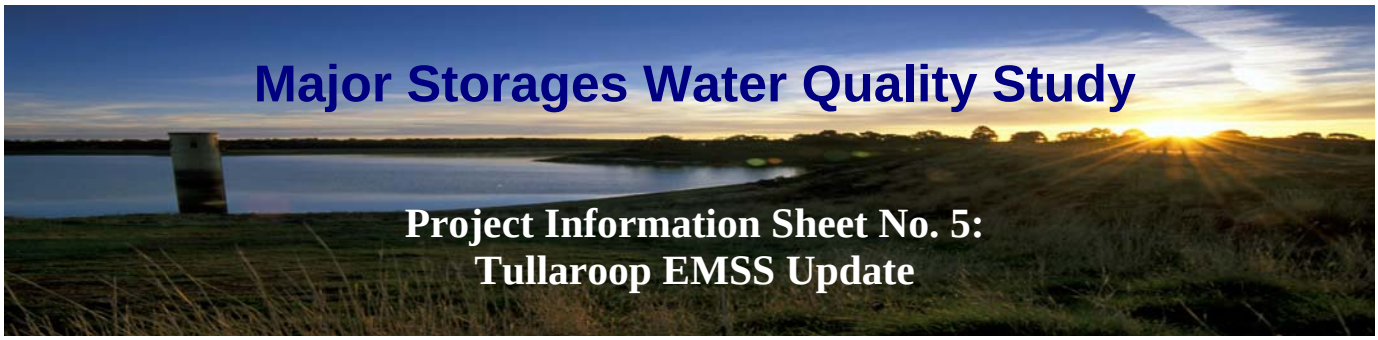


Major Storages Water Quality Study

Project Information Sheet No. 5: Tullaroop EMSS Update

The fifth in a series of project information sheets being distributed by Goulburn-Murray Water (G-MW) about the Major Storages Water Quality Study project.

This information sheet provides a progress report on the ongoing development and preliminary outcomes form the application of a new surface water quality software model (**EMSS-Tullaroop**) built for the catchment to Tullaroop Reservoir. This work comprises part of the Goulburn Murray Water (G-MW) **Major Storages Water Quality Study (MSWQS)** project**.**

Where are we at?

The project is progressing well. An EMSS framework (EMSS-Tullaroop) has been built for the Tullaroop catchment, and we are starting to communicate initial modelling results. A more comprehensive analysis of preliminary findings of the catchment modelling component of this study is provided in the main project report '*Tullaroop EMSS - A Preliminary Report on Catchment Surface Water Quality Investigations'* (G-MW unpublished report, July 2004 available from S. Papworth, Project Officer).

What can we do with EMSS-Tullaroop?

EMSS is a regional catchment scale computer surface water quality model developed by scientists from the Cooperative Research Centre (CRC) for Catchment Hydrology. EMSS predicts runoff, and daily and long-term loads of water quality pollutants. At present, EMSS-Tullaroop models three priority water quality pollutants, **Total Suspended Solids (TSS), Total Nitrogen (TN) and Total Phosphorous (TP).**

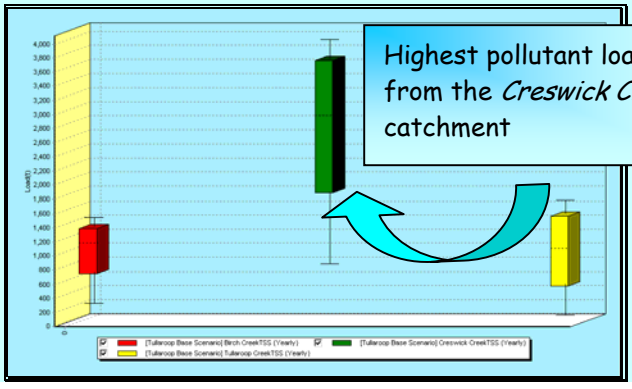
The potential applications of EMSS-Tullaroop are many and varied, and include a scenario testing capability providing a means to evaluate the relative effectiveness of targeting subcatchments for rehabilitation. For example, a catchment manager could consider a number of scenarios for rehabilitating different sections of stream riparian zones, progressive land use change, improved land management practices or point source management. In this way the effectiveness of these strategies at reducing pollutant export rates could be compared and selection of the most cost-effective strategies evaluated.

