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Using airborne LIDAR bathymetry to map shallow river environments: a successful pilot on the Colorado River

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Despite the fact that Airborne LiDAR Bathymetry (ALB) systems have been in existence for over 20 years, they have rarely been used in riverine environments. Consequently, the “river survey” and the “shallow river survey,” in particular, still present a major technical challenge to the surveyor.

In late November 2004, the U.S. Bureau of Reclamation opened the valves in Glen Canyon Dam to commence “a high flow test study” on the Colorado River within the Grand Canyon. The river was “flushed” for five days in an experiment to rebuild sandbars and beaches that provide habitat for endangered wildlife and campsites for Grand Canyon tourists. As part of this overall experiment, the United States Geological Survey’s Grand Canyon Monitoring and Research Center (GCMRC) in Flagstaff, Arizona, required pre- and post-test bathymetry of the river to support sediment storage and movement studies.

Fugro Pelagos was contracted to conduct a helicopter-based