

1 Introduction

The substantial groundwater resources of the northern Perth Basin have been known since the late nineteenth century, when government geologist Andrew Gibb Maitland highlighted the need for further investigations to meet the demand for information.

The favourable results which have accrued by the sinking of artesian wells in that tract of country adjacent to the Indian Ocean which may be called the Great Coastal Plain, and the possible amelioration of some of the conditions of life in the arid portions of the Colony, has led to applications from the Departments of Works and Lands for geological advice in connection with the question. The demands for such advice far exceed the limits of the accumulating supply of information.
(Maitland 1898)

Since Maitland published his report 118 years ago, a wealth of hydrogeological information and knowledge has been progressively collected across the northern Perth Basin and surrounds. Until now, this information, which represents an investment of over \$100 million in real terms, has been stored among private bore records, government databases, geological reports and unpublished hydrogeological reports.

The Department of Water is Western Australia's lead water agency, responsible for managing the state's vast groundwater resources. The department is custodian of all northern Perth Basin data, comprising geological logs, drillers' logs, water levels, aquifer test results and water quality. This bulletin represents the first compilation and analysis of all available information on the groundwater resources of the basin in one document. The area covered by this bulletin also includes the southernmost portion of the Carnarvon Basin and the Northampton Inlier that are adjacent to the northernmost extent of the Perth Basin.

This publication is colloquially referred to as the 'northern Perth Basin bulletin' and it provides not only a technical resource for groundwater professionals but also a complete source of information for current and potential groundwater users and the general public.

The geographical scope of this bulletin extends from Gingin Brook in the south to the Murchison River in the north and from the Indian Ocean in the west to the western edge of the Darling Plateau in the east (Figure 1).

The geological sequence of this region records over 500 million years of Earth's history. The sediments of the entire Perth Basin have been deposited within relatively low-lying topography created by rifting during the breakup of Gondwana some 300 million years ago. It is these sediments, up to 12 km thick and now filled with water from rainfall past and present, that provide most of the water resources to the region. Some of the geological formations within the Perth Basin have analogues within the southern Carnarvon Basin that were deposited at the same time, under similar environmental conditions. For completeness, these formations are also described in this bulletin.

This bulletin is considered a companion document to previously published reports on the hydrogeology of the Perth Basin in the Perth region (Davidson 1995) and the southern Perth Basin (DoW in prep.). Collectively, these three publications provide a full description of the geology and hydrogeology of the entire Perth Basin. For further information on the Carnarvon

Basin, readers are referred to Hocking et al. (1987), which describes the geology of the Carnarvon Basin, and Allen (1987), which describes the hydrogeology of the Carnarvon Basin north of the Murchison River.

This bulletin contains six chapters and a series of appendices. After this introduction, Chapter 2 presents an historical overview of our understanding of the groundwater resources of the northern Perth Basin, including hydrogeological investigations, groundwater model development and ecohydrological investigations. Chapter 3 summarises the environmental setting of the groundwater system, describing the climate, land use, catchment hydrology, ecosystems and geological setting. Chapter 4 presents detailed stratigraphic and lithologic descriptions of the geological formations of the region. Chapter 5 summarises the current state of knowledge of the aquifers in the region, with a focus on the aquifers of the northern Perth Basin, but also includes the southern Carnarvon Basin, and the Northampton and Mullingara inliers. Chapters 4 and 5 of this bulletin are based on a preliminary report produced for the Department of Water by Pennington Scott (2010), with modifications and additions. Finally, Chapter 6 focuses on the management of groundwater resources, including current use and future potential demand.

Groundwater concepts and terminology that might not be common knowledge are explained in the glossary, along with a list of abbreviations and a reference list containing all relevant publications and sources of data. The appendices present data from aquifer tests and the estimated aquifer properties.

This bulletin contains over 100 figures that include geological and hydrogeological maps, cross-sections, diagrammatic sections, geophysical logs, hydrographs and climate data. Maps are drawn on a regional scale based on the interpretation of available data and are valid at the scale presented. Digital spatial data can be accessed at spatial.data@water.wa.gov.au by quoting the datasets and the relevant figure number.