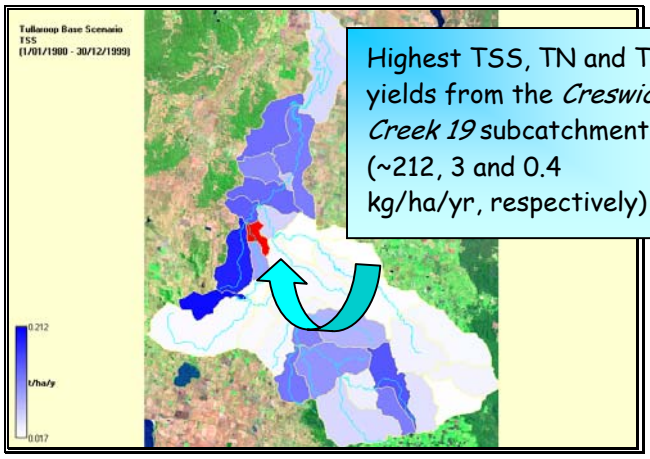
However the primary application of EMSS-Tullaroop is to make informed estimates of catchment and sub-catchment scale pollutant loads generated (in tonnes/year) and specific yields (tonnes/hectare/year) under current catchment conditions. High and low priority catchments and subcatchments can be identified and prioritised for possible remedial action.

Some early EMSS-Tullaroop predictions

Key findings of preliminary investigations that should be considered by managers of Tullaroop catchment include the following:

- On a 'whole catchment' scale, average long-term (1980 – 1999) pollutant *generation* rates in the catchment upstream of Tullaroop Reservoir are approximately 4700 t/yr (TSS), 83 t/yr (TN) and 11 t/yr (TP). However these predictions do not include pollutants trapped within Tullaroop Reservoir, or deposited in rivers, streams and floodplains in transit. Estimated long-term average pollutant loads actually *exported* to the Lower Tullaroop Creek and Loddon River system (*i.e.* below Tullaroop Reservoir) are **approximately 210 t/yr (TSS), 3.5 t/yr (TN) and 0.5 t/yr (TP).**
- EMSS-Tullaroop can be used to help identify catchments and subcatchments which should be the focus of future management activities for water quality improvements and/or further investigation. The **Creswick Creek catchment, and more specifically, the Creswick Creek 3, 13, 17 and 19 subcatchments** should be the focus of future investment and management activities for water quality improvements.





- Approximately **96% of total TSS, TN and TP loads** generated within the Tullaroop catchment are **trapped in Tullaroop Reservoir.** Impacts to downstream water quality are therefore mitigated, and are less than they may have been prior to the construction of the reservoir. However, with continued pollutant loadings water quality within the reservoir will likely progressively deteriorate over time.
- Most pollutant load is generated during wetter climatic periods as high flow events over short duration flow periods. Often, much of the annual pollutant load is generated during 1-2 day rain events. As a general rule, EMSS-Tullaroop predicts that pollutant loads generated during **wetter years are 5-10 times higher than those generated during the drier years**.
- Large scale revegetation of the catchment for water quality improvement purposes seems unlikely to be effective. Proportionally, the return on investment of resources will likely be marginal, and unrealistically large areas would need to be revegetated to achieve significant improvements, at least on a whole of catchment scale.
- Conversely, further clearing of existing forested areas could be expected to have proportionally high detrimental impacts on water quality, and should be avoided wherever possible in the Tullaroop catchment.
- Riparian zone management options seem likely to be somewhat more effective at reducing pollutant exports.

Note that the prediction of water quality pollutant loads with any surface water model carries with it a degree of uncertainty. EMSS-Tullaroop is no different in this regard, and model outputs must be interpreted and used with a degree of caution.

Where to next?

Time and budget constraints permitting, it is desirable that as additional data becomes available it should be progressively added to this model, to improve and refine model predictions.

Re-releases of the EMSS modelling system ('E2') are anticipated, and would provide enhanced functionality and greater surety of the accuracy of model outputs. In particular, the ability to model at a finer scale would greatly enhance the usefulness of EMSS-Tullaroop. Other models, including catchment salt and pathogen models are scheduled to be available for incorporation into the EMSS framework in the near future.

While verification and enhancement of the model is an on-going process, the model in its current form provides a useful tool to assist catchment management decision making. G-MW has made EMSS-Tullaroop freely available to key catchment management stakeholders for use in reviewing, planning and prioritising works and evaluating performance against catchment management action targets, and risk ranking/prioritisation processes. G-MW also sees EMSS-Tullaroop being used as a tool to assist local government, where the predictive capability of the model could be used to provide scientifically based input to large scale planning processes, such as relevant planning scheme reviews and amendments.

Another goal is to link EMSS-Tullaroop with storage water quality models currently being constructed for Tullaroop Reservoir as a separate phase of the Water Quality Study Project.

More information?

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