An inventory of Inland Aquatic Research in Western Australia

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Western Australia

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AN INVENTORY OF INLAND AQUATIC RESEARCH IN WESTERN AUSTRALIA

edited for

The Inland Aquatic Group of Western Australia

by

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INTRODUCTION

Water related research in Western Australia has expanded steadily over the past decade. The quantity of this research and its origins from a diversity of laboratories have made it difficult for researchers to keep in touch. Previous reviews of available literature and information on wetlands of Western Australia have helped to overcome this disadvantage. Smith's (1975) review was part of a nation-wide assessment of Australian wetlands. This was followed by an inventory from the Department of Conservation and Environment (Chiffings, 1977) and was subsequently updated by Brown (1979). However, these excluded information on estuarine research and a separate document was produced to meet this need. (Hodgkin, E. and Majer, K. 1976. "An index to ecological information on estuaries and marine embayments in Western Australia" CSIRO Division of Fisheries and Oceanography. Report No. 70). Due to the recent proliferation of research in all of these areas, these publications need to be updated.

The formation of an Inland Aquatic Group in September 1982 has allowed people working in water-related research to be more aware of the types of research, including estuarine projects, that are currently underway. The group meets bi-monthly for informal presentations and discussions of work-in-progress. One of the initial aims of this group was to produce a current inventory of all inland aquatic research in Western Australia, which would be a useful guide for researchers not only in Western Australia but throughout Australia.

Scope and use of this inventory

This inventory attempts to present all information available up to October 1983, related to inland waters of Western Australia. Research on chemical, physical and biological aspects in all types of inland lentic and lotic systems are included. Details from the Department of Conservation and Environment inventory (Brown, 1979) have been updated or deleted where applicable.

The inventory is arranged into two sections. The first section deals with current research projects, listed alphabetically by Institution. The separate entry for each project includes the major institution involved, a list of the chief researcher (underlined) and co-workers, a brief resume of the project, the expected duration and the numbers of references on the subject in the bibliography. A subject index containing the names of people and their respective institutions precedes the research entries. The second section contains the current published and unpublished information on water-related research in Western Australia. A subject index to the bibliography is also included. An index to the localities of research activity was not included in this inventory. Anyone wishing to find the localities of many wetland areas can refer to the index and maps in Brown (1979) or contact the research group concerned.

Every effort has been made to contact all people involved in inland aquatic research in Western Australia. However, it is inevitable that in the production of this inventory some omissions have occurred and apologies are offered for any oversights. If you are involved in, or know of, other projects and/or references on water-related research in Western Australia, please forward the information to the address below. Your help will facilitate future updates of this inventory.

ATTENTION: DR JENNY ARNOLD

The Director

Department of Conservation and Environment

BP House

1 Mount Street

PERTH WA 6000

ACKNOWLEDGEMENTS

We wish to thank the following people for their help with the production of this inventory. Peter Davies helped collate the initial material and searched for references. Jenny Arnold, Jenny Davis and Don Edward proof-read the final version and provided comments. Special thanks must go to Sue Masiero for completing the arduous task on the word processor.

The Department of Zoology, University of Western Australia provided the services of their word processor. This and the financial support from the Department of Conservation and Environment and the Waterways Commission are gratefully acknowledged. Dr Jenny Arnold (DCE), Dr Rob Atkins (WC) and Dr Don Edward (UWA) are thanked for the organization of these funds.

Finally, we wish to thank the people who submitted information on their research and particularly, those who have contributed to the success of the Western Australian Inland Aquatic Group.

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CURRENT RESEARCH PROJECTS

Margaret Brock

School of Environmental
and Life Sciences,
Murdoch University

The ecology of hydrophytes in saline wetlands of Western Australia.

1. To catalogue the diversity and distribution of hydrophytes in saline lakes in W.A.

2. To relocate Ruppia tuberosa in its type locality and assess its distribution in W.A.

3. To assess the biotic diversity and community composition in fresh and saline, temporary and permanent wetlands, including in particular three wetland reserves in the Woodanilling Shire.

4. To assess the life cycle patterns, stability of growth form, germination requirements and tolerance of salinity and drying of species of Ruppia, Lepilaena and Lamprothamnium.

5. To estimate the effect of grazing of waterfowl on beds of hydrophytes and hence the role of hydrophyte species as bird food.

Duration: 1980-1984

References: 104, 105, 316, 351

Ms Pippa Chrystal
Professor I.C. Potter
Mr Martin Holtz

School of Environmental
and Life Sciences,
Murdoch University

The ecology of benthic fishes and crustacea of the Swan Estuary

This study is examining the way in which bottom-dwelling fish and crustaceans utilize the offshore regions of the Swan-Avon estuary. Otter trawls and gill nets are being used to sample regularly during the day and night at different depths of the lower and middle estuary. Salinity, temperature and oxygen readings are taken throughout the water column. Particular attention is being given to the feeding, reproduction, growth and aging of flathead (Platycephalus endrachtensis), flounder (Pseudorhombus jenynsii), blowfish (Torquigener pleurogramma) and gobbleguts (Apogon rueppellii).

Duration: 1st year of 2 years

References: 363, 364, 510-512

Howard Gill

School of Environmental
and Life Sciences,
Murdoch University

The biology of gobies in the Swan-Avon river system

The current study will use beach seines, gill nets and otter trawls to collect samples of the five species of gobies found in the Swan-Avon estuary.

Emphasis will be placed on elucidating the age structure and growth of each species using length-frequency and otolith data. Attention will also be focussed on establishing in which region of the estuary each species is found and also the type of preferred habitat. Detailed feeding studies will be carried out to ascertain whether the diets of sympatric species overlap. Regular sampling during the night and day, allied with tagging, will help elucidate patterns of seasonal and diurnal movement. Monthly collections of gonad weights and examinations of histological sections of testes and ovaries will enable the time and place of spawning to be determined. These field studies will be supplemented by laboratory investigations which will provide the gobies with alternative substrates and food supplies.

Duration: 4½-5 years, including writing up

References:

Goen Ho
Peter Newman
Bill Parker
Kuruvilla Mathew
Beth Earnshaw
Tony Ford
Michelle Miller

School of Environmental and Life Sciences, Murdoch University

Water management using the soil and soil amenders.

Use of the soil to purify waste water by manipulating flow rates and by amending the soil so that the right combination of adsorption and infiltration occurs. So far we have studied nitrogen removal from sewage and located certain loams which when added to Bassendean Sand improve its performance considerably. New grant to study red mud for its ability to remove N & P from sewage and also its ability to promote agricultural production. Research of relevance to both ground water and surface water.

Duration: Ongoing

References: 419

Steve Nel
Professor I.C. Potter

School of Environmental and Life Sciences, Murdoch University

The biology of the catfishes Cnidoglanis macrocephalus and Paraplotosus albilabris.

Trawling, gill netting and trapping are being used throughout the Swan-Avon Estuary to obtain samples of the cobbler. Particular attention is being paid to examining growth, feeding and distribution.

Duration: Ongoing

References:

P. Newman
H. Venkitachalam
K. Mathew

School of Environmental
and Life Sciences,
Murdoch University

Wetland management

Comparative study of North Lake, Bibra Lake and several nearby swamps has been completed and published. Monitoring continues of water quality.

Monitoring of Emu Lake water quality with studies of management options a continuing project since 1976. Data have been collected on stormwater quality but not yet written up. One honours and one masters have been completed on it.

Monitoring of some lakes at Collie with suggestions for management on acid leaching from coal mine waste.

