributed to another successful year.

Injecting Metham to control spot infestations of *Phytophthora cinnamomi*.
Photo: Rodney Armistead
During 2007 a wide range of significant achievements by staff and students in the Centre for Rhizobium Studies (CRS) reinforced its international, national and regional profile as a focus for integrated research and education in the science of root-nodule bacteria. Centre staff were involved in several substantial joint ventures and research collaborations during the year that place the CRS in a strong, strategically important position for the future, and provide a number of unique research opportunities. Very exciting news received during the year was the very well deserved promotion of two core academic staff in the CRS – Dr Wayne Reeve (to Senior Lecturer) and Dr Lambert Bräu (to Lecturer). Many congratulations to Wayne and Lambert for their success.

The year commenced with substantial representation by the CRS at the combined 15th International Congress on Nitrogen Fixation / 12th International Conference of the African Association for Biological Nitrogen Fixation held from 21st to 26th January in Cape Town, South Africa. The Congress is the premier international nitrogen fixation meeting held once every two or three years, and participation by six CRS members (postgraduates Julie Ardley, Sharon Fox, Yvette Hill and Jason Terpolilli, and Drs Kemanthi Nandasena and Graham O’Hara) highlighted the breadth and excellence of current CRS research in rhizobiology. Four of the CRS participants gave invited presentations, with Graham O’Hara also being invited to chair a session at the Congress. The fact that the CRS contingent was one of the largest research groups at the Congress is indicative of the both the strength of the Centre, and the opportunities it provides for research training and collaboration.

Dr Wayne Reeve continued to lead the CRS in its significant research collaboration on genome sequencing of root nodule bacteria with the US based Community Sequencing Project, run from the US Department of Energy. During 2007 the sequencing of the key acid tolerant strain of *S. medicae* WSM419 was completed, and sequencing commenced of two key strains of clover rhizobia - WSM1325
and WSM2304. During the year Drs Reeve and Bräu visited the Joint Genome Institute (JGI) facility based at Walnut Creek in California, USA to participate in workshops, and hold discussions with JGI research collaborators. Following on, Lambert and Wayne also visited the laboratories of Professor Finan at McMaster University in Canada to continue a longstanding collaborative research relationship with the CRS.

Many congratulations are due to CRS members Dr Kemanthi Nandasena, Professor John Howieson and Dr Ravi Tiwari who linked with Professor Craig Atkins (University of Western Australia) and Professor Clive Ronson (University of Otago, NZ) for success with funding from the Australian Research Council for their project on the “Evolution of diverse symbiotic phenotypes among native soil bacteria following spread of a genomic island from a rhizobial inoculant”. This proposal builds on recent research at the CRS showing the root nodule bacteria for *Biserrula pelecinus* L, a new pasture species that is rapidly gaining popularity in Western Australia, are evolving *in situ* in the WA wheat belt through lateral transfer of symbiotic genes from inoculant *Mesorhizobium* sp. strains to other soil bacteria. This process contributes to the development of soil populations of rhizobia that do not fix much nitrogen with legumes. The ARC-funded project aims to improve our understanding of transfer mechanisms of symbiotic genes so that the development of soil populations of rhizobia suboptimal in nitrogen fixation can be prevented in the future. The knowledge from this project will contribute to the enhancement of sustainable agriculture.

The CRS continued its role as the leader of the GRDC/AWI-funded National Rhizobium Program (NRP), and during 2007 commenced negotiations with GRDC for the development of a new five-year program to be directed from Murdoch University. Professor John Howieson and Dr Graham O’Hara ran the initial planning meeting at SARDI in May 2007, where agreement was reached that the CRS would continue to lead the program for the next phase. Dr O’Hara chaired the subsequent meeting held in Sydney in November where the detailed proposal was developed in consultation with key national stakeholders. An important aspect of the plans for the new GRDC-funded program is that the research will switch from rhizobia for pasture and forage legumes to focus specifically on rhizobia for pulse legumes.

There has been very promising progress in the ACIAR-funded project in legume and rhizobium development for small landowners in the Eastern Cape of South Africa (acronym ECCAL) that commenced in June 2006 under the leadership of Professor Howieson, working with Ron Yates and Neil Ballard. The ECCAL project is based in the Eastern Cape region of RSA and aims to address two of the major constraints to lifting livestock production, i.e. the quality and quantity of forages, and effective communal management of feed resources. The CRS-lead team is working with livestock farmers in communal areas to improve pasture production through the introduction of grasses, legumes and rhizobia, and by developing innovative, participatory management strategies for the future utilisation of this pasturage. The first experiments to select appropriate forage and rhizobium genotypes were sown in plots on Dohne Research Station in the EC, during a visit by John Howieson and Ron Yates during November 2006. A second set of experiments was established in three community farms in the EC in March 2007. The ECCAL trials are now progressing well in six communities and the team of John Howieson, Ron Yates and Neil Ballard combined their monitoring visits in 2007 with legume collection trips in the Western Cape.
The first products of the CRS perennial forage legume pre-breeding program have transitioned to field evaluation by DAFWA, including crosses of *Lotononis bainesii* and four species of *Lessertia*. Research on the root nodule bacteria of these genera with agronomic potential in southern Australia continues through the programs of several postgraduate students in the CRS. Also during 2007 the CRS continued its collaborative research association with the inoculant manufacturing company ALOSCA PTY LTD, and during the year this collaboration was able to employ Dr E. Sezmis on funding provided via a research levy.

Finally, it is very important to gratefully acknowledge all the sponsors, staff and associates who contributed to the research environment in the CRS during 2007. As the Centre enters its second decade we look forward to an exciting period of research and discovery in the science of rhizobiology.

Pink pigmented nitrogen fixing nodule bacteria isolated from the South African legume known as *Lotononis bainesii*. The symbiotic effectiveness & specificity of these novel bacteria are being investigated to discover useful inoculant strains. Photo: Maria Waters
The SABC is the major Centre for Agricultural Biotechnology in Western Australia. It continues to operate in a cost-effective manner as a “Research Hotel” to provide major equipment and facilities to WA researchers working on plant, animal and biomedical R&D projects. There are about 20 research groups, from University, State Government and Industry using the SABC, with about 250 registered researchers, about half of whom are based in the SABC laboratories full time, and about half who are based elsewhere but access the facilities and equipment when required. The SABC is thus a resource centre for WA biotechnology researchers, with a small core staff who run the Centre (Director Professor Mike Jones, Laboratory Manager Dr David Berryman, Professional Officer Ms Frances Brigg, Office Manager Ms Andrea Tongue).

Much time in 2007 was taken up with developing a proposal to the WA State Government to expand the SABC into the WA Biotechnology Centre (WABC), with the addition of a WA State Biomedical Biotechnology Centre and WA Industrial/Environmental Biotechnology Centre, and also in discussions with DAFWA staff on the future of ARWA alliance (Agricultural Research WA) and the proposed move of about 700 DAFWA staff to the Murdoch campus. Some funds were also raised under the NCRIS program to support Genomics Australia/transcriptomics research in the SABC (major NCRIS funds were also raised for associated metabolomics equipment – Separation Sciences Laboratory, and in Bioinformatics, as part of Murdoch’s overall support and expertise in biotechnology and molecular biology).

An ARC LIEF major equipment grant submitted by the Director and other Murdoch, DAFWA, CUT and Saturn Biotech researchers for a pro-TOF Mass Spectrometer was successful, and forms part of the rolling program to upgrade major equipment.

Since the SABC is a resource centre, it is the groups that use the centre that carry out R&D, and not the SABC itself.
Proteomics International maintained continued growth. In the past year, the company has firmly bedded down its Bioven™ platform and now is capable of processing venoms from arthropods to generate potential new pharmaceuticals. The process is based on mass spectrometry. Alongside this and using closely related technology, Proteomics International as a partner in the Centre for Food and Genomic Medicine, has commenced working on biomarkers in diabesity.

The company’s presence at the State Agricultural Biotechnology Centre at Murdoch University has continued to develop and has forged strong alliances with Prof. Richard Oliver and Dr Peter Solomon in their work on the plant pathogen *Stagonospora nodorum*, and with Prof Andrew Thompson in his work with *Giardia* where PhD student Rob Steuart is continuing his studies.

Proteomics International is also a key commercial partner in the Centre for Comparative Genomics where they work closely with Professor Bellgard and his team on biomarker projects.

The staff have also been involved in undergraduate teaching in the past year, and the running of Courses on Proteomics.

Proteomics International greatly values its relationship and on-going collaborations with us all at the SABC, and they look forward to building the “omics” capability toolkit that has become essential to today’s biological sciences and the biotechnology industry.
Alexia Bivoltsis was awarded a 1st Class for her honours project in December 2007. Her research, which formed part of the Jurien SRFME project, focused on studying the fish communities of reefs, seagrass and unvegetated sand habitats in the JBMP using baited remote underwater video techniques. This study was one of the first to compare the densities, diversity and composition of fishes in these three major habitat types in the same region. Not surprisingly, she found vast differences among the fish assemblages of these habitats. Within reef habitats, the characteristics of the fish communities were related to the degree of exposure of the reefs and the concomitant changes in algal communities that occur across that exposure gradient.

The results of underwater visual census of the reef fish communities in the JBMP by David Fairclough parallel those of Alexia’s baited video study, with the characteristics thus changing with increasing exposure (Figure 1). This pattern essentially mirrors that of the most speciose families, i.e. the labrids and pomacentrids, which drive the overall distribution pattern of reef fishes in the JBMP. However, this clearly demonstrates that there is spatial partitioning among the species of those families. The ubiquitous species, e.g. Western King Wrasse and McCulloch’s Scalyfin can be contrasted with those that are found mainly on the outer reefs (e.g. Southern Maori Wrasse and West Australian Puller) or the inner reefs (e.g. Brownfield’s Wrasse and Miller’s Damselfish).

Fig 1. Reef fish communities. Resource partitioning

Analysis of similarities. $p = 0.1\%$, Global $R$ statistic = 0.518

Labridae (27 spp.) $p = 0.1\%$, $R = 0.622$ Stress = 0.13

Pomacentridae (9 spp.) $p = 0.1\%$, $R = 0.472$ Stress = 0.14

Non-metric multidimensional scaling plots derived from the Bray-Curtis similarity matrix obtained using the mean densities of each species at each reef site.
Resource partitioning among the Labridae in the JBMP, and, in particular, the abundant Western King wrasse (WKW), Brown-spotted wrasse (BSW) and Southern Maori wrasse (SMW) is being investigated by Elaine Lek as part of her PhD. Preliminary results demonstrate that in terms of diets there is obvious overlap in what they consume, e.g. the presence of gastropods (Figure 2). However, the BSW can be regarded as a generalist, while WKW and SMW are relatively more specific. Resource partitioning among those three labrids is further demonstrated by the phase shift in the timing of their spawning periods, as demonstrated by their gonadosomatic indices. WKW spawn in autumn/early winter, BSW spawn in winter/early spring and SMW spawn in spring/summer. This shift helps the larvae and juveniles avoid competition with closely related and thus morphologically similar species at a critical time in their life.
The Feral Pig Problem

Peter Spencer

The forests in the Perth Hills and South West are the main problem areas for feral pigs. These pigs are causing major damage to flora and fauna. “In some cases it can look like a machine has gone through and ripped up the area when in fact it’s the pigs,” – according to Perth Hills acting District Manager for the Department of Environment and Conservation, Stefan de Haan. Recreational hunters are bringing the destructive animals in to the area to hunt for sport, sometimes including pregnant sows, and impeding attempts to cull feral pigs.

