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**EFFECTS OF LAND-USE ON STRUCTURE
AND FUNCTION OF AQUATIC
INVERTEBRATE COMMUNITIES**



A thesis presented in partial
fulfillment of the requirements
for the degree of
Master of Science in Ecology
at Massey University

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SUMMARY

Two aspects of benthic invertebrate community function; colonisation and resilience, were examined during January to March, 1996. In the first study (chapter 2) colonisation patterns of invertebrate communities were examined in 9 streams situated in 3 different land-use types in the Waikato region of New Zealand. The communities colonising tiles in streams situated in different land-use areas were found to be quite different. The communities of pasture streams had greater invertebrate abundance and taxonomic richness compared with forested sites and exotic *Pinus radiata* forest sites were more heavily dominated by a single taxa. Colonisation was found to proceed more quickly in streams located in pastoral catchments, followed by those in *Pinus radiata* and native podocarp / broadleaf forest. Two colonisation models (power and negative exponential) were fitted to the changes in community structure with no land-use differences being found. The greater and more quickly accruing periphyton levels found in the pasture streams, in providing a more food rich and structurally complex environment, may speed colonisation. Alternatively, land-use induced disturbance in the pasture and *Pinus radiata* catchments eliminating less resilient taxa and leaving better colonisers may explain why colonisation proceeds more quickly in these streams.

In the second study (chapter 3) structure and resilience of invertebrate communities inhabiting 4 streams in each of 3 different land-use categories; hill country pasture, *Pinus radiata* plantation forest and native podocarp / broadleaf forest, were examined in streams in the Waikato region of New Zealand. Community structure was assessed using detrended correspondence analysis to ordinate sites according to community composition. Community matrices were constructed and eigenvalues extracted to provide an estimate of community resilience. Although community composition was effected by land-use there was no corresponding effect on community resilience and nearly all the communities fell

outside the limits for local stability. Resilience appears to depend not on what particular taxa make up a community but on some threshold number being present to allow for normal community function.

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Frontispiece: AgResearch Station, Whatawhata, Waikato.	



Plate 1. Pasture site PW2 at the AgResearch Station, Whatawhata.



Plate 2. Pine forest site EM2 in the Ngaruawahia State Forest.



Plate 3. Native forest site NW5 at the AgResearch Station, Whatawhata.

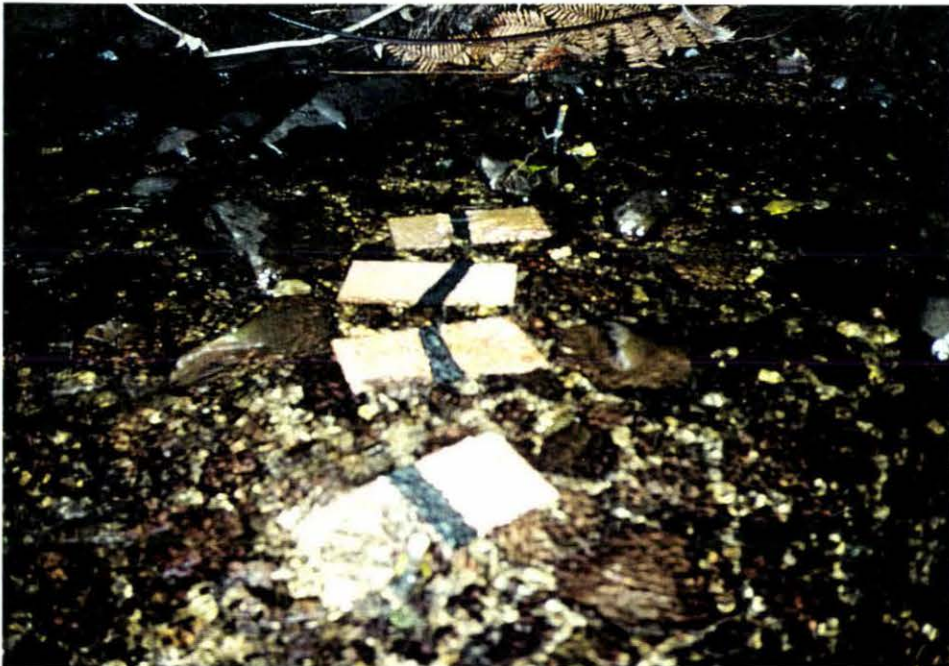


Plate 4. Tiles shortly after being put in place at site NW5.



Plate 5. Tiles before removal on day 42 at site PW5.



Plate 6. Stones sampled for invertebrates at pasture site PP.