Duration: Ongoing

References: 72, 495

Luke J. Pen
Margaret Brock
Chris O'Neil

School of Environmental
and Life Sciences,
Murdoch University

Canning River wetlands - An ecological study

An ecological study of the Canning River wetlands. Emphasis is given to plant communities, the species Typha orientalis, T. domingensis and Scirpus caldwellii (selected as possible indicators of severe environmental disturbance), bird life and the environmental effects of a mosquito abatement programme. The objective of the study is to produce ecological information which may be useful for the development of a management programme.

Duration: Full-time study October 1982 - September 1983

References: 499

Professor I.C. Potter
G. Davis
R. Manning

School of Environmental
and Life Sciences,
Murdoch University

The biology of Pelates sexlineatus in the estuary of The Peel-Harvey and the Swan-Avon River systems.

Comparisons are being made between the biology of the six-lined trumpeter in the Peel-Harvey and Swan-Avon river systems. Particular attention is being given to elucidating whether the diet of this weed eating fish differs in the two systems.

Duration: Ongoing

References:

Professor I.C. Potter
Dr. R. Lenanton
R. Manning
N. Loneragan

School of Environmental
and Life Sciences,
Murdoch University

The effect of the blue-green alga Nodularia spumigena on fish populations in the Peel-Harvey Estuary.

Samples of fish have been taken throughout the Peel-Harvey system, including tributary rivers, to establish the way in which the blue-green alga Nodularia spumigena has affected fish populations. Preliminary results indicate that high densities of Nodularia causes the death of a few species and the re-distribution within the system of some others. Current work is also utilising log book returns of fishermen to establish the affect on the commercial fishery.

Duration: 4th year of sampling

References: 363, 364, 511

Ian Potter
Neil Loneragan
Rod Lenanton
Nick Caputi

School of Environmental
and Life Sciences,
Murdoch University

The use of estuaries and marine embayments by fish and crustaceans in south-western Australia

Much biological data have been collected by the Department of Fisheries, the Cockburn Sound Study Group and Murdoch University for the more important fishes and crustacea in a range of estuaries and coastal marine embayments in south-western Australia. During recent years these environments have been subjected to varying degrees and different types of perturbation. The biological data thus provide an excellent opportunity for evaluating changes caused by man's activities, as well as providing a sound basis for proposals regarding the management of estuarine and coastal fisheries.

This research is being undertaken jointly by Murdoch University and the Western Australian Department of Fisheries and Wildlife and has the following specific aims.

1. To elucidate quantitatively the role played by estuaries and marine embayments in the life cycle of the more abundant fish and crustaceans found in these environments.
2. To describe quantitatively the type of habitats utilized in these systems by the different species.
3. To use these results to examine the impact that man's activities have had and are continuing to have on the fish and crustacean fauna in polluted marine embayments and estuaries.
4. To initiate, as the results of 1-3 become available, further studies of the fish and crustacean fauna of south-western Australian systems, particularly in the Swan-Avon and Peel-Harvey estuaries.

5. To compare the age structure, growth rates, seasonal movements and habitat preferences of important species in estuaries and marine embayments. This will provide information relevant to legislation on minimum legal mesh sizes and on "open" and "closed" fishing waters, as well as the relative importance of different types of habitat.

Duration: Ongoing

References: 142, 143, 363, 364, 510-512, 518-520

Professor I.C. Potter
Dr. D.J. Macey
Dr. R.C. Lethbridge
Professor J. Penhale
R.W. Hilliard
Dr. J. Webb

School of Environmental and Life Sciences, Murdoch University

Ecological, anatomical, physiological and biochemical studies on the Lamprey *Geotria australis* Gray

A detailed study has been undertaken of the life cycle and ecology of the Southern Hemisphere lamprey, *Geotria australis*, in the rivers of south-western Australia. Physiological and biochemical studies have involved investigations of blood properties, iron metabolism and proximate body composition, with particular emphasis on the significance of differences between life cycle stages. Anatomical and cytological studies have concentrated on the structure of the larval and adult intestine. Other studies have included investigations of the microbial flora of the larval intestine, haemorrhagic septicaemia in adult lampreys, chromosomal composition based on gill and testicular material, and the ultrastructure of the gills.

Duration: 1976-1988 (6 years complete of 12 years).

References: 70,71, 259, 365-370, 393-398, 505-509, 513-516, 538, 539

Professor I.C Potter
J.W. Penn
Mr. K. Brooker

School of Environmental and Life Sciences, Murdoch University

Biology of the school prawn *Metapeneaus dalli* in the Swan River.

The life cycle and ecology of the school prawn is being investigated using beach seines and otter trawls.

Duration: Continuing

References: 500

Dr. R.B. Humphries
Mr. C.M. Croft
Professor J. Imberger
A/Professor A.J. McComb

Centre for Water Research, University of Western Australia

Feasibility study of management options for the eutrophic Peel-Harvey Estuary.

More than 10 management options have been proposed for the correction of the eutrophic state of the Peel-Harvey Estuary. All of these options will be considered from at least the following points of view: (i) likelihood of success (ii) time required for desired effect(s) to occur (iii) practicability and cost of each option (iv) the potential level of nutrient reduction (v) anticipation of possible changes to catchment hydrology, estuarine hydrodynamics and estuarine ecology.

Duration: 1 Year (1982/1983).

References: 265, 284-291, 293-295, 297

R. J. Lukatelich
N. D'Adamo
Professor J. Imberger
A/Professor A.J. McComb

Centre for Water Research, University of Western Australia

Murray River Study

The aim is to understand the dominant physical and biological processes which affect water quality in the lower reaches of the river during its estuarine phase.

Fish kills which have been observed in the lower reaches of the Murray River are of particular concern to local residents and the responsible authorities. Possible causes are being investigated.

A regular monitoring programme has been undertaken to examine general trends in water quality over the summer-autumn period.

Intensive sampling over a 2-4 day period has been carried out on two occasions to look at short-term changes in the vertical structure, nutrient content and phytoplankton biomass and production.

A deep section of the river was artificially destratified to study effects on vertical structure and water quality. The energy input and the movement of the mixed lens was monitored.

Duration: December 1981 - August 1983.

References: 172, 388

R. J. Lukatelich
A/Professor A.J. McComb

Centre for Water Research, University of Western Australia

Wilson Inlet Study

Residents in the Denmark area are concerned about the quality of their estuary, and some feel that this quality has deteriorated over the years. In order to assess whether or not the suggested deterioration has taken place a pilot monitoring programme is being undertaken.

Ruppia biomass, macroalgal biomass, phytoplankton biomass, water column nutrient levels and selected physical variables are being monitored at approximately 6 week intervals. A general assessment of the degree of eutrophication of the estuary will be made by comparison between data obtained, and those from other estuaries and embayments. The data will be a very useful baseline against which to judge any future claims of major deterioration.

A major management tool in controlling the hydrology and biology of the estuary is available through the timing of the opening of the bar. The present study will provide information about the total loss of nutrients from the system during bar opening, and the effect of ponding relatively nutrient-rich river water on the nutrient load accumulated in both the sediments and plant material.

Duration: June 1982 - June 1983.

References:

Vincent Lyne
Professor J. Imberger

Centre for Water Research and Department of Civil Engineering, University of Western Australia

The role of hydrodynamic processes in planktonic productivity.

