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Troglofauna in the Pilbara region, Western Australia – Patterns in diversity and distribution, and sampling considerations for conservation assessment

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Discovery of diverse terrestrial invertebrate assemblages in subterranean habitats associated with iron-ore bearing rocks in the Pilbara region has driven a spate of troglofauna surveys as part of pre-mining environmental impact assessment. We present the results from recent surveys undertaken by mining companies which contribute new understanding towards this remarkable hidden element of biodiversity in Western Australia's arid regions. Patterns in the systematic composition, species richness and abundance of troglofauna assemblages collected from mining exploration drill holes are described. The systematic composition of the assemblages includes arachnids (Araneae, Pseudoscorpionida, Schizomida, Palpigrada), insects (Diplura, Thysanura, Coleoptera, Hemiptera, Blattodea), myriapods (Diplopoda, Chilopoda, Symphyla, Pauropoda) and crustaceans (Isopoda). Species distribution patterns, which ranged from regionally widespread to highly localised short-range endemics, were not necessarily concordant with geologic habitat discontinuities. Among the taxa which exhibited morphological modifications to subterranean life (troglomorphy), such as loss of eyes and pigment and elongation of appendages, their degree of specialization varied, and a proportion of troglomorphic taxa were more typically associated with soil, plant roots or leaf litter, as opposed to deep subterranean habitats. The emerging patterns and characteristics of the subterranean assemblages have important ramifications for interpretation of ecological survey data, and the conservation assessment of 'troglofauna'. We identify some key issues involved with survey and assessment of troglofauna, and highlight future challenges in this rapidly developing research field.