The conservation status of aquatic insects in
south-western Australia

by

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This thesis is presented for the degree of Doctor of Philosophy of Murdoch University

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I declare that this thesis is my own account of my research and contains as its main content work, which has not previously been submitted for a degree at any tertiary education institution.

Signed ………………………

Date ………………………
Abstract

Freshwater ecosystems in south-western Australia have been extensively altered over the last two centuries as a result of human activities. The effect this has had on aquatic fauna, particularly invertebrates, is largely unknown because of inadequate knowledge of the pre-existing fauna. Future changes in the composition of aquatic fauna will also go undetected unless current distributions of existing species are well documented.

This thesis addresses the problem by investigating the current distributions and conservation status of aquatic insects in south-western Australia from three orders: Odonata, Plecoptera and Trichoptera. Extensive distributional data was collected by identifying larval specimens from a large number of samples collected throughout the south-west as part of an Australia-wide macroinvertebrate bioassessment project. In addition, a database created from a species-level biological study of the wheatbelt region of Western Australia was utilised, and previously published records of occurrence for species within the south-west were compiled. These results were then used to assess the conservation status of each species using the IUCN red list criteria.

Environmental parameters measured at time of sampling were also examined using logistic regression to determine which factors are important in influencing the distributions of aquatic insects in south-western Australia. The conservation value of sites based on Odonata, Plecoptera and Trichoptera compositions was also determined and the degree of protection provided for sites of high conservation value investigated.

The high rainfall forested region of the south-west was found to be important for a large number of species, including the majority of those found to be rare and/or restricted.
Overall, 37% of species were found to be threatened, with the Trichoptera containing both the greatest number and highest proportion of threatened species. Logistic regression results generally agreed with the distributions obtained for each species, with rainfall and other parameters indicative of streams in the headwaters of forested catchments being positively associated with species found to be restricted to the high rainfall region. Two parameters known to be affected by human disturbance in the south-west, conductivity and nutrient concentrations, were found to be important in determining the occurrence of many species and this could have important consequences for aquatic insect conservation. Widespread species occurring within the low rainfall region of the south-west did not show as many significant relationships to measured environmental parameters, possibly due to their greater ecological tolerances and adaptations which allow them to persist in a low rainfall environment. The implications of results are discussed, and recommendations for the conservation and management of aquatic insects in south-western Australia are given.
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