

Ecological water requirements for the Blackwood Groundwater Area
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The requirement

Natural ecosystems (bushland, swamps, lakes, and streams) are important features of the South West landscape. They provide habitat for wildlife, support ecological functioning in natural systems and provide recreation and scenic values. All ecosystems require water for their continued survival. This water can come from annual rainfall, surface runoff, and/or groundwater. Systems reliant on groundwater discharge, either partially or totally, are known as 'Groundwater Dependent Ecosystems (GDEs)'.

This project is about identifying priority groundwater dependent ecosystems in the South West Yarragadee Blackwood Groundwater Area, and then determining the groundwater requirement to sustain their ecological values. This information will then be used in other processes to develop an overall strategy for groundwater management in the South West.

Objectives

The objectives can be summarised into three requirements.

- Categorising GDEs for their relative dependence on groundwater and the relative importance of their ecological values. Establish management objectives for high value GDEs.
- Defining the interim 'Ecological Water Requirements (EWRs)' needed to maintain the ecological values, and determining the impact of changing groundwater availability.
- Recommending on-going water level and biological monitoring programs for the GDEs, and additional work required to refine and eventually finalise the EWRs.

Methods

The major tasks are:

- identification of GDEs by means of a desktop collation of climatic, geological, hydrologic, landform, soil, and ecological data for the area;
- field inspections for determining relative dependency on groundwater, based on the presence or absence of indicator species, and estimation of potential impacts associated with changes in groundwater levels;
- based on field inspections and data collation, rank GDEs for groundwater dependence and ecological values; and
- determining impact thresholds for GDEs, leading to the definition of EWRs utilising a series of ecological management objectives.

The project is being done in two phases.

- *Phase I* (to be completed in July 2003) - investigation of GDEs on and adjacent to areas most closely linked to the groundwater in the SW Yarragadee Formation (southeast Blackwood Plateau, Scott Coastal Plain, between Bunbury and Capel), and along the Lower Blackwood River.
- *Phase II* (to be completed in October 2003) - investigation of GDEs elsewhere across the SWYBGA, focusing on other aquifer systems not directly linked to the SW Yarragadee Formation.

Preliminary findings

Phase I has been completed, and the draft report has been submitted to the Department of Environment. The key findings for each ecosystem are summarised in the attached table. This is a *very abbreviated preliminary summary* - people interested in learning more about the preliminary results of the study should contact the Department of Environment in Bunbury.

