

LOCK 3 TO MORGAN MODEL 2005

Purpose

The purpose of the model, as described in Middlemis (2005), is to provide a management tool for determining salt loads entering the River Murray from the major irrigation areas. Following accreditation by the Murray-Darling Basin Authority (MDBA), the model results are used to evaluate salt loads from accountable actions, such as irrigation practice, irrigation area development and Salt Interception Schemes.

Background

From Middlemis (2005), the Lock 3 to Morgan model is designed with features to represent the irrigation, drainage, and Salt Interception Schemes in these areas, and appropriate features to represent the river and very simple floodplain processes.

The model was developed by Aquaterra in 2004 and accredited by MDBA in 2005 (Middlemis *et al.*, 2005). The model has been re-run for all standard scenarios in 2007 (Aquaterra, 2007). It was applied to the history match period (1967 to 2003) to determine the salt loads at the key dates of 1988 and 2000, as well as at 2003. It was then applied to the prediction scenarios for the period 2004 to 2104 for MDBA Salinity Register Entry.

The model was built with Processing MODFLOW (PM).

Location

The location of the model domain is shown in Figure 1. The flow budget zone involves an area between Lock 3 and Morgan and it covers both sides of the River.

Model structure

Model domain and grid size

The model domain simulates an area 71 km (east to west) by 45 km (north to south). The bounding coordinates of the model domain are 372000E, 6196700N (south-west) and 443000E, 6241700N (north-east) (GDA 1994, MGA Zone 54).

The Morgan to Lock 3 model has a grid spacing of 75 m square cells in the Qualco and Waikerie irrigation areas. The grid expands to 200 m x 75 m in the Woolpunda reach, to reduce the dimensionality of the model, and because the increased bore spacing in this area makes it feasible. Regionally, the grid expands to a maximum of 265 m x 580 m.

The overall grid comprises 342 rows x 534 columns, giving 182 628 cells per layer, or 1.28 million cells over the 7 model layers. Along with the recharge, river, Salt Interception Scheme (SIS) pumping bores and disposal basin leakage features in the model, the model size results in relatively slow run times (in the order of several hours for long runs).

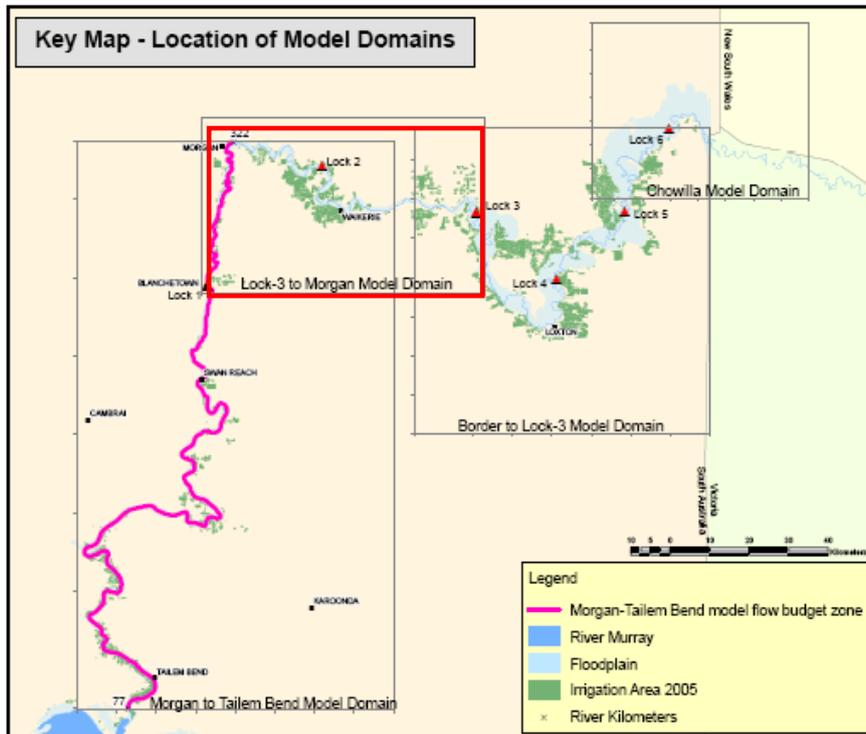


Figure 1. Lock 3 to Morgan model domain

Model layers

There is a layer to represent each major unit of the Murray Group (below the water table), plus one layer to represent the underlying Renmark Group (Table 1 and Figure 2):

Table 1. Model layers

Layer	Hydrogeological unit	Aquifer/ Aquitard	Note
1	Loxton Sands	Aquifer	Unsaturated in most area and as a perched aquifer in part of Qualco and Waikerie areas
2	Cadell Formation	Aquitard	As an aquitard in area when perched aquifer existing
3	Glenforslan Formation	Aquifer	-
4	Finniss Formation	Aquitard	-
5	Mannum Formation	Aquifer	-
6	Ettrick Formation	Aquitard	-
7	Renmark Group	Aquifer	-

MORGAN-LOCK 3 MODEL LAYERING

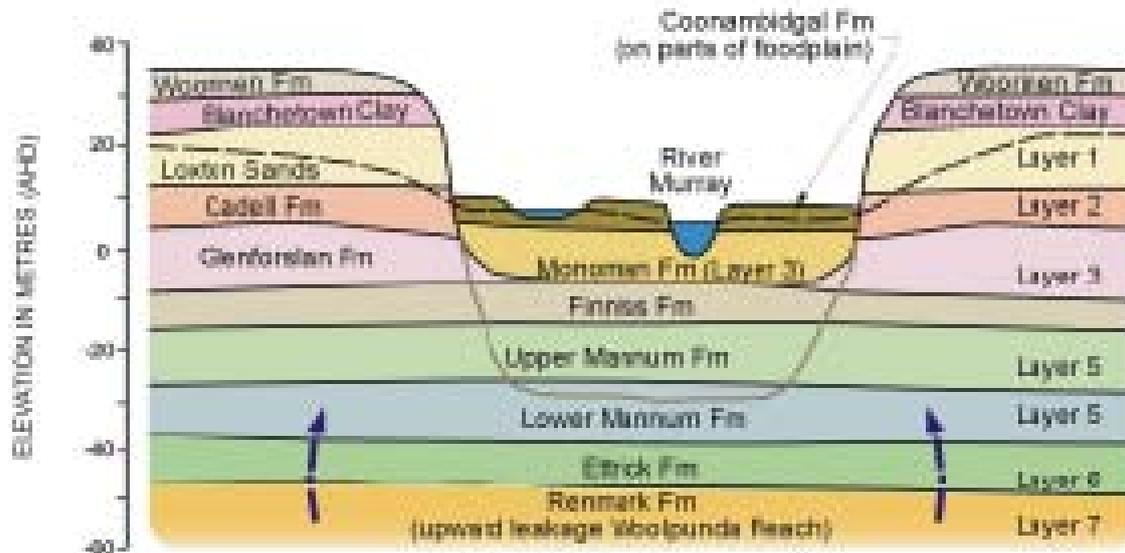


Figure 2. Cross-section

Reports

Middlemis H, Jolly I, Georgiou J and Walker G, 2005, *Groundwater Modelling of Salt Interception Schemes in the Woolpunda – Cadell reach of the River Murray, Volume 1: Main Report*, prepared for the Department of Water, Land and Biodiversity Conservation

Aquaterra, 2007, *Lock 3 to Morgan accountable salinity debits and credits – Groundwater Modelling Scenarios*, prepared for the Department of Water, Land and Biodiversity Conservation