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**Biophysical and Institutional Challenges
to Management of Dairy Shed Effluent
and Stream Management Practices on
New Zealand Dairy Farms**

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Thesis submitted for the degree of Doctor of Philosophy

University of Auckland, New Zealand

February 2004

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Abstract

New Zealand dairy farmers have been accused in a national 'dirty dairying' campaign of 'selfishly destroying the community's natural water resources' (Fish & Game 2001, pg 1) through a combination of point and diffuse source pollution and habitat modification. The dirty dairying debate in response to Fish & Game's campaign is about the conflicts that arise through differing values of rural water resources in New Zealand. That farming practices affect freshwater ecosystems is broadly recognised but poorly understood. The problems encountered in New Zealand's dairy sector, however, are exacerbated by the nature of relationships between dairy industry actors, gaps in information and provision of environmental advice to farmers.

This thesis examines aspects of the debate through scientific and social frameworks using three strongly interrelated investigations situated in the laboratory, field and social environment. Each investigation adds further levels of complexity providing potential biophysical solutions as well as insights into the challenges facing those seeking to manage the effects of dairy farming practices. Investigations focused mainly on dairy effluent and stream ecology in the Waikato and Taranaki areas.

The research showed that both dairy shed effluent (DSE) dilution in stream flow and stream management practices, particularly riparian shading, were important in reducing the effects of discharges to stony stream communities. In some situations, diffuse inputs from stream management practices had already degraded stream communities, making them less sensitive to discharges. However, significant adverse effects on stream benthic invertebrates were observed for oxidation pond discharges at 338-fold and below, but not at 1000-fold dilution.

Significant improvements in rural water and habitat quality are unlikely to be achieved under the regulatory regime in place at the time of the interviews carried out in this research. DSE discharges are controlled through statutory regulation, but in many cases the permitted dilution rates are too low. Controls on diffuse pollution and habitat modification are voluntary, and undertaken by some farmers. Improvements in rural water and habitat quality are constrained by a lack of clear understanding by farmers on

the importance of DSE treatment and stream management practices and a lack of impetus to act. Contributing to this is limited availability, transfer and often misalignment of information between dairy industry actors involved in environmental management. However, enhanced information provision alone is unlikely to lead to improved rural water and habitat quality and Fonterra's Clean Stream Accord (May 2003), while contentious, represents a potentially effective way forward for stream management in New Zealand. Success of this Accord depends on all dairy industry actors (including farmers) working together and combining their strengths in order to generate useful, practical information and solutions to achieve improvements in rural water and habitat quality.

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