Objective: to determine the key environmental interactions between algae, nutrients and the hydrodynamics of lakes and reservoirs. Emphasis is placed on clarifying the role of lake and reservoir mixing and circulation processes on the productivity of algae. Model ecosystems are used to analyse the spatial and temporal variability of phytoplankton production as a function of the characteristic time and length scales of the physical and planktonic processes.

Duration: Completed.

References: 389

Mr. S.J. Barry
Dr. D.T. Bell
A/Professor A.J. McComb

Department of Botany, University of Western Australia

Nutrient and energy dynamics in the jarrah forest

The project is intended to develop an understanding of the flow of nutrients and energy in the jarrah forest ecosystem and to determine the impact of forest management options on the nutrient and hydrological cycle of the jarrah forest region of W.A. Paired catchment input-output budgets are being determined to compare to the budgets once logging, control burning, or bauxite mining options are implemented in the catchments. Nutrient levels of the separate components of the ecosystem have been established in 2 catchments. One of the catchments will be

logged during the summer of 1982-83. A computer model is being developed to simulate annual transfer of nutrients between component parts.

Duration: Ongoing. 3rd year of project completed.

References: 55

Jane Chambers
A/Professor A.J. McComb

Department of Botany,
University of
Western Australia

The significance of wetlands in removing phosphorus from water in the Harvey River Catchment, southwestern Australia.

The work is concerned with the properties of emergent plants as "biological filters" for phosphorus in the water of the Harvey River Catchment. Three wetlands in the Meredith Drain sub-catchment of low, medium and high phosphorus status (approx. 60, 750 and 10,000 ug/l respectively) are being studied in terms of their hydrology and the nutrient status of water, sediments and surrounding vegetation. One sedge, common to all of these wetlands, Lepidosperma longitudinale, is being studied in particular, with regard to phenology, growth and effectiveness in removing phosphorus from water.

Duration: Ongoing

References: 135

Jonathon Dodd
Dr. D.T. Bell

Department of Botany,
University of Western
Australia

Water utilization of the banksia woodlands of the Swan Coastal Plain

The project aims to determine the amount of water utilized by the canopy and understorey species of the banksia woodland to assist in the development of models to implement the extractions of appropriate amounts of ground water for public use. The methodology involves measurement of appropriate values of the Penman-Montieth equations to predict transpiration in the major species, to determine correlations of transpiration to environmental and soil moisture parameter, and to develop a computer model to determine total community water use over time.

Duration: Last year of 3 year project.

References:

Karen Hillman
A/Professor A.J. McComb

Department of Botany
University of
Western Australia

The productivity of the seagrass Halophila ovalis in the Swan-Canning Estuary, Western Australia.

Seasonal variations in the biomass and productivity of the seagrass Halophila ovalis in the Swan-Canning estuary are being measured to assess its importance relative to the other primary producers in the estuary. Physical parameters - including salinity, temperature, dissolved oxygen, light attenuation and pH are being monitored to assess the effects of environmental factors on the growth of Halophila. This is being supplemented by laboratory experiments using growth cabinets.

The importance of Halophila in supporting the estuarine food web is also being investigated. This is largely being carried out by the measurement of natural carbon 13 - carbon 12 ratios in the tissues of key plants and animals in the estuary.

Duration: 3rd year of Ph.D Thesis

References:

R.J. Lukatelich
A/Professor A.J. McComb

Department of Botany
and Centre for Water
Research, University of
Western Australia

Phytoplankton ecology in the Peel-Harvey Estuarine System

Research has been directed towards gaining an understanding of the phytoplankton ecology of the Peel-Harvey estuarine system, with particular reference to the seasonal and spatial variation in the quantity of the phytoplankton and the relation of this variation with physico-chemical factors. The role of the phytoplankton in nutrient cycling within the system is being assessed. The work has been part of a botanical contribution to a multidisciplinary study of the estuary.

Duration: Ongoing

References: 386, 387

A/Professor A.J. McComb

Department of Botany
and Centre for Water
Research, University
of Western Australia

Nutrient budgets and plant growth in water bodies.

Involved with colleagues, research officers, research students and technical staff in studying nutrient loads and plant growth in estuaries and other water

bodies, and nutrient loss from catchments. Most work involves man-induced perturbations, and is often collaborative with the Department of Conservation and Environment. Includes phytoplankton, macroalgal growth and aquatic plants in lakes, Peel-Harvey, Swan and Blackwood River estuaries, and the catchments of the jarrah forest and coastal plain.

Duration: Ongoing

References: 69, 76, 140, 152-156, 200, 236-239, 260, 353, 387, 388, 424-428, 542

Jenny Davis

Departments of Civil Engineering and Zoology, University of Western Australia

Benthic boundary layers and the hydrodynamics of benthic invertebrates.

A predominantly marine project based on an investigation of the intertidal whelk, Thais orbita. Three experimental approaches; flow visualisation, boundary layer profiles; and force measurements, are being used to investigate the interaction between shell sculpturing and water movement around the animal. It is hoped that these methods might also be extended to an investigation of other benthic invertebrates. Similar research was previously undertaken on psephenid larvae. A microflowmeter is presently being developed for velocity measurements within the benthic boundary layer.

Duration: 2 years

References: 590

Jenny Davis

Departments of Civil Engineering and Zoology, University of Western Australia

Taxonomy and zoogeography of Australian Psephenidae.

An ongoing project from my Ph.D study. A review of the family in Australia is currently being prepared. Although larvae of this family are common in streams in mainland eastern Australia and Tasmania they have not yet been recorded from Western Australia.

Duration: Ongoing

References:

Stella E. Humphries
Professor J. Imberger

Department of Civil Engineering, University of Western Australia

Bloom formation in blue and green algae.

An examination of the hypotheses for blue-green algal blooms. The main

emphasis of the study is on the effect of hydrodynamics on bloom formation.

Duration: Completed

References: 298

Professor J. Imberger

Centre for Environmental Fluid Dynamics and Centre for Water Research. Department of Civil Engineering, University of Western Australia

Mixing in Fluids

The stratification introduced by surface heat transfers in lakes and coastal seas very often dominants the fluid force balance, especially at intermediate and smaller scales of motion where the mixing of the fluid takes place. A knowledge of the fundamental mixing processes in these situations is essential for the understanding of the conveyance and the dispersal of the fluid borne substances, both natural and those introduced by man in the form of pollutants from outfalls, powerstations and non-point sources.

Study being undertaken in the Centre for Environmental Fluid Dynamics has as its focus the isolation, measurement, parameterisation and subsequent modelling of mixing processes in a stratified fluid. Considerable emphasis is being placed on the biological consequences of such mixing events. A new research facility for studying mixing in stratified fluids,in the field, the Djinnang II, has recently been developed and will allow,for the first time, on-line measurement of the turbulent fields,the timescale motions and the forcing functions during active mixing events and subsequent gravitational readjustments.

Duration: 6 years.

References: 46, 298, 306-309

Hugo Bekle
Dr. P.H. Armstrong

Department of Geography, University of Western Australia

Waterbird usage of lakes in the Perth region, Western Australia

This study recognises lakes as 'systems', in relation to waterbird usage of lake habitats, in which the ecological interaction or connection of several species of birds and a number of lakes is examined. The study area comprises twenty lakes - representing the major part of the area and diversity of lake habitats available to waterbirds - in the Perth region of the Swan Coastal Plain.

Different components of a lake ecosystem influence each other in determining its waterbird populations. Habitat preferences of different waterbirds are related to the physical, chemical and biotic features of lake ecosystems; these may alter in accordance with seasonal changes, providing the stimulus for birds to seek an

alternative location. Some relationships between these different components have been obtained from regular surveys over a period of sixteen months during 1980-81.

