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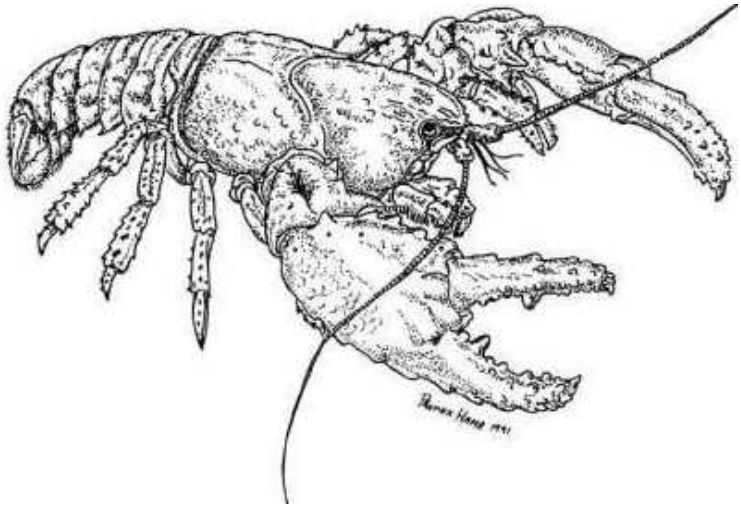

Impact of the 2016 fires on the Mole Creek Karst

by **Deb Hunter**

Hickmannia troglodytes - cave spider - Photo by Deb Hunter

Introduction

This article outlines the possible and probable impacts of the fires on the Central Plateau in 2016 on the Mole Creek karst's natural values and the karst resources used by the human community.

The Mole Creek karst is one of eastern Australia's largest and most densely cavernous karsts. It measures approximately 26 x 10 km and extends from the midslopes of the Great Western Tiers across the Mole Creek valley to the foot of the Gog Range. Its main catchment includes the higher slope of the

Tiers and the northern margin of the Central Plateau which was burnt in the Lake Mackenzie/Mersey fire.

In 2013 the importance of the karst was recognised when the Tasmanian Wilderness World Heritage Area was extended from the edge of the Central Plateau to include much of the western escarpment of the Tiers and the Mole Creek karst and its catchment.

The Mole Creek valley is an important farming area, and the caves are important for tourism and speleology. The caves of the Mole Creek karst are recognised for their high degree of endemism in an obligate troglophile faunal assemblage. The karst fauna are vulnerable species and research is incomplete.

Streams in the Mole Creek landscape - tributaries of the Mersey River - flow underground for most of their courses for most of the year and surface water is scarce. The (water-)saturated (phreatic) zone of the karst is important for water resources in a landscape with poor availability of surface water. The Mole Creek karst is a _fluviokarst_, one where the water that flows through the karst systems arises not only from precipitation, but more importantly, from topography abutting the limestone at higher elevation.

Two important aquifers that release water to the karst drainage systems of Mole Creek have for a long time buffered inputs to the systems. The most substantial of these aquifers consists of a reservoir held in thick slope sediments eroded from higher elevations slopes on the Tiers. This perched aquifer overlies the forested karst contact (the geological boundary of the limestone with adjoining sedimentary rocks); it releases water gradually into the karst drainage systems. However, the majority of the obscured karst contact is now planted out to timber plantations of *Eucalyptus nitens*; plantations that are known for substantial interception of aquifer recharge in southeast Australia by virtue of high water demand in rapid growth phase. The second aquifer is comprised of streams that rise on the Central Plateau and upper escarpment of the Tiers that directly input the karst drainage systems. Most of these streams have been maintained as small but permanent streams, due to the sponge-like release of moisture throughout the year by the peat soils of the northern Central Plateau.

The loss of the peat based soils of the northern margin of the Central Plateau in the fires is likely to compromise their buffering effect on stream flows. Observations have already shown that broadacre plantations over the midslope perched aquifer have recently changed the karst hydrology. The aquifers enabled gradual release along the rivers over the seasons and release between potential meteoric phreas recharge events (a phreatic zone is where spaces in the rock are permanently water-filled). The likely effect most residents, water users and regular cavers will notice is higher magnitude oscillations in cave stream volumes. The epiphreas will also fluctuate more noticeably (the epiphreatic zone is the part of the cave system where the water level of the phreas seasonally fluctuates). The cave fauna will be vulnerable to longer dry spells and more frequent floods. While speleologists (cave explorers and researchers) will be alert for changes, others may encounter conditions they did not expect and face increased risk of flash flooding. Youth adventure groups with non-specialist leadership and unaccompanied general public dominate the use of easily accessible 'wild' caves.

Documented Impacts

The author has observed unusual hydrological behaviour in one popular beginner group cave at Mole Creek, repeat trips encountering unexpected pools of water. Further, on one occasion since the fires, a one metre deep stream in the overflow surface channel outside this cave was found to be dry

less than two hours later.

The peat burnt more thoroughly closer to the escarpment because it was fuelled by an increase in available oxygen. Sub-alpine impacts were patchy and limited by airflow characteristics. To the east-south-east of Mt Parmeener lies a depression formed by a slumped field of dolerite columns that can be regarded as a pseudokarst. This was partly explored by the author some years ago, and was found to contain dark cave-like spaces with troglophillic fauna including the cave spider *Hickmania troglodites*. The vegetation of the depression was burnt in the 2016 highland fires.

Conclusion

It is imperative that sufficient resources be allocated to monitor the impact of the fires on the behaviour of the karst drainage systems, water quality and karst ecosystems dependent on karst hydrology. There may be a need to establish fauna sanctuaries and the impact on future water supplies must be assessed.

Severe floods with landslides in 2011 and 2016 have also profoundly affected the caves and changed the karst drainage. It will be important to integrate studies to achieve long-term views and strategies.

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