

## CEE-LINE™ Echo Sounder with Trimble R10 GNSS Used for Dam Bathymetric Survey in Thousand Oaks, California USA.

*For a small lake survey in Thousand Oaks, California, the CEE-LINE™ echo sounder was the ideal solution for a simplified acquisition method using Trimble GNSS and acquisition software. Lightweight and convenient for a kayak, the echo sounder was connected to the TSC3 and stowed while the data collector was storing data points in continuous mode. Trolling motor power resulted in a balanced setup.*

In January 2019, GIS Surveyors, Inc. (GSi) was contracted to perform a topographic and hydrographic survey of Lake Eleanor in Thousand Oaks, CA to enable inundation mapping and to develop an Emergency Action Plan. Lake Eleanor Dam was constructed in 1881 to provide water for irrigation. It is a concrete arch, approximately 37 feet high and 140 feet long.



Lake Eleanor Dam, CA USA.

The surface area of the Lake Eleanor reservoir is approximated at 8.2 acres. The dam has been classified as a "high" hazard due to downstream potential if the dam were to fail. GSi was tasked with quantifying current reservoir capacity using the most cost-effective methodology available while maintaining data integrity and accuracy.

Approaching Lake Eleanor is difficult, with only a 3-foot wide gate providing access to the top of the dam. Since there was no way to easily launch a traditional survey vessel at the site, GSi determined that a kayak would be the best way to survey the lake. In terms of the most appropriate echo sounder, it was determined that the CEE-LINE™ single beam echo sounder, coupled with a Trimble R10 GNSS system and TSC3 data collector would provide an accurate and reliable hydrographic solution without any additional mobilization or setup time while resolving the lake's access issues.

The CEE-LINE was pole-mounted on the port side of the kayak just aft of the seating position. A trolling motor

was mounted to the same cross-brace on the starboard side, providing balance to the vessel and extra power to reduce rolling movement.



*CEE-LINE™ and R10 installed.*

Survey lines were run at regular intervals throughout the extents of the lake. Additionally, topographic survey shots were collected around the edges of the lake to determine lateral lake extents and water level elevations. To determine raw lake depths, the elevations collected by the sonar system were subtracted from the lake water level elevation. Resulting data were exported to Civil 3D, where contours and planimetrics were created to generate a comprehensive map of the survey area. Lake surface

area and volume was calculated per client request.



*Surveying with Continuous Topo Acquisition.*

GIS hydrographic specialist and Survey Operations Manager Marshall Blackburn summarized the CEE-LINE survey; "Ultimately the client was very happy not only with the results of the survey, but with the methodology used to complete the survey in less than optimal conditions. The CEE-LINE echosounder proved to be a robust and reliable solution for this remote reservoir survey, and it will certainly be implemented again for similar surveys in the future."