Duration: To be completed during 1984

References: 47-54, 221

Professor N.F. Stanley
L. Moore
Dr. B. Knott

Department of Microbiology,
University of Western
Australia

Limnology and microbiology of the lakes of the Clifton - Preston complex.

A long term study aimed at elucidating: the limnology of this complex of lakes; the biology of key macroinvertebrate and vertebrate species present; factors influencing the initiation and formation of mats and stromatolites.

Duration: Long term.

References:

Chris Austin

Department of Zoology,
University of Western
Australia

Systematics of the genus Cherax: An electrophoretic and morphological study.

Crayfish of the genus Cherax are the most diverse and widespread members of the southern hemisphere family of freshwater crayfish the Parastacidae and are thus of inherent systematic interest. There are 27 currently described species distributed in eastern and northern Australia and in the southwest of Western Australia. The present taxonomic treatment of the aim of the group is inadequate and is in need of revision. Thus the aim of this project is to produce (1) a revised taxonomy (2) a phylogeny and (3) a zoogeographic analysis of Cherax throughout Australia.

Electrophoretic and multivariate methods are being used which will involve both phenetic and cladistic analyses.

Duration: 3-5 years

References:

Stuart Bunn
Dr.D.H.Edward

Department of Zoology,
University of Western
Australia

Community structure and function of stream macroinvertebrates.

The primary aim of this project is to determine the functional organization of the invertebrate fauna in small streams in the Darling Range. The following aspects are being examined:

1) Regular sampling of the macroinvertebrates to provide information on the spatial and temporal variation in both species composition and community structure.
2) The breakdown of leaf-litter in the field and laboratory to determine the importance of this as a primary food source for invertebrates.
3) Analysis of life cycle patterns of the dominant taxa.

Duration: 3rd year of Ph.D.

References: 116, 305

Stuart Bunn
Dr. D.H. Edward

Department of Zoology,
University of Western
Australia

Survey of the invertebrate fauna of headwater streams in the northern jarrah forest.

This work is an extension of the project on community structure and function of stream invertebrates and has two major aims:
1. To gather distributional data on species of invertebrates in jarrah forest streams.
2. Of particular interest, to record the distribution of the mayfly Tasmanocoenis tillyardi. Preliminary data have indicated an association of the larvae of this species with sites affected by excessive inorganic sediment. Investigation of the possible use of this species to indicate inorganic sediment pollution is continuing.

Duration: Ongoing. Commenced January 1983.

References: 187

Dr. D.H. Edward

Department of Zoology,
University of Western
Australia

Biology and taxonomy of the Chironomidae (non-biting midges) of Australia.

A study of all subfamilies within the Chironomidae which includes taxonomy of adults, descriptions of immature stages and egg masses of species in Australia; general biology and distribution of species particularly in Western Australia.

Duration: Ongoing

References: 183-185, 188

Dr. D.H. Edward

Department of Zoology,
University of Western
Australia

Inland lentic waters of Western Australia.

General research on physical features, chemistry and fauna of inland lentic waters of Western Australia including permanent and ephemeral saline and freshwater lakes and pools, and ephemeral pools on granite outcrops.

Duration: Ongoing

References: 38, 186, 189

Dr. D.H. Edward
Stuart Bunn

Department of Zoology,
University of Western
Australia

Seasonal meromixis in saline lakes on Rottnest Island, Western Australia.

Three of the five major salt lakes on Rottnest Island become meromictic in winter and spring. This pattern of lake circulation is unusual, and few meromictic lakes are known in Australia. Chemical and physical measurements have been taken to determine the duration and nature of the meromixis in these lakes.

Duration: Field work completed.

References: 114

Mr. J. Goodsell

Department of Zoology,
University of Western
Australia

Ecophysiology of osmoregulation in freshwater crayfish.

This study examines the mechanisms of osmoregulation in a species of freshwater crayfish. The rates and sites of water and electrolyte transport are being determined in the laboratory using radio-isotope techniques.

Duration: 2 years

References:

Dr. B. Knott

Department of Zoology,
University of Western
Australia

Systematics of freshwater Crustacea, with particular reference to the Isopoda and Amphipoda.

The taxonomic revision of the suborder Phreatoicoidea (Isopoda) is continuing; other aspects of the biology and evolution of the phreatoicoids are

also being studied. The general thrust of this research has been expanded to include other freshwater Crustacea, particularly Amphipoda.

Duration: Long term

References: 276

Dr. B. Knott
C. Austin

Department of Zoology,
University of Western
Australia

Subterranean Fauna of Western Australia

This project was initiated 2 years ago with the chance discovery of an extensive aquatic fauna inhabiting cave streams. The work has been extended to include all subterranean waters. The work is aimed at describing the various species; and elucidating community structure and relationships (especially nutrient pathways) and adaptations to underground habitats.

Duration: Long term

References: 124

Jane Prince

Department of Zoology,
University of Western
Australia

Survey and collection of the simuliid fauna of south-western Australia.

The distribution and seasonal occurrence of 13 morphologically distinct taxa in the south-west of Western Australia has been documented and collections made to allow description of the 9 previously undescribed species for all life-stages. Work is now directed towards looking at the relationships between these taxa using electrophoretic and ctyological techniques.

This project was funded by A.B.R.S. during 1981 and 1982. Electrophoretic and cytological work is continuing until all species have been examined.

Duration: Ongoing

References: 517

Brad Pusey
Dr. D.H. Edward
Professor S.D. Bradshaw

Department of Zoology,
University of Western
Australia.

Aestivation in Lepidogalaxias salamandroides

This project has just commenced. Intend to study respiration during aestivation, in water and in air. Examine production of mucus sheath during

aestivation (as in lungfish). Examine energy sources during aestivation, (preliminary data suggest this is fat) and storage of metabolic wastes.

Duration: Ongoing

References: 432, 522

J.A. Stoddart

Department of Zoology, University of Western Australia.

Taxonomy of Western Australian freshwater mollusca

This is an ongoing project started in 1977 at the Western Australian Museum at the request of the Western Australian Department of Public Health. It aims to clarify the species taxonomy of the freshwater molluscs (primarily gastropods) of Western Australia and to document these relationships.

Duration: Ongoing

References: 116, 605-608, 705

I. Lantzke

Western Australian College of Advanced Education, Claremont

Limnology of selected lakes of the Perth region.

Spring and autumn samples from lakes are analysed for water clarity, temperature, O_2, conductivity, pH, chloride, orthophosphate, calcium, magnesium alkalinity and macroscopic water animals and plants. Since 1982, sodium and potassium have been measured.

Suplementary studies of vertical water stratification, diurnal and short period changes of water chemistry or animals are also undertaken intermittently.

Lakes: Jandabup, Little Badgerup, Perry (3), Bibra and Mt. Brown. Some data are also held on Star Swamp, Claremont, and Hazelmere .

Duration: Ongoing

References:

I. Lantzke

Western Australian College of Advanced Education, Claremont

Variation in the water chemistry and the macroscopic animals of selected lakes of the Perth region.

Approximately monthly samples from nine lakes were analysed for water clarity; pH; dissolved oxygen; orthophosphate; chloride ion and conductivity.

Water temperature and macroscopic fauna were noted. Lakes: - Herdsman (drain only): Perry (3); Claremont; Bibra; Coogee; Mt. Brown; Coolongup (white).

