ANNUAL RESEARCH ACTIVITY REPORT

July 2003 – June 2004

Science Division

Discovering the nature of WA
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Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

EXTERNAL PARTNERSHIPS

Biological component

Partnership Name	**Project - i.e. CRC, Govt Depts, Universities, Industries, Other (sponsorships etc)**	**Involvement ($)**	**Involvement (in kind)**
ABRS	Taxonomy of Stylidium: 1 Scientist	$72k for 3 yrs	Curatorial (0.05)
ABRS	Taxonomy of Baeckea: 1 Scientist	$36k for 3 yrs	B Rye (0.5), Curatorial (0.05)
ABRS	Taxonomy of Asteraceae: 1 Scientist	$20k	Curatorial (0.05)
Alcoa	Diversity in Dieback Resistant Jarrah (DRJ) clones	$13k	M Byrne (0.1)
ANU	Pilbara biological survey groundwater mapping, ostracod identification and shell chemistry as habitat indicator, Prof P De Deckker, Dr J Reeves	CALM contribution $50k	S Halse (0.05)
ANZEC / CRC for Australian Weed Management	Technical Group for weeds of conservation significance	Nil	G Keighery (0.05)
Assessment of the emission of dioxins from bushfire activity in Australia	Work is being conducted as part of Environment Australia's National Dioxins Program, co-ordinated through CSIRO Division of Atmospheric Research.	$10k funding made available from Environment Australia to cover costs of sampling emissions from bushfires in south-west WA	L McCaw, R Smith, J Neal; Total 0.3 FTE pa. Other collaborators include National Research Centre for Environmental Toxicology and University of Melbourne.
Bushfires CRC	Managing fires in forest landscapes SW Australia	$40k pa over 7 yrs 2003-10 contributed by CALM. $94k for next 4 yrs to fund PhD	L McCaw (0.4), R Robinson (0.2), J Farr (0.2), B Ward (0.2), G Liddelow (0.2), B Smith (0.2), J Neal (0.2), F Metcalfe (0.2), Li Shu (0.2), R Smith (0.1) (2.1 FTE pa)
Chevron-Texaco	Monitoring mammals on Barrow Island	$6k pa for 5 yrs	K Morris (0.05), A Burbidge (0.05)
CMAE / AGWA/ Gascoyne Murchison Project	Gascoyne Murchison Strategy	2002-03 - $180k 2003-04 - $150k	K Tinley (1.0), J Richardson (0.6), G Burke (0.5), J Richardson (1.0) for 25 days
CRC for Greenhouse Accounting	Project A2 Developing carbon accounting systems		R McKellar (0.1), 1.3 FTE
CRC for Plant Based Management of Dryland Salinity	Biodiversity Program Project - Management of weed and genetic risk in perennial landuse systems	$756 200 over 4 yrs (2004-2008)	M Byrne, M Lyons, S Halse, N Gibson
Dampier Salt	Pilbara biological survey	20 airfares Perth – Karratha - Return	S van Leeuwen
Dept of Environment (Cwth)	AVH: Australia's Virtual Herbarium: 2 databasers, curator	$96k for 5 yrs	A Chapman (0.05), Database (3.0)
Dept of Industry and Resources – Pilbara Iron Environment Committee	Pilbara biological bibliographical database	$6k for 2004 ($4k committed for 2005)	S van Leeuwen (0.01), Paul Gioia (0.01)
Dept of Planning & Infrastructure	SWALE: Surveying WA's Land Edge: 1 Scientist	$20k for 2 yrs	N Lander (0.05), R Davis (0.05),
Dept of Planning & Infrastructure	MPP: Marine Plants Project: 1 curator	$24,750 plus 2004/2005	C Parker (0.2), Database (1.0)
Dept of Premier and Cabinet	Bushplan	$100k for 2003-04	A Hopkins (1.0)