DNA sampling of pigs in the Perth area found they have the same genes as pigs as far away as Northampton – over 400 km away. Veterinary research student, Jordan Hampton, has used DNA technology for the first time to determine the genes of these feral pigs. Plans are being put in place by The Department of Environment and Conservation to use this DNA technology to track the illegal release of feral pigs into our National Parks, State Forests and reserves.

Dr. Peter Spencer from the School of Biological Sciences, a wildlife forensics researcher, has reported that there is very little vegetation between these two regions to support migration and it is highly unlikely that the feral pigs could roam this far and wide without food.

Two feral pigs were caught in the northern part of Gingin late last year weighing in at 180 kg (their normal weight being approximately 75-120 kg). It is expected that over 300 pigs will be trapped and shot over the summer and autumn period. More than $100,000 is being spent on feral pig control and the DEC regional nature conservation leader, Brad Barton, said that 300 pigs were destroyed last year but illegal dumping was not helping all the good work.

Statistics from the South-West, Mid-West and Kimberley show that the national pig population was between 13 million to 23 million. There were no firm estimates on the WA pig population as yet, but numbers in the South-West were rising. Pigs are not generally a threat to people but we need to be aware around feral pigs in the bush. There is also the problem of herds becoming established from escaped and released domestic pigs.

The Sporting Shooters Association of Australia is aiding the fight by providing DNA samples for research. They are aware of the illegal activity and are reporting offenders to the authorities. Fines for the illegal releasing of pigs on DEC land are $500 and interfering with trap sites can bring a fine of $2000.
Population viability analysis of the Perth metropolitan population of Little Penguins

Stuart Bradley, Ron Wooller, Belinda Cannell
Prof William Sherwin, Dr Jennifer Sinclair (UNSW)

Little Penguins in Perth Metropolitan waters are an important ecotourism and natural resource for WA. They breed on Penguin Island, an important regional tourist venue, and Garden Island, a major Department of Defence facility. They forage in waters heavily impacted by commercial and recreational vessels, and bounded by heavy industry. This project is using genetic, demographic and movement data to model the population and predict its viability in the face of a range of threats from human activities. The model will enable management strategies to be evaluated to secure the future of the population.

Nestboxes on Penguin Island are checked fortnightly to obtain information on various population parameters, including timing and success of breeding, body condition and mortality rates. The breeding season began unusually early in 2007, with first eggs laid in April. The latest eggs were laid in October. The overall success was above average, with 50% of fledglings raised from all the eggs laid (average 40%).

It is necessary to determine where the penguins travel and forage so we can ascertain the types of threats the penguins are potentially exposed to. In 2007, satellite tags were successfully deployed on 23 penguins. The penguins from Penguin Island generally foraged in the bays south of the island, but three penguins headed north. All the penguins from Garden Island foraged in Cockburn Sound.
It is also necessary to know the size of the population in order to predict the probability of its extinction. To answer this question, we are using a Mark-Release-Recapture program. Unmarked penguins are microchipped when encountered in nestboxes. Several times a year penguins are caught on the beaches as they return to the colony, and the proportion of unmarked birds is determined. Unmarked penguins are also microchipped on these occasions. 882 penguins have so far been microchipped, and the number of recaptures is increasing.
We will also use genetic information from the colonies in Perth, and some in the south west, to work out the rate of immigration and emigration between colonies and to help validate the estimates of the size of the population. Blood samples were collected from penguins on Penguin Island, three sites in the south west of W.A. and on Woody Island in the Recherche Archipelago. The samples from Penguin Island and the south west have so far been analysed. Preliminary statistics on population structure show that Penguin Island is significantly different from the south west. However, using a hypervariable section of the control region (HVRI) of the mitochondria, we did not find that Penguin Island was significantly divergent from the other WA populations. However, we so far have only a small number of samples for Muttonbird and Mistaken Islands. Increasing the number of samples will increase our chances of detecting any rare haplotypes and obtain a more accurate measure of population divergence.

Finally, we have recruited many volunteers to walk the majority of the foreshore from Woodman Point to Halls Head, looking for dead penguins. Autopsies were performed to determine cause of death if the carcasses were in good condition. In 2007, 29 penguin carcasses were found, 10 of these could be autopsied.

The joint project between Murdoch University and the University of NSW has been funded by the Australian Research Council Linkage Scheme, Department of Environment and Conservation, Fremantle Ports, Department of Defence, Tiwest and Winifred Violet Scott Estate Trust Fund.

Protecting wildlife from cats

Michael Calver

Wildlife biologists at Murdoch University have confirmed that commercially available CatBibs can help reduce the number of attacks on wildlife in WA by altering the hunting behaviour of cats.

Mike Calver, Associate Professor in Biological Sciences worked with 56 cat owners in Perth to find out whether CatBibs could reduce attacks by cats on wildlife.

The cats involved in the research had been identified by their owners as hunters and most came from the outer suburban foothills where cats have ready access to native bushland. Each pet spent a period of 3 weeks wearing the device and 3 weeks without it.

“The results revealed that the CatBibs stopped 81 per cent of cats from catching birds, 33 per cent from catching reptiles and frogs, and 45 per cent from catching mammals,” Associate Professor Calver said.
“Alone or in combination with a bell, these deterrent devices may lead to reductions of 50 per cent in the numbers of prey taken by pet cats and may stop some from hunting altogether”.

“They cause no significant cat welfare issues beyond the risk inherent in wearing a safety collar”.

Associate Professor Calver says that cat ownership is declining in Australia in contrast to the increasing popularity of pet cats in Europe and the United States.

“One reason for this could be that pet cats are bad for wildlife, and raise concern for the environment”.

“This is supported by the strong response for volunteers for this project”.

Worn by cats while they are outside the CatBibs are made of neoprene, which is a light, tear resistant fabric used in wetsuits. They attach to the collar via a hook and loop pads (Velcro) which release if the CatBib snags.

**Fish get health check-up**

A new study into the health of the Swan River Estuary will examine the river’s fish communities through a joint project between Murdoch University and state government agencies.

Murdoch University’s marine ecology experts Dr Fiona Valesini and Professor Ian Potter at the Centre for Fish and Fisheries Research will supervise the three-year project.

Dr Valesini said the $430,000 study will focus on fish communities as the main indicators of environmental health in the river and provide a cost-effective monitoring strategy for the future.

“While these approaches have been used successfully by managers of estuaries in North America and Europe this is the first time such a study has been undertaken for an estuary in Western Australia,” Dr Valesini said.

“The health of the stock of the iconic fish species Black Bream will also be examined as part of this study.”

The project will also focus on determining how large algal blooms may affect the movement of fish in the river and their survival rates.

The researchers will also investigate whether changes to the amounts and types of food available to fish in the river had impacted on their ability to survive.

The Swan River Trust, Department of Fisheries and the Department of Water will join Murdoch in the study as part of the Swan River Trust’s Healthy Rivers Program.

The study will use Murdoch University’s extensive archive of fish abundance data, collected by the Centre for Fish and Fisheries Research over the past 30 years, and new research. It will also try to relate findings back to changes in the water quality of the Swan River Estuary over that time.
Biodiversity field studies at Ningaloo Reef

Mike van Keulen

During September 2007, the biodiversity component of the CSIRO Wealth from Oceans Collaborative Cluster program for Ningaloo Reef got underway, with a two-week field trip that sampled the Coral Bay and Osprey regions of Ningaloo Reef. The biodiversity project validates and supplements the habitat mapping programme led by Halina Kobryn of the School of Environmental Science. Hyperspectral aerial photography flown in 2006 is being processed to produce high resolution habitat maps; these habitat maps will provide managers with an unprecedented level of information about the Ningaloo Marine Park’s marine ecosystems. With an estimated $30 million of research currently underway at Ningaloo Reef, this information will also be invaluable to researchers investigating ecological processes in different parts of the reef.

Pulling together researchers from Murdoch, CSIRO and the University of Queensland, a number of field techniques were trialled and valuable data collected on habitat classification at a number of study sites. An innovative approach to surveying the shallow benthic habitats of the Coral Bay region was the use of a commercial glass-bottomed boat. This enabled the team to survey large areas that were too shallow to sample by conventional means. Other surveys were undertaken by snorkel and were carried out at Five Finger Reef and Monck Head within the Coral Bay region, and Osprey Bay and Yardie Creek within the Osprey region.

In addition to the biodiversity studies, spectral signatures were collected from a range of marine organisms to inform the habitat maps being developed from the hyperspectral imagery. An underwater spectrometer was deployed to sample key benthic organisms that make up the dominant substrates within the study areas. This work has been on-going since the aerial photography was flown in 2006.

The field programmes will continue for another two years and will include taxonomic surveys of relatively understudied groups including algae and seagrasses, soft corals and sponges. Project participants include Murdoch University, CSIRO, the WA Museum and the University of Queensland.

Related to these studies is a new PhD project examining diversity of coral-microbial communities, being undertaken by international student Janja Ceh. The project is co-supervised by Mike van Keulen and Graham O’Hara both of the School of Biological Sciences & Biotechnology, and David Bourne of the Australian Institute of Marine Science in Townsville. Janja is in receipt of a WA Marine Science Institution top-up award to support her research.

Centre for Organic Waste Management

In 2007 COWM delivered successful research outcomes in a number of ways:

The EBCRC project on biological dechlorination of chlorinated solvents that contaminate the soil in Sydney’s Botany Bay has developed a microbiological process and a biochemical process that can completely dechlorinate this noxious substance by removing all 6 chlorine atoms. PhD student Donny James has demonstrated that dechlorination rates of up to 0.1 moles per m$^3$ are possible if suitable conditions are applied. Interestingly a particular vitamin was necessary to allow the bacteria obtained from waste water treatment plants to dechlorinate the solvent. The biochemical process involving the same vitamin has been submitted as a patent by Dr. Ralf Cord-Ruwisch and Dr. Matt Lee, resulting in the supporting company in Sydney to develop the process further and appoint Dr. Lee as the scientist.

The EBCRC project on conversion of municipal solid waste (MSW) into biogas and compost by a patented technology of Perth based company AnaeCo was successfully completed. The project documented that within a short time of 3 weeks the organic fraction of MSW could be stabilised by converting most of its
readily degradable, putrescent organics into biogas that can be used on site for electricity generation. Murdoch University’s experts (Dr. Wipa Charles, Lee Walker and Dr. Ralf Cord-Ruwisch) in this process will help test run a commercial scale DiCOM plant opening in Shenton Park in 2008.

