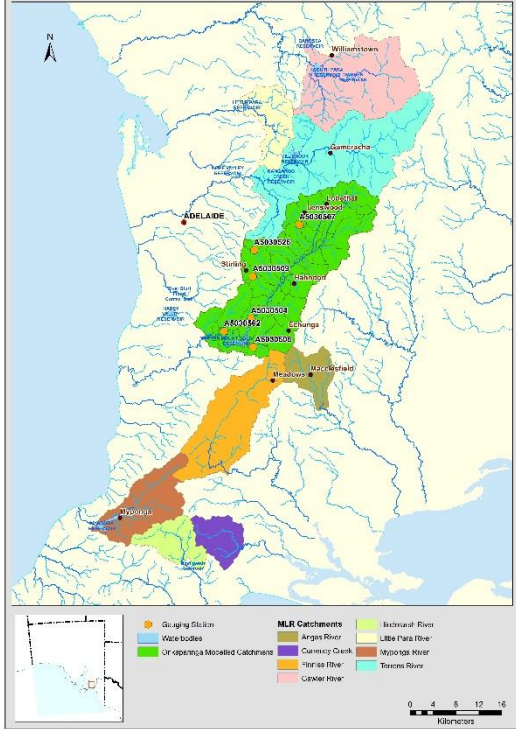


GOYDER INSTITUTE MODEL METADATA TEMPLATE

METADATA REQUIRED	DETAILS
Model Name and version	Statistical Models for constituent and flow modelling in the Onkaparinga Catchment
Date of lodgement of Metadata. Name of Metadata Provider	26 June 2015 Dr Petra Kuhnert, Petra.Kuhnert@csiro.au CSIRO Digital Productivity Flagship Data Integration, Assimilation and Uncertainty
Goyder Institute Project Number and Name	GOYDER INSTITUTE FOR WATER RESEARCH Project No. I.1.7 Mt Lofty Ranges (MLR) Water Quality Model
Project Team	<u>Project Leader:</u> Prof Jim Cox, Jim.Cox@sa.gov.au Sustainable Systems Group, SARDI, <u>CSIRO Project Leader:</u> Dr Petra Kuhnert, Petra.Kuhnert@csiro.au CSIRO Digital Productivity Flagship, Waite Rd, Urrbrae SA <u>Project Team Members:</u> Vinod Phogat, SARDI, Vinod.Phogat@sa.gov.au Nigel Fleming, SARDI, Nigel.Fleming@sa.gov.au Leon vanderLinden, SA Water, Leon.vanderlinden@sawater.com.au Andrew Freebairn, CSIRO, Andrew.Freebairn@csiro.au Daniel Pagendam, CSIRO, Dan.Pagendam@csiro.au Arthur Read, CSIRO, Arthur.Read@csiro.au Shaun Thomas, SA EPA, Shaun.Thomas@epa.sa.gov.au Ying He, SA EPA, Ying.He@epa.sa.gov.au Jacqueline Frizenschaf, SA Water, Jacqueline.Frizenschaf@sawater.com.au
Creator/Developer	Petra Kuhnert and Dan Pagendam, CSIRO Digital Productivity Flagship Data Integration, Assimilation and Uncertainty
Owner/Contact Person and contact details	Statistical Models: Petra Kuhnert, CSIRO Digital Productivity Flagship, Data Integration, Assimilation and Uncertainty (Petra.Kuhnert@csiro.au)
Model Location	<i>Where is the model archived?</i> <i>Provide contact details of individual and unit/group within designated organisation</i> Scripts relating to the site based modelling, spatio-temporal modelling and flow calibration are archived within the CSIRO Data Access Portal (https://data.csiro.au/), Contact: Petra Kuhnert, Petra.Kuhnert@csiro.au or Dan Pagendam (Dan.Pagendam@csiro.au) <i>Is there a version of the model in active further development? Where is this active version located?</i> No

METADATA REQUIRED	DETAILS
IP or other permission requirements	<p>***** REFER TO GOYDER INSTITUTE FOR WATER RESEARCH AGREEMENT *****</p> <p><i>Are there any IP issues associated with the model and/or the dependencies that future users need to be aware of?</i></p> <p>IP held by CSIRO</p> <p>Permission for use of input data (TSS, TN and TP) would need to be sought from SA Water. Contact :</p> <p>Leon van der Linden Leon.VanDerLinden@sawater.com.au</p> <p>Jacqueline Frizenschaf Jacqueline.Frizenschaf@sawater.com.au</p>
Licences associated with model and/or dependencies	<p>***** REFER TO GOYDER INSTITUTE FOR WATER RESEARCH AGREEMENT *****</p> <p><i>Are there any licenses associated with the model and/or the dependencies that future users need to be aware of?</i></p> <p>Site-based and space-time models are dependent on R version 3.1.2 and relevant R packages that are adopted by the scripts.</p> <p>Flow calibration models are dependent on the LibBi package version 1.2.0.</p> <p>Data used in this study was obtained and used with permission of SA Water.</p>
Confidentiality agreements associated with model and/or dependencies	<p><i>Are there any confidentiality agreements associated with the model and/or the dependencies that future users need to be aware of?</i></p> <p>Users should be made aware that the scripts provided on the CSIRO Data Access Portal house statistical models that are appropriate for the suite of data analysed. The inclusion of new or additional datasets may warrant investigation of the appropriateness of the models to determine whether they are still fit-for-purpose. As such, consultation with a Statistician is recommended before these statistical models are used for other locations or other datasets.</p>
Brief outline of model	<p>This project developed</p> <ol style="list-style-type: none"> 1. Site-based statistical models for TSS, TN and TP for each monitored site in the Onkaparinga Catchment, Mt Lofty Ranges; 2. Spatio-temporal model that incorporated multiple sites in the MLR and examined scenarios; and 3. Statistical calibration models for flow.

