METHODS OF ASSESSMENT OF MACROINVERTEBRATE BIODIVERSITY IN NEW ZEALAND STREAMS

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ABSTRACT

In this study different sampling methodology and strategy was explored to develop an efficient inventory protocol for assessing biodiversity of stream macroinvertebrates in New Zealand. In a preliminary study 3 benthic invertebrate sampling techniques (Surber, kicknet and individual stone sampling) were compared to examine which maximised collected biodiversity per unit effort. Kicknet samples collected a higher number of taxa than either Surber or individual stone samples. Three-minute kicknets collected significantly more taxa than the other techniques, although 30-second kicknets collected the most taxa per unit effort. Detrended correspondence analysis of sampling techniques showed groupings of 30-second and 1-minute kicknets, 5 or more Surber samples, or individual stones samples collected the best representation of the community.

Three strategies of sample collection using kicknet samples were investigated in 54 streams, in 3 conservation regions in the South Island, to see which collected greater taxa richness per unit effort. These strategies examined taxa accumulation in three samples in a) the same stream, b) different streams within one region, c) different streams in each of the 3 regions. Collected taxa richness was higher when sampling effort was spread over more habitats and a larger area i.e., strategy b and c.

Environmental characteristics measured at each stream, were assessed to examine links between community structure and habitat characteristics. Community structure was most strongly linked with altitude, canopy cover, moss cover, stream width, and temperature. Five groups of communities were identified ranging from small high altitude streams with moss and high canopy cover, to larger more open low altitude streams. These groups had a common core of invertebrate taxa that differed in density and relative abundance. To test for the presence of indicator taxa of biodiversity, individual taxa densities were correlated with total taxa richness. Several taxa e.g., *Archichauliodes diversus* and *Coloburiscus humeralis* showed positive linkages with taxa richness, but none were particularly strong suggesting indicator taxa might not be appropriate for the measurement of invertebrate biodiversity in New Zealand streams.

EXPLANATION OF TEXT

This thesis is a combination of three individual papers. This has resulted in some replication of introductions, methods and site descriptions in Chapters 2 and 3.

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"When one tugs at a single thing in nature, he finds it attached to the rest of the world"

John Muir, 1911