THROMBOLITES OF LAKE CLIFTON

Thrombolites are a form of microbialite – odd, rock-like structures formed by photosynthetic microbes that precipitate calcium carbonate (limestone). Some of these structures are evidence of the oldest life on Earth and are therefore of great scientific interest. They also provide evidence of historical environments through information held in their structure.

Worldwide, microbial structures are restricted to a few areas including the Bahamas, Bermuda and Western Australia. Western Australia contains the oldest known microbialite fossils, at 3.5 billion years. The State also contains the greatest number and most varied types of living microbialites in the world.

Exposed thrombolite reef in Lake Clifton. Photo – Val English

Thrombolites have a clotted internal appearance and have existed for at least 570 million years. They were the most dominant living marine structures for millions of years. Around 395 million years ago, faster-growing marine organisms such as corals and macroalgae are believed to have led to the decline of the thrombolites as a result of competition for space.

The best known microbialites in Western Australia are the stromatolites that occur at Hamelin Pool, Shark Bay. Living microbialites in the south west of the State that are not as well known occur at Esperance, Augusta, Rottnest Island, Cervantes, Rockingham, Lake Clifton, Pamelup Pond and Lake Preston in Yalgorup National Park. Each of these occurrences constitutes a distinct and very significant community in terms of history, structure, and morphology.

Lake Clifton supports the largest known examples of living non-marine microbialites in the southern hemisphere. Radiocarbon dating indicates the Lake Clifton thrombolites began to form up to 1950 years ago. Despite their relative youth, they have been built by direct descendants of the oldest known forms of life that may be little different from those primitive ancestors.

The Lake Clifton thrombolites grow continuously and depend on a continuous discharge of groundwater, low in salinity and nutrients and high in alkalinity, into their habitat. Nutrients leaching into the groundwater from agricultural and urban land in the catchments affect the water quality in the lake, with algal blooms already being observed in Lake Clifton.

Colse up of thrombolite structures in Lake Clifton. Photo – Robyn Luu

The current salinity of Lake Clifton, which has increased sharply since the early 1990s, is thought to be a threat to the thrombolites. The increase is caused by changes in the water balance (the various inflows and outflows) of the lake. In particular the fresh groundwater flowing into the lake on the eastern side is thought to be essential to the survival and growth of thrombolites. If climate change, or groundwater abstraction for agricultural, urban or other purposes results in lower water levels in the lake, or reduces the inflow of fresh groundwater into the catchment, the thrombolites may stop growing.

Recovery of threatened ecological communities

The Department of Conservation and Land Management (CALM) has written an Interim Recovery Plan to address the greatest threats to the Lake Clifton thrombolites and set up a Recovery Team to implement the plan. The team consists of individuals from CALM, University of Western Australia, Water and Rivers Commission, Lake Clifton Land Care Group, City of Mandurah and CSIRO.

THROMBOLITES OF LAKE CLIFTON

The Lake Clifton thrombolites, listed as a Threatened Ecological Community, are subject to many other threats. These include crushing by visitors (or stock if fences are breached), pollution, altered groundwater flow, increased runoff due to land clearing, alterations to surrounding vegetation, introduction of exotic fauna such as snails and fish, and smothering by weeds or by sediment.

Recovery actions that have been, and will be, progressively implemented to protect the Threatened Ecological Community include:

- the construction of a boardwalk;
- weed control;
- regular monitoring of water quality and levels;
- monitoring the general health of the microbialite community;
- ensuring that relevant authorities, landowners and the Department's personnel are aware of the presence of the thrombolite community and the need to protect it, and that all are familiar with the threats identified in the Interim Recovery Plan; and
- promoting research that assists in the recovery of the Threatened Ecological Community.

For further information please contact CALM's Swan Region office on (08) 9368 4399.

The Interim Recovery Plan will be deemed a success if water quality and levels are maintained or improved in Lake Clifton, and the vigour and extent of the microbial community is maintained.

The vegetation surrounding the thrombolite community at Lake Clifton is important for filtering nutrients. Photo – Robyn Luu

The thrombolite reef in Lake Clifton is seasonally inundated. Photo – Robyn Luu

The boardwalk constructed at Lake Clifton helps prevent crushing of the thrombolites. Photo – Stephen Dutton

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