Ecosystems studied	Ecological values	Management Objectives	Likelihood of abstraction impacting values	Potential impacts	Risk
Bunbury-Capel - Coastal areas					
Vegetation, Flora	Diversity and integrity, sign't communities	Seasonal variation maintained	M	L	L
Wetlands	Diversity and fragmentation, refugia	Seasonal variation maintained	H	M	H
Fauna	Diversity, integrity, significant species	Seasonal variation maintained	M	L	L
Processes*	Soil bio-chemistry	Seasonal variation maintained	H	L	H
Bunbury-Capel - Riverine					
Vegetation	Fringing veg, linkages and habitats	Maintenance of flows	L	M	H
Flora	Overstorey species, linkages and habitats	Maintenance of flows	L	L	L
Wetlands	Refugia, prov'n of linkages and habitat	Maintenance of flows	L	L	L
Fauna	Remnant pop'ns of significant mammals	Seasonal variation and range maint'd	M	L	M
Processes	Flow permanence and connection	Maintenance of flows	L	L	L
Bunbury-Capel - Inland					
Vegetation, Flora	TEC's – remnant vegetation, Rare and endangered species, significant species	Seasonal variation maintained	M	H	M
Wetlands	Boyanup wetlands, habitat, refugia	Seasonal variation maintained	M	H	H
Fauna	Remnant pop'ns of significant mammals	Seasonal variation maintained	M	M	M
Processes	Soil bio-chemistry	Seasonal variation maintained	H	L	H
Blackwood River - Main stream					
Vegetation	Fringing and terrace vegetation	Seasonal inundation	L	M	M
Flora	Diversity of species on riverine fringes	Seasonal fluctuations in moisture	L	M	M
Fauna	Significant species, fish, macroinvertebrates	Maintenance of flows	L	M	M
Processes	Channel maintenance	Seasonal elevated flows	L	L	L
Processes	Pool water quality	Maintain water quality	M	M	M
Blackwood River Valley - Tributaries					
Vegetation, Flora	Fringe vegetation, diversity of species, significant species.	Maintain diversity of vegetation	M	M	M
Fauna	Diversity of species, significant species.	Maintain diversity of fauna	M	H	H
Processes	Channel maintenance, water quality	Maintain existing range of water quality	M	H	H
Blackwood River - Estuarine					
Flora	Seagrasses, macroalgae, primary production	M'ce of flows turbidity, colour, depth	L	H	M
Fauna	Fish	Maintain seasonal flows of fresh water	L	H	M
Processes	Connectivity of linkages, fringe vegetation	M'ce of flows turbidity, colour, depth	L	H	M
Blackwood River Valley - Swamps (Sumplands and Damplands)					
Vegetation, flora	Diversity, significant communities, Diversity and rarity, significant species	Seasonal variation and range maint'd	M	H	H
Fauna	Diversity of species, significant species	Seasonal variation and range maint'd	M	H	H
Processes	Soil bio-chemistry	Seasonal variation, anaerobic cond'ns	M	L	M
Blackwood Plateau - Uplands/Slopes					
Vegetation, flora	Connectivity, range of communities, Diversity of species, significant species	Maintain seasonal variation and range	L	L	L
Fauna	Diversity of species, significant species	Maintain seasonal variation and range	L	M	L
Scott Coastal Plain - Swamps (Sumplands and Damplands)					
Vegetation, flora	Diversity, significant communities incl potential TECs, significant species, incl extensive rare and priority species	Maintain seasonal variation and range	M	H	H
Wetlands	Local diversity, remnants, corridors, links	Maintain seasonal variation and range	M	H	H
Fauna	Diversity of species, significant species	Maintain seasonal variation and range	H	H	H
Processes	Soil bio-chemistry	Seasonal variation, anaerobic cond'ns	M	L	M
Scott Coastal Plain - Creeks					
Vegetation, flora	Fringe vegetation, Diversity of species, significant species	Maintain diversity of vegetation, Maintain diversity of flora	M	M	M
Fauna	Diversity of species, significant species	Maintain seasonal flows	M	H	M
Processes	Connectivity and linkages	M'ce of flows turbidity, colour, depth	L	H	M
Scott Coastal Plain - Lakes					
Wetlands	Diversity of fringes of lakes	Maintain seasonal variation and range	M	M	M
Fauna	Diversity of species, significant species	Maintain seasonal variation and range	H	H	H
Scott Coastal Plain - Uplands/Slopes					
Vegetation, flora	Diversity of communities, diversity of species, significant species,	Maintain seasonal variation on lower slopes	L	M	L
Fauna	Diversity of species, significant species	Maintain seasonal variation on lower slopes	L	M	L

H – High; M – Moderate; L – Low

TEC – Threatened ecological communities

The term 'process' refers to ecological processes such as nutrient and carbon cycling, and soil microbial activity.

The summary table shows the ecological values associated with each ecosystem studied. The management objectives for these values, the 'likelihood' that any groundwater abstraction (pumping) including existing and potential future private allocations from the South West Yarragadee formation will threaten this value (high, medium, low), and the potential impacts ('consequences') if this occurs (high, medium, low). These two criteria are combined in an overall assessment of 'risk'.

Assumptions

To determine interim EWR's, valid ecological assumptions have been made in assembling and interpreting data from previous research, and from the field work. These assumptions will be tested through on-going water level and biological monitoring programs for the GDEs, and any additional work required refining and eventually finalising the EWRs.

Next steps

Desktop identification of GDEs for Phase II is underway. Fieldwork will be completed in August.

Project Team

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