

# HOLOCENE LAKE-LEVEL HISTORY OF LITTLE TWIN LAKE, NORTHCENTRAL WA

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A 12000 year sediment record is preserved in Little Twin Lake, WA, a closed basin kettle lake set among similar lakes in a moraine/outwash landscape. The lake bottom consists of two regions: a gently shelving apron (to ~4.5 m) with a deeper (~8.5 m) section at the lake's west end. Ten sediment cores were collected ON [in] a transect from shallow to deep water in order to reconstruct lake level fluctuations. An additional core taken to preserve the sediment/water interface was also collected, as well as samples of surface sediment, lake and ground water, and vegetation. The chronology is provided by AMS radiocarbon dates and microprobe analysis of five tephra horizons. The deep water record is dominated by centimeter scale layers ranging from fine organic rich muds to carbonate shells and shell fragments, with occasional tephra layers. Surface sediment samples, and upper sections of apron cores are composed primarily of dark, organic rich sediment. Below the near surface organic-rich zone the apron cores consist of coarse, carbonate rich marl. Nearly pure white in color, the marl is typically massive with no visible sediment horizons, although some laminations can be seen in the deeper sections of the marl deposits. Very coarse sand and pebble deposits were found beneath the marl deposits.

Analyses include  $^{18}\text{O}$ ,  $^{13}\text{C}$ ,  $^{15}\text{N}$ , C, and N for the two cores collected in the deepest region of the lake. Magnetic susceptibility and wet and dry bulk densities were analyzed on all cores. These data suggest that mid-Holocene lake levels and P-E balance were lower, and that temperatures were possibly higher than today. Although marl dominates the apron cores, it is not found in the modern depositional environment, implying recent departure from previously long-lived drier conditions. A frequently fluctuating lake level under warmer and drier conditions may have allowed oxidization and decomposition of organic apron sediment and preservation of only carbonate shells and stem casts, producing the marls while still allowing uninterrupted deep water sedimentation.