

GROUND PENETRATING RADAR SURVEY OF A POSSIBLE BURIED FOREST BED, MADISON COUNTY, MT

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ABSTRACT

A Ground Penetrating Radar (GPR) survey was conducted over a continuous 532 m (1740 ft) long transect at Willow Swamp, Madison County, Montana (Willow Swamp 7.5 min. Quadrangle) to determine the nature of subsurface deposits, their thickness, and stratigraphy. A 6.5 m (20 ft) deep GPR profile was established employing a 300 MHz medium wavelength antenna and correlated by core samples.

Willow swamp today is a high mountain bog at 2103 m (6960 ft) elevation situated in a pre-glacial depression. The origin of the bog is attributed to the damming of a tributary valley by glacial ice in late Pinedale time (12,000-23,000 BP). Initially, a lake formed behind the residual lateral moraine. Water level subsequently rose and eventually breached the moraine, leaving the present day bog as a remnant. Geologic reconstruction indicated that lightly stratified sands and gravels accumulated in the glacial lakebed. After breachment and drainage, the remnant lakebed provided a postglacial environment suitable for a stand of trees. A forest appeared to have covered the entire former lakebed, as represented by GPR scans of what is interpreted to be residual stumps and disturbed soil patterns. Overlying this unit is a sequence of organic clays and blue clays that imply reducing conditions. Coring reached this unit, but not further (2.28 m). The uppermost unit consisted of dark sedge peat and silty organic clay. The upper unit probably represents a wetland environment with a fluctuating water table. It is suggested that beaver damming activity may have contributed to the continued existence of the wetland. The age of the forest bed remains to be radiometrically dated. It is, however, suggested that it is bracketed in age from late Pinedale (ca. 12000 BP) to perhaps Younger Dryas (9000-10000 BP).