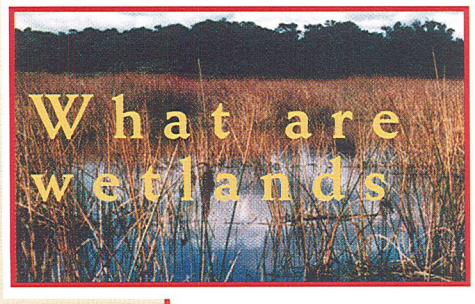
Wetlands

Cliff Winfield

of the Perth Region

Wetlands of the Perth region.

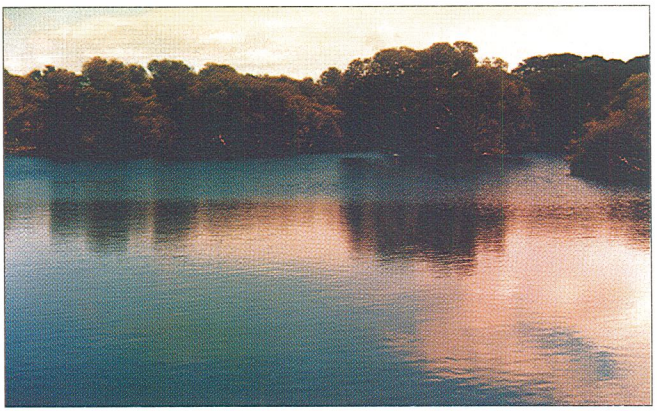
The wetlands of the Perth region provide a habitat for many millions of animals (including insects, frogs and birds) and plants. Aboriginal people used them as a source of food, and today they give us a place to see wildlife and relax. This pamphlet outlines some of the features of wetlands and the factors that affect them. It also describes some of the wetland research that is currently underway to improve wetland management and protection.



Wetlands include lakes, swamps and damplands. They can be deep or shallow and have open water, reed cover or be a flooded forest. Wetlands can be large or small, natural or artificial, and may contain water all year round or only part of the year. Some wetlands contain water for only a few days or weeks (damplands) while others contain water for many weeks or months or each year (like Forrestdale Lake). Permanent wetlands contain water throughout most years, only very occasionally drying out (like North Lake).

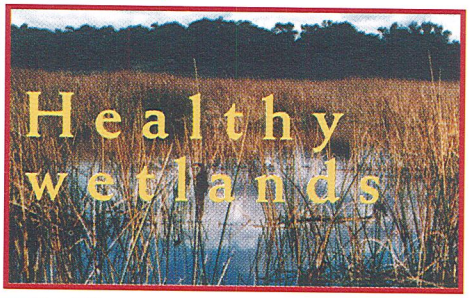
The metropolitan area around Perth contains many wetlands. Most of these wetlands are connected to the groundwater and exist because the winter rainfall raises the level of the groundwater above the ground surface in low lying areas. Other wetlands are rain-filled depressions; these wetlands are common in the drier regions away from the west coast.

Wetlands are deepest in September and October after the winter rains have raised the groundwater level. They are shallowest in autumn when evaporation and use of water by plants and people have reduced the groundwater levels.



Shirley Balla

There are several different types of wetlands. Some of them have a large area of open water with reeds and trees around the edges. Others have no open water but have trees and reeds which are flooded to a depth of about a metre in winter.



Healthy wetlands tend to have several things in common - they have many different kinds of animals, a variety of plants in the water and around the water's edge, and shrubs and trees surrounding the wetland. Conservation of these healthy wetlands is important since animals and plants rely on these wetlands for survival.

Many wetlands dry out in summer and don't refill until the winter rains start. Of those wetlands remaining around Perth, the ones that dry are often the healthiest. However, groundwater extraction for public water supplies for the people of Perth and for irrigation of parks and recreation areas makes particular wetlands shallower than they would naturally be. As a result, they may dry sooner and for longer. If a wetland is dry for longer than it used to be, the animals and plants in and around that wetland change.

