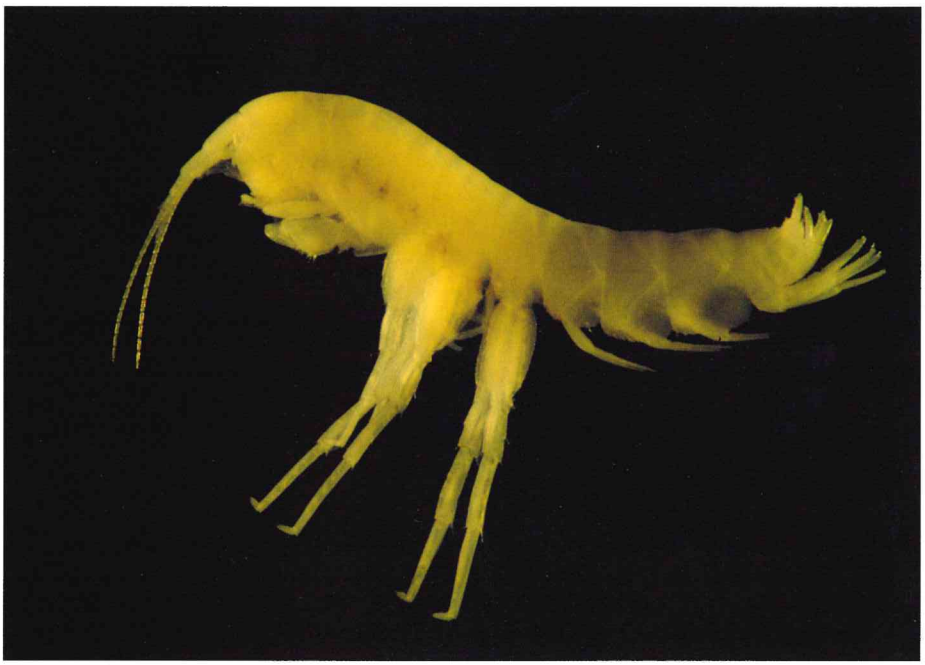
INVERTEBRATE COMMUNITIES OF CAVES

on the South West coastal plain

There are several areas of caves in the south west of Western Australia. Most dark caves are inhospitable places for animals to reside permanently mainly due to the lack of a reliable source of nutrients. In some caves, however, roots from living trees above the ground branch out forming root mats within cave streams or pools. These root mats provide a constant and abundant food source for a rich aquatic fauna, especially invertebrates. Aquatic root mat communities are known in caves from two areas at Yanchep, and Augusta-Margaret River.



The Crystal Cave crangonyctoid within Yanchep National Park is critically endangered. Photo – Edyta Jasinska

The root mat fauna of the Augusta-Margaret River and Yanchep caves are remarkable in their high species richness and abundance. They may contain 30–40 species of invertebrates, while three to six species is more usual for aquatic caves elsewhere in the world. Some species only occur in these cave streams and some, including the Crystal Cave Crangonyctoid, are Gondwanan relicts—with ancestors traceable back to when Australia was part of the super-continent, Gondwana, at least 100 million years ago. The aquatic root mat communities have been listed as threatened ecological communities. As the invertebrate communities are highly restricted, and facing high levels of threat, they have been ranked Critically Endangered.

The caves that contain root mat communities in the Augusta-Margaret River area occur on a geological formation known as the Leeuwin-Naturaliste Ridge. The cave streams are either of groundwater origin or, especially in the case of temporary streams, are a continuation of surface creeks that flow into the caves. Several caves known to contain root mat communities occur within 10km of the coastline on a Tamala (coastal) limestone ridge between 0.5 and 25km apart. The invertebrate species present vary greatly in composition and abundance from cave to cave. This, plus differences in the water (pH, temperature, electrical conductivity) between the caves, has resulted in these caves being considered to contain distinct communities. Several tree species, including karri (*Eucalyptus diversicolor*), marri (*Eucalyptus callophylla*) and peppermint (*Agonis flexuosa*) extend roots into these caves.

