



Australian Government



Geological and Bioregional Assessment Program

Fact sheet 21

Revising the geology of aquifers in the Cenozoic Lake Eyre Basin

In the Cooper GBA region, groundwater is sourced from either deep aquifers in the Eromanga Basin (also known as the Great Artesian Basin or GAB) or shallow near-surface aquifers. Shallow aquifers include those in the Cenozoic Lake Eyre Basin (Quaternary sediments, Namba Formation, Eyre Formation, and their respective equivalents in Queensland, the Whitula and Glendower formations) and the Winton Formation (Eromanga Basin). The aim of this study was to improve the understanding of the geology of shallow aquifers using existing petroleum well data. Some outcomes include:

- Approximately 1900 wells had information that was suitable for this study (Geological and Bioregional Assessment Program, 2020a). Data were interpreted to identify boundaries between different geological formations and to determine the vertical distribution of sands and shales in each well bore (Figure 1).
- The topography of the sub-surface geology is variable in the region. For example, the top of the Winton Formation can be over 300 m below ground level and a series of deep (palaeo) valleys are incised into the top of the Winton Formation and subsequently filled with sediments (Figure 2).
- It can be difficult to pick boundaries between the Quaternary sediments and the Namba Formation, and between the Namba Formation and the underlying Eyre/Glendower formations. Further, lithological variations due to changes in depositional environments make it difficult to correlate the Namba Formation over large distances, which may limit understanding of groundwater connectivity.
- Variations in sub-surface geology and structure are likely to influence groundwater flow and connectivity by separating the aquifer into different compartments. For example, groundwater under Lake Yamma Yamma (Figure 2) may be stagnant as there is no obvious outlet due to the configuration of the surrounding local geology. This may also be the case in South Australia in the vicinity of Moomba, where buried ridges segregate sandstones deposited in valleys on either side of them (for example the Gidgealpa and Packsaddle ridges (Figure 2).
- High variability in the thickness of the Namba Formation and overlying Quaternary sediments may be indicative of recent fault movement or subsidence (for example Lake Yamma Yamma).

Figure 1 Example petroleum well log from Cooper Creek floodplain in Queensland

Depth in feet, original geophysics data (GammaRay – GR), drillers mudlog, interpreted geological formation intervals, depth in metres, processed and standardised gamma ray log (GRn), and interpreted lithology shown as stippled yellow for sandstone and brown for clay-rich sediments, such as shale or siltstones.

Data: petroleum well interpretations (Geological and Bioregional Assessment Program, 2020a), tabulated well picks used for modelling (Geological and Bioregional Assessment Program, 2020b)

