

HYDROLOGY RESEARCH FOR A DRYING CAVE

- Jayme Hatcher

The Augusta Margaret River Tourism Association (AMRTA) has been successful in obtaining Western Australian State Government funding for its Lake and Jewel Cave Hydrology and Recovery Project – \$150,000 of Natural Resource Management funding to investigate the alarming decline of water levels at these major geotourism icons – Lake Cave and Jewel Cave.

Lake Cave, with its contributing water catchment area and its groundwater dependent ecosystem in the Leeuwin-Naturaliste Ridge, over the last six years has seen a dramatic drying of the cave. With the current rate of decline, the lake and its dependent biodiversity (root mat stygofauna community) is predicted to disappear within two to four years!

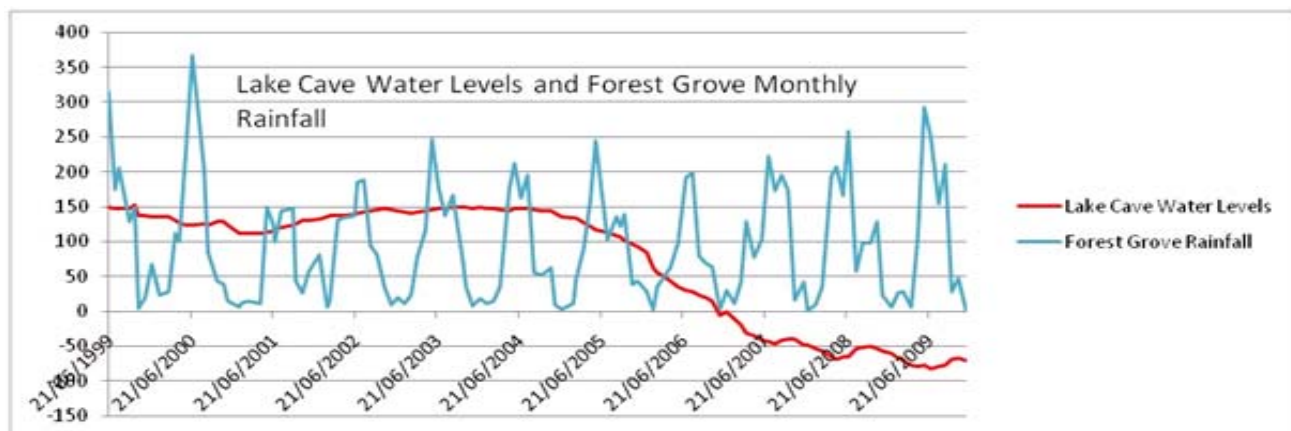
This project is of the highest priority for the Augusta Margaret River Tourism Association who has been working closely with Dr Stefan Eberhard (Director, Subterranean Ecology Pty Ltd), Dr Steve Appleyard (Adjunct Associate Professor, School of Earth and Environmental Sciences, University of Western Australia) and other academics from Curtin University. As a group we have been identifying knowledge gaps, management and research priorities, and an action plan to sustain Lake Cave and its stygofauna, as well as undertake research to better understand the factors affecting the declining water resource and biodiversity values which are threatened by declining water levels resulting from climate change, and possibly other human influences. Jewel and Easter Caves are also similarly threatened, although the unique stygofauna community in these caves may already be extinct, or near extinct, partially owing to the failure of previous recovery plan actions.

The three major goals of the project are:

- 1) Immediate Life Support System for Lake Cave – which aims to stabilise the current rate of decline by enhancing the natural groundwater recharge regime by harvesting local rainfall runoff and recharging the lake via a dispersed irrigation system that supplements the natural recharge regime. Water quality and quantity will be closely monitored to ensure that natural background values are not exceeded, and no contaminants enter the system.
- 2) Research the hydrology and stygofauna of Lake Cave required to understand, conserve and ensure sustainable management of the cave system, its contributing water catchment area and its Threatened Ecological Community (TEC) of stygofauna.
- 3) Continue research and recovery actions (where possible) for the endemic stygofauna community in Jewel and Easter Caves (Aquatic Root Mat Community No. 1) which is listed as Endangered under the EPBC Act.

In the last six years the water within Lake Cave has been disappearing at approximately 1mm a week. The rate has dramatically increased and as the water disappears; so does the natural microclimate that exists within the cave. The stygofauna (19 species) could be lost forever.

We predict, at the current rate of decline, that the cave will be dry within two to four years. The graph below shows rainfall records in relation to the declining water levels within the cave:



This graph reflects the dramatic decline in water levels since 2006. Lake Cave has been a major attraction in the region since 1901 and has always been known for its spectacular lake and reflections (see the images below).