Partnership Name	**Project - i.e. CRC, Govt Depts, Universities, Industries, Other (sponsorships etc)**	**Involvement ($)**	**Involvement (in kind)**
Netherlands Institute for Sea Research (NIOZ)	Benthic studies – Roebuck Bay, NHT + Wettenhall – Roebuck Bay book	$27k	G Pearson (0.15)
Netherlands Institute for Sea Research (NIOZ)	PhD – T Compton	$5k from Stipend funds (CALM)	G Pearson (0.05)
Newmont Australia and Gindalbie Gold NL	Genetic structure in the Priority One Species Genus sp. Yalgoo (JM Ward s.n. 11/7/1999)	$26k	D Coates (0.05), M Byrne (0.05), B Macdonald (0.05)
NHT	Western bristlebird research plan	$99 387	AH Burbidge (0.1), J Rolfe (0.05)
NHT	Western ground parrot recovery	$150k	AH Burbidge (0.1), B Barrett (1.0)
NHT	Pilbara biological survey, especially stygofauna	$273k	S Halse (0.8)
NHT	Regional assessment of the conservation status of vegetation units throughout WA (Beard)	$31 525	A Hopkins (0.1)
NHT	Review and update of Ramsar Information Sheets for WA	$6900	S Elscot (0.2), J Lane (0.05)
NHT	Nomination and improved documentation of nationally important wetlands in under-represented IBRA regions in WA	$70k for 2003-05	S Elscot (0.25), G Pearson (0.1), A Clarke (0.2), J Lane (0.15)
NHT2	Dibbler recovery program	$40 500	T Friend (0.1)
NHT2	Gilbert's potoroo recovery program	$73k	T Friend (0.75)
Nickol Bay Naturalists' Club (funded by Woodside)	Botanical survey of selected Dampier Archipelago islands	$5k	S van Leeuwen (0.2)
Nickol Bay Naturalists' Club (WWF/NHT funded)	Conserving Pilbara olive pythons on the Burrup Peninsula	$ 2k (CALM); $ 3k (TSN)	D Pearson (0.1)
PEST Animal Control CRC	Honours project: Fox re-invasion rates	Nil	N Marlow (0.05)
Portman Iron Ore and Botanical Gardens and Parks Authority	An integrated research program focused on practical outcomes for the *in-situ* and *ex-situ* conservation, restoration and translocation of the DRF *Tetratheca paynterae* (Tremandaceae)	$101k pa for 2004, 2005 and 2006	C Yates (0.4) D Coates (0.05)
Project Vesta – behaviour of summer fires in dry eucalypt forests	Collaborative fire research with CSIRO Forestry and Forest Products, with funding support from Australasian Fire Authorities Council.	$ 1 054k over 8 yrs 1995-03. Project completed July 2003. However ongoing finalization of project until end 2003	L McCaw (0.1), R Smith, J Neal
Robe River Iron Associates (West Angelas Coondewanna West Envion Offsets)	Botanical survey of Tussock Grassland communities in the Pilbara biogeographical region	$20k for 2003	S van Leeuwen (0.2), B Bromilow (0.2)
Robe River Iron Associates (West Angelas Coondewanna West Environmental Offsets)	Fire-Mulga study: post burn monitoring	$20k pa 2002-05 $103k 2006-2011	S van Leeuwen (0.1), T Start (0.05), B Bromilow (0.1)

Future direction(s)
Data analysis will consist of comparing the structure of stands across sites and seeking patterns and relationships with fire and grazing history. Importantly, the analysis will seek to identify obstructions to recruitment that could be attributed to fire or to grazing or to both. A brief paper will be written in the next 12 months and submitted to the *Journal of the Royal Society of Western Australia*.

CALM Region
Kimberley.

IBRA Region
Victoria Bonaparte.

Directory of important wetlands in Australia: revised editions

SPP # 1999/0014

Team members
J Lane (0.15), G Pearson (0.1), A Clarke (0.2), S Elscot (0.25); Total (0.7).

Aim
To prepare revised editions of the Western Australian Chapter of *A Directory of Important Wetlands in Australia* (Environment Australia 2001), incorporating additional wetlands and information. To periodically update the national database of Directory wetlands.

