

# Advantages of Lake Buoy Technology: Introducing the Lake Taupo automatic monitoring station

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Lake Taupo is an iconic lake of regional, national and international significance. In the 1990's it was recognised that the lake's high water quality status was under threat due to land use pressures. In response, the government, with Waikato Regional Council and Taupo District Council, committed almost \$82 million over 15 years to reduce nitrogen inputs to the lake, aiming to protect water quality and clarity. Globally there has been a strong drive in the past decade to deploy monitoring buoys on lakes of importance, in order to provide critical lake information to researchers, managers, and the general public. Lake buoy technology can provide data at temporal scales that outstrip current models and theory. A monitoring buoy was installed in Lake Taupo to improve the environmental information available on the lake state and dynamics to support research, monitoring and management. This monitoring buoy is the deepest in New Zealand with sensors down to 150 m depth. The buoy provides high frequency data, in real time, on the physico-chemical characteristics of the lake and meteorological drivers. I will provide an overview of the design of the monitoring station and describe advantages relative to traditional monitoring. Vertical mixing is of prime importance in this deep lake in driving the annual maximum in algal biomass, as routine monitoring has shown. However, the frequency of routine monitoring, once per 3 weeks and only in the daytime, is too low to ensure a good understanding of the duration and intensity of the annual mixing period. The buoy station provides data every minute. Compared with routine monitoring the buoy station provides much higher resolution of mixing dynamics in the lake, stratification and the effects on hypolimnetic oxygen and algal biomass, allowing development of a much better understanding of the drivers of the lake's ecosystem condition.