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**Ecology and conservation of ground-dwelling beetles in
managed wet eucalypt forest: edge and riparian effects**

Susan C Baker BFSc, BSc (Hons)

Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy,

School of Zoology, University of Tasmania, November 2006

Declarations

Statement of originality

This thesis contains no material that has been accepted for a degree or diploma by the University or any other institution, except by background information and duly acknowledged in the thesis. To the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due acknowledgement is made in the text.

Susan Claire Baker

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Abstract

Limited understanding of the ecology of ground-dwelling invertebrates in Tasmania has hampered our ability to assess the adequacy of forest management. This thesis documents the distributions of ground-dwelling beetle assemblages in managed, wet eucalypt forests of southern Tasmania, and explores the response of beetles to ecological gradients caused by riparian influences near small streams (since retained riparian corridors are a major conservation tool), and edge effects from recently clearfelled logging coupes. Extensive pitfall trapping using replicated transects at four sites was employed to compare the beetle fauna between five habitats: young logging regeneration, the interior of upslope mature forest, the riparian-upslope transition in mature forest interior, and across coupe edges (both into upslope mature forest and into streamside reserves). Data screening ensured that the primary transect design, which employed traps positioned at unequal distances within transects, was unlikely to produce patterning in beetle distributions attributable to spatial autocorrelation or pitfall trap depletion.

Beetles responded to riparian influences, showing subtle shifts in assemblage composition, and generally reduced abundance or species richness nearer to streams. However, site differences outweighed riparian effects. Beetles assemblage composition differed substantially between young logging regeneration and mature forest: several species were identified as indicators of each habitat. Beetles responded more strongly to edge effects than to riparian influences. Depth of edge influence extended ~ 22 m into unlogged non-riparian forest, but further into streamside reserve edges (up to ~ 65 m). Four beetle species, *Choleva* TFIC sp 01 (Leiodidae), *Decilaus nigronotatus*, *D. lateralis* and *D. striatus* (all Curculionidae), were indicators of mature forest interior.

A second survey compared beetles between logging regeneration, upslope mature forest interior, mature forest interior riparian areas, and streamside reserves that had been logged on both sides, in five stands of each of the four habitats. Streamside reserves (average width 40 ± 6 m ($\pm 95\%$ CI) from reserve edge to stream) supported different beetle assemblages to unlogged areas, and were probably entirely edge-effected.

These results suggest that current corridor provisions, which rely heavily on riparian reserves, may be inadequate to conserve beetles dependent on mature forest interior. Reserve corridors may need to be wider, and should more often be positioned upslope away from riparian areas. Alternatively, a mix of different types of reservation strategies (e.g. conserving some contiguous blocks of mature forest in lieu of widened corridors) needs to be developed to increase the probability that edge-sensitive and mature forest specialist taxa will be conserved.

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