Summary of progress and main findings
- Funding was provided from Environment Australia's Natural Heritage Trust National Funding Program in May 2003 for CALM to undertake work leading to the nomination and improved documentation of nationally important wetlands in under-represented IBRA regions of the State.
- Representation of Western Australian wetlands in the Directory has been reviewed.
- Attention is now being focused on IBRA regions with few listed sites. Wetland literature relating to these regions and sites has been collated and is being analysed.
- This literature, specialist knowledge and existing biophysical maps, photographs and satellite images is being used to plan a program of wetland data and knowledge acquisition. The Nullarbor and Ord Victoria Plains IBRA regions are being focused on initially.

Management implications
- Literature search and field survey results will lead to identification of nationally important wetlands, values and threats and provide a basis for conservation and wise use management of these wetlands.

Future direction(s)
- Site managers and others with substantial relevant knowledge will be contacted and site visits and surveys conducted to collect field data and other information to support site listings.
- Specimens will be identified, data analysed and information synthesized.
- Descriptions of proposed new sites for the Directory will be prepared, together with enhanced descriptions of existing sites.
- The Western Australian component of the national Directory will be updated in 2005 to include these new sites and enhanced site descriptions.

CALM Region(s)
Kimberley, Pilbara, Goldfields, Midwest, South Coast, Wheatbelt.

IBRA Region(s)
Main focus is on Central Ranges, Coolgardie, Gibson Desert, Great Victoria Desert, Hampton, Little Sandy Desert, Mallee, Nullarbor, Ord Victoria Plains, Tanami, Yalgoo.

Management implications
- Advice provided to regulatory authorities on the likely impacts of mining developments on mulga woodlands.

Future direction(s)
- Complete botanical identifications and commence floristic analysis.
- Re-sample the 70 km of line transect and analyse change in community structure that has occurred as a consequence of fire.
- Prepare manuscript on the floristic differentiation between Mulga woodland communities within the Hamersley Range.
- Ongoing sorting on invertebrate samples and commence identification of ants.
- Refurbish permanent inventory sites and undertake a sampling session.
- Ongoing liaise with Ecosystem Research Group, School of Plant Biology, and the University of Western Australia over preparation of manuscripts for 'Pilbara Disturbance Ecology' book.

CALM Region
Pilbara.

IBRA Region
Pilbara.

Monitoring of Carnac and Penguin Island Silver gull populations
SPP # 1999/0012

Team members
J Lane (0.05); other CALM collaborator D Coughran; Total (0.05).

Aim
To monitor trends in the numbers of breeding pairs of Silver Gulls *Larus novaehollandiae* on Carnac and Penguin Islands, as an indicator of the effectiveness of CALM's Perth metropolitan area gull management plan.

Summary of progress and main findings
Numbers of gulls on low-level, oblique, aerial photographs of Carnac and Penguin Islands taken in May 2003 were counted. Trends in gull numbers on these 2 islands over the 10 yrs since 1994 were determined. There was a strong decreasing trend on Penguin Island and a significant overall decrease in numbers on the 2 islands combined. No further surveys are planned for several years.

Management implications
- The decline in Silver Gull numbers on Penguin and Carnac Islands suggests that efforts to reduce gull access to artificial food sources and thereby limit gull numbers in the greater Perth metropolitan area are having the desired effect. It is possible, however, that other factors have caused or contributed to the observed decline. Further consideration of the survey results and related information is required before firm conclusions can be reached.

Future direction(s)
A report on trends in annual gull numbers on Carnac and Penguin Islands during the period 1994-2003 will be prepared. This report will contribute to a Departmental review of Silver Gull management in the greater Perth Metropolitan Area.

CALM Region
Swan.

IBRA Region
Swan Coastal Plain.