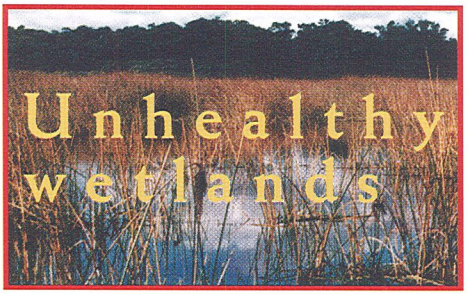
Ray Froend

Shirley Balla

The Water Authority tries to minimize the effect of extracting groundwater to supply Perth in order to protect the wetlands and also pumps groundwater directly into some wetlands to maintain water levels. Almost all of the animals are adapted to wetlands drying out and either spend the dry period as eggs or adults in the dry mud, fly to permanent wetlands or spend the dry period as a flying adult that doesn't need wetlands.

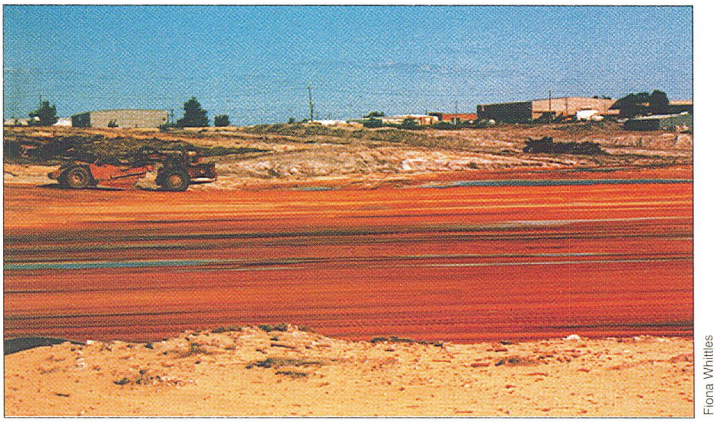
Some of these healthy wetlands have very dark coloured water, while others are clear. The dark colour comes naturally from the decaying leaves and bark from the trees, shrubs and reeds around these wetlands.

Many wetlands which occurred around Perth no longer exist. In fact the centre of Perth is built over several wetlands. As the city expanded, wetlands have been filled in and built over. Over 50% of the original wetlands have been lost to landfill or drainage and a further 20-30% have been drastically modified by clearing of vegetation.



Unhealthy wetlands usually have large numbers of only a few types of animals. They have very little vegetation in an around the edges, usually only lawn, and the water is often green with an algal bloom. Lake Monger is an example of an unhealthy wetland and efforts are being made to improve it.

The loss of vegetation in and around wetlands may lead to the loss of colour in the water and a reduction in the number of animals that live in the wetland. This is because the wetland vegetation provides both food and shelter for the animals. Vegetation also filters out nutrients from the water and helps to limit the amount of nutrients available to algae in the water.



Fiona Whittles

Jenny Davis

One of the other major problems is nutrient enrichment, which results from large inputs of nutrients to the wetlands. These nutrients can come from septic tanks, fertilizers and stormwater drains which carry fertilizer from urban gardens. Nutrient enriched wetlands often have green or blue-green algal blooms which can turn the water bright green (like Lake Monger, Jackadder Lake and North Lake in summer). When these algal blooms are particularly severe, they produce a strong, unpleasant odour which is released as the algae dies and decays.

Algae are plants which produce oxygen during the day and consume oxygen at night. As the algal cells die, bacteria and fungus feed on them, using up more oxygen. The lack of oxygen at night can suffocate and kill the animals that live in the water and dead fish are occasionally found floating in these enriched wetlands. Only the hardy animals survive and