Root mat communities in Yanchep caves occur at the junction of the Bassendean sands and Tamala Limestone (Spearwood Dunes). On the western side of the Gnangara mound (a shallow aquifer that extends from Moore River to the Swan River) waters flow towards the coast and seep through the sand forming pools and streams in caves around Yanchep. The Australian Speleological Federation has recorded 315 caves in Yanchep National Park but only 10–15 contain permanent water. Six of these contain root mats and support 30–40 species of animals. All the roots that grow into the caves belong to tuart trees (*Eucalyptus gomphocephala*). More than half of the species of each cave at Yanchep occur in the root mats, with the remainder in open water, root detritus, and sand in the stream bed.

The persistence of the root mat communities of the Leeuwin and Yanchep caves depends on the presence of permanent water in caves. Continuing decline in the level of groundwater will cause the streams to completely dry out and the communities to be lost. Many of the species have no drought-resistant stages and therefore are unable to survive drying. Water levels in caves in both areas have been declining, and this presents the most serious threat to the communities. At Yanchep this is due to a combination of a drying climate and increased use of the waters of the Gnangara mound. The reasons are less clear in the Leeuwin caves, but also appear to include the dry climate. The loss of the trees whose roots provide habitat and food for the communities is also a threat, as is pollution of the groundwater.

For further information please contact the Department's Swan Region office on (08) 9368 4399 or the Blackwood District office on (08) 9752 1677.

Recovery

of threatened ecological communities

The Department of Conservation and Land Management (the Department) is committed to ensuring that Critically Endangered Ecological Communities are not totally destroyed. This is done through the preparation of an Interim Recovery Plan (IRP), which outlines the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened ecological communities in the wild and begin the recovery process.

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The Department has established a Recovery Team to coordinate the implementation of recovery actions that address the greatest threats to the survival of the Yanchep caves community. A team for the Leeuwin caves is currently being established. Recovery Teams consist of representatives from the Department, community groups, private landowners, local shires and various government agencies. Recovery actions that have been, and will be, progressively implemented to protect the threatened ecological communities include:

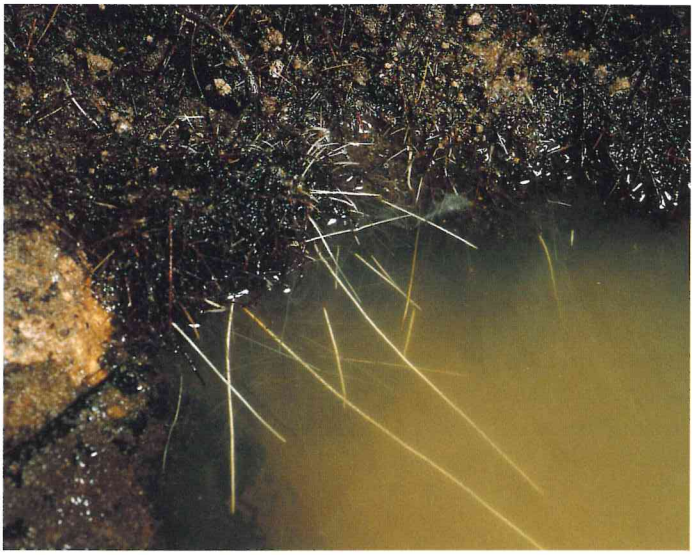
Protection from current threats:

Monitoring of water levels and quality, investigating and mapping caves streams, monitoring trees above caves, conducting further surveys for the community, establishing a semi- permanent system for remote monitoring and artificial watering of caves at Yanchep caves, and regular monitoring of the health of each community.

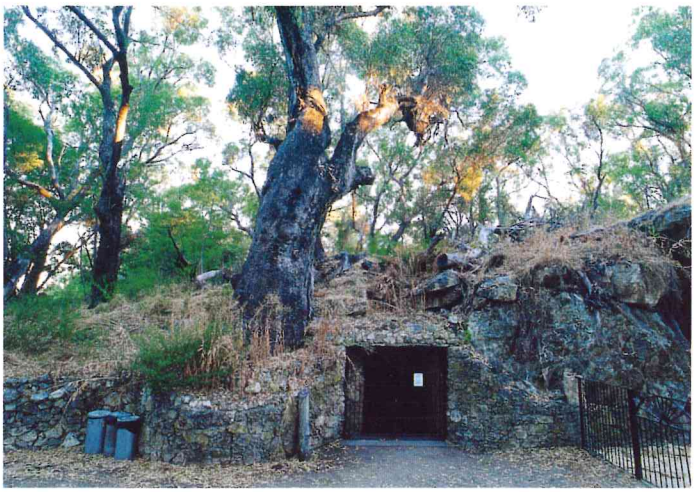
Protection from future threats:

The development of strategies to manage fire, regenerate trees above caves if required, monitor invertebrate communities, minimise impacts of current and future management practices, ensuring that all relevant people are aware of the communities' presence and the need to protect them, and that all are familiar with the threats identified in the Interim Recovery Plans.