Duration: data collection completed

References

I. Lantzke

Western Australian College of Advanced Education, Claremont

Studies of the limnology of Herdsman Lake

Approximately monthly sampling of 3 contrasting fen sites and one in the drain linking Herdsman Lagoon to the main drain is carried out for water depth, clarity, temperature, conductivity, pH, O_2, chloride, orthophosphate, calcium, magnesium, sodium, potassium, carbonate and bicarbonate, and macroscopic aquatic animals and plants.

Standing crops of T. orientalis at two of the sites, and the average concentration of N, P, K, Ca, Zn and Mn, in leaf, stem, and sometimes roots are measured at intervals.

Laboratory studies of orthophosphate absorption by Herdsman peaty-marl soil are in progress.

Occasional studies of stratification, water chemistry and aquatic animals and plants in Herdsman Lagoon are also undertaken.

Duration: Ongoing

References:

Jacob John

Western Australian Institute of Technology

The diatom flora of the salt lakes of Yalgorup National Park, Western Australia.

A taxonomic study of the diatoms of the hypersaline lakes of Yalgorup National Park in relation to water quality. The study revealed a limited number of species (35 species), many of which are new records for Australia. Some species occurred in large numbers in hypersaline conditions, several times that of sea water.

Duration: 1976-77 and 1980

References: 326

John Kowarsky
Rob Rippingale

Western Australian
Institute of Technology

Marron intensive culture

Investigation into optimising survival and growth of freshwater crayfish of genus Cherax in intensive culture apparatus.

Duration: Ongoing

References:

Dr. R.J. Rippingale

Western Australian
Institute of Technology

Fauna of coastal-plain lakes

A survey of eight coastal-plain lakes to describe the composition of the macroinvertebrate fauna. Principle objectives are to determine the extent of seasonal and shorter term changes in faunal composition with comparisons between lakes.

Duration: 1 or 2 years.

References:

Dr. R.J. Rippingale
N.A. Smith

Western Australian
Institute of Technology

Tertiary treatment of wastewater with macrophytes.

On site studies at Westfield Wastewater Treatment Plant, Western Australia. Laboratory work at WAIT.

To investigate the effectiveness of macrophyte growth in reducing the nutrient and B.O.D. load of final effluent from an urban wastewater treatment plant.

To investigate the effectiveness of macrophytes in facilitating the dispersal of water from final effluent by infiltration and by evapo- transpiration.

To investigate uses of macrophyte biomass produced in working towards the above objectives.

11 experimental ponds have been established, (each with surface area $12m^2$, volume $10m^3$). Effluent enters each pond at a controlled flow rate and overflows to waste. Three macrophyte species are established in the ponds. Weekly harvest of biomass and weekly assays of water quality are undertaken. Results indicate that high rates of biomass production and significant reductions in nitrogen can be achieved with a 7 day retention time of water.

Duration: Ongoing

References:

Dr. J. Arnold (co-ordinator)

Department of
Conservation and
Environment

Meredith Drain Study

A study has been recently undertaken by Ms. J. Chambers, Department of Botany, University of Western Australia and will look at the wetland vegetation and nutrient relationships of this system. Comparisons of the fauna of Reserves C12049, C12632 and adjacent farmlands in the Harvey area have been completed and a report will be published soon.

Duration: Ongoing

References: 135

Dr. J. Arnold (co-ordinator)
R. Masini

Department of
Conservation and
Environment

Inland waters of the Pilbara

An inventory and classification of inland surface waters of the Pilbara has been made.

Priorities for management and guidelines for conservation have also been established. A report on Phase 1, the Fortescue and Oakover systems, is in preparation.

Duration: Phase 2, 1983-84

References:

Dr. G. Chittleborough
Dr. E.P. Hodgkin
Dr. R. Field

Department of
Conservation and
Environment

South coast estuary inventory

An inventory of information on the hydrology, nutrients, fauna, flora and catchment status is currently in preparation.

Duration: Ongoing

References:

Dr. G. Chittleborough
Dr. E.P. Hodgkin
Dr. R. Field

Department of
Conservation and
Environment

Peel-Harvey Estuarine Study

Data are being collated on the hydrology, nutrients, fauna and aquatic flora of this estuarine system and options assessed for its management. Studies of the catchments supplying the system are also being conducted.

Duration: Ongoing

References: 89, 179, 262-265

Dr. Noel Morrissy
C.J. Fellows
G. Cassells
A. Church
W. Pound

Department of Fisheries
and Wildlife, Western
Australian Marine
Research Laboratories

Freshwater ecology, fisheries management and aquaculture research and development.

Freshwater fisheries: occasional ad hoc investigations; applied research, notably on marron fishery.

Aquaculture: freshwater crayfish; pure and applied research on marron as a commercial species; currently battery culture and the problem of artificial feed.

Duration: Ongoing

References: 451-476

Jennny Shaw
Professor I.C. Potter
Dr. R. Lenanton

Western Australian
Marine Research
Laboratories

The role of *Halophila ovalis* in the Swan River with reference to the movements of fish and crustacea

This study is investigating the role *Halophila* and macroalgal beds to fish and the pattern of diurnal fish movements on and off shore. Seining and gill netting are used at three sites in Melville water to compare "weeded" and "non-weeded" areas during the day and at night. The stomach contents of most fish caught at one site are being analysed. Macrobenthos are obtained by coring and pump netting while plankton is sampled with a tow net. Particular attention is being given to analysing the diet and habitat preferences of two commercially important fish: Tailer (*Pomatomus saltatrix*) and Blowfish (*Torquigener pleurogramma*).

Duration: 1st year of 2 years.

References:

Judith Brown

Western Australian
Wildlife Research Centre

Ecology of Typha orientalis and Baumea articulata

A study of the growth and rate of spread of Typha and Baumea at Thomsons Lake and gathering of information on their phenology. The effect different water levels and water quality (salinity) have on their growth and colonization will also be determined.

Duration: 1983 and 1984

References:

Dr. A. Burbidge

Western Australian
Wildlife Research Centre

The biology of the short-necked tortoise (Pseudemydura umbrina Sienbenrock) and management for its conservation.

Intensive population study throughout the winter period each year by mark and return. Total numbers, growth rates, recruitment, age to sexual maturity, breeding in captivity success. One water sample at Ellen Brook and four at Twin Swamps two to three times per year are analysed for total nitrogen, nitrate nitrogen, total phosphorous, fluoride, sulphide, total dissolved solids, chloride and dissolved oxygen.

Duration: Ongoing

References: 117, 119, 121

J.A.K. Lane
D.R. Munro

Western Australian
Wildlife Research Centre

Duck shooting seasons

Decisions concerning duck seasons in the south-west of the State are based on annual assessments of conditions for waterfowl breeding. These assessments are based on rainfall data, and on water-depth data derived from the WNR monitoring programme.

Duration: Ongoing

References: 672

J.A.K. Lane
D.R. Munro

Western Australian
Wildlife Research Centre

Wetland creation

No further progess was made during 1982/83 with the proposal to create new wetlands by damming old drainage lines (salt lake chains) of the wheatbelt. A start of this project is now awaiting an assessment of waterbird usage of the Beverley Lakes Wetland Nature Reserve, as part of the larger assessment of usage of all WAWA-vested WNRs.

Duration:

References:

J.A.K. Lane
Donald R. Munro
Grant B. Pearson

Western Australian
Wildlife Research Centre

Wetland Nature Reserves: Monitoring of water depth and quality

Objectives:
Routine monitoring of water depth and water quality of selected wetland nature reserves (120) in the south-west of the State assists in:

i) annual evaluation of conditions for waterfowl breeding
ii) prediction of summer conditions for waterfowl
iii) determination of seasonal, annual and longer-term variations in water depth and quality - important aspects of the condition of WNRs.
iv) management of particular WNRs e.g. Lakes Chittering, Nonalling, Byenup, Tordit Garrup, Poorginup and Chandala.