State Salinity Strategy wetland monitoring

SPP # 1998/0018

Team members
Fauna - S Halse (0.1), D Cale (0.5), M Pennifold, (0.2), R Dodds (0.1); Flora - M Lyons (0.4), N Gibson (0.05), D Mickel (0.5); Surface water - J Lane (0.35), G Pearson (0.1), A Clarke (0.6),), S Elscot (0.1), Y Winchcombe (0.3), B Johnson (0.05); Groundwater - S Halse (0.05), contracts; Total (3.3).

Aim
To monitor changes in biodiversity, surface water quantity and quality, and groundwater levels at selected Wheatbelt wetlands in relation to increasing dryland salinity and land-use changes.

Summary of progress and main findings
- Fauna monitoring – results from commencement of program in 1997 to April 2001 summarized in paper submitted to *Conservation Science Western Australia*. Monitoring for 2002-03 completed.
- Surface water monitoring – 2003 monitoring completed; database corrections and update completed; analyses of 1978-2000 depth and salinity data from 151 wetlands completed, compilation of draft 1978-2000 report well advanced.
- Wetland bathymetry – field surveys of lake bed, shoreline, inflow and outflow contours of Lakes Gore, Quallilup, Shark, Mears and major part of Yenyenning lakes completed, and maps and depth-volume calculators prepared. Field surveys of Lakes Taarblin (north section), Ardath, Wallambin North and Campion completed. Mappingog yenyenning Gore, Quallilup, Shark and Mears Lakes completed.
- Publicity – filmed Post Cards WA segment on faunal aspects of monitoring program was to be screened in June 2003.
- Vegetation monitoring for 2003/04 completed, collaboration began with CRC for Plant based Management of Dryland Salinity on detailed measures of soil and plant vigour.
- Ground water monitoring for 2003/04 completed, data logger installation completed, groundwater bores surveyed into vegetation transects.
- Paper on 5 yrs monitoring of vegetation monitoring in the Lake Muir-Unicup wetland system submitted.
- Management – contributed to Bryde, Buntine-Marchagee, Drummond, Muir, and Toolibin TAGs and provided advice to Warden Biodiversity Recovery Catchment, advised on biodiversity aspects of drainage issues in the wheatbelt.

Management implications
- Analyses of trends in depths and salinities of 41 wetlands monitored for 20 or more years have revealed several wetlands undergoing diverse changes that warrant further investigation and possibly corrective management.
- Evidence is growing that several waterbird species have been lost from wheatbelt wetlands over the past 20 yrs as a result of salinization and will not return unless salinities decrease and riparian and emergent vegetation is re-established.
- Surface water management is as important in some wheatbelt wetlands (such as Coomalbidgup Swamp) as groundwater management in maintaining wetland health and greater focus on surface water is required.
- Annual changes in wetland conditions as a result of drought or high-rainfall events affect the use of wetlands by invertebrates, waterbirds and plants. Wetland condition cannot be easily assessed without understanding where a wetland is in the hydrological cycle and having information on its capacity to recover from perturbation (such as extreme flood events), which is often determined by the frequency of recent perturbations.

Future direction(s)
- Continue monitoring according to current protocols.

- Reports on trends in depth, salinity and acidity/alkalinity of monitored wetlands from 1978-2000 to be completed.
- Investigations into causes of changes in depths and/or salinities of several monitored wetlands to be initiated.
- Bathymetric maps of Lakes Taarblin (north section), Ardath, Wallambin North and Campion to be completed. Further bathymetric surveys to be undertaken.
- Monitoring bores to be surveyed to depth gauges.
- Analyse groundwater trends are 1 or 2 wetland areas as a case study showing value of monitoring.

CALM Region(s)
Midwest, South Coast, Wheatbelt, South West, Swan, Warren.

IBRA Region(s)
Avon Wheatbelt, Esperance Plains, Geraldton Sandplains, Jarrah Forest, Mallee.

Impacts of Dawesville channel on Peel-Harvey Estuary waterbirds

SPP # 1999/0016

Team members
J Lane (0.35), G Pearson (0.05), A Clarke (0.05), Y Winchcombe (0.05); Total (0.5).

