CaveWorks Research

Mammoth Cave Water Tracing

- Stefan Eberhard*

The *CaveWorks* research project in the Leeuwin-Naturaliste Ridge karst near Margaret River, Western Australia, has discovered a previously unknown stream connection between one of the region's most historic tourist caves and the beach several kilometres away.

Water tracing conducted during winter 2000 proved that the Mammoth Cave stream flows to Conto Spring. The stream flowing into the popular tourist entrance of Mammoth Cave was found to travel a linear distance of 3.5 kilometres beneath the limestone ridge, to emerge at Conto Spring on the shores of the Indian Ocean.

The connection was proved using small quantities of environmentally-friendly fluorescent dyes, and specialised laboratory techniques (developed by the Ozark Underground Laboratory in the USA) that detected the dye in minute concentrations at the spring.

The destination of the Mammoth Cave stream has remained a mystery for many years. A number of earlier tracing attempts failed to detect anything beyond a stream connection with Conference Cave, but nothing was known of where the water went from here. The *CaveWorks* trace re-confirmed the obvious connection from Mammoth Cave to Terry's Cave and thence to Conference Cave.

Other earlier water tracing studies have established hydrological connections from Calgardup Cave to Bobs Hollow, and, from Lake Cave to Conto Spring. An attempt to trace Ruddocks Cave failed when the dye ended up back outside the "inflow" entrance, presumably due to back flooding!

There are a number of springs on the coast that might have been fed by Mammoth Cave, including Bobs Hollow, Conto Spring, and a number of other outflows, some of which are only visible at extreme low tide. Bobs Hollow represents the shortest potential flow route and previous speculative interpretations of the North Mammoth Doline Chain suggested a possible (fossil) flow path towards Bobs Hollow. A discrete submarine or intertidal resurgence of the Mammoth Cave waters had also been postulated.

The dye was injected into Mammoth Cave stream under average winter flow conditions and was detected at Conto Spring within 18 hours. This rapid travel time indicates that the water is flowing through a well developed conduit!

The water tracing and mapping study undertaken by *CaveWorks* has found that the entire catchment area of the Mammoth Cave system is within the boundaries of the Mammoth Cave Reserve and the Leeuwin-Naturaliste National Park. The study has also shown that there are no adverse impacts derived from neighbouring agricultural or viticultural land use activities affecting the catchment of Mammoth Cave.

At the same time as the Mammoth trace, different dyes were also injected into WI83 stream sink and Forest Grove stream sink. These dyes were not detected at Lake Cave or Conto Spring. No dyes were detected in Connelley's Cave or Bob's Hollow. Sampling for the dyes continued for 13 weeks.

The results have improved our understanding of the cave system and will contribute to the protection and sustainable management of groundwater resources and associated ecosystems in this area. Further water tracing studies are planned.

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