COWM has been consulting for the Water Corporation and Alcoa in a number of projects that included the production of computer model simulations of microbial processes that occur within their operations. Such simulations of biological environmental processes are also being used in the teaching of science, to expose students to the usefulness of understanding bioreactions and being able to predict and control them for the benefit of the environment. The model simulations allow understanding and predicting emissions of pollutants and greenhouse gases into the atmosphere and aqueous environments.

Aside from the above mentioned biogas project, COWM has ongoing research on other biofuels, namely the production of bio-ethanol and of direct electricity using microbial fuel cells (MFC). MFC is a new and rapidly expanding bioprocess in which bacteria form biofilms on a cheap conductive material (such as graphite gravel) and transfer the energy (electrons) from organic pollutants to the graphite, from where it flows towards a suitable receiver. In the process electricity is generated. COWM is one out of less than a dozen world wide groups developing this technology, with PhD student Kayu Cheng a recipient for the Huber Prize of Technology.

A new patent on a novel biological waste water treatment process has been filed from the work of PhD student Leonie Hughes. This process promises to more effectively remove nutrients that would otherwise cause algal blooms in rivers and estuaries. In particular this process holds promise for applications where nutrients such as ammonia and phosphate are in high concentrations or where nitrous oxide emission must be minimised. At present Murdoch University is looking for industrial partners to commercialise this technology.

The patent on biocement production is being commercialised together with the Dutch company Deltares. This process can cement soft soils such as dykes, train embankments or unstable soils, by using local soil bacteria and get them to produce calcium carbonate (limestone) without the need of mechanically disrupting the soil. The first m³ block of biocement has been successfully produced in Holland.

**DNA fingerprinting at Saturn Biotech**

Saturn Biotech is situated in the SABC at Murdoch University and its current Managing Director is Adjunct Associate Professor Chris Florides. Saturn Biotech provides diagnostic genetic services and already has a client base of various creatures from the Perth Zoo, including endangered rhino’s, African painted dogs and some frog species. The company services are in increasing demand as DNA fingerprinting is becoming more and more popular amongst scientists as a weapon for protecting endangered species.

Some of the DNA fingerprinting with which Saturn has been involved with in the past year include tracking the origin of illegal bear-bile products in Vietnam, testing the fidelity of African painted dogs, testing frogs in Perth Zoo for the deadly amphibian chytrid fungus and investigating the genetic identity of the endangered Javan rhinoceros population. Frog species are decreasing due to the chytrid fungus. Two Australian species have already disappeared and 52% of the remaining species are threatened. Dr. Florides is working with the Perth Zoo to track the origin of the fungus and to help with a captive-breeding program for other threatened species around the world.

“When we look at how endangered a species is, among other things, we have to look at how genetically diverse individuals are within populations,” he said. “One of the traits of inbreeding is that mating does not produce viable progeny. As species get closer and closer to extinction, the gene pool becomes narrow and in most cases the species loses viability. There are species that cannot be saved because the gene pool has become too narrow and the population is suffering from inbreeding depression”.

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Another project that Saturn is involved in at present is the rehabilitation of the 3000-4000 moon bears held in farms for bile production in Vietnam. “The government in Vietnam has allowed the bears to be registered for bile production but is not issuing any new licences and has ordered that they be rehabilitated as soon as possible”, Dr. Florides said.

“So once these bears go, there will not be any more legal bile trade. But what is happening is that as these bears die they are being substituted with poached bears, which are being passed off as the licensed bear. “The plan is to DNA fingerprint all the licensed bears, so that any products intercepted and suspected to be illegal can be detected with a DNA test and their source revealed”.

Sedated Moon Bear.
Photo: Chai Yun

Taking hair samples for DNA extraction.
Photo: Chai Yun
Freshwater Sawfish Project

The Freshwater Fish Group welcomed a new Masters student, Jeff Whitty from the USA this year. Jeff, who is supervised by David Morgan, is involved in tracking (acoustic and satellite) Freshwater Sawfish and Northern River Sharks in the Kimberley. This work is funded by DEWHA under the Marine Species Recovery Programme and also involves Dean Thorburn (Murdoch University), Stirling Peverell (QLD DPI&F) and the Yiriman Rangers from Jarlmadangah. The sawfish project was aired on the ABC (Catalyst) in 2007. Transcripts and vision can be downloaded at:

http://www.abc.net.au/catalyst/stories/s2043601.htm

Another part of the project is examining the population genetics of Freshwater Sawfish across northern Australia, which is being undertaken by Nicole Phillips (PhD student) under the supervision of Jennie Chaplin and David Morgan. Nicole is also examining the population genetics of other sawfishes (see Genetics).

Travis Fazeldean has also joined the Freshwater Fish Group on a traineeship. Travis, also a Yiriman Ranger has been involved for a couple of years in our Kimberley research on sawfish.
CRC for National Plant Biosecurity News

There are three Biological Science Students on CRCNPB scholarships:

Ms Kylie Ireland (60033)
Mr Alex Rea (60042)
Mr Craig Webster (60043)

Two awards were won in 2007. The first being for CRCNPB PhD student Craig Webster who won an award for his oral presentation at the recent Australian Plant Pathology Society (WA Branch) postgraduate symposium, and the second for CRCNPB Education and Training Program Leader Dr Kirsty Bayliss for the CRC Association ‘Science In Action’ Expo – Winner of the Best Exhibitor Award - for increasing awareness and understanding of the relevance and benefits of scientific research.

International Collaborations

CRCNPB PhD Student Kylie Ireland travelled to the US to present her work on *Phytophthora ramorum*, a serious threat to Australia’s plant industries. Kylie spent a large part of her PhD in the US with the leading researchers working on this pathogen.

Workshops/training courses held

A number of BSB staff and students attended the CRCNPB Plant Biosecurity Awareness for Researchers workshop held in August. Several staff and students also attended the annual CRCNPB Science Exchange to present their work in November.
For the past 5 years we have been examining new and emerging pathogens threatening the biodiversity of Australia’s endemic eucalypts and the productivity of commercial plantations. This project is funded as an ARC Discovery and is in collaboration with Prof Mike Wingfield from the Forestry and Agriculture Biotechnology Institute in South Africa, Prof Daping Xu from the Research Institute for Tropical Forestry in China and Dr Thu from the Forestry Research Institute in Vietnam.

In the first 3 years of the project we monitored plantations in Asia and northern Australia and identified that the most serious and active pathogens in South-east Asia were *Kirramyces destructans* (causes severe leaf blight) and *K. zuluensis* (stem cankers on susceptible hosts). Molecular phylogenetic studies have established that *K. destructans* has been spread around the region on infected germplasm. Current research involved the establishment of trials with 25 species on endemic Australian tropical and sub-tropical eucalypt species in Vietnam and Thailand. The species are being screened for their resistance to *K. destructans* and *K. zuluensis*.

To date we have trained one PhD student (Vera Andjic) and produced 15 publications in international peer reviewed journals.
PUBLICATIONS

Book


Book Chapters


Research Papers (Refereed)


Craig M, Withers P & Bradshaw S (2007) Diet of *Ctenotus xenopleura* (Reptilia: Scincidae) in


Nandasena K, O’Hara G, Tiwari R, Sezmis E & Howieson J (2007) In situ lateral transfer of...
symbiosis islands results in rapid evolution of
diverse competitive strains of mesorhizobia
suboptimal in symbiotic nitrogen fixation on
the pasture legume Biserrula pelecinus L.
Environmental Microbiology 9(10), 2496-
2511.

Nandasena K, O’Hara G, Tiwari R, Willems A,
& Howieson G (2007) Mesorhizobium ciceri
biovar biserrulae, a novel biovar nodulating
the pasture legume Biserrula pelecinus L.
International Journal of Systematic and
Evolutionary Microbiology 57(5), 1041-1045.

Nichols P, Loi A, Nutt B, Evans P, Craig A,
Pengelly B, Dear B, Lloyd D, Revell C, Nair
R, Ewing M, Howieson J, Auricht G, Howie
J, Sandral G, Carr S, de Koning C, Hackney
E, Foster K, Skinner P, Barbetti M, & You M
(2007) New annual and short-lived perennial
pasture legumes for Australian agriculture-
15 years of research. Field Crops Research
104(1-3), 10-23.

Norman B & Stevens J (2007) Size and maturity
status of the whale shark Rhincodon typus at
Ningaloo Reef in Western Australia. Fisheries
Research 84(1), 81-86.

O’Keefe D, Berryman D, Coutts B & Jones R
(2007) Lack of seed coat contamination
with Cucumber Mosaic Virus in lupin permits
reliable, large-scale detection of seed
transmission in seed samples. Plant Disease
91(5), 504-508.

Publication and lectotypification of the name
Stenocarpus sinuatus (Proteaceae). Journal
of the Adelaide Botanic Garden 21, 85–87.

Paling E, van Keulen M & Tunbridge D (2007)
Seagrass transplanting in Cockburn Sound,
Western Australia: A comparison of manual
transplantation methodology using Posidonia
sinuosa Cambridge et Kuo. Restoration
Ecology 15(2), 240-249.

Comparisons between the influences of
habitat, body size and season on the dietary
composition of the spardin Acanthopagrus
Iatus in a large marine embayment.
Estuarine, Coastal and Shelf Science 72(4),
626-634.

biology of the Flesh-footed Shearwater
Puffinus carneipes on Woody Island, Western
Australia. Emu 107(4), 275-283.

Sanmee R, Dell B, Lumyong P & Lumyong
S (2007) First record of Tricholoma
fulvocastaneum from Thailand. Mycoscience
48(2), 131-133.

Saqib M, Smith B, Parrish J, Ramsdale R & Jones
M (2007) Phytoplasma-associated disease in
Allocasurina fraseriana and Acacia saligna in
Kings Park. Journal of the Royal Society of
WA 90, 175-178.

Setiawan A, Davis L, Darby J, Lokman P, Young
Effects of artificial social stimuli on the
reproductive schedule and hormone levels of
yellow-eyed penguins Megadyptes antipodes.
Hormones and Behavior 51(1), 46-53.

Spencer P, Cardoso M, How R, Williams J,
amplification at microsatellite loci in
Australian quolls including the description of
five new markers from the Chuditch
Dasyurus geoffroii. Molecular Ecology Notes
7(6), 1100-1103.

Strain L, Isdepsky A, Borowitzka M & Daume
S (2007) Three algal propagation methods
assessed to create a Rhodophyta diet for
juvenile greenlip abalone Haliotis laevigata in
the later nursery phase. Journal of Shellfish
Research 26(3), 737-744.

Stukely M, Crane C, McComb J & Bennett I
(2007) Field survival and growth of clonal,
macropropagated Eucalyptus marginata
selected for resistance to Phytophthora
cinnamomi. Forest Ecology and Management
238(1-3), 330-334.

