A new set of high-resolution seismic reflection data acquired on Skaneateles Lake, New York reveals a dynamic depositional environment and complex deglacial and modern lake level history. Detailed bathymetric results were merged with a regional Digital Elevation Model, in order to provide an integrated perspective view of the lake basin and environs. The new digital data set reveals a stratigraphic framework similar to that observed in adjacent Finger Lakes, with substantially better spatial resolution of key erosional surfaces and depositional sequences. A major bathymetric drop near the center of the lake is interpreted as a part of a regional E-W trending lineament observed in the Digital Elevation Model, and may correlate to a recently active bedrock fault. A large number of dense polygonal faults are observed in the south central part of the lake, mainly in the deeper stratigraphic sequences, and are interpreted to be caused by sediment dewatering in the recent past. Several major slide deposits, ranging in volume from 1.2-6.6 x 10^6 m^3, are observed at three different stratigraphic levels. Forthcoming studies will incorporate high-resolution correlations between seismic reflection data and a suite of new sediment piston cores recently acquired from the lake.