

Informing fresh water management for the Auckland Region.

C. Muller, S. Ira, T. Stephens, P. Nowell.

Auckland Council (Healthy Waters) is developing a water quality accounting framework, the Fresh Water Management Tool (FWMT). Designed to support fresh water management, the FWMT assesses present and future water quality as well as feasible action strategies. The FWMT generates optimised action plans based on 50-year life-cycle costs and continuous effects of feasible interventions linked to critical sources of contaminants contributing to water quality degradation. Optimisation is through continuous, process modelling which allows detailed plans to be developed for any feasible water quality improvement target (e.g., action type, scale, location, treatment and cost).

The FWMT programme is decadal, underpinned by external review and continuous improvement. FWMT Stage 1 baseline water quality (2013-17) is now available alongside a library of rural and urban activities associated with mitigations

(<https://www.knowledgeauckland.org.nz/publications/freshwater-management-tool-report-6-literature-review-of-primary-sector-responses-to-water-quality-efficacy-and-cost/> - see FWMT reports #6, 7, 8 & 11).

Development is nearing completion of full catchment-integrated optimised action plans (5,465 catchments, 100+ activities, 15-minute basis). This paper highlights the development of the FWMT stage 1 for rural sector uses in catchment action planning and adaptive management for water quality improvement.

The paper presents base economic and environmental footprints for pasture, horticulture and forestry enterprises utilised by the FWMT. The environmental footprint considers nitrogen, phosphorus, sediment and E. coli losses of base land uses as well as when applying both edge-of-field devices and practice-based mitigations aimed at improving water quality. For each mitigation there is a generalised environmental impact, detailed economic impact and an opportunity estimate (i.e., how much of the landscape the mitigation is applicable to). The economic impact is based on the 50-year life-cycle cost across capital, maintenance, replacement and where suitable, opportunity cost or reduced profit, at a range of discount rates. Generalised benefits are used to guide process-modelling with latter enabling dynamic changes in performance with weather events.

This paper covers the FWMT Stage 1 body of work for the rural sector. This stage was focused on developing and testing the FWMT and as such, Auckland specific farm systems modelling was limited, and the focus was on building 50-year life-costs for mitigation options modelled or researched elsewhere and integrating these into the FWMT which is a novel approach to catchment modelling in New Zealand. It also highlights key areas of the modelling to address in the next stage of the continuous improvement process.

Keywords: freshwater management, abatement cost, land use modeling,