Stukely M, Webster J, Ciampini J, Kerp N,
Colquhoun I, Dunstan W & Hardy G
(2007) A new homothallic Phytophthora
from the jarrah forest in Western


**Patents submitted**


**Conference Papers**


**Biological Sciences & Biotechnology**

Page 42


Cheng K, Cord-Ruwisch R & Ho G (2007) *Computer-controlled microbial fuel cell enables efficient electricity production by activated sludges*. 11th World Congress on
Anaerobic Digestion: Bioenergy for our Future, Brisbane 24-28 September, p 105.


Fordham J (2007) Lay Decision Makers and The CSI Effect, Speaker; Challenges to Justice: Case Studies from Around the World, Session Chair; Citizens & Experts, Session Chair, all at Joint Annual Meeting of the Law and Society Association and the Research Committee on Sociology of Law (International Sociological Association),Berlin 2007.


Grigg A, Craig M, Hobbs R, Garkaklis M, Grant C,

Hardy G (2007) *The dynamics and management of Phytophthora in the jarrah Eucalypt marginata forest of Western Australia.* In: 40th Brazilian Phytopathological Society Meeting, Maringa, Brazil 13-17 August 2007.


Hardy G (2007) *National Best Practice in the management of Phytophthora cinnamomi for biodiversity conservation in Australia.* In ‘4th IUFRO Phytophthoras in Forest & Natural Ecosystems’. Monterey, California USA.


PUBLICATIONS cont.....

and Plant Tissue Culture, KL. Malaysia, June 2007.


Tovar F, Burgess T, Robinson R & Hardy G (2007) Survey of fungi on Eucalyptus globulus coppice stumps in Western Australia. In ‘12th IUFRO Conference on Root and Butt Rots of Forest Trees’, Berkley (California) – Medford (Oregon), USA.


Walker R, Bräu L & Reeve W (2007) Quorum sensing in Sinorhizobium medicae and its role in nodulation and nitrogen fixation. 13th SUNFix Symposium, University of Sydney, NSW.


Technical Reports


Howieson J (2007) Technical issues relating to agricultural microbial genetic resources (AMiGRs), including their characteristics, utilization, preservation and distribution. Technical Review for the Genetic Resources.


Morgan D & Beatty S (2007) Freshwater fish and crayfish monitoring of the Angove River, Western Australia. Centre for Fish & Fisheries Research (Murdoch University) report to the Water Corporation of Western Australia.

Morgan D, Beatty S & McAleer F (2007) Canning River – freshwater fishes and barriers to migrations. Centre for Fish & Fisheries Research (Murdoch University), report to Department of Water and South East Regional Centre for Urban Landcare.


Workshops/Seminars


Cannell B (2007) Using satellite tags and human eyes to show that Little Penguins use Cockburn Sound, Warnbro Sound and Comet Bay. Biotelemetry Workshop, Curtin University, W.A.


**Magazine Article**


Dr Paul Drake measuring root respiration of blue gums using an open flow IRGA-based gas exchange system. The measurements are part of an investigation into carbohydrate mobilisation during early coppice regrowth being undertaken with CSIRO.

Photo: Dr Paul Drake
NEW RESEARCH GRANTS

Alcoa World Alumina Australia

- Plant nutritional status of residue disposal areas
  Researchers: Dell & Bell
  $18,840.25

- Effect of paclobutrazol on clonal dieback resistant jarrah
  Researcher: McComb
  Duration: 18 June 2007 – 30 June 2008
  $13,599.00

ARC Discovery Projects

- Ancient DNA as a tool to study Australia’s “Paleome”: exploring climatic change, past biodiversity, extinctions and long-term survival of DNA
  Researcher: Bunce
  Duration: 1 January 2007 - 31 December 2010
  $192,000.00

- Molecular dissection of resistance to subterranean clover mottle virus using Medicago truncatula
  Researcher: Jones
  Duration: 1 January 2007 - 31 December 2009
  $300,000.00

ARC Linkage Project & Alcoa World Alumina Australia

- Long-term survival of Phytophthora cinnamomi in black gravel soils on mining leases in the jarrah (Eucalyptus marginata) forest
  Researchers: Hardy, McComb & O’Brien
  Duration: 1 July 2007 – 30 June 2010
  $97,881.00

- Understanding successional processes to maintain vertebrate populations in production landscapes
  Researchers: Hobbs & Hardy
  Duration: 1 July 2008 - 30 June 2013
  $557,267.00

ARC Linkage Project & Dardin Agriculture Holdings Australia

- Combinatorial controlled gene expression delivering crops resistant to nematodes
  Researcher: Jones
  Duration: 1 July 2007 – 30 June 2010
  $314,990.00

ARC Linkage Project & New Pro Microculture

- Propagation of terrestrial orchids for cultivation and conservation using in vitro symbiotic germination and tuberisation
  Researcher: McComb & Dell
  Duration: 1 July 2007 – 30 June 2010
  $252,000.00

ARC Linkage Project & Department of Conservation and Land Management

- The nature, diversity and potential impact of infectious agents in Western Australian threatened mammals
  Researchers: Thompson, Lymbery, Clark & Spencer
  Duration: 1 January 2007 - 31 December 2009
  $555,354.00

ARC Linkage Infrastructure

- High Throughput orthogonal mass spectrometer for biotechnology research in WA
  Researcher: Jones
  Duration: 1 January 2007 - 31 December 2007
  $189,000.00

Australian Academy of Science Grants

- A Conservation Dilemma: The population and epidemiological dynamics associated with recent decline of woylies (Bettongia penicillata) in Australia
  Researcher: Spencer
  Duration: 1 January 2007 - 31 December 2008
  $8,500.00

Boddington Gold Mines Scheme

- Black Cockatoo Study
  Researcher: Calver
  Duration: 1 June 2007 – 30 April 2009
  $195,271.00
**Bowman Bishaw Gorham**  
Marine Plant Survey of the Maret Islands  
Researcher: Huisman  
Duration: 15 April 2007 – 26 April 2007  
$15,362.16

**Bunbury Port Authority; Cable Sands WA Pty Ltd; City of Bunbury Consultancy; Department of Conservation and Land Management Research Grants; Lyondell; WA Plantation Resources WAPRES Research Grants & Worsley Alumina Research Grant**  
An ecosystem approach to estimating the viability of bottlenose dolphin populations exposed to industrial port and tourism activities, south-west Australia  
Researchers: Bejder, Loneragan & Bradley  
20 April 2007  
$79,500.00

**Conservation International Foundation**  
Balancing artisanal fishing and conservation goals in a newly-established network of marine protected areas in Raja Ampat, Papua  
Researcher: Loneragan  
Duration: 1 October 2007 - 30 September 2010  
$60,000.00

**CRC for National Plant Biosecurity**  
Enhancing surveillance with remotely controlled aircraft to demonstrate freedom from EPPs over spatially large areas  
Researchers: Bayliss, Wagner  
Duration: 1 July 2007 – 30 September 2009  
$162,344.00

Classical and molecular taxonomy and pathogenicity testing of *Phytophthora* species  
Researchers: Burgess & Hardy  
Duration: 16 April 2007 – 15 April 2010  
$38,000.00

**CRC NPB Bacterial Diagnostics Project CRC20054**  
Researchers: Jones & Berryman  
Duration: 31 December 2007 - 31 December 2011  
$154,049.00

**Department of Agriculture and Food WA**  
Application of molecular technologies in wheat breeding  
Researchers: Cakir & Jones  
Duration: 1 July 2007 – 30 June 2008  
$95,302.00

**Department of Education, Science and Training**  
A National Postgraduate Curriculum in Plant Biosecurity  
Researcher: Bayliss  
Duration: 1 January 2007 – 28 February 2010  
$215,348.00

**Department of Environment and Conservation**  
Consultancy services for a dolphin monitoring program at Monkey Mia  
Researcher: Bejder  
Duration: 1 March 2007 – 1 October 2012  
$109,355.98

Resource availability and woylie declines in South-Western Australia  
Researchers: Bryant & Wilson  
Duration: 1 July 2007 – 30 June 2010  
$15,000.00

Resource availability and woylie declines in South-Western Australia  
Researchers: Bryant & Wilson
Relationships between habitat types and fish assemblages in Broke Inlet
Researchers: Potter & Valesini
Duration: 1 June 2007 - 31 December 2008
$18,227.00

**Department of Environment and Water Resources**

The marine benthic flora of the Great Barrier Reef (Rhodophyta)
Researcher: Huisman
Duration: 23 October 2007 – 30 June 2008
$52,365.00

**Department of Fisheries WA Research Grant**

Mitigation of bottlenose dolphin by-catch in the Pilbara Finfish Trawl Interim Managed Fishery
Researchers: Bejder & Loneragan
29 November 2007
$5,109.00

A genetic assessment of the relationships among the assemblages of the blue swimmer crab, *Portunus Pelagicus*, in Cockburn Sound, The Swan River estuary and Warnbro Sound
Researchers: Chaplin & Sezmis
Duration: 8 November 2007 – 1 May 2008
$32,413.00

Aquatic Fauna Survey - Hay and Denmark Rivers, and Warren and Donnelly Rivers
Researchers: Beatty & Morgan
Duration: 1 December 2007 - 1 December 2008
$46,210.50

**Department of Fisheries WA Research Grant; Department of Water & Swan River Trust Grants**

Development of biotic indices for establishing and monitoring estuarine health
Researchers: Potter & Valesini
Duration: 1 July 2007 – 30 June 2010
$382,168.00

**Department of Industry and Resources & NCRIS National Collaborative Research Infrastructure Strategy**

NCRIS 5.1 Genomics /Transcriptomics support for SABC staff member
Researcher: Jones
Duration: 1 June 2007 – 30 September 2011
$418,332.00

**Department of Water**

Assessing of fish migrations in the Harvey irrigation region and determination of the impact of irrigation check structures
Researchers: Beatty & Morgan
Duration: 1 May 2007 – 1 March 2009
$33,423.00

Migration patterns, habitat and water requirements of fish and invertebrates in the Blackwood River
Researchers: Beatty & Morgan
$199,750.00

Fish migration patterns in the Blackwood River – summer works
Researchers: Beatty & Morgan
$29,325.00

Restoring fish passage in the Canning River
Researchers: Beatty & Morgan
$13,756.20

**European Union**

European network on emerging diseases and invasive species threats to European Forest Ecosystems
Researcher: Burgess
Duration: 1 January 2007 - 31 December 2008
$12,000.00

**Geocatch**

Goldfish control in the Vasse River
Researchers: Beatty & Morgan
$7,015.00

**GRDC Research Grants**

Australian Winter Cereal Molecular Marker Component Project: genetic analysis and marker-trail linkages South and West
Researchers: Cakir & Jones
Duration: 1 July 2007 – 30 June 2008
$106,000.00
Law Society of WA Public Purposes Trust
Jury Intimidation
Researcher: Judith Fordham
Duration: 1 July 2007 - 30 June 2008
$98,500

Marsden Fund - Royal Society New Zealand
Relative Neighbours: ancient DNA and stable isotopes as windows into the genetic structure, microhabitat and environment of four sympatric species of moa (Aves: Dinornithiformes) in North Canterbury
Researcher: Bunce
Duration: 1 January 2007 - 31 December 2009
$77,980.00

