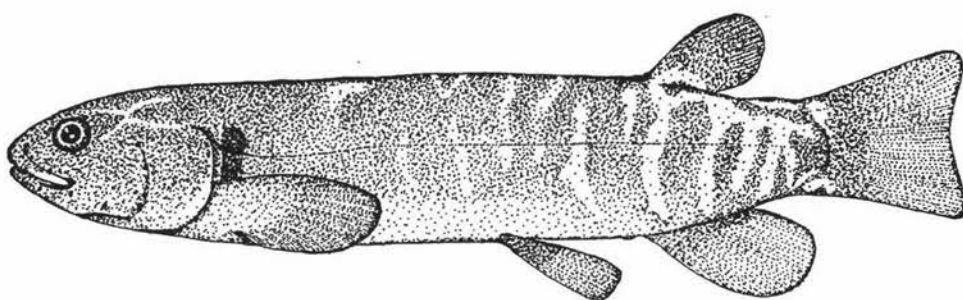


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**FRESHWATER FISH COMMUNITY STRUCTURE IN TARANAKI:  
DAMS, DIADROMY OR HABITAT QUALITY?**



**A thesis submitted  
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**By  
MICHAEL KEVIN JOY**

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## ABSTRACT

The relationships between freshwater fish community structure and habitat characteristics including dams were examined at 85 sites on 38 waterways draining Mount Taranaki during the summer of 1997/98. Thirteen native and two exotic fish species were captured. Four groupings were identified based on species composition. The first two were high elevation site groups: one dominated by the diadromous Galaxiids: shortjawed kokopu, banded kokopu and koaro, the other dominated by longfin eels. The third group of sites was a mid-elevation group dominated by redfin bullies and longfin eels while the fourth group was made up of low elevation sites dominated by redfin bullies and shortfin eels. Discriminant analysis revealed that distance from the sea, site elevation and the presence of dams were the environmental variables most strongly associated with fish distribution patterns.

Data from the New Zealand freshwater fish database (NZFFD) were used to examine the influence of dams and other environmental variables on the fish communities. The sites listed in the NZFFD as having free migratory access were used as reference sites for the construction of a predictive model of fish community assemblage. The species found at test sites were compared with the predicted assemblage and an observed over predicted ratio (O/P) produced for each test site in order to evaluate the relative impact of migratory barriers. The 85 sites from the 1997/98 survey, which were independent of the reference sites used in the model, were used as a test of the model. The O/P ratios were significantly lower for sites above barriers when compared with sites with free access. To demonstrate the use of the model, the impact of the Motukawa dam on fish communities was analysed by comparing the O/P ratios for sites above and below the dam. The resulting ratios were significantly lower above the dam, indicating that the dam was having a negative impact on fish communities.

Distinctive trajectories of occurrence were detected for 13 species from the Taranaki ring plain. The diadromous species were ranked based on their ability to penetrate inland to enable comparison with other regions. The Taranaki rankings were consistent with rankings for the same species from the West Coast of the South Island.

The high proportion of diadromous species in the Taranaki fauna means that access is of primary importance in structuring the fish communities and the large number of dams in the region has had a discernable negative effect on freshwater fish communities.

## **EXPLANATION OF TEXT**

This thesis is a combination of three individual papers. This has resulted in some repetition in introductions, methods and site descriptions between chapters. Chapter two has been submitted to Ecological Applications and Chapter three to the New Zealand Journal of Marine and Freshwater Research. The model outlined in Chapter 3 has been made into a Windows based computer program called Redfin version 1.1. The program has been installed and used by the Taranaki Regional Council, Department of Conservation Wanganui and the consulting firm Resource and Environment (New Plymouth).

The fish sampling methods used in this project have been sanctioned by the Massey University Ethics Committee.

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Finally, I want to dedicate this thesis to my sister Bernice Hawken and to my partners' mother Peggy Hewitt who both died during the writing of this thesis.

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