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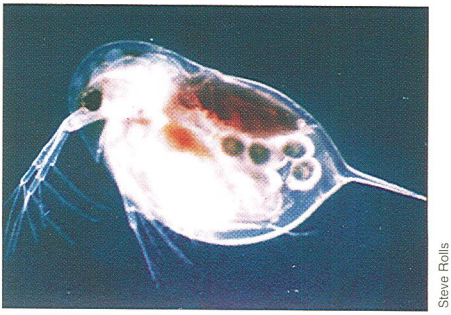
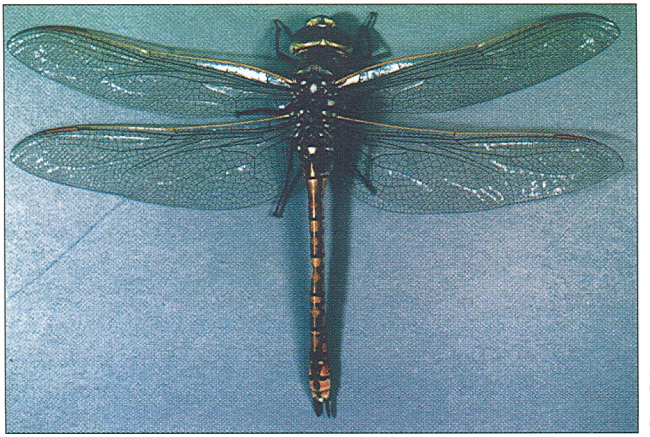
because there is large amounts of algae to eat, these few types of animals (like water fleas and mosquitofish) become very numerous. Swarms of midges often develop and are a nuisance to local residents.

Another consequence of algal blooms is the loss of wetland plants which grow under water and around the edges because the algae sheilds out the light the plants need to grow.

Overfilling of a wetland has the same effect by making the water too deep for the light to reach the plants. Overfilling of wetlands happens when nearby bush is cleared and houses are built around the wetland. The trees are no longer there to use the water so the groundwater level rises, and the rain that falls on houses and roads may run off into wetlands through stormwater drains instead of being absorbed into the ground. Both these things cause the wetland water levels to rise for a few years until gardens become established. Dead trees can often been seen in wetlands that are too full, like Yangebup Lake. The death of vegetation means loss of food and shelter for the animals which become less numerous.



Steve Rolls



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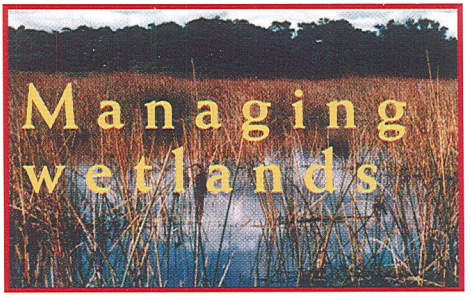


About 70% of the wetlands that once existed in the Perth region have been filled, drained, or cleared. As the urban area continues to expand and engulf more wetlands, the remaining wetlands become pressured by factors associated with urban development: vegetation clearing, overfilling, nutrient enrichment, pollution leaching into groundwater and groundwater extraction. In order to conserve the wetlands as the urban area expands, it has become necessary to manage the land around wetlands to reduce the impact of clearing, drainage and changing water levels.

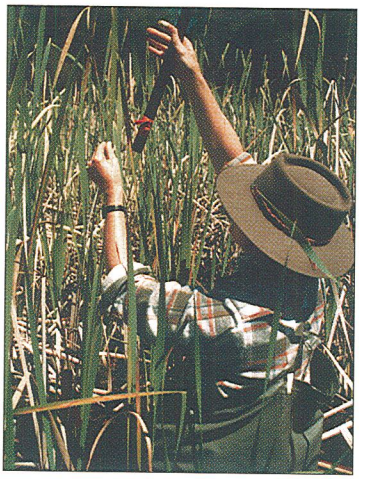
Good management requires detailed information about the groundwater and the plants and animals that live in these wetlands. Research on wetlands will provide information that will help improve unhealthy wetlands and protect and conserve healthy ones.

The Water Authority of Western Australia, the Environmental Protection Authority and the Land and Water Resources Research and Development Corporation have been instrumental in integrating and coordinating wetland research and have funded five wetland research projects. These are:

Wetland classification based on the quality of the water and the animal communities.

Aims:

- *To classify the different types of wetlands in the Perth area,*
- *To determine relationships between invertebrate communities and the quality of the water,*
- *To design a monitoring programme, and*
- *To determine water quality standards and specific management strategies for the urban wetlands.*



Ray Froend

Undertaken by Dr Ron Rosich at the Water Authority, and Dr Jenny Davis and Dr Stuart Bradley at Murdoch University.