Mineral Processing Control
The potential of Sodium Polysulphide in controlling Phytophthora cinnamomi
Researcher: Hardy
Duration: 1 January 2007 – 1 January 2008
$13,413.40

National Heritage Trust Grant
Potential role of vertebrate in the spread of weeds and other undesirable plants
Researcher: Calver
Duration: 1 July 2007 – 30 June 2008
$8,000.00

Kimberley Rivers - fish surveys
Researcher: Morgan
Duration: 14 July 2007 – 30 April 2008
$77,970.00

Native Vegetation Fund Grants Scheme
A review of the distribution of Phytophthora cinnamomi in regional South Australia
Researchers: Hardy, O’Brien & O’Gara
Duration: 1 April 2007 - 1 December 2007
$20,000.00

Natural Resource Management Board
Vertebrate pest management in the desert: feral camels
Researcher: Spencer
Duration: 1 October 2007 - 31 December 2011
$600,501.00

Peel Harvey Catchment Council
Impact of the Pinjarra weir to fish movement, Proposal to monitor fish movement above & below the weir
Researchers: Morgan & Beatty
Duration: 20-November 2007 – 1 January 2007
$7,624.50

Port Stephens Pearls
Impacts of Pearl Oysters aquaculture on Bottlenose Dolphins in Port Stephens, NSW
Researchers: Bejder, Loneragan & Allen
$22,468.00

Resources Engineering Pty Ltd
Biopleaching of stannite concentrate
Researcher: Cord-Ruwisch
Duration: 1 March 2007 - 1 November 2007
$12,000.00

Saturn Biotech Pty
Analysis and interpretation of genetic (AFLP) data
Researchers: Sezmis & Chaplin
Duration: 1 February 2007 – 28 February 2007
$5,341.05

South-West Catchment Council Research Grants
(i) Characterisation of fish usage of Yarragadee discharge based on water chemistry (ii) The salinity tolerance of fishes of the Blackwood River and predictions of population viabilities
Researchers: Beatty & Morgan
Duration: 1 March 2007 – 28 February 2009
$75,734.00

Fish migration patterns in the Blackwood River
Researchers: Beatty & Morgan
$59,814.00

Superseed Technologies Pty Ltd
Postgraduate Scholarship
Researchers: O’Hara, Howieson & Reeve
Duration: 1 May 2007 – 1 May 2010
$90,000.00
Swan Catchment Council

Classifying shallow water benthic habitats of the Swan River/Mapping the marine habitat of the Swan Region
Researcher: Valesini
Duration: 30 June 2007 – 30 June 2008
$189,794.00

United Exports

Low chill peach micropropagation
Researcher: McComb
$10,930.00

Western Australian Marine Science Institution

Dynamics of the ecosystems of three estuaries in south-western Australia
Researcher: Hall
Duration: 23 March 2007 – 22 March 2010
$33,000.00

Applying the ecosystem based fisheries management (EBFM) framework
Researcher: Loneragan
Duration: 1 June 2007 – 1 June 2010
$250,626.00

Trophic interactions and ecosystem modeling for Ecosystem Based Fisheries Management
Researchers: Loneragan & Hall
Duration: 1 July 2007 – 30 June 2010
$242,280.00

Development of bioregional level assessments of the status of community structure based on fishery dependent and/or fishery independent data
Researchers: Potter & Hall
Duration: 31 December 2007 – 30 June 2011
$281,611.00

Water Corporation Research Consultancy

Determining impact of Yarragadee Aquifer Nannup bore release on the ecology of the Blackwood River
Researchers: Beatty & Morgan
Duration: 14 August 2007 - 30 June 2008
$13,345.20

Monitoring the adequacy of environmental water provisions for fish and crayfish communities of Samson Brook, Harvey River and Harris River
Researchers: Beatty & Morgan
$35,351.00

Management of Aquatic fauna during remedial works at Phillips Creek Reservoir (Lowes Churchill and Associates)
Researchers: Beatty & Morgan
$9,171.00

Angove River fish survey
Researchers: Beatty & Morgan
$10,679.90

Wastewater characterisation to improve biological nutrient removal
Researchers: Cord-Ruwisch & Charles
Duration: 1 January 2007 – 30 September 2007
$35,662.00

Winifred Violet Scott Estate Fund

An ecosystem approach to evaluating the impacts of tourism and port activity on dolphins of south-western Australia
Researchers: Bejder & Loneragan
Duration: 1 July 2007 – 1 July 2011
$48,000.00
WORKSHOPS & TRAINING COURSES

Introduction to DNA Cloning, Sequencing and Analysis

A five day workshop, Introduction to DNA Cloning, Sequencing and Analysis was run in January 2007. Nine participants each obtained hands-on experience with preparing DNA from plasmids and cutting and pasting DNA, transferring plasmids into *E.coli*, amplifying DNA by polymerase chain reaction (PCR), and preparing DNA for sequencing and sequence analysis. The lectures were presented by Mr Rohan Lowe, Dr Andrew Mikoza, Dr Peter Solomon, Professor Mike Jones and Laboratory Demonstrators John Blinco, Mohammed Saqib and Rohan Lowe. On-line computer workshops were presented by Roberto Barerro and John Dunn from Centre for Bioinformatics and Biological Computing.

Protein Biotechnology for Medicine, Agriculture and Industry and Mass Spectrometry For Proteomics

Two separate, two day Proteomics workshops were held in September and November 2007 with nine participants. The workshop was running the most recent state-of-the-art instrumentation now available in the SABC. Dr Richard Lipscombe (Managing Director) and Dr Rob Lock (Senior Research Scientist) from Proteomics International presented a combination of hands-on experiments, lectures, on-line computer workshops and demonstrations. These workshops are suited to people working in various biologically related industries such as agriculture, the food industry, medicine, forensics, microbiology, biotechnology and veterinary science.

Professor Mike Jones, Muhammad Saqib and Ben Smith examining virus infected plants.
Photo: Brian Richards
POSTGRADUATE STUDENTS IN 2007

Postgraduate Degrees Completed

Anderson Nari PhD – Supervisors: O’Brien, I Colquhoun (Alcoa), Hardy
DNA methods for the detection of Phytophthora cinnamomi from soil

Archibald Robert PhD – Supervisors: Bowen, Hardy
Fire and the persistence of Tuart woodlands

Cosgrove Jeffrey PhD – Supervisor: Borowitzka
The use of Pulse-Amplitude-Modulated (PAM) fluorometry for the rapid assessment of primary production and ecophysiological status of phytoplankton in marine and estuarine environments

Dawson Linda PhD – Supervisors: Mead, Bentel
FLJ22318: A novel binding partner of the NKX3-1 Homeodomain protein in prostate cancer cells

Francis Anthony PhD – Supervisor: O’Brien
An integrated classical and molecular phylogenetic assessment of the sequestrate cortinarioid fungi with particular emphasis on application to the Australian assemblage

Gibbs Brenton PhD – Supervisor: Cord-Ruwisch
Factors leading to improved simultaneous nitrification and denitrification (SND) in sequencing batch reactors (SBR)

Manning Robert PhD – Supervisor: Dell
Fatty acid composition of pollen and the effect of two dominant fatty acids (Linoleic and Oleic) in pollen and flour diets on longevity and nutritional composition of honey bees Apis Mellifera

Newell Christopher PhD – Supervisors: McComb, Dell
In vitro soil-less (IVS) rooting medium

Pember Matthew PhD – Supervisor: Potter
Characteristics of fish communities in coastal waters of North-Western Australia, including the biology of the threadfin species Eleutheronema tetradactylum and Polydactylus macrochir

Wall Katrina Joy PhD – Supervisors: O’Hara, Toze
Action of autochthonous bacteria on the decay of enteric viruses in groundwater: the health aspects of water reuse via managed aquifer recharge

Continuing Postgraduate Students

Al-thawardi Salwa PhD – Supervisor: Cord-Ruwisch
Optimisation of biocementation by using urease active bacteria

Allen Mark PhD – Supervisors: Loneragan, Erdmann (Env Sci)
Balancing artisanal fishing and conservation goals in a newly-established network of marine protected areas in Raja Ampat, Papua

Andjic Vera PhD – Supervisors: Hardy, Burgess
The role of Phaeoleospora destructans, P. eppicocoides and P. eucalypti in plantation eucalypt diseases

Angel Sarah PhD – Supervisors: Bradley, A. Huggett (CSIRO)
Landscape genetics and population viability of declining avifauna in fragmented eucalypt woodlands of the West Australian wheatbelt

Armstead Rodney PhD – Supervisors: Hardy, Dell, M. Garkalis (CALM)
The impact of plant disease and cross disturbances on guilds of mammals in Southern Australian ecosystems

Austin Rebecca PhD – Supervisors: Bradley, C Hyde (Zoo)
An analysis of the genetic viability of long-term captive stocks for future restocking of wild populations

Bartron Claire PhD – Supervisor: Gill
A taxonomic revision of the elasmobranch family Rhinobatidae (Chondrichthyes: Rhinobatiformes)

Berryman Abby PhD – Supervisors: Wooler, Calver
Song sharing and repertoire change as indicators of social structure in the noisy scrub-bird

Blinco John PhD – Supervisors: Jones, Wylie
Engineering synthetic resistance to CMV and...
BYMV in legumes and other plant species  
Bridgwood Samantha PhD – Supervisors: van Keulen; M. Cambridge (UWA)  
Physical factors determining the structure of seagrass meadows in Warnbro Sound, Western Australia  

Cancilla Damien PhD – Supervisors: Hardy, M. Garkalis (CALM)  
Ecological aspects of *Pseudomys shortridgei* in southern Western Australia  

Ceh Janja PhD – Supervisors: van Keulen  
Microbial communities associated with reef-building corals of Ningaloo Reef in Western Australia  

Cheng Ka Yu PhD - Supervisor: Cord-Ruwisch, Ho  
Electrochemically catalysed hydrogen production from acetate in microbial fuel cells  

Chisholm Warren PhD – Supervisors: van Keulen, Verduin, Paling (Env Sci)  
The stability of shallow coastal sediments with and without seagrasses  

Chuwen Ben PhD – Supervisor: Potter  
Implications of environmental change and mortality estimates for sustaining fish populations in south coast Western Australian estuaries  

Coen Natasha PhD – Supervisors: Potter, Valesini  
Epifaunal assemblages of Western Australian estuaries  

Coulson Peter PhD – Supervisors: Potter, Hall  
Size and age compositions, growth and reproductive biology of the western blue groper and queen snapper on the south coast of Western Australia  

Cresswell Ian PhD – Supervisors: Dell, Bridgewater, Semeniuk  
Understanding and managing the Mangal and coastal saltmarsh zone in Australia  

Dell John MPhil – Supervisor: Calver  
Conservation Biology of ten species of Thornbills (family Acanthizidae) over three climatic zones in south-western Australia  

Eshraghi Leila PhD – Supervisors: O’Brien, McComb, Hardy  
The role of phosphite in inducing resistance to *Phytophthora cinnamomi* in *Arabidopsis thaliana*  

