

Southern basin regional water strategy modelling

The NSW Government has invested in new climate datasets and improved hydrological modelling to inform the development of the Murray and Murrumbidgee regional water strategies. To gain a more sophisticated understanding of the regions’ climate and the effect of future climate change, the government is significantly improving the southern basin hydrological models.

To develop the new, integrated model framework of the southern basin (Figure 1) and improve the integration and functionality of our hydrologic models, we work collaboratively with other state and territory governments, the Murray–Darling Basin Authority, Snowy Hydro Limited and Icon Water. This important work brings together several separate hydrological models (some of which are owned and managed by different governments and other entities) into an integrated modelling framework of the southern connected system for the first time. This work ensures we have state-of-the-art models that will allow us to better understand the regions’ climate and water-related risks to NSW communities and water users.

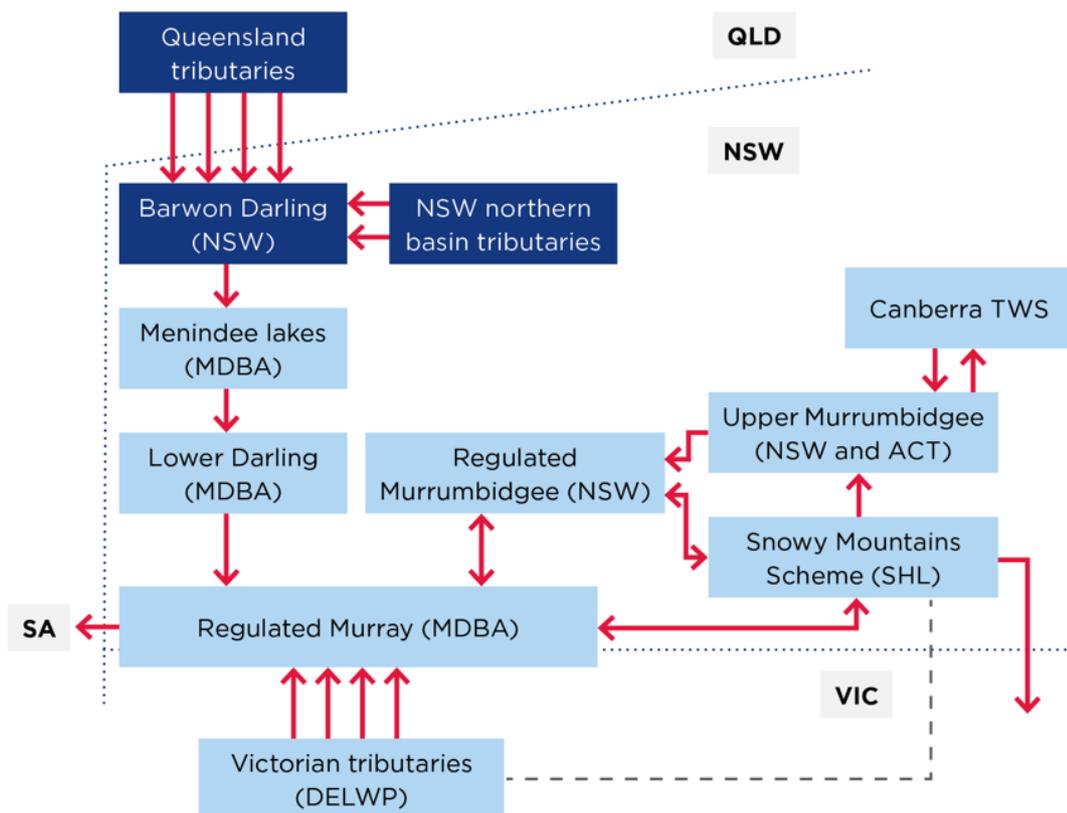


Figure 1. Integrated Southern Basin Model

Key: DELWP = Victorian Department of Environment, Land, Water and Planning; MDBA = Murray–Darling Basin Authority; SHL = Snowy Hydro Ltd; TWS = Town Water supply

Figure 1 shows that there are feedbacks between the Murray, Murrumbidgee and Snowy models. We consider these feedbacks by running the models several times until the exchange of information between models has converged.

For all water planning and management decisions, the NSW Government uses the most up-to-date information, evidence and hydrological models available at the time. We continuously seek to improve the functions and integration of our hydrological models to help ensure we manage NSW's water resources sustainably for current and future generations.

Through the work of the regional water strategies, we were able to upgrade and improve various hydrological models in the southern basin. This has given us the ability to better:

- understand the interactions between the Snowy Scheme, the upper Murrumbidgee, the regulated Murrumbidgee and Murray systems
- reflect the inputs from the Snowy Scheme to the Murrumbidgee and Murray systems
- reflect downstream requirements placed on the upstream systems
- reflect operational practices, including a better understanding of how held environmental water is used in the Murrumbidgee region.

