Short-Range Endemic Invertebrates

ENVIRONMENTAL MANAGEMENT

ecologia Environment comprises a group of professional scientists offering services in all fields of environmental management. *ecologia* Environment has the expertise and capability to conduct Short-Range Endemic (SRE) invertebrate assessment surveys, ongoing monitoring and management in accordance with the Environmental Protection Authority Position Statement No. 3 *Terrestrial biological surveys as an element of biodiversity protection. ecologia* Environment is dedicated to achieving project goals with cost effective strategies and timely execution.

DISTRIBUTION

Short-Range invertebrates have been recorded from a variety of areas in Western Australia, including the Kimberley, southern Carnarvon Basin, Wheatbelt, Goldfields, Yilgarn Plateau and several regions in the South West (e.g. Stirling, Porongorup, Darling Ranges and Warren bioregion).

However, systematic collections of invertebrate species have begun only relatively recently and thus data on species distributions are far from complete. New species are likely to be discovered in the near future, particularly from areas such as the Midwest and eastern Goldfields.

Short-Range Endemics are species with ranges smaller than 10,000 km^2

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Invertebrate Short-Range Endemics (SREs) are species of terrestrial and aquatic invertebrate animals which typically occupy small geographic areas of up to 10,000 km^2, but often much smaller and isolated. This is due to a combination of biological and historical factors.

The current distribution of species in Western Australia reflects the connections to the Gondwana supercontinent (approx. 180-65 million years ago), with subsequent fragmentation due to aridification and forest contraction in the Miocene/ Pleistocene era (approx. 24 million – 10 000 years ago), creating isolated, relictual refugia. These refugia are defined as habitats that are permanently moist and shaded, although experiencing a summer dry period. These are generally areas with high rainfall and/or prevalence of fog, whether induced by topography or coastal proximity, or areas associated with freshwater courses (e.g. swamps or swampy headwaters of river systems), or microhabitats associated with southern, shady slopes of hills and ranges, rocky outcrops, deep litter beds, or various combinations of these features. As a result, these habitats support only small, spatially isolated populations, which are further restricted by their low dispersal powers, typical for all SRE species.

Despite the fact that short-range endemism is sporadic across most groups of Australian invertebrate fauna, there are several taxonomic groups that are almost exclusively composed of SREs or contain a high proportion of SRE taxa. These include terrestrial and aquatic snails, trap-door spiders, velvet worms, false scorpions, scorpions, millipedes, centipedes, native earth worms, terrestrial and aquatic isopods and freshwater crayfish.

PERCEIVED RISKS - CONSERVATION ISSUES

The biology of most SRE invertebrates is little known and their precise distribution and life history are poorly documented. Because of their small size and often specialized behaviour, many SREs are restricted to relict microhabitats, which are extremely vulnerable to disturbances, particularly by agriculture and mining. As resource development activities have the potential to cause extinction of SRE species directly, or indirectly contribute to it, identifying the conservation values of SRE species has become an essential part of Environmental Impact Assessments undertaken by the Environmental Protection Authority.

Due to their limited dispersal abilities and specific habitat requirements SRE's are especially vulnerable to the effects of activities associated with mining, such as

- Clearing
- Surface pollution (eg. dust, salinisation)
- Direct excavation

Identification of SREs and their microhabitats is, therefore, crucial for the conservation of biodiversity. Not only due to the greater possibility for a SRE species' entire range to be destroyed, but also due to their limited dispersal capabilities which make them more vulnerable to the effects of habitat fragmentation and the associated problems of declining population numbers, inbreeding and loss of genetic diversity. Furthermore, even when loss of habitat occurs only in parts of the SRE species range, their extinction may still occur due to their inability to disperse and exchange genes between fragments and/or recolonise those that became vacant. Therefore, careful management of particular populations and microhabitats is essential to the continuous survival of SREs.

SAMPLING TECHNIQUES

A combination of several techniques is used in SRE surveys to obtain a representative sample of potential SRE invertebrate communities. These typically employ:

- Wet pitfall traps
- Dry pitfall traps and funnels (also readily used for vertebrate fauna trapping)
- Hand foraging
- Leaf-litter collection

The wet pitfall traps contain a solution to catch and preserve specimens. The traps are typically open for 1 to 3 months and cleared at the end of this period. The dry pitfall traps and funnels are typically used for vertebrate fauna survey and thus are cleared on a daily basis. Hand foraging techniques involve searching for SREs in suitable microhabitats (e.g. under rocks and decomposing logs, under bark of trees and in deep leaf-litter). Where deep leaf-litter is present in the area, samples of leaf-litter are collected and examined in the laboratory for microscopic SRE communities. All potential invertebrate SRE fauna are preserved in 100% ethanol for further morphological identification and potential DNA assessment.

LEGAL REQUIREMENTS

Short-Range Endemics are protected under two State Acts and a Federal Act:

- *Environmental Protection Act 1986*
- *Wildlife Conservation Act 1950*
- *Environmental and Biodiversity Conservation Act 1999*

Any proposal whereby the protection of SRE fauna has been identified as a conservation issue will be assessed under these acts.

Any proposal that could potentially have a significant impact on SRE habitat, either due to its destruction by clearing and excavation activities or due to pollution, may be subject to formal Environmental Impact Assessment under the *Environmental Protection Act 1986*.

If a species is likely to be threatened by a proposal then it may also subject to the requirements of the *Wildlife Conservation Act 1950*.

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WHY ECOLOGIA ?

Because we offer the following capabilities:

- An experienced team of invertebrate scientists who provide all the requisite expertise for successful completion of Short-Range Invertebrate Fauna assessments.
- Long established relationships with key stakeholder regulatory agencies, including the Department of Environment and Conservation and the Environmental Protection Authority.
- Strong links to the University of Western Australia and the WA Museum, which ensure that latest technologies and methodologies are implemented, and research findings are incorporated into management strategies.
- Over 18 years experience in biological surveys and management in all regions in Western Australia.

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