Duration: Ongoing

References: 356, 673, 675-677

J.A.K. Lane
D. R. Munro
G.B. Pearson

Western Australian
Wildlife Research Centre

Feral ducks and geese

The last cull of feral ducks and geese on metropolitan lakes by Departmental staff was in 1979. From February 1982 to February 1983 feral "mallard" numbers rose from 223 to 252, muscovy fell from 27 to 17 and geese from 29 to 27. The rate of increase in "mallard" numbers observed in recent years has declined;probably due to the efforts of private citizens who have been encouraged, and in two cases authorized, to remove these birds.

An assessment of the risk in terms of gene flow which the feral "mallard" population poses to native Black Duck (A. superciliosa) populations was suggested to the University of W.A. Zoology Department as an Honours project. It has since been taken up by Ms M. Silberstein and is due for completion by November 1983. D. Munro and members of the W.A. Field and Game Association are assisting with the collection of specimens.

Duration: Ongoing

References:

J.A.K Lane
G.B. Pearson

Western Australian
Wildlife Research Centre

Wetland Nature Reserves: Area of Wetland Reserved. Salinity and Permanence classification

The card index of administrative information concerning the 250 -odd Wetland Nature Reserves in the southern half of W.A. was up-dated during 1982/83, as was the aerial photographic library (Lands and Surveys Dept. 9"x9" prints - 1: 40 000). These continue to be useful in dealing with the many queries which arise each year concerning WNRs and their management.

No further progress has been made towards computerising a salinity-permanence classification of the reserve system.

Duration:

References: 104, 356

D.R. Munro

Western Australian
Wildlife Research Centre

Lake Chittering water level management

The "check structure" (adjustable-height weir) on the outlet from Lake Chittering continues to require frequent checking and adjustment during winter and spring each year in order to fill the lake without flooding the adjoining landholders' properties. Since the check structure was installed in April 1977 it has been possible to hold water right through summer, despite the low rainfalls of recent years. Lake Chittering is therefore a most valuable breeding and summer refuge area for waterbirds.

Duration: Ongoing

References: 356

D.R. Munro

Western Australia
Wildlife Research Centre

Lake Muir Wetland Nature Reserve management

Mines Department require regular monitoring of water depth, salinity and pH of the above lakes prior to mining for peat. This monitoring has been carried out

since April 1977 and is now being performed as part of a wetland monitoring programme.

Duration: Ongoing

References: 356

G.B. Pearson

Western Australian
Wildlife Research Centre

Farm dams for waterfowl

A pamphlet describing methods for increasing the suitability of farm dams for breeding waterbirds, particularly game-species of ducks is being printed for distribution to students of Agricultural High Schools and other interested persons, and for publication in S.W.A.N.S. Members of the W.A. Field and Game Association continue their experimentation with various designs of nest-boxes for ducks.

Duration: Ongoing

References:

G.B. Pearson
J.A.K. Lane

Western Australian
Wildlife Research Centre

Western Australian wader study group

More than 300,000 waders were counted in the Australian Wader Study Group's spring '83 expedition to the north-west and 4,100 of these were banded and colour-dyed. In February 1983 Pearson and Lane undertook an aerial survey of the north-west coast as part of a national wader count. 480 000 birds were counted; 310 000 of these were on 80 Mile Beach making this the largest known concentration of migratory wading birds in Australia.

In October 1982, G. Pearson led a one-week course on wader identification, trapping and banding at Eyre Bird Observatory. A similar course will be run by Pearson and Lane in October 1983.

Duration: To 1985 at least.

References:

D. Watkins

Western Australian
Wildlife Research Centre

Benger Swamp management research

Benger Swamp is situated on the Swan Coastal Plain near Harvey. The project involves researching aspects of management for the 600ha swamp. Of the study area 85% is owned by the Department of Fisheries and Wildlife for vesting as a wetland reserve. Over the past 50 years the swamp has been drained in early summer to enable the growing of potatoes and fodder crops. The swamp fills again in early

winter. Research includes; monitoring of waterbird usage, water level control, water quality and salinity problems, past changes in vegetation, monitoring future vegetation changes and implemention of management techniques.

Duration: 1st six months of 3 year study

References:

F. Batini

Forests and Public Works Departments of Western Australia and CSIRO, Division of Animal Production

Salinity Water Yield

Researching the effects of Agro-Forestry in catchment areas on water quality.

Duration: Ongoing

References: 28-31

F. Batini

Forests and Public Works Departments of Western Australia

Monitoring the effect of a green firewood operation on the salt and water yield of a water catchment area.

Salinity of and depth to deep and perched groundwater, water yield, rainfall and salt fall in Helena River Catchment.

Duration: Ongoing

References: 28-31

Dr. A.D. Allen

Geological Survey of Western Australia

The hydrogeology of the Carnarvon Basin.
A regional study of the groundwater resources of the Carnarvon Basin.

Duration: Commenced 1982, Completion 1983.

References: 2

Dr. A.D. Allen
Mr. W.A. Davidson

Geological Survey of
Western Australia

Hydrogeology of the Perth Metropolitan area.

A major publication detailing information about geology and groundwater resources learned from exploratory drilling in the Perth region.

Duration: Commenced 1979, Completion 1984.

References: 3,4,5, 711-713

Mr. D.P. Commander

Geological Survey of
Western Australia

The hydrogeology of the Fortescue River flood plain.

A study of the groundwater resources on the coastal plain adjacent to the Fortescue River.

Duration: Commenced 1983, Completion 1984.

References:

Mr. D.P. Commander

Geological Survey of
Western Australia

The hydrogeology of the Rober River flood plain.

A study of the groundwater resources on the coastal plain adjacent to the Robe river.

Duration: Commenced 1983, Completion 1984.

References:

Mr. D.P. Commander

Geological Survey of
Western Australia

Geology and Hydrogeology of the 'Superficial Formations' in the lake Clifton borehole lines, south west coastal groundwater area.

A study of the stratigraphy and occurrence of groundwater and its relationship to coastal lakes.

Duration: Completed (in press)

References: 718

Mr. D.P. Commander

Geological Survey of
Western Australia

Hydrogeology of the Western Fortescue Valley.

A study of the occurrence, recharge and quality of groundwater resources in the vicinity of Millstream.

Duration: Completed (in press)

References

Mr. W.A. Davidson

Geological Survey of
Western Australia

Hydrogeology of the Lexia Area (S.E. Gnangara Mound).

A study of the groundwater resources of part of the Gnangara Mound being made on behalf of the Metropolitan Water Authority.

Duration: Commenced 1983, Completion 1984.

References:

Mr. A. Deeney

Geological Survey of
Western Australia

The hydrogeology of the Harvey borehole line.

A study of the geology and hydrogeology from a line of four deep bores across the Perth Basin.

Duration: Commenced 1983, Completion 1984.

References:

Mr. A. Deeney

Geological Survey of
Western Australia

The hydrogeology of the Harvey Region.

A study of the groundwater resources of the superficial formations with special reference to problems of land salinization and nutrient input into the Harvey Peel Inlet from groundwater.

Duration: Commenced 1983, Completion 1984.

References:

Dr. K. Hirschberg

Geological Survey of
Western Australia

Inventory of sanitary landfill sites and potential for groundwater pollution.