Farmer Bryn PhD – Supervisors: Hall, Chaplin  
The biology and population structure of mulloway *Argyrosomus japonicus* in Western Australia  

Fon Sing Sophie PhD – Supervisors: Borowitzka, Twomey  
Lipid production using microalgae  

Fretzer Sarah PhD – Supervisor: Hall  
Analysing the effects of anthropogenic activities on different aquatic ecosystems in Western Australia & identifying ecosystem-based management policies that provide long-term sustainability  

Gonzalez Gerding Macarena PhD – Supervisors: O’Hara, Bräu, Reeve & Howieson  
Molecular and ecological characterisation of *Lessertia spp.* root nodule bacteria  

Gill Reetinder PhD – Supervisor: Appels  
Genetic studies of male sterile facilitated recurrent selection in barley  

Grayson Jacqueline MPhil – Supervisor: Calver  
Domestic pet cats in suburban Western Australia: the possible impacts on bird species richness and the community’s response to cat legislation  

Hair Sam PhD – Supervisors: Borowitzka, S. Daume (Fisheries WA) N. Buller  
The role of bacteria in the nutrition of post-larval abalone (*Haliotis Laevigata*)  

Hallett Christopher PhD – Supervisors: Potter, Hall  
The development and validation of an estuarine health index using fish community characteristics  

Hans Rajat MPhil – Supervisors: Cord-Ruwisch, Ho  
Value addition to water sources by ion exchange treatment  

Hawkes Rebecca PhD – Supervisors: O’Hara, Plumb (CSIRO)  
The genus Ferroplasma: Species diversity, distribution and applications for biomining  

Hill Yvette PhD – Supervisors: O’Hara, E. Watkin (CUT), K. Dixon
Investigation of symbiotic associations of the legume species and potential for use in the rehabilitation of excavated sites within the Shark Bay salt operational area, Useless Loop, Western Australia

Hourston Mathew PhD – Supervisors: Potter, Valesini
Meiofauna of Western Australian estuaries

Hughes Leonie PhD – Supervisor: Cord-Ruwisch
Advanced biological nitrogen removal by using a twin biofilm reactor system comprising storage driven denitrification and nitrification

Hughes Leonie PhD – Supervisor: Cord-Ruwisch
Meiofauna of Western Australian estuaries

Ireland Kylie PhD – Supervisors: Hardy, Huberli, Dell
Susceptibility of Australian plants to Phytophthora ramorum, an emerging potential threat to Australian plant industries and ecosystems

Jackson Gary PhD – Supervisors: Potter, Hall, R. Lenanton (Fisheries WA)
Fisheries biology and management of pink snapper, Pagrus auratus, in the inner gulfs of Shark Bay, Western Australia

Jackson Kelsie PhD – Supervisor: Loneragan
Developing ecosystem models of Jurien Bay, Western Australia: A comparison of modelling approaches and model uses

Jackson Sarah PhD – Supervisors: Hardy, Dell
Mycosphaerella leaf disease on eucalypts in Western Australia

James Donny PhD – Supervisors: Cord-Ruwisch, O’Hara, Lee
Microbial reductive dechlorination of Hexa-Chloro-Butadiene in the presence of organic electron mediators

Jardine Nathan PhD – Supervisors: Hardy, O’Brien
Is phoshide accumulation necessary for the induction of protection against Phytophthora cinnamomi?

Jones Ashlee PhD – Supervisor: Potter
Biology of elasmobranchs on the lower west coast of Australia

Jones Barbara PhD – Supervisors: Bradley, Calver
Field Study of the Western Ringtail Possum

King Michaela PhD – Supervisors: Hardy, McComb, O’Brien, Reeve
Genomic analysis of phospide responsive genes from Phytophthora cinnamomi

Kurscheid Sebastian PhD – Supervisors: M. Bellgard (DArts)
Identification of novel tick antigens

Lee William PhD – Supervisors: Tiwari, Reeve, O’Hara
Investigating mechanisms of stationary phase stress tolerance in Sinorhizobium

Lek Elaine PhD – Supervisors: Potter, Fairclough
Biology of three species of wrasses in Jurien Bay Marine Park

Lever Mitchell PhD - Supervisor: Cord-Ruwisch, Ho
An environmentally sustainable process for the production of fuel ethanol from lignocellulosic waste.

Linke Thea PhD – Supervisor: Potter
The benthic macroinvertebrate fauna and food webs of two divergent estuaries on the south coast of Western Australia

Liu Shuie PhD – Supervisors: Jones, Dell
Expression of reporter genes in feeding cells induced by root-knot nematode

Loo Hui Ping PhD – Supervisors: Jones, G. Dwyer (AgWA)
Molecular studies of Ascochyta blight disease in chickpea (Cicer arietinum)

Maker Garth PhD – Supervisor: Cake
Regulation of surfactant production by fetal type II pneumocytes and the characterization of fibroblast-pneumocyte factor

Marshall Karen PhD – Supervisor: Cake
Enzymatic mechanisms involved in the partitioning of fatty acids into either catabolic or anabolic processes

McAleer Fiona PhD – Supervisors: Gill, Morgan, Beatty
Influence of surface & groundwater on the fish & crayfish fauna of the Blackwood River
McCluskey Shannon PhD – Supervisors: Loneragan, Bejder
Foraging ecology and diet of bottlenose dolphins (*Tursiops spp.*) in Southwestern Australia

McGregor Kenneth PhD – Supervisors: van Keulen, Twomey
The trophic ecology & habitat requirements of the manta ray (*Manta birostris*) in lagoonal systems of Ningaloo Reef, Western Australia

Mifka Helen PhD – Supervisors: O’Hara, Reeve, Tiwari
Genetic instability in *Rhizobium leguminosarum*

Moore Glenn PhD – Supervisors: Chaplin, Potter
Phylogeography of marine fish species of the genus *arripis* with sympatric and allopatric breeding populations in Australian waters

Mortimer Sheila -Jones PhD – Supervisors: M. Jones, R.Jones, G. Dwyer (AgWA)
Localisation and quantification of potato viruses in leaf and tuber tissues of *solanum tuberosum*

Murphy Marie PhD – Supervisors: Hardy, Dell, M. Garkalis (CALM)
The role of native caching mammals in the recruitment and regeneration of Sandalwood (*Santalum spicatum*) in Western Australia

Ninawi Elmi PhD – Supervisors: Reeve, O’Hara
Symbiotic protein secretion systems of *Sinorhizobium medicae* WSM419

Nutt Brad PhD – Supervisors: McComb, Howieson
Breeding for hard seeded yellow *Seradella*

O’Neill Sally PhD – Supervisor: Calver
Short Ecology of the pale field rat *Rattus tunneyi* in semi-arid Western Australia

Oliver Keith PhD – Supervisors: Bradley, Greene (DHS)
The role of transposable genetic elements in the process of evolution

Phillips Nicole PhD – Supervisor: Chaplin
Conservation genetics of *Pristis* species in Australian waters

Ratanasanobon Kanokwan PhD – Supervisor: M. Jones
Tissue culture and transformation of grain legumes

Rea Alex PhD – Supervisors: Hardy & O’Brien
Classical & molecular taxonomy & pathogenicity testing of *Phytophthora* species

Rodda Kerry PhD – Supervisors: Bryant, Wilson
Food resources & woylie declines in south-western Australia

Rowland Andrew PhD – Supervisors: Gill, Mackie
The biology and ecology of Samson fish (*Seriola hippos*), with emphasis on the sportfishery targeting deepwater spawning aggregations west of Rottnest Island.

Sakalidis Monique PhD – Supervisor: Burgess
Hardy investigation and analysis of taxonomic irregularities within the fungal genus *Botryosphaeria*

Saqib Muhammad PhD – Supervisor: M. Jones
Viruses of leguminous plants: New viruses and molecular studies on resistance using *Medicago truncatula*

Shaw Jeremy PhD – Supervisors: Macey, L. Brooker (USC) P. Clode (UWA)
Biomineralization in the radula teeth of chitons

Shepherd Lachlan PhD – Supervisor: Cord-Ruwisch
Biological nutrient removal via simultaneous nitrification and denitrification in membrane biological reactors.

Scott Peter PhD – Supervisors: Hardy, B. Shearer (CALM)
Root and basal rots of *Eucalyptus gomphocephela* (Tuart)

Sing Sophie PhD – Supervisors: Borowtizka, Twomey
Lipid production using microalgae

Singh Meenu PhD – Supervisor: Jones
Production of recombinant antigens against jembrana disease virus in plants to control jembrana disease and study their immunogenic response

Smith Holly PhD – Supervisors: Bejder, Bradley
Population dynamics and habitat utilisation in bottlenose dolphins, Bunbury, Western
Australia

So Thea PhD – Supervisor: Dell, Ruthrof
Inoculation of seeds with beneficial organisms for improving success in forest restoration

Stasikowski Patsy PhD – Supervisors: Hardy, O’Brien, McComb
An investigation into the mechanism of action of phosphite on the defence system of Arabidopsis thaliana when challenged by Phytophthora cinnamomi

Strain Lachlan PhD – Supervisors: Borowitzka, S. Daume (Fisheries WA)
Algae for the nutrition of abalone

Swift Rebecca PhD – Supervisors: Bräu, Hardy, McComb
Plant growth promoting rhizobacteria and its ability to improve agricultural crop productivity

Taylor Katherine PhD – Supervisors: Burgess, Hardy, Barber
A detailed study of Mycosphaerella Cryptica and M. Nubilosa in Western Australia, focusing on impact to native remnants

Terpollili Jason PhD – Supervisors: O’Hara, Howieson, Reeve, Tiwari
Investigating the regulation of nitrogen fixation in the symbiosis between Sinorhizobium melloti and the pasture legume Medicago

Tian Tina PhD – Supervisors: Reeve, Tiwari
Characterisation of the role of the acid activated lpiA genetic circuit in Sinorhizobium medicae WSM419

Toon Natalie PhD – Supervisor: Loneragan, Gill
Catchability of western rock lobster (Panulirus cygnus); the influence of temperature, light intensity, lobster size, moult stage and commercial fishing apparatus

Tovar Francisco PhD – Supervisors: Hardy, Burgess
The cause of basal stem rot in second rotation Eucalyptus globulus plantations

Travers Michael PhD – Supervisor: Potter
Fish communities in offshore waters of the

Kimberley

Tucker Graeme PhD – Supervisors: Mead, Cake, Berryman
Clarify and explore the significance of Adrenocorticotropic hormone (ACTH) and Pro-opiomelanocortin (POMC) in the disease Neuroblastoma

Tweedley James PhD – Supervisors: Valesini, Potter, Hoeksema
The relationship between habitat types & faunal community structure & trophic linkages in the Broke inlet, Western Australia

von Eckstaedt Sebastian Vitzhum PhD - Supervisor: Cord-Ruwisch
Ordour control.