The threats to Lake Cave are reduced groundwater inflow to the cave system associated with drying

climate trends in southwest Western Australia (climate change), which might also be exacerbated by blue gum plantations in the cave's catchment area.

It was recognised early that Lake Cave contains one of the most diverse community of stygofauna – including an aquatic root mat community – which is

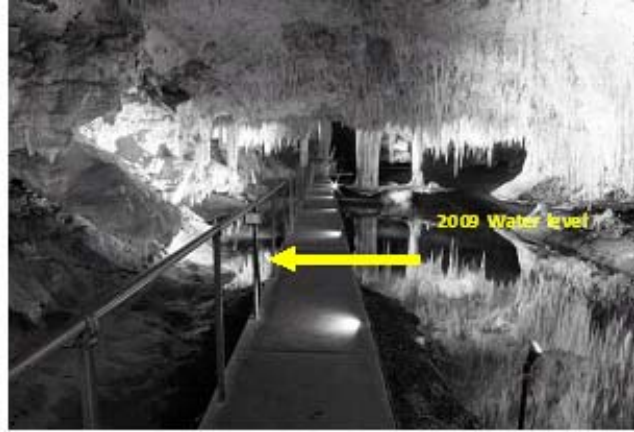
threatened by the declining water levels. The Lake Cave Stygofauna Community was nominated in January 2010 for listing as a Threatened Ecological Community (TEC) under the Commonwealth Environmental Protection & Biodiversity Conservation Act 1999 (EPBC Act) (status Critically Endangered). Root mat stygofauna communities in four other caves in the Leeuwin-Naturaliste Ridge, including Jewel and Easter Caves (managed by the

AMRTA) are also listed as TEC's (status Endangered) under the EPBC Act.

Ultimately the research aims to deliver strategies for conservation, recovery, and sustainable management of geoheritage, water resources, and biodiversity values, while ensuring the caves continue to be a major iconic geotourism attraction within the Margaret River Region.



Lake Cave 2003



Lake Cave 2009

COMING EVENTS

This list will simply list events of special interest to cave managers and cavers. If you are interested in any listed events, contact Professor Elery Hamilton-Smith for further details at <elery@alphalink.com.au>.

2010: July 4-8	Australian Earth Sciences Convention, Canberra
July 12-14	14th Australasian Bat Society Conference, Darwin, Northern Territory
July 25-28	13th Cave Guides Gathering, Wellington, NSW
Aug 2-6	NSS Convention, Essex Junction, Vermont
Aug 4-8	Cuba Speleo Society 70th Anniversary Conference. Also Latin America and Caribbean Federations meetings
Aug 7-10	Pre-conference excursion to Lava fields of Western Victoria
Aug 12-17	14th International Vulcanospeleology Conference, Undara, Queensland
Aug 24-26	Parks Forum 4th International Parks Leadership Conference, Sydney
Aug 29-Sept 3	Conference International Society for Subterranean Biology, Postojna, Slovenia
Sept 28-29, & Sept 30-Oct 1	Small Cities Conference. Sustainability of Small Country Towns, LaTrobe University, Bendigo
Oct 20-24	ISCA Congress, Liptovsky Mikulas, Slovakia
Oct 31-Nov 3	Geological Society of America, Denver, USA
Oct 31 - Nov 4	National Groundwater Conference: Challenge of Sustainable Management, Canberra
Nov 5-6	Applied Geography in Theory & Practice, University of Zagreb, Croatia
Nov 16-20	International Conference on Speleology: Development and Interaction of sciences. Naberezhnye Chelny, Russia
2010: Nov 18-19	National Indigenous Conference and Dialogue, University of NSW, Sydney
2010: Dec 6th	Biodiversity and Human-Environment Relations, Macquarie University, Sydney
Looking Ahead:	
2011: Jan 10-14	12th Multidisciplinary Conference on Sinkholes, St. Louis, USA
2011: Jan 11-15	IUCN Commission on Environmental, Economic and Social Sciences, Whakatane, NZ
2011: Apr 17-22	Australian Speleological Federation Conference, Chillagoe, Queensland
2011: April	Central American Congress of Speleology, Coban, Guatemala
2011: May 8-13	19th ACKMA Conference, Ulverstone, Tasmania
2011: Jul 18-22	NSS Convention, Glenwood Springs, Colorado
2012: May	ACKMA Annual General Meeting. Venue – to be advised.
2012: June 25-29	NSS Convention, Greenbrier Valley, West Virginia
2012: Sept 6-15	World Conservation Conference, Jeju Island, S. Korea
2013: May	ACKMA 20th ACKMA Conference, Waitomo Caves, NZ