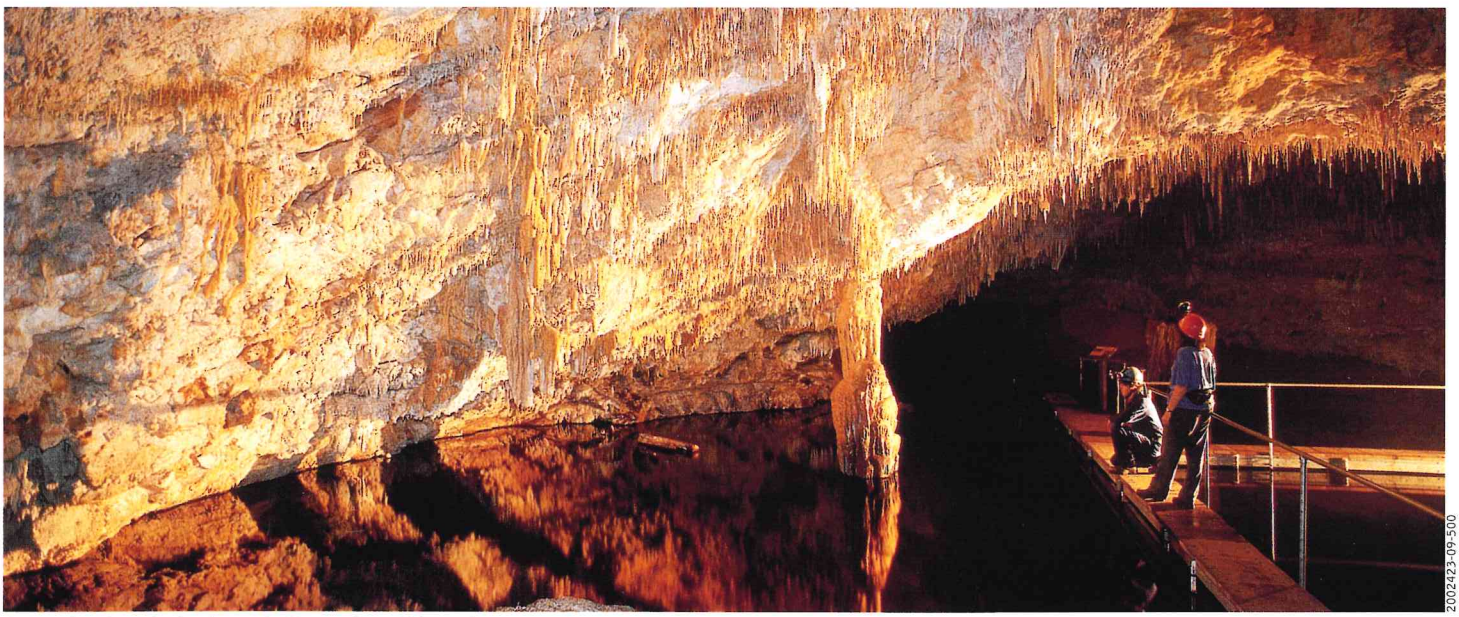
IRPs will be deemed a success if they result in a better understanding of the communities and the factors affecting them, no drying out of known occurrences of the root mats occur, all the Gondwanan species in the aquatic root mat assemblages are maintained, the trees that are currently supplying or are likely in future to supply roots to the caves are maintained, and overall reduction of threatening processes occurs.



Root-mat close up showing new growth (white shoots).
Photo – Micheal James



Cabaret Cave area in Yanchep National Park showing tuart forest surrounding limestone caves. Photo – Michael James



Calgardup Cave in the Leeuwin-Naturaliste Ridge. Photo – Michael James

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