We acknowledge that operational and water use decisions will continue to evolve over time. We may need to make ongoing changes to the hydrological models to reflect these practices.

Table 1 summarises the model development, upgrade and integration process work we have done for the regional water strategies.

Specific work done to date

Table 1. Work done by catchment

Valley/catchment	Specific work for regional water strategies	Reasons
Snowy catchment	<ul style="list-style-type: none"> • Development of snow melt and rainfall runoff models • Use of existing Snowy model with this new data to generate inflows into Murray and Upper Murrumbidgee models, reflecting Snowy Hydro Licence requirements. 	<ul style="list-style-type: none"> • To generate instrumental and stochastic inflow and climate to be used by the Snowy Hydro Ltd model. This will provide inflow and water licence inputs to Murray and Murrumbidgee models.

Valley/catchment	Specific work for regional water strategies	Reasons
<p>Victoria</p>	<ul style="list-style-type: none"> • To provide a set of inflows into Victorian river systems (Kiewa, Ovens and Goulburn) that allows modelling of the instrumental and stochastic periods that is consistent with climate data throughout the southern connected system. • To provide a consistent set of climate inputs that were used to model Victorian demands over the instrumental and stochastic periods. • Development of a regression model for Broken Creek inflows • Flow modelling through the Victorian Department of Environment, Land, Water and Planning (DELWP) river system models, to generate inflows into the Murray from Victorian tributaries 	<ul style="list-style-type: none"> • To generate instrumental and stochastic inflows from the Kiewa, Ovens, Goulburn and Broken river systems for the Murray river system model.
<p>South Australia</p>	<ul style="list-style-type: none"> • Development of a rainfall runoff model of South Australian catchments • Development of regression model for Adelaide water supply 	<ul style="list-style-type: none"> • To generate runoff from Eastern Mount Lofty Ranges and demand for Metro Adelaide Water Supply under stochastic climate, enabling 10,000-year simulation of the Murray Source model.
<p>Upper Murrumbidgee</p>	<ul style="list-style-type: none"> • A new Source model that includes: <ul style="list-style-type: none"> — improved understanding of Snowy Hydro contributions (from Snowy Hydro Model) — rainfall runoff models of all catchments — river-reach crop-demand models — integration of Tantangara and Goodradigbee operations — ACT, Yass and Cooma water supply and demand models 	<ul style="list-style-type: none"> • To enable the water security analysis of the key towns of Upper Murrumbidgee including ACT, Yass and Cooma. • To provide Goodradigbee and Murrumbidgee inflows into the regulated Murrumbidgee model.

Valley/catchment	Specific work for regional water strategies	Reasons
<p>Murrumbidgee</p>	<ul style="list-style-type: none"> • Inclusion of inflows from Snowy and Upper Murrumbidgee river system models • Murrumbidgee regulated model upgraded to the Source Modelling Platform • Snowy Water Licence implementation • Improved urban demand models • Modelling of held environmental water 	<ul style="list-style-type: none"> • This is a new source model of the regulated Murrumbidgee system developed as part of NSW Department of Planning and Environment’s Transition to Source from IQQM (Integrated water Quantity and Quality simulation Model) modelling platform. It is more representative of current conditions in the valley, including aspects such as Snowy Water Licence and current environmental water use.
<p>Murray</p>	<ul style="list-style-type: none"> • Existing Source Murray Model (water resource plan version) has been updated to include: <ul style="list-style-type: none"> — improved understanding of inflows to regulated system from Snowy — development of rainfall runoff models upstream of Hume Dam — improved representation of local water utility demands for towns across the Murray — improved Snowy Water Licence implementation (post-corporatisation) — improvements to allow the Murray model to run for 10,000 years including resource assessment and effluent and river rating curves. 	<ul style="list-style-type: none"> • Upgraded model allows for better representation of Snowy/Murrumbidgee linkages and represents current conditions in the valley

The model improvements discussed above for the purposes of regional water strategies apply to resource planning models for surface water. Such models do not directly represent surface water-groundwater interactions and cannot represent complex flood behaviour. Despite these limitations, the new climate datasets and modelling will be an important first step in advancing our understanding of the risks to surface water systems in the NSW Murray and Murrumbidgee regions and the towns, communities, industries and the environment that rely on them. The NSW Department of Planning and Environment is also working to further advance its climate science to inform future water management in NSW.

Given the complexity of this work, we are completing extensive reviews and quality assurance processes before we release the regional water strategy modelling outputs. Once the reviews are complete, the NSW Government intends to make the outputs publicly available. This evidence will relate to NSW water resources and the government will make it available where its release does not affect commercial confidentiality.

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