



**The Department of  
Water, Land and  
Biodiversity  
Conservation**

# **Eyre Peninsula Water Management GIS Report** (NHT Project 974221)



**Report DWLBC 2002/03**



**The Department of  
Water, Land and  
Biodiversity  
Conservation**

# **EYRE PENINSULA WATER MANAGEMENT GEOGRAPHIC INFORMATION SYSTEM**

*NHT Project No 974221*

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*Department of Water, Land and Biodiversity Conservation*

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Government  
of South Australia

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Covering Photographs

Groundwater wetting front discharging from sanddunes, drainage course to groundwater recharge points Uley South, Murdinga Dryland salinity rehabilitation trench.

## Foreword

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South Australia's water resources are fundamental to the economic and social wellbeing of the State. Water resources are an integral part of our natural resources. In pristine or undeveloped situations, the condition of water resources reflects the equilibrium between rainfall, vegetation and other physical parameters. Development of surface and groundwater resources changes the natural balance and causes degradation. If degradation is small, and the resource retains its utility, the community may assess these changes as being acceptable. However, significant stress will impact on the ability of a resource to continue to meet the needs of users and the environment. Degradation may also be very gradual and take some years to become apparent, imparting a false sense of security.

Management of water resources requires a sound understanding of key factors such as physical extent (quantity), quality, availability, and constraints to development. The role of the Resource Assessment Division of the Department of Water, Land and Biodiversity Conservation is to maintain an effective knowledge base on the State's water resources, including environmental and other factors likely to influence sustainable use and development, and to provide timely and relevant management advice.

**Bryan Harris**

Director, Resource Assessment Division  
Department of Water, Land and Biodiversity Conservation

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## **ABSTRACT**

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Groundwater is Eyre Peninsula's most precious resource and has become the sole source of reticulated water to meet potable and industrial demand. Water resources on Eyre Peninsula are scarce and fragile, particularly in the low rainfall regions, with few reliable freshwater streams and the groundwater availability is highly variable. The groundwater recharge and hence the security of the resource, is highly dependent upon local rainfall, landcover and landuse.

Surface water is scarce and unreliable, and reticulated water is limited. Difficulty in accessing water resources has placed both a social and economic burden on the rural community throughout the region. The information contained on the CD will provide a vital framework for the future management planning of the available resources in the region.

## INTRODUCTION

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Funding was received from the Natural Heritage Trust (NHT) to undertake the development of a GIS framework in which to present the groundwater resources of Eyre Peninsula (NHT project No. 974221).

The groundwater systems of Eyre Peninsula are unique in comparison to other semi-arid regions within the State. The thin veneer of surface calcrete which overlies some of the more extensive potable groundwater lenses, promotes high runoff of rainfall that is directed to the underlying host rock (Quaternary limestone) through dissolution features. Recharge rates and groundwater quality are therefore higher than would normally be associated with similar semi-arid environments.

The demand on these potable groundwater resources has increased over the past few years; however, a decade of below average rainfall has seen many of these resources continue to decline even in areas where no pumping demand exists. In other areas across the peninsula the occurrence of relatively saline groundwater in close proximity to ground surface presents a real threat of increased dryland salinity. Areas around Cowell on the eastern side of the peninsula are developing remediation strategies via drainage to preserve the productivity of the land.

The project has extended the Geographical Information System (GIS) coverage beyond the limits of the Lincoln 1:100 000 map sheet to incorporate the map sheets of Yardea, Streaky Bay and Kimba. This information has been compiled to ensure that every opportunity is taken to protect the region's groundwater resources and to achieve a high level of equity in its allocation.

In addition, areas where depth to groundwater is less than two metres below ground surface are at risk from dryland salinity. The information provided on the CD can be used to develop management strategies to address specific areas before the risk of salinisation becomes too great.

## AIMS AND OBJECTIVES

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Potable groundwater resources occur along the western coastal margin of Eyre Peninsula and across the southern tip of the peninsula due to slightly elevated rainfall and a suitable host rock (Quaternary limestone) to receive rapid recharge. The major groundwater sources are located in two principal areas; County Flinders at the southern tip of the peninsula encompassing Coffin Bay and Port Lincoln; and County Musgrave along the western side of the peninsula between Elliston and Lock. Both the County Flinders and County Musgrave regions have been prescribed under the *Water Resources Act 1997* and are currently administered by the Eyre Peninsula Catchment Water Management Board.

Other discrete groundwater resources occur throughout Eyre Peninsula and are often used to supply the small coastal townships along the western side of the peninsula eg. Port Kenny and Streaky Bay.

The groundwater resources of Eyre Peninsula are often referred to as lenses. Within the Musgrave Prescribed Wells Area the extent of the potable groundwater lenses are defined by the 1000 mg/L isohaline contour within the saturated zone of the unconfined Quaternary limestone.

The information has been compiled to assist the Eyre Regions Catchment Water Management Board to develop a catchment water management plan for the whole region with particular emphasis on areas that may be at risk from dryland salinisation.

The information is provided on CD and contains free shareware software Acrobat Reader version 4.0 or Arc explorer version 1.1. The disk is configured for autorun when inserted for ease of use. The contents provide information concerning depth to watertable, watertable elevation above sea level, groundwater salinity and groundwater yield. Drilling activity is limited on Eyre Peninsula and it is envisaged that the information presented on this CD is likely to remain valid for several years. It is likely that under the direction of the Catchment Water Management Board in future years more detailed work will be undertaken to further define the available resources across Eyre Peninsula which will facilitate the compilation of information at scales of 1:10 000 or 1:2500.