Aim
To assess the impacts of the Dawesville Channel (completed in April 1994) on waterbird populations of Peel-Harvey Estuary.

Summary of progress and main findings
- Substantial progress was made in preparation of a report comparing the results of 1970s and 1990s surveys of waterbirds on Peel-Harvey Estuary. An extensive review of relevant ornithological literature was undertaken so that changes in abundance can be considered in broader contexts of species' life histories, changes in distributions and population abundance, etc.

Management implications
- Management implications will be assessed on completion of the 1970s to 1990s 'comparisons' report.

Future direction(s)
- The 'comparisons' report, comparing results of pre- and post-Dawesville Channel waterbird surveys will be completed.

CALM Region
Swan.

IBRA Region
Swan Coastal Plain.

Management of the Vasse - Wonnerup wetlands

SPP # 1999/0017

Team members
J Lane (0.1), Y Winchcombe (0.05), G Pearson (0.05); Total (0.2).

Aim
To undertake monitoring programs that will enable impacts of water level and salinity management regimes of Vasse-Wonnerup Ramsar Site to be assessed. The principal issues of interest in this project are impacts on waterbird populations, fringing plant communities and the occurrence of mass fish deaths.

Summary of progress and main findings

- A report on waterbird surveys undertaken between 1998 and 2001 has not been prepared, due to priority being given to other work. The fringing vegetation monitoring plots established in 2000 have not been revisited, due to priority being given to other work by the District.
- Monitoring of water levels in the Vasse and Wonnerup estuaries has been rationalized, by reducing the number of data loggers, relocating them to easy access points and having a locally-based officer download the data. Conversion (to Australian Height Datum) and graphing of data has been brought up-to-date during 2003-04.
- Monitoring of fish activity and water levels at the floodgates was undertaken during 2003-04, initially by team staff and later (February 2004 onwards) by contractors to the Water Corporation during replacement of the floodgates. The Vasse estuary floodgates were opened on several occasions to maintain the target, summer-autumn, water level and to allow fish to pass.
- A meeting of the inter-agency Vasse Estuary Technical Working Group were convened to decide arrangements for summer opening of the sandbar at the wetland system mouth; for water level, water quality and fish monitoring, and for floodgate openings to release fish and manage water levels. The VETWG also provided technical advice to the Water Corporation regarding environmental aspects of replacement of the floodgates during 2003-04.
- The Team leader provided ongoing advice to the Water Corporation and its contractors concerning management of water levels and fish during replacement of the floodgates (January-June 2004).
- Advice was supplied in response to public queries about management of the wetland system and places to see waterbirds. Scientific advice was provided to the Busselton Shire concerning its proposal to establish a Busselton Wetlands Interpretive Centre and associated wetland experiences.

Management implications

- Water levels and flows were successfully managed throughout summer-autumn of 2003-04. There were no mass fish deaths, and adverse impacts on waterbird populations and fringing plant communities that would result from excessive water levels and salinities were avoided.

Future direction(s)

- A concise report will be prepared, recording water levels, floodgate openings, fish releases and fish death incidents in the Vasse-Wonnerup system since the Dec 1997 report of Lane, Hardcastle, Tregonning & Holtfreter.
- Monitoring of water levels and fish activity during summer will continue. Gates will be opened as necessary to manage water levels and release fish. The VETWG will be convened as necessary.
- Further technical advice will be provided if needed concerning operation of the replacement (2004) floodgates from an environmental perspective. Public enquiries concerning management of the wetlands will be responded to.

CALM Region
South West.

IBRA Region
Swan Coastal Plain**.**

The impact of wildfire, in old growth forest of the Walpole-Nornalup National Park, on short-range endemic invertebrates and their forest floor communities

SPP # 2003/03

Team members
I Abbott (0.02), A Mellican (0.02), P Van Heurck (0.5); regional staff - E Middleton; Walpole-Nornalup Parks Association & Walpole community volunteers; Total (0.54).

Aim
To inventory the differences in species compositions of the arthropod litter communities containing short