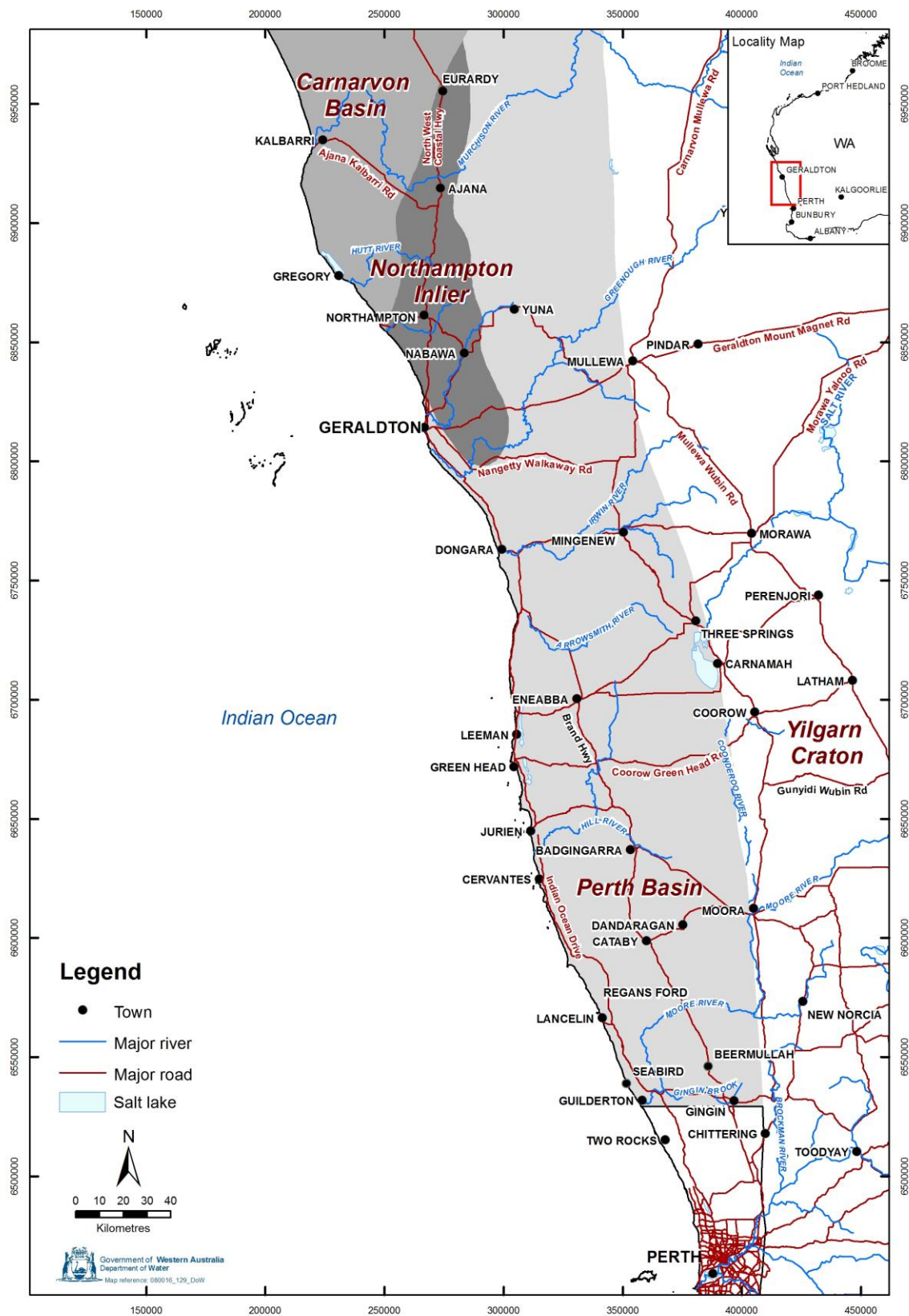


Figure 1 Geographical area covered by the northern Perth Basin bulletin