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Biota (n): The living creatures of an area; the flora and fauna together

Dr Michelle Carey
CZR Resources
Via email

Dear Michelle

CZR Robe Mesa Project Troglofauna Habitat

Further to our recent meeting at the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS), we provide a summary of the topics covered in regard to troglobitic fauna (troglofauna) in relation to the above project.

In particular, this correspondence provides:

- background on what is known about the distribution and habitat use of troglofaunal in the Robe River valley (Robe valley);
- a summary overview of the findings and habitat use by this subterranean fauna within the Robe Mesa project tenure; and
- the likelihood of habitat fragmentation impacts arising from the implementation of the project, and implications for the persistence of individual species and the troglofaunal community of Mesa F as a whole, of which the project tenure is relatively small part.

1. Background on Troglofauna in the Robe Valley

Troglofauna were first discovered in the channel iron deposit (CID) mesa landforms of the Robe valley by Biota (2004), representing the first record of this significant ecological community in the Pilbara bioregion. Given the propensity for short-range endemism and narrow habitat requirements known for troglofauna from elsewhere, the isolated and disconnected nature of the CID mesas suggested a possible model of relictual 'island' populations (Biota 2004).

Subsequent assessment work for Rio Tinto's Mesa A project in the Robe valley supported this hypothesis (Biota 2006), demonstrating that each sampled mesa contained its own distinct suite of troglofauna species. Continued research in other mesas in the Robe valley further confirmed this finding, showing a pattern of broad similarity amongst mesas at higher taxonomic level, but with complete replacement of individual species from one mesa to the next (Harvey et al. 2008, Biota 2009, 2017a). The troglofauna of CID mesas in the Robe valley are now accepted as being endemic to each discrete landform, which has resulted in the listing of the faunal community as a Priority Ecological Community by the Department of Biodiversity, Conservation and Attractions (DBCA).

While individual species are apparently restricted to any given mesa, genetic data indicate a high degree of gene flow within the mesas; to the extent that exactly the same haplotype can occur across the entire landform (Biota 2017a). This is consistent with species distribution data from the better sampled mesas in indicating a general lack of barriers to gene flow in subterranean habitats across the extent of each mesa (Biota 2017b, 2019a).

Level 4, 46 Colin Street, West Perth WA 6005 | PO Box 538, West Perth WA 6871 | T: (08) 9328 1900
E: biota@biota.net.au | W: www.biota.net.au

2. Key Findings from the CZR Robe Mesa Project Tenure

Given the known significance of the Robe valley for troglofauna, the project tenure was sampled in accordance with current Environmental Protection Authority (EPA) technical guidance for subterranean fauna (EPA 2021). A total of 102 troglofauna specimens were collected from 22 drillholes across the three phases of sampling completed within the project tenure. The range of higher taxonomic ranks recorded are typical of the troglofauna assemblage recorded in other mesas in the Robe valley (Biota 2023).

DNA sequencing has been completed for the specimens from the first two phases of sampling to assign species identifications (Biota 2023), with those from the third phase of sampling currently being analysed. The sequenced specimens from the project tenure are genetically distinct from similar specimens recorded at other mesas in the Robe Valley. This corroborates previous studies that demonstrate that mesas in the Robe Valley are habitat isolates, and there is no gene flow between mesas.

A subset of six of the troglofauna species recorded from the project tenure are currently only known from within the proposed pit outlines (Biota 2023). However, based on surface geology and modelled stratigraphic cross-sections, suitable connected habitat is likely to occur outside of the conceptual pit outline within the survey area. This is supported by the recorded locations of the troglobitic schizomid, *Draculoides* sp. H-SCH200, which occurs both inside and outside the conceptual pit. Similarly, suitable habitat is likely to occur throughout Mesa F, which is contiguous with that of the project tenure (Biota 2006, 2011b). It is therefore very likely that the species recorded from the project tenure, and those apparently only occurring within the pit outlines, would also occur throughout Mesa F. This would be entirely consistent with the findings demonstrated for all other CID mesa landforms in the Robe valley where longer-term sampling has better documented the fauna.

3. Proportional Habitat Loss and Fragmentation

As outlined above, while it is unlikely that any species of troglofauna would be restricted in distribution to the proposed pit area, questions have been raised in regard to the effect of habitat fragmentation and proportional habitat loss from Mesa F, of which the project tenure forms part.

It must be recognised in any such consideration that troglofauna occur in a three-dimensional environment (Biota and DC Blandford & Associates 2013). This means that while a planar, two-dimensional view such as a map is helpful to conceptualise impact footprints, the most informed assessment is provided by considering volumetric change to the mesa landform and the CID strata as a whole.

In the case of the Robe Mesa project, this indicates that troglofauna habitat removal for the proposed pit would represent:

- 13% of the available habitat within the project tenure by volume; and
- 3.5% of the estimated total habitat present within the entire Mesa F landform.

Even at initial assessment, the loss of 3.5% of the habitat of an ecological community would appear unlikely to represent a significant impact. Further; for context on past EPA advice to the Minister for the Environment on similar Robe valley projects, the loss of up to 50% of the habitat of a mesa was deemed acceptable (EPA 2007), provided that the persistence of troglofauna in the retained habitat could be demonstrated. Conditioned monitoring that has been conducted for these past approved projects has indeed demonstrated this, yielding data to support both maintenance of key habitat parameters and the ongoing persistence of troglofauna species in retained portions of mined mesas (MWH 2014, Biota 2019b, 2020a). Given these observations, it would seem to be an acceptably low risk that the relatively small loss of 3.5% of the troglofauna habitat would lead to any significant impact on the subterranean biodiversity values at Mesa F.

Similarly, habitat fragmentation does not appear to be a credible impact pathway. This too must consider the three-dimensional habitat perspective and that the proposed pit would still leave a surrounding margin of connected habitat on the mesa edge that is also vertically connected to underlying CID strata below the pit floor. Such connections have been shown to continue to support troglofauna during mining operations in the Robe valley (Biota 2020b). These observations suggest that the likelihood of fragmentation significantly affecting the troglofauna of Mesa F is also low.

I trust the above meets current requirements. Please advise if you, CZR or DEMIRS require any further input from us in relation to this topic.

Yours sincerely,

Biota Environmental Sciences Pty Ltd

Garth Humphreys
Principal Ecologist / Director

Adjunct Lecturer, School of Animal Biology, University of Western Australia
Honorary Research Associate, Terrestrial Zoology, Western Australian Museum
Inaugural Member, Environmental Protection Authority, Scientific Advisory Council

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