

Proglacial Lake Bonney, east Antarctica: revisiting a more than 100 year environmental record

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Lake Bonney in Taylor Valley, east Antarctica, is a proglacial lake with two distinct lobes separated by a relatively shallow sill in a narrow channel referred to as the Bonny Narrows. Robert Falcon Scott passed through the Bonney Narrows in 1903 on his first expedition in the area, and made a measurement of the channel's width that has been used to estimate lake level at the time in order to extend our lake level record for Lake Bonney to well over 100 years now. The sill depth was at most a few meters deep during Scott's visit and the two lobes had apparently only joined in the years prior. The sill is now an important physical control of the geochemistry and ecology of the two lobes and is more than 18 m below the surface. West Lake Bonney (WLB) has a hypersaline brine bottom water which is held back from East Lake Bonney (ELB) by the sill. The brine is displaced over the sill, by a mechanism referred to as "chemocline leakage". The brine sinks on the ELB side following a former river channel until it finds its neutral buoyancy in ELB, a few meters below the sill depth. The nature and timing of the chemocline leakage is largely unknown, but is driven by subglacial brine input from Taylor Glacier and perhaps some contribution from displacement by glacier advance. In this presentation, I will review the history of the connectivity between the two lobes of Lake Bonney as indicated by geochemical proxies and physical evidence collected from the lake surface and through recent diving operations.