METADATA REQUIRED	DETAILS
Area/region covered	<p>Onkaparinga Catchment in the Mount Lofty Ranges (see Figure below), where 6 gauged sites were analysed.</p> 
Platform and language and version	<p>(1) Space-time models and site based models for TSS, TN and TP developed in the R programming language v 3.1.2 using the methodology outlined in Kuhnert et al. (2012).</p> <p>(2) Calibration of flow has been implemented in LibBi (www.libbi.org) using the Bayesian hierarchical modelling set up outlined in Pagendam et al. (2014).</p>
Dependencies upon: <ul style="list-style-type: none"> i) other models and/or platforms (including version) and location ii) essential data and data sources and location 	<p>(1) Statistical models will depend on the R programming language. Relevant flow, water quality and spatial data (housed by SA Water/EPA will be required for the model.</p> <p>Contact : Ying He (Ying.He@epa.gov.au) or Leon van der Linden (Leon.VanDerLinden@sawater.com.au)</p>

METADATA REQUIRED	DETAILS
How was model used	<p>Statistical models and the calibration of flow were used to assist in the interpretation of water quality data collected for the Onkaparinga catchment in the Mount Lofty Ranges. The calibration of flow data using Bayesian methods assisted in the parameterisation of the SimHyd model into the dynamic SedNet model currently under development for the Mount Lofty Ranges.</p> <ul style="list-style-type: none"> ○ <i>Parameterisation/Validation (if applicable; include time period of calibration/simulation)</i> Summarised in the Goyder Institute Technical Report 15/6 ○ <i>Scenarios and outputs from various runs (indicate where these are stored)</i> Summarised in the Goyder Institute Technical Report 15/6 ○ <i>Assumptions behind model (indicate where these are stored)</i> Summarised in the Goyder Institute Technical Report 15/6 ○ <i>Limitations of model</i> Models are limited by the data that is input into the model. If flow and constituent data is not supplied then the model cannot be run. Furthermore, the addition of new data will require expertise from a Statistician to ensure the current suite of models are fit for purpose. ○ <i>Peer review process (if applicable)</i> Final report reviewed by two reviewers external to the project. ○ <i>Extensibility of model (can it be run for different time periods)</i> The models can be run for any time period for which input data is available. The Goyder Institute Technical Reports are available at: http://goyderinstitute.org/
Specificity of data	<p>Data for the statistical component of this work was sourced from SA Water, DEWNR and EPA and consisted of TSS, TN, TP and flow (Contact Ying He (Ying.He@epa.gov.au) or Leon van der Linden (Leon.VanDerLinden@sawater.com.au))</p> <p>Spatial datasets and GIS layers were obtained from Darran King (CSIRO) and are housed on the CSIRO Data Access Portal. (Contact Darran King – Darran.King@csiro.au)</p>
Datasets/data products produced	Outputs from the statistical modelling components of this work will be summarised in the final report.
Other Information	

METADATA REQUIRED	DETAILS
Publications (papers and technical reports)	<p>Journal Papers:</p> <p>Kuhnert, P.M., Henderson, B.L., Lewis, S.E., Bainbridge, Z.T., Wilkinson, S.N., Brodie, J.E. (2012) Quantifying total suspended sediment export from the Burdekin River catchment using the loads regression estimator tool, <i>Water Resources Research</i>, 48: W04533.</p> <p>Pagendam, D.E., Kuhnert, P.M., Leeds, W.B., Wikle, C.K., Bartley, R. and Peterson, E.E. (2014) Assimilating catchment processes with monitoring data to estimate sediment loads to the Great Barrier Reef, <i>Environmetrics, Special Issue on Physical-Statistical Models</i>, 25, 214-229.</p> <p>Wilkinson, S.N., Dougall, C., Kinsey-Henderson, A.E., Searle, R.D., Ellis, R.J. and Bartley, R. (2014) Development of a time-stepping sediment budget model for assessing land use impacts in large river basins, <i>Science of the Total Environment</i>, 468-469, 1210-1224.</p> <p>Technical Reports:</p> <p>Fleming, N.K., Cox, J.W., He, Y. and Thomas, S. (2012) Source Catchment hydrological calibration in the Mount Lofty Ranges using PEST parameter optimisation tool, eWater Cooperative Research Centre Technical Report, ISBN 978-1-921543-63-0.</p> <p>Fleming, N.K., Cox, J.W., He, Y., Thomas, S. and Frizenschaf, J. (2010) Analysis of Total Suspended Sediment and Total Nutrient Concentration data in the Mount Lofty Ranges to derive event mean concentrations, eWater Cooperative Research Centre Technical Report, ISBN 978-1-921543-32-6, August 2010.</p> <p>Kuhnert, P., Pagendam, D., Cox, J., Fleming, N., He, Y., Jenkins, C. and van der Linden, L. (2015) An improved water quality model for the Onkaparinga catchment. Goyder Institute for Water Research, Technical Report Series No 15/6.</p>
Collaborations and acknowledgements	<p>DEWNR Science, Knowledge and Monitoring staff CSIRO Land and Water Flagship : Darran King, Darran.King@csiro.au, Ross Searle, Ross.Searle@csiro.au, Dr Scott Wilkinson, Scott.Wilkinson@csiro.au, Yong Bing Khoo, YongBing.Khoo@csiro.au) CSIRO Digital Productivity Flagship : Dr Jess Ford, Jess.Ford@csiro.au, Dr Adrien Ickowicz, Adrien.Ickowicz@csiro.au)</p>
Keywords	Water quality modelling; flow; calibration; uncertainty; Source.