Wakefield Corey PhD – Supervisors: Hall, Potter, R. Lenanton (Dept Fisheries WA)
Biology and stock assessment of the commercially and recreationally important pink snapper (Pagrus auratus) in marine waters on the central, lower and south coasts of Australia

Walker Lee PhD – Supervisor: Cord-Ruwisch
Optimisation and modelling of the DICOM process, a hybrid reactor for the conversion of solid wastes into biogas and compost

Webala Paul PhD – Supervisor: Bradley
Bat community structure & habitat use across disturbance regimes, south-western Australia

Webb Jason PhD – Supervisor: Borowitzka
Fluorescence, photosynthesis and calcification in coccolithophorids

Webster Craig PhD – Supervisor: Jones
Microarrays for plant virus diagnosis

Webster Fiona PhD – Supervisors: van Keulen, Babcock (CSIRO)
The effect of algae, herbivores and nutrients on the settlement and survival of corals

Wentzel Kobus PhD – Supervisors: Hardy, T. Fleming (DHS)
The impact of tuart (Eucalyptus gomphocephala DC) decline on fauna diversity
POSTGRADUATE STUDENTS cont.....

White Nicole PhD – Supervisor: Spencer
Molecular ecology, conservation, management and protection of black-cockatoos in the south-west of Australia

Whitty Jeff MPhil – Supervisor: Morgan
Seasonal movements & habitat utilisation of Pristis microdon & Glyphis sp. C

Whyte Gilbert PhD – Supervisors: Hardy, Burgess
Fungal pathogens threatening the sub-tropical plantation industry in Australia

Wildsmith Michelle PhD – Supervisors: Potter, Valesini, Babcock (CSIRO)
The benthic macroinvertebrates of Western Australian estuaries, with particular reference to the effects of eutrophication

Winzer Andrew PhD – Supervisor: Gill
The biology and prevalence of Cirolana hesperia and their effect on the western rocklobster fishery

Woodward Eleanor PhD – Supervisors: Mead, P. Hart (Telethon Institute)
IL-4 signalling in human monocytes and macrophages

Yates Ronald PhD – Supervisors: O’Hara, Howieson
The role of root nodule bacteria in the utilisation of exotic perennial legumes in southern Australia and Uruguay

Zhang Jing Juan PhD – Supervisors: Appels, Dell
Improving drought tolerance of bread wheat using genetic and bioinformatics tools
HONOURS STUDENTS 2007

Completed in 2007

Balagopal Vijay - Supervisor: Mead
Androgens and the WNT pathway:
Critical regulators of prostate cancer cell proliferation.

Bivoltsis Alexia - Supervisor: Fairclough
A baited video study of the fish faunas in the main habitat types and management zones of the Jurien Bay Marine Park.

Creese Sonja – Supervisor: Bowen
A Comparative Dietary Analysis of the Black-flanked Rock-wallaby (Petrogale lateralis lateralis), Euro (Macropus robustus) and Feral Goat (Capra hircus) in Cape Range National Park, Exmouth, Western Australia.

Deanasen Aneesha - Supervisor: Mead
The role of genetic variation on chromosome 3p in the control of bone mineral density.

Foong En - Supervisor: Mead
Cloning and expression of GPR30 and examination for protein interactors with its C-terminal tail.

Gilovitz Chid - Supervisor: Hardy
Resistance of Lambertia taxa to Phytophthora cinnamomi.

Giustiniano Danielle - Supervisor: Spencer
Population dynamics of camels in the arid and semi arid rangelands.

Gulliver Rosalind - Supervisor: Mead
The role of Kinin receptors in the migration of mature monocyte-derived dendritic cells.

Haddad Christina - Supervisor: O’Hara
Characteristics of Novel Acidophilic Microorganisms isolated from acidic terrestrial environments.

Kaur Rasvinder - Supervisor: Lock
Proteomic Analysis of Venom.

Kehoe Monica - Supervisors: Jones/R Jones (DAFWA)
Evaluation of the responses of three different mustard species to inoculation with Turnip Mosaic Virus (TUMV).

Langdon Mark - Supervisor: van Keulen
The role of sea urchin grazing in Seagrass meadow decline at Luscombe Bay, Western Australia.

Looi Kevin - Supervisors: Mead/S Devadason
Defining the optimal inhalation technique for delivery of therapeutic aerosols to young children: Development of an ex vivo method.

Ng En Nee - Supervisor: Mead
Effect of the interaction between glutathione-S-transferase polymorphisms and environmental tobacco smoke exposure on asthma and atopy in a cohort of asthmatic children.

Nowicki Anna - Supervisors: Bryant/P de Tores
Analysis of capture data: a case study using Program MARK for analysis of brushtail possum trapping data and its relevance to conservation management of the western ringtail possum.

Puglisi Benjamin - Supervisor: Loneragan
Protected species bycatch in the South Coast purse seine fishery.

Ramsdale Rachel - Supervisor: Mead
Androgen regulation of breast cancer cell proliferation role of INK4 inhibitors.

Riddington John - Supervisor: Gill
The mitochondrial DNA sequence of Geotria australis and Mordacia mordax: phylogeny and the establishment of a lamprey consensus gene order.

Ryan Catherine Mary – Supervisors: McComb/M Panaia
Invitro propagation of Lomandra species.

Sommerville Emma – Supervisor: Potter
Food partitioning by four elasmobranch species in the coastal waters of south-western Australia.
Sykes Leon Peter - Supervisor: J Allen
Analysis of the effects of Hepatitis C virus structural proteins on host response.

Taylor Catherine - Supervisor: Calver
The likely role of free-ranging birds (both native and exotic) as vectors of weed and other nuisance plant seed dispersal in Western Australia.

Tink Calais Jayne - Supervisor: Hesp
Developing and testing of a new model for estimating natural mortality in fishes.

Then Zhi Yue - Supervisor: Berryman
Detection of PCR Amplicon contamination in Forensic DNA samples using quantitative Real-Time Polymerase Chain Reaction (qPCR).

Zhang Priscilla Min - Supervisors: Mead/J Bentel
The role of p27 in the androgen responsiveness of breast cancer cells.

Whelan Barbara - Supervisor: Chaplin
The extinction of the Thylacine: Quantifying the effects of competition, hunting, disease and habitat alteration.

Wong Yan - Supervisor: Mead
Polymorphisms in cytokine genes (TGFβ and HGF) controlling epithelial - mesenchymal transition and risk of post-transplant obliterative bronchiolitis (OB).

Yeo Ai - Supervisor: Mead
Elucidation of optimal inspiratory flows for delivery of dry powder aerosols to children.

Yu Chih - Supervisor: Cord-Ruwisch
Bio-leaching of Stannite.

Continuing Honours

Annese Teresa - Supervisor: Mead
Respiratory factors affecting lung deposition of therapeutic aerosols in young children.

Bisley Jacquline - Supervisor: Mead
Regulation of inflammation by SOCS1 in activated human monocytes and macrophages.

Candy Patrick - Supervisors: Reeve/C Jones
Functional and comparative analysis of the genome of Sinorhizobium medicae WSM429.

Cottingham Alan - Supervisors: Hesp/Potter
An assessment of the current state of the stock of black bream in the Swan River.

Crisafuli Brett - Supervisors: Hesp/Potter
Biology of two species of mullet in estuaries on the South Coast of Western Australia.

Ellison Shane Alan – Supervisor: Cake
The effect of neuregulin-1β on phosphatidylcholine synthesis and secretion in the developing lung.

Fleyfel Ibrahim - Supervisor: Mead
Altering the cellular tropism of the Hepatitis C virus and targeted.

Gardner Michelle - Supervisors: Chaplin/Potter/Berryman
Comparison of the genetics and biology of restocked vs native black bream Acanthopagrus butcheri, in the Blackwood River Estuary.

Howe Chris - Supervisors: Archibald/Craig/Hardy/Burgess
Ground-dwelling vertebrate communities in remnant vegetation within Bluegum plantations.

Law Ying Yu – Supervisor: Cord-Ruwisch
Ammonium Facilitated Biochemical Fuel Cell.

Lock Peta - Supervisor: Nandasena
Identify the symbiotic properties of Australian Mesorhizobium.

Mapondera Tendai - Supervisors: Matsuki/Burgess
Population genetics of Gonipterus scutellatus.

McLay Emma - Supervisor: Bunce
DNA extraction and quantitation of
Biological samples - focusing on forensic seizures.

Moody Kate - Supervisor - Florides
A Method to identify subterranean clover varieties based on protein profiles using orthogonal, time of flight mass spectrometry.

Nice Penelope - Supervisor: Fleming
Oligospermia and Azoospermia in non-reproductive male Damaraland mole-rats Cryptomys damarensis.

Parkinson Liza - Supervisors: Mead/R Graham
Characterisation of a novel gene in (Tfr2)-associated haemochromatosis.

Rodwell Tracey - Supervisors: Hesp/Potter
Biology of King George Whiting in estuaries on the south coast of Western Australia.

Walker Robert - Supervisors: Reeve/Bräu
Quorum sensing in Sinorhizobium medicae.

Wang Cuiping - Supervisors: G Dwyer (DAFWA), R Jones (DAFWA)
Genome sequence characterisation of wheat streak mosaic virus.

Rhiannon Curry - Laboratory Technician, assisting Honours student Aneesha Deanasen. Photo: Maria Waters
VISITING RESEARCHERS & OCCUPATIONAL TRAINEES

Visiting Occupational Trainees

**Liang Cheng** visited Murdoch University to work on an aspect of ongoing “biocementation” research, in collaboration with Dr. Ralf Cord-Ruwisch for a period of 12 months. The object of his visit was the exchange expertise on microbial calcite formation; exploring new applications of calcite formation and optimising urease production (the enzyme needed for calcite formation). Cheng Liang is enrolled as a PhD student at the Southeast University, China.

**Ms Nathalie Long**, a visiting occupational trainee from University of Montpellier, France to undertake, with Professor Dell, a literature review of impact of abiotic stress on *Phytophthora* dieback; supervised glasshouse experiment on the effect of water logging on gas exchange on *Banksia* and infection by *Phytophthora*; write up scientific report on the experiment and assist in the field work on *Phytophthora* dieback on the south coast of WA.

**Mr Bruno Miguel Curado Pais**, from Portugal, accepted an appointment to examine clonal variation in growth and lipid production in a strain of the microalga *Tetraselmis*. He also worked on developing a culture regime for this alga in a Biocoil-type tubular photobioreactor to compare growth in the closed photobioreactor system with outdoor raceway systems.

**Alois Schhiessl**, was here as a Visiting Occupational Trainee from the University of Natural Resources and Applied Life Sciences, Vienna, Austria. Alois was proposed by Associate Professor Bob Mead and Chris Florides.

**Ms Julia Sgonina**, from Anhalt University of technology, Köthen, Germany worked with PhD student Sophie Fon Sing on the effects of salinity on the growth, lipid productivity and fatty acid composition of selected strains of saline microalgae with potential for biofuels production. Cultures were grown both in the laboratory and in outdoor raceways. Julia also participated in the isolation and characterisation of new algae strains.

Visiting Researchers

**Mr Naif Al-Harbi**, is a visiting researcher doing research on *Dunaliella* culture and carotenogenesis and attending a training course on algal biotechnology.