## DATA SOURCE AND LIMITATIONS

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Data has been sourced from information held within State databases principally that owned and administered by the Resource Assessment Division of the Department of Water, Land and Biodiversity Conservation (SA Geodata). Whilst every effort has been made to validate and present the information as accurately as possible there are still likely to be a number of errors or omissions from the data set. For example groundwater salinity information for the Robinson lens may be considered unreliable due to the methods used to obtain samples. Yields could in some instances be slightly overestimated, if values have been derived primarily from airlift tests and not aquifer pumping tests.

It should also be noted that the drill hole data set is likely to be skewed toward the locality and occurrence of groundwater that is of a usable quality. Information about the occurrence and yield of more saline groundwater is likely to be limited given that there is no significant demand for saline groundwater. This may impact on the extent of areas that could be at risk from dryland salinisation. It is also probable that a proportion of information about groundwater quality is missing or has never been captured in the database.

The information has been compiled and presented in its present format with the aid of computer contouring packages. The algorithms used to generate the contours have been selected based on the best spatial fit for the available data. A slightly different result will occur if the same set of data is contoured using a different algorithm.

The information is presented at the 1:100 000 scale to reflect the regional occurrence of groundwater. Past experience has demonstrated that there is a tendency for the information to be taken and used at a scale less than 1:100 000. This is an inappropriate use of the information as supplied and can lead to erroneous conclusions about the extent, locality or capacity of the resource. Any work requiring a more detailed assessment and finer scale such as 1:10 000 the appropriate information should be obtained from the Department of Water, Land and Biodiversity Conservation and re-evaluated at the appropriate scale to provide a more accurate interpretation of the resource within the area of interest. The department does not guarantee, nor does it accept liability for the accuracy of the information provided if it is used for a purpose other than that for which it was intended.

Up-to-date water level monitoring data from the observation monitoring wells established within most of the major groundwater resources across Eyre Peninsula can be accessed via the Department of Water, Land and Biodiversity Conservation Internet site [www.dwlbc.sa.gov.au](http://www.dwlbc.sa.gov.au)

## CONCLUSIONS

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The project has extended the Geographical Information System (GIS) coverage beyond the limits of the Lincoln 1:100 000 map sheet to incorporate the map sheets of Yardea, Streaky Bay and Kimba. This information has been compiled to ensure that every opportunity is taken to protect the region's groundwater resources and to achieve a high level of equity in its allocation.

The information can be used as a benchmark to assist the Eyre Regions Catchment Water Management Board to develop a catchment water management plan for the whole region. Despite the limitations of the data set the information can be reliably used for broadscale planning and risk assessment of the likely areas to be affected by dryland salinisation. The information can also be used to assist future development planning to prevent competition or conflicts between proposed landuses and to preserve the integrity of the available resources.

Drilling activity is limited on Eyre Peninsula and it is envisaged that the information presented on this CD is likely to remain valid for several years. In future years, under the direction of the Catchment Water Management Board, more detailed work will be undertaken to further define the available resources across Eyre Peninsula which will facilitate the compilation of information at much finer resolution requiring a greater level of accuracy such as scales of 1:10 000 or 1:2 500.

## SI Units Commonly Used Within Text

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Name of unit	Symbol	Definition in terms of other metric units	
Millimetre	mm	$10^{-3}$ m	length
Metre	m		length
Kilometre	km	$10^3$ m	length
Hectare	ha	$10^4$ m <sup>2</sup>	area
Microlitre	μL	$10^{-9}$ m <sup>3</sup>	volume
Millilitre	mL	$10^{-6}$ m <sup>3</sup>	volume
Litre	L	$10^{-3}$ m <sup>3</sup>	volume
Kilolitre	kL	1 m <sup>3</sup>	volume
Megalitre	ML	$10^3$ m <sup>3</sup>	volume
Gigalitres	GL	$10^6$ m <sup>3</sup>	volume
Microgram	μg	$10^{-6}$ g	mass
Milligram	mg	$10^{-3}$ g	mass
Gram	g		mass
Kilogram	kg	$10^3$ g	Mass

## Abbreviations Commonly Used Within Text

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Abbreviation	Name	Units of measure
TDS	= Total Dissolved Solids ( <i>milligrams per litre</i> )	mg/L
EC	= Electrical Conductivity ( <i>micro Siemens per centimetre</i> )	μS/cm
pH	= Acidity	
δD	= Hydrogen isotope composition	‰
CFC	= Chlorofluorocarbon ( <i>parts per trillion volume</i> )	pptv
δ <sup>18</sup> O	= Oxygen isotope composition	‰
<sup>14</sup> C	= Carbon-14 isotope ( <i>percent modern Carbon</i> )	pmC
ppm	= Parts per million	
ppb	= Parts per billion	

## **ACKNOWLEDGEMENTS**

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Funding support from the Natural Heritage Trust (NHT) is gratefully acknowledged, which has enabled this information to be compiled into a format that is useful for planners, resource managers and the general public. The information CD has been produced by the Publications and Displays branch of Primary Industries and Resources SA. Any queries concerning the information contained on the disk should be directed to the Department of Water, Land and Biodiversity Conservation, Resource Assessment Division, GPO Box 2834, ADELAIDE SA 5001.