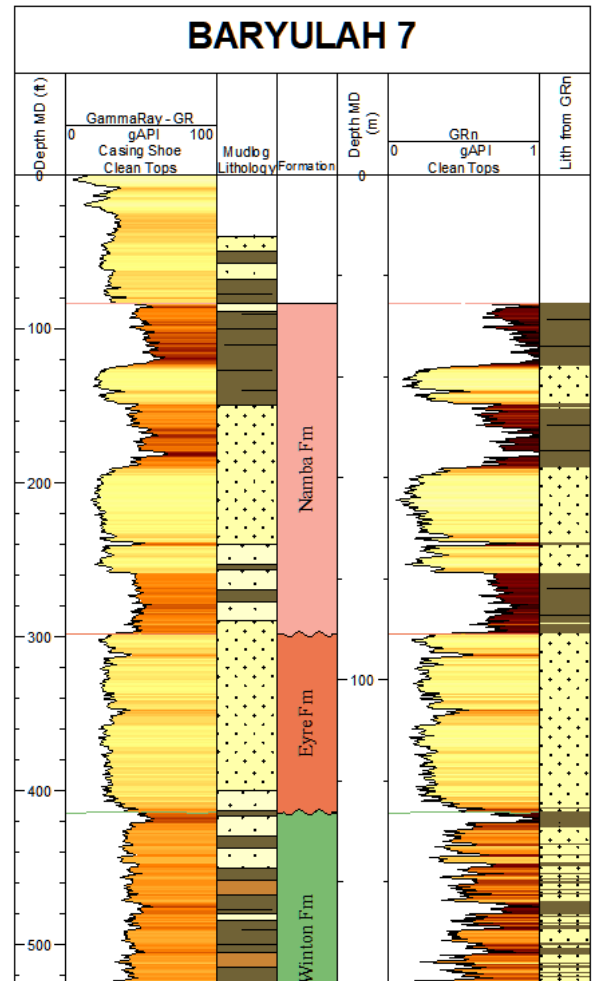
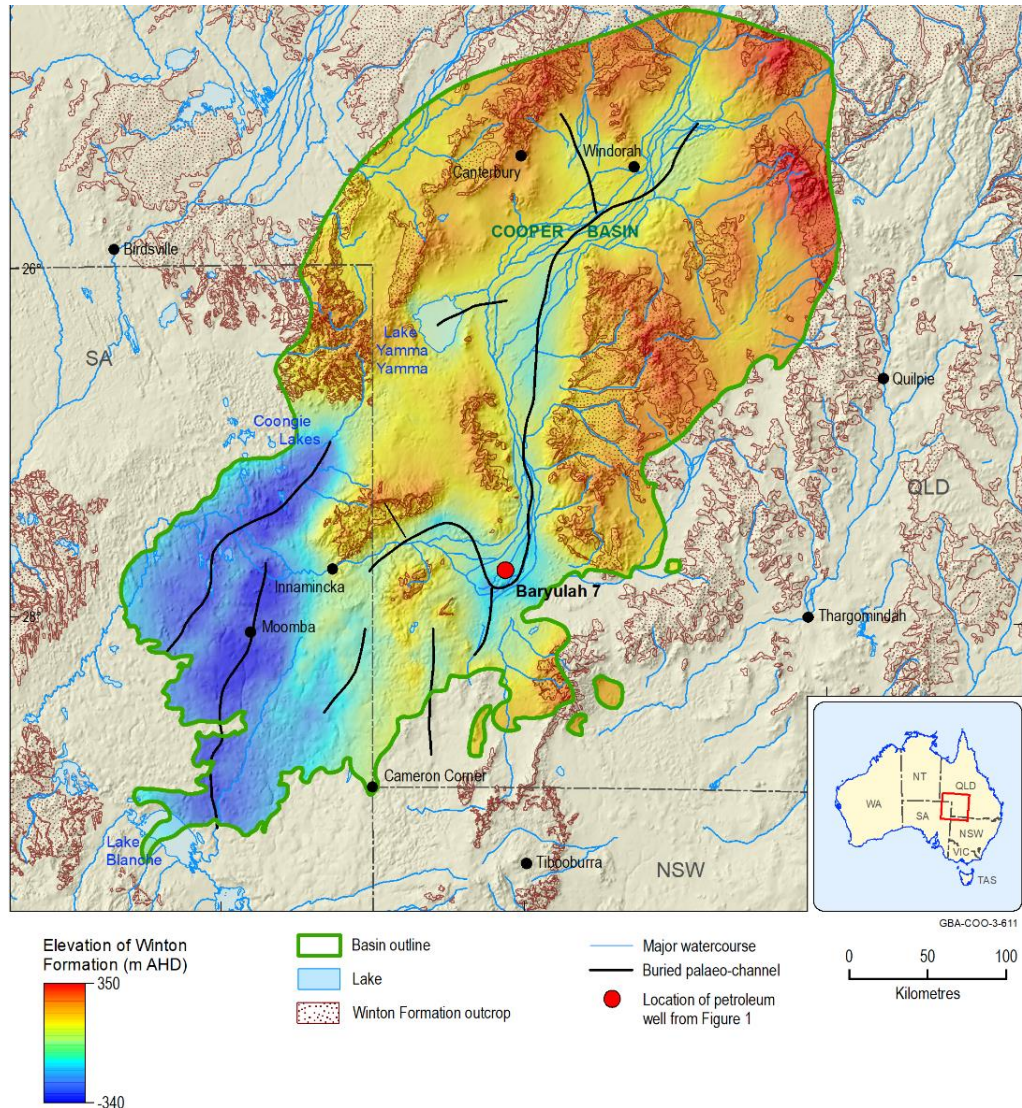


Figure 2 Interpreted top of Winton Formation (base of the Lake Eyre Basin)

Blue areas indicate where the Winton Formation is more deeply buried, whereas warmer colours indicate shallower burial, with brown indicating outcrop of the Winton Formation.
 Data: Winton Formation geological model (Geological and Bioregional Assessment Program, 2021)

The GBA Program

The \$35.4 million Geological and Bioregional Assessment (GBA) Program is assessing the potential impacts of shale and tight gas development on water and the environment to inform regulatory frameworks and appropriate management approaches. The geological and environmental knowledge, data and tools produced by the GBA Program will assist governments, industry, land users and the community by informing decision-making and enabling the coordinated management of potential impacts.



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Find out more

Datasets that support this work are available at data.gov.au:

- Geological and Bioregional Assessment Program (2020a) [Cenozoic and Winton formation geology project for the Cooper GBA region](#).
- Geological and Bioregional Assessment Program (2020b) [Cooper GBA stratigraphic drillhole intersections](#).
- Geological and Bioregional Assessment Program (2021) [Top of the Winton Formation gridded surface](#).

More information is available at bioregionalassessments.gov.au/gba.