A listing of landfill sites with dates of operation and results of preliminary testing to determine direction of groundwater flow and nature and extent of any pollutant problems.

Duration: Commenced 1981, Completion 1984.

References:

Mr. A. Kern

Geological Survey of
Western Australia

The hydrogeology of the Leederville Formation and interaction with each other and the surface water.

A study of the groundwater resources, their interaction with each other and the surface water resources.

Duration: Commenced 1983, Completion 1984.

References:

Mr. M. Martin

Geological Survey of
Western Australia

Design and installation of multiport bores.

A description of the design, installation and use of multiport bores for pollution and salinity studies.

Duration: Commenced 1983, Completion 1984.

References:

Mr. M. Martin

Geological Survey of
Western Australia

Strontium isotope ratios in groundwater from the Darling Range.

Project in collaboration with W.A.I.T. Sampling and analysis of groundwater from lateritic profiles and bedrock.

Duration: Commenced 1983, Completion 1984.

References:

Mr. M. Martin

Geological Survey of
Western Australia

Salinity studies Meringie Farms.

Joint study with PWD. Investigation of salinization processes.

Duration: Commenced 1982, Completion 1984.

References:

Mr. R. McGowan

Geological Survey of
Western Australia

Hydrogeology of Ivanhoe Plant, Ord River.

A description of the hydrogeology of irrigated areas supplied from the Ord Scheme.

Duration: Commenced 1983, Completion 1984.

References:

Mr. R. McGowan

Geological Survey of
Western Australia

Hydrogeology of Winchester catchment.

Joint project with Agriculture on spatial and temporal variation in water levels and salinity resulting from clearing and agriculture.

Duration: Commenced 1983 ongoing.

References:

Mr. J. Moncrieff

Geological Survey of
Western Australia

Hydrogeology of the Salvado Area (Lancelin-Guilderton).

Study of groundwater resources on the superficial formations north of the Gnangara Mound.

Duration: Commenced 1979, Completion 1984.

References:

Mr. R. Smith — Geological Survey of Western Australia

Perth urban water balance.

A joint study with the MWA and CWR of factors affecting quantity and quality of shallow unconfined groundwater in urban Perth to determine if current levels of private extraction are maintainable without serious adverse affects.

Duration: Commenced 1981, Completion 1985.

References: 717

Mr. P. Thorpe — Geological Survey of Western Australia

Isotopic studies to determine natural infiltration rates on the Gnangara Mound.

A joint study with MWA and CSIRO using Tritium, oxygen isotopes, and carbon-14 to determine recharge rates for comparison with recharge rates estimated by other methods.

Duration: Commenced 1981 - ongoing.

References:

P. Moore
R. Blankley
J. Iveson — Metropolitan Water Authority

Selected stream microbiology (bacteria)

Sampling of Darling Range streams for coliforms E. coli and other selected faecal pollution indicators for -

(a) Routine monitoring.
(b) Provide a data base to assess the usefulness of some indicator organisms and their relationship with fauna and human activity in the forest.

Duration: Current phase 1972-1978 a revised programme will continue.

References: 310, 311

Brett O'Brien — Metropolitan Water Authority

Dam Biology

To establish an inventory of the organisms associated with the Metropolitan Water Authority dams in the Darling Range.

This inventory will serve two main purposes: Firstly it will act as a data base to record any future changes; and secondly it will provide the initial step in determining the food webs present.

Duration: Ongoing

References:

Dr. A.N. Start

National Parks Authority,
Karratha, Western Australia

Monitoring Programme: Millstream.

Experience has shown that the transect - piezometer technique has serious limitations in providing early prediction of environmental change. Emphasis has therefore moved towards more detailed monitoring of surface waterflow and more generalized monitoring of vegetation dependent on aquifer derived water. The objective has not altered i.e. monitoring programme to assess the effect of ground water extraction by the PWD on Millstream pools and surrounding vegetation.

Duration: Ongoing

References:

Mr. K.L. Barrett

Public Works Department,
Water Resources Section

Effects of Land use Changes on Streamflow and Water Quality in South West of Western Australia.

A number of research catchments are monitored for changes in streamflow and water quality characteristics resulting from clearing natural vegetation for agriculture, mining and chipwood production.

Reports prepared for the State Research Steering and Co-ordinating Committees.

Duration: Ongoing

References:

Mr. K.L. Barrett

Public Works Department,
Water Resources Section

Recording of Streamflows, Water Quality and Catchment Rainfall in Western Australia.

A network of gauging stations record streamflows throughout the State. At these stations pluviograph records are also obtained and monthly water samples are routinely tested for conductivity, temperature and turbidity. Additional samples are also obtained for periodic analysis of major ions. Some sediment metering is also undertaken.

These hydrologic data, together with water quality data from other authorities are stored in a computer based filing system.

Streamflow and water quality information are summarised in publications at approximately 5 yearly intervals, but more detailed daily information is available on microfiche, as hard copy or on magnetic tape in AWRC interchange format.

Duration: Ongoing

References:

J.P. Singleton

Town Planning Department,
Urban Design Section

Northern Wetlands (Wanneroo eastern chain)

Investigate the status and planning context of the lake system.
Identify the use and management potential of the wetland system.
Identify other matters of relevance to existence of the wetland system.

Duration: Ongoing

References:

R. Atkins
W. Hosja

Waterways Commission

Seasonal variation of phytoplankton in the Swan River.

Salinity, temperature, dissolved oxygen, secchi disc readings and phytoplankton samples are being collected at seven sites at monthly intervals in the Swan River estuary in Western Australia.

Species dominance and diversity will be related to seasonal changes in salinity and water temperature.

Duration: 1 year.

References: 252

R. Atkins
R.J. Lukatelich
W. Hosja

Waterways Commission
and Centre for Water
Research

Water quality monitoring of the Peel-Harvey System, Western Australia

The regular water quality monitoring programme was an important part of the recently concluded EMAC study of the Peel/Harvey Estuarine System. To follow on from this programme a reduced monitoring programme has been implemented. Three sites are being sampled each week during high river flow and Nodularia blooms and at fortnightly intervals during the rest of the year.

Parameters include the nutrients nitrogen and phosphorus (both inorganic and total), Chlorophyll 'a', salinity, temperature, dissolved oxygen.

Duration: Ongoing

References: 387

Dr. N. Marchant

Western Australian Herbarium

Aquatic vascular plants

No research projects specifically related to wetlands are currently in progress, however, a long-term interest in the taxonomy, distribution and ecology of aquatic vascular plants is still retained.

Duration: Ongoing

References: 589

Mr. T.E.H. Aplin

Western Australian Herbarium

Cyanobacteria

Identification of cyanobacteria is done as a service to the public and government bodies. Records are maintained on the distribution of toxic cyanobacteria.

Duration: Ongoing

References: 18-20

Dr. G.R. Allen

Western Australian Museum

Survey of the inland fish fauna of Western Australia.

Surveys were carried out on all the major river systems of Western Australia so that a field guide could be prepared for all the fishes inhabiting the State's rivers. Relationships between Western Australia's inland fish fauna and those of the other States were also investigated.

Duration: Work complete (1974 to 1981)

References: 6-11

Dr. G.R. Allen
Dr. D.F. Hoese

Western Australian and Australian Museums,

Review of the gobiid fish genus Glossogobius of Australia and New Guinea.

Duration: Ongoing

References:

Dr. G.R. Allen
Dr. D.F. Hoese

Western Australian and Australian Museums,

Revision of the eleotrid genus Mogurnda.