The effects of altered water levels on wetland plants.

Aims:

- *To study the effects of changing water levels on the survival of individual species of common wetland plants,*

Stuart Halse

- *To study the effects of changing water levels on the composition of wetland plant communities, and*
- *To develop a model which will help predict the effects of changing water levels.*

Undertaken by Prof Arthur McComb and Dr Ray Froend at Murdoch University.

An assessment of the value of different types of wetlands for waterbirds.

Aims:

- *To find out which waterbirds use different types of wetlands, in what sort of numbers and at what time of the year,*
- *To identify what makes a wetland good or bad for waterbirds,*
- *To predict the effect of changes in a wetland, especially water depth, on its use by waterbirds, and*
- *To determine how often birds move between different types of wetlands.*

Undertaken by Dr Stuart Halse and Dr Andrew Storey at the Department of Conservation and Land Management, and by Mr Rodney Vervest of the Royal Australasian Ornithologists Union.

Interactions between the wetlands and the groundwater.

Aims:

- *To understand how groundwater moves into and out of wetlands,*
- *To define the zone upstream of a wetland which supplies groundwater to the wetland,*
- *To test predictions about interactions between wetlands and the groundwater by measuring concentrations of chemical tracers in and around wetlands, and*
- *To develop computer models for studying groundwater flow in and around wetlands.*

Undetaken by Dr Lloyd Townley and Dr Jeffrey Turner at the CSIRO Division of Water Resources.

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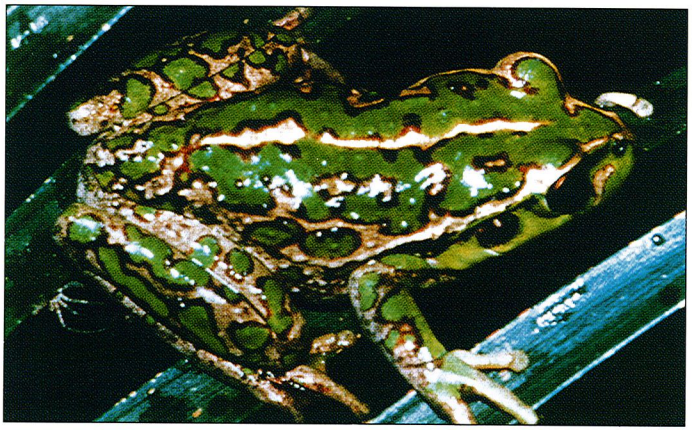

J. D. Roberts

Effects of seasonal drying and nutrient enrichment on the wetland invertebrates.

Aims:

- *To study how seasonal drying affects the wetland invertebrates,*
- *To find out how nutrient enrichment affects the invertebrates,*
- *To discover when the invertebrates need water in the wetlands and for how long,*
- *To determine how the invertebrates survive when the wetlands are dry.*

Undertaken by Dr Jenny Davis and Ms Shirley Balla at Murdoch University.

Wetland mapping, classification and evaluation

The wetlands of the Perth region have been mapped using a wetland classification system designed by C A Semeniuk. In a joint project, the V & C Semeniuk Research Group, Water Authority and Department of Land Administration have refined wetland boundary definition and classification.

Preliminary management objectives have been determined for over 2000 basin and flat wetlands using guidelines prepared by the Environmental Protection Authority. This has been coordinated by the

Water Authority with advice from the Gnangara Mound Technical Advisory Group and the W A Water Resources Council. Evalauations were carried out over four years by Environmental Science students at Murdoch University, Environmental Protection Authority staff, and by consultants Joan Payne, Jan Rodda and Gary Middle.

Stored on the Water Authority's computer based wetland mapping system, clear and accurate statistics of the wetland resources, its condition and discrete wetland identification numbers are now available for use for better land planning, water resources management and wetland management and research.

These projects will be completed by July 1992. This research has greatly increased our knowledge of how wetlands function and how they can be better managed. The results will be integrated into a report that will be useful for wetland managers by June 1993. With this information it will be possible to improve the way we conserve our wetlands for the future.