

FRESHWATER MANAGEMENT TOOL - A NEXT GENERATION DECISION-SUPPORT TOOL FOR SCIENCE, POLICY AND CATCHMENT MANAGEMENT IN NEW ZEALAND

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Auckland Council has developed the first regionwide, continuous and process-based accounting framework for water quality in New Zealand – the Freshwater Management Tool (FWMT). The FWMT serves dual purposes for the unitary authority, guiding watershed decision-making for National Policy Statement for Freshwater Management (NPS-FM) planning and delivery of operational programmes to maintain and improve water quality.

The FWMT heralds a shift away from a statistical to deterministic and steady state to continuous understanding of water quality variation, at scale and resolution (e.g., of chronic and acute effects from cumulative sources). Simulated contaminants include total and dissolved forms of nitrogen and phosphorus, total suspended sediment, *E.coli*, total zinc and copper. Contaminant responses to meteorological and biophysical processes are resolved by up to 107 sources into ~100 Ha sub-catchments over 490,000 Ha of landscape.

Baseline simulation (2013-2017) is complete with truly representative outputs for the NPS-FM available across ten graded contaminants and for 3,085 km of permanent stream in the Auckland region (e.g., continuous in space and time). Contaminant time-series are now available from the FWMT to all coastal receiving waters, advancing integrated freshwater and coastal approaches.

The FWMT offers improved powers for translating science into policy, planning and management, but also increasing challenges. The process-modelling and continuous capabilities better enable explanations of existing and future water quality (e.g., under varied climate or development). However, with improved understanding comes increasing demand for better outcomes – raising the challenge of developing optimized approaches. Development is ongoing for exactly that, optimized scenario modelling of diverse rural and urban options (e.g., stormwater devices, edge-of-field devices, practice-based changes). Outputs will help bridge the scientific, policy and management divide by highlighting opportunities, costs and benefits of alternative management approaches, including whom is best placed to take targeted action for integrated benefit.