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**Title:** The costs of meeting environmental objectives with increasing reliability  
A case study of the Lower Goulburn River Floodplain, Victoria, Australia

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**Abstract:** *The Guide to the proposed Murray Darling Basin Plan sets out a proposed approach to restoring the balance of environmental and consumptive water uses in the Basin. The Guide outlines environmental water requirements, sustainable diversion limits, and identifies key environmental assets and ecosystem functions. The proposed diversion limits are lower than current diversion limits for most catchments in the Murray Darling Basin – in effect requiring a transfer of water from consumptive uses, principally agriculture, to the environment.*

*The enabling legislation for the Guide, the Commonwealth Water Act 2007, specifies the need to 'balance' environmental, economic and social outcomes. To this end a constrained optimisation model is used to develop heuristic decision rules for an environmental manager to minimise the economic cost of meeting environmental release objectives given an uncertain but temporally correlated sequence of hydrological data.*

*The problem is cast in terms of changing the distribution of non-independent arrival times between flow events to one that is more closely aligned desired environmental outcomes. The desired distribution for different classes of flow events are defined in terms of one or more time thresholds (anchor points) and their associated exceedence probabilities.*

*The model is used to elicit tradeoffs between the reliability with which different environmental objectives can be delivered as measured by overall economic costs and the specific costs to tax payers and of foregone agricultural production under variable climatic conditions.*

Informed decisions can then be made about changing desired environmental outcomes where the likelihood of achieving a specified flow regime is low and the costs of meeting those outcomes high. Similarly, where environmental values can be improved at relatively low cost, environmental objectives can be reviewed and adapted based on economic as well as scientific data. Lastly, we can construct a Bayesian inference framework that allows the ongoing evaluation of the effectiveness of management plans.