Duration: Ongoing

References: 269

G.W. Kendrick

Western Australian Museum

Palaeontology of non-marine molluscs (Cainozoic) in Western Australia

An on-going interest, dealing with material (invariably rare) as it becomes available. Includes molluscan material from non-marine archaeological sites.

Duration: Ongoing

References: 266, 334-338, 595

G.W. Kendrick
K.-H. Wyroll
I.W. Twaddle
P. Hesp

Western Australian Museum

The palaeoclimatic significance of late Quaternary marine units (including estuarine deposits), and their possible implications for the climate of W.A. over the next half century.

The project aims to reconstruct major environmental parameters in SW Western Australia during the Middle Holocene and last interglacial of the Late Pleistocene when global climates are believed to have been warmer than at present. This will involve absolute age determinations using ^{14}C and electron spin resonance techniques, oxygen isotopic analysis, palaeontologic studies and sea level measurements along several thousand km of coastline. Results of this study, which

will have bearing on estuarine and fluviatile hydrologic environments, will be interpreted in the light of analogous modern climatic situations.

Duration: Ongoing

References: 257

Dr. O. Nichols
Miss B. Glossop
Mr. F. Miller
Mr. C. Carati
Mr. D. Watkins

Alcoa of Australia Ltd

Ecological survey of Spectacle Swamps, Mandogalup

The survey is designed to produce a detailed inventory of the flora and vertebrate fauna of the Spectacle Swamps. This area is a compartively large, mature wetland, and is relatively undisturbed. The findings are being used to develop an effective management plan for the area.

Duration: Survey work complete

References:

Dr. O. Nichols
Mr. D. Kabay

Alcoa of Australia Ltd

Rehabilitiation of clay Lakes at Wellard

The project involves developing a rehabilitation plan for pits from which clay has been extracted. Because of the diminishing number of wetlands on the Swan Coastal Plain, the aim of the project is to create a habitat which will promote conservation of waterfowl, particularly rarer species (e.g. Freckled Duck). The final design will include islands, varying sloped banks, natural water flow and suitable vegetation.

Duration: completed in 2-3 years

References: 333

Dr. O. Nichols
Mr. N. Murray
Mr. D. Watkins
Mr. F. Miller

Alcoa of Australia

Ecological survey of Kemerton Wetlands

The area is part of a chain of wetlands north of Australind. It is being surveyed as part of a general biological survey of Alcoa-owned land in the area. Results to date indicate that several species of birds use the area fairly

intensively for breeding purposes e.g. Darters. Comparison with other wetlands is needed before the conservation value of be area can be assessed.

Duration: Ongoing

References: 113

Maryanne Sawle
David Halford
L. O'Halloran

Dames & Moore

Harris River Dam (Aquatic Survey) Collie, Western Australia

As part of the environment assessment of the proposed Harris River Dam Site a survey of the aquatic fauna is being undertaken.

Streams above and below the proposed dam are being surveyed prior to construction. The aim of the survey is to collect information on the aquatic fauna to provide a basis for assessing environmental change.

Duration: Ongoing

References:

Maryanne Sawle
David Halford
P. Davies
L. O'Halloran

Dames & Moore

Survey of Odonata Fauna - Millstream Western Australia.

The level of withdrawal from the aquifer at Millstream has been of concern for some time to National Parks and the Public Works Department.

In order to provide some information on the possible changing environment (particularly aquatic) at Millstream, a survey of the dragonflies is being undertaken. It is the aim of the survey to gather sufficient information on the Odonata fauna to provide a basis for a monitoring programme.

Duration: Ongoing

References: 167

Nathan Sammy

Dampier Salt Pty Ltd

Inventory and interrelationships of hypersaline biota

Identify and study relationships for various brine organisms. Investigational work includes laboratory cultures of various brine organisms to

study responses to various environmental regimes possibly leading to nuisance blooms.

Duration: Continuing

References:

A.H. Van der Wiele ESRI Australia

Herdsman Lake Environmental Monitoring

This project includes:

i) water monitoring for nutrients, metals and physical parameters and
ii) faunal studies (birds, frogs, aquatic invertebrates, vegetation surveys and phytoplankton).

Duration: Ongoing

References:

Dr. P.N. Chalmer

Le Provost, Semenuik and Chalmer, Waterways Commission

Assessment of effects of acid-iron effluent on the benthic biota of Leschenault Inlet, Western Australia.

Laporte Pty Ltd operates a titanium production plant on the eastern shore of Leschenault Inlet. Acid-iron waste is produced. The study consists of two parts. The first describes the benthic biota, their composition, abundance and distribution, together with their potential value as a food resource for fish. Most of this information is available, therefore, no field work is envisaged, it is a desk study where the information needs to be reviewed and presented in a format appropriate to this problem. The second is to assess the effects of effluent spillages on the benthic biota. There are two approaches:

(i) Survey an affected area immediately after a spill event and compare it with a nearby unaffected 'control' area. Subsequent surveys of these areas would show the recovery.

(ii) Survey areas which in the past have been affected by effluent leakages, either as a result of pipeline breakages or seepage from the disposal site, and compare these areas with nearby, unaffected control areas.

Duration: Completed

References:

Dr. L. Borowitzka
Dr. T. Moulton
Dr. M. Borowitzka

Roche Algal Biotechnology
A Division of Roche Products
(Aust.) Pty Ltd

Extraction of marketable pigments from the salt-lake alga, Dunaliella salina

In 1978 Roche established this long-term R and D project to determine the feasibility of commercially producing beta carotene (used in animal feeds and in colouring of margarine, baked goods and other foods) from pond cultures of the unicellular green alga, Dunaliella salina. We have a pilot plant consisting of ponds and field laboratories at Hutt Lagoon, North of Geraldton, our main laboratory at Murdoch University and also maintain laboratories in Sydney. We are studying many aspects of D. salina including; competition, predation, physiology (particularly osmoregulation and pigment production), biochemistry, ecology, taxonomy and ultrastructure.

Duration: Continuing since 1978

References: 87, 88, 106, 504

CSIRO Division of
Groundwater Research

Groundwater Research

To investigate, and develop models of, the physical and chemical processes affecting the quality and quantity of groundwater, including natural interactions between surface water, groundwater, soils and rocks, and responses to man-made stresses such as mining, waste disposal, agriculture, artificial recharge and pumping.

Duration: Long term

References:

Roger P. Jaensch

Royal Australian
Ornithologists Union

An assessment of waterbird usage of wetland nature reserves in south-western Western Australia, vested in the Western Australian Wildlife Authority.

The R.A.O.U. Waterbird project entails a four year study of waterbird usage of Wetland Nature Reserves (WNR), controlled by the Western Australian Wildlife Authority (WAWA) in the south-west of the State (approx. Geraldton to Esperance). Information is gathered by volunteer observers many of whom were contributors to the Australian Bird Atlas (ended Dec. 1981), and will be stored and analaysed by computer. This project is entirely funded by the W.A. Department of Fisheries and Wildlife.

The aims of the project are:

1. To provide information on waterbird usage to help in the management of WNR's and in resolving conflicts between different uses,
2. To assess the role and importance of the WNR system in the conservation of waterbird populations,
3. To provide appropriate experience for future monitoring of waterbird abundance and
4. To assess the efficiency and practicability of various methods of conducting a census of waterbirds under Australian conditions.

Duration: 2nd year of 4 years

References: 317

SUBJECT INDEX - BIBLIOGRAPHY

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