**Mr Simon Allen**, a Visiting Research Fellow until December 2008. Mr Allen was proposed by Professor N Loneragan, Dr G O’Hara and Dr L Bejder. Mr Allen is to write-up and publish papers on research undertaken with Lars Bejder and to assist in the establishment of Murdoch University as a centre for marine mammal research.

**Associate Professor Yanfei Cai** is a Visiting Research Scientist from the Department of Soil Science College of Resource & Environment, South China Agriculture University Guangzhou, China. Yanfei was proposed by Professors Dell and Hardy to undertake joint research. Yanfei Cai is self-funded.

**Dr. Giovanni Garau**, from Italy, is a visiting research scientist in the Centre for Rhizobium Studies. During his stay he will undertake research with Professor Howieson and Dr. Graham O’Hara in comparative studies into the genomes of *Sinorhizobium medicae* and *Sinorhizobium meliloti* in relation to their response to legume host and acid soil stress.

**Mr Martin Bay Hebsgaard** is visiting this School from the University of Copenhagen, Denmark. During this period Martin will be undertaking research on the isolation, characterization and analysis of ancient DNA from extinct species together with Dr. Michael Bunce.
Ms Ton Nu My Nga, of the University of Nha Trang, Vietnam is intending to spend her time in Professor Michael Borowitzka’s laboratory learning techniques of algae isolation and culture and participating in algae studies of culture, especially of species used in aquaculture.

Ms Phakpen Poomipant, from the Department of Soil Science, Kasetsart University, Thailand, is a visiting Research Scientist with Professor Bernie Dell for 1 year from November 2007. She will undertake collaborative research on beneficial soil-inhabiting fungi for sustainable crop production.

Ms Montathip Sommeechai, from Faculty of Forestry, Kasetsant University, Thailand and funded by the ATSE Crawford Fund, undertook research with Prof Bernie Dell and Dr Paul Barber in tree management, becoming familiar with methods for the assessment of tree health. She also gained experience in the use of gas exchange and pressure bomb equipment for the measurement of tree water stress and photosynthesis in the greenhouse and in the field. She also viewed rural tree health problems and discussed management options with workers in the area. She joined the team of pathologists and physiologists working on aspects of tree decline in south Western Australia.

Mr Leon Van Paasen, visited here very briefly in 2007 as a Visiting Research Associate enrolled as a PhD student at the University of Technology, Delft, Netherlands. Leon is visiting Murdoch University to work on biocementation for a period of 3 months. His research activities are in collaboration with Dr. Ralf Cord-Ruwisch and GeoDelft, a Dutch Company.

Ms Jumnian Wongmo, from Thailand, was here as a visiting research scientist. Ms Wongmo undertook research on mineral nutrition of upland field crops of Northern Thailand in collaboration with Professor Bernie Dell.
PERSONNEL

Professors
M. Borowitzka, BSc Syd., PhD Syd., FAICD Dip.
J. Bradley, BSc Liv., PhD Liv.
B. Dell, BSc W.Aust., PhD W.Aust.
M. Jones, BA Camb., MA Camb., PhD Camb.
N. Loneragan, BSc W.Aust., BSc Murd., PhD Murd.
P. Rogers, BSc W.Aust., BSc Murd., MBA W.Aust.

Research Professors
J. Howieson, BSc W.Aust., MSc W.Aust., PhD W.Aust.
I. Potter, BA Oxford, PhD NSW, FAIBiol, FTSE, FZS.

Emeritus Professors
P. Carnegie, BSc StAnd., PhD Aberd.
J. McComb, BSc W.Aust., PhD W.Aust., FIAAST, FTSE.
R. Wooller, CertEd S'ton., BA York(UK), PhD Durh.

Associate Professors
M. Cake, BSc W.Aust., PhD W.Aust.
M. Calver, BSc Murd., PhD Murd., DipEd Murd.
J. Fordham, BSc LLB ANU FAICD.
G. Hardy, BSc W.Aust., PhD W.Aust.
D. Macey, BSc Bath., PhD Murd.
R. Mead, BSc W.Aust., PhD W.Aust.
B. Wilson BSc LaTrobe, MSc LaTrobe, PhD Deakin, DipEd LaTrobe.

Senior Lecturers
R. Cord-Ruwisch, MSc Freib., PhD Aix-Marseille/.
H. Gill, BSc Liv., PhD Murd.
P. O'Brien, BSc NUI, PhD NUI.
G. O'Hara, BSc W.Aust., PhD Nott.
P. Spencer, BSc JCU, PhD JamesCook.
R. Tiwari, BSc Meerut, MSc GBP, PhD GBP.
M. van Keulen, BSc Murd., PhD Murd.

Lecturers
B. Bowen, BSc W.Aust., PhD W.Aust.
K. Bryant, BSc Murd., PhD Murd.
M. Bunce, BSc Lincoln, PhD ANU.
J. Chaplin, BSc Qld., PhD W'gong.
C. Jones, BSc W.Aust.

W. Reeve, BSc Murd., PhD Murd.
F. Valesini, BSc Murd., PhD Murd.

Associate Lecturer
L. Bräu, BSc W. Aust., PhD W. Aust.

Postdoctoral Fellows, Senior Research Fellows, Research Leadership Fellows and Research Associates
S. Allen, MSc Macq.
P. Barber, BSc LaTrobe, PhD LaTrobe.
K. Bayliss, BSc(Hort.) W. Aust., PhD W. Aust.
S. Beatty, BSc Murd., PhD Murd.
L. Bejder, BSc Odense, MSc Otago, PhD Dalhousie.
M. Cakir, BSc Ege., MSc Ege., PhD Sth Dakota.
B. Cannell, BSc Murd., PhD Monash.
W.Charles, PhD, Murd.
D. Close, BagSci. UTas, PhD UTas.
M. Craig, BSc W.Aust; PhD W.Aust.
P. Drake, BSc JamesCook., PhD ECU.
W. Dunstan, BSc Murd., PhD Murd.
D. Fairclough, BBus Curtin., BSc Murd., PhD Murd.
H. Finn, BA Oberlin, PhD Murd.
J. Fosu-Nyarko, BSc Ghana., PhD Murd.
S. Gupta, BSc Kuru., MSc Kuru, PhD PAU.
A. Hesp, BSc Murd., PhD Murd.
S. Hoeksema, BSc Murd., PhD Murd.
D. Hüberli, BSc Murd., PhD Murd.
J. Huisman, BSc Melb., PhD Melb.
M. King, BSc Curtin., PhD Murd.
M. Lee, BSc LaTrobe., PhD Adel.
D. Li, BSc UWA.
S. Metcalf, BSc Melb., PhD Tas.
D. Morgan, BSc Murd., PhD Murd.
K. Nandasena, BSc Murd., PhD Murd.
E. O’Gara, BA ANU, GradDipApplSci CharlesSturt, PhD Murd.
M. Panaia, PhD UWA.
M. Perera, BSc Kuban., PhD MTAA.
K. Ruthrof, BSc Murd., PhD W. Aust.
J. Verduin, BSc Wales, M.Phil Wales, PhD W. Aust.
N. Williams, BAGSc Adelaide, PhD Murd.
S. Wylie, BSc Otago, PhD Murd.
Z. Wang, MEd HebeiTch, PhD Murd.

Professional Officers, Technical Officers & Research Assistants
J. Box, BSc Natal Pmb.
R. Carr, BSc Murd.
M. Dobrowliski, BSc UWA. PhD Murd.
F. Drake-Brockman, BSc Murd.
J. Ellery BSc Murd.
A. Hewison BSc Murd.
D. Hodgson, BSc UWA.
P. Hollick, BSc Murd., PhD Murd.
K. Howard BSc Murd., PhD Murd.
S. Jackson, BSc Murd.
J. Lawrence, BSc Murd.
V. Limadinata, BSc Murd.
T. Paap, BSc Murd., PhD Murd.
R. Swift, BSc Murd.
A. Vivas-Marfisi BSc Caracas, PhD Murd.
E. Walker, BSc Murd.
S. Westcott, BSc Murd.
D. White, Dip. Murd.

Technical Staff
L. Atherton, Laboratory Assistant.
F. Brigg, SABC Technical Officer BSc W.Aust.
M. Buttery, BSc Murd., PhD Murd. Technician.
R. Curry, BSc Murd., Technician.
M. Dawson, Senior Technician.
R. Ho, BEng. Curtin. Laboratory Assistant.
J. Kettle, Laboratory Assistant.
R. Loxley, BSc Murd., BAppSc Curtin, Senior
Technician.
I. McKernan, BSc Murd, Technician.
J. Minetto, Glasshouse Assistant.
N. Moheimani, PhD Murd.
C. Mueller, BSc JamesCook, Senior Technician.
D. O’Mahony, BAppSc Curtin, Lab Technician.
K. Ridgway, B AppSci (Biology) UTS.
J. Ryan, Technician.
K. Tan, BSc W.Aust Laboratory Assistant.
M. Taylor, Laboratory Technician.
G. Thomson, BSc Curtin, Professional Officer.
M. Turner, Senior Technician.

Adjunct Professors
D. Bird, BSc Adel., PhD Adel.
K. Gregg, BSc Qld., PhD Qld.
R. Jones, BA Camb., MA Camb., PhD StAnd.
R. Lance, BSc W Aust., PhD Washington State.
C. Li, PhD Adel., MSc Zheijag.
P. Loh, DipHort Sing., MBA Dubuque, PhD Nott.
S. Sharma, BSc Delhi., MSc IARI., PhD IARI.

General/Administrative
I. Abraham, BSc W.Aust., PhD W.Aust.
N. Adams, Secretary.
D. Berryman, Manager SABC BSc Murd., PhD Monash.
C. Hubbard, Secretary.
N. Kennedy, Administrative Assistant.
L. Lendrum, Secretary.
A. Tongue, Office Manager HND Leeds.
R. Treadgold, School Manager.
M. Waters, School Administrative Officer.

Adjunct Associate Professors
J. Bentel, BSc NSW., PhD NSW.
N. Bougher, BSc W.Aust., PhD W.Aust.
M. Byrne, BSc W.Aust., PhD W.Aust.
D. Coates, BSc W.Aust., PhD W.Aust.
P. DiMarco, BSc W.Aust., PhD W.Aust.
C. Florides, BSc Wales, CPAg.
M. Francki, BSc Adel., PhD Adel.
A. George, BA W.Aust.
R. Lenanton, BSc W.Aust., MSc W.Aust., PhD Murd.
D. Lunney, MSc Sydney.
P. Madsen, BSc Aarhus., MSc Aarhus., PhD Aarhus.
J. Prince, BSc Murd., PhD Tas.
B. Shearer, BSc W.Aust, PhD Minnesota.
J. Short, BSc Sydney, MSc Sydney, PhD Murd.
G. Turbett, BSc UWA., PhD UWA.
K. Smettem, BSc UWA., PhD Sheff.
M. Wahlberg, M.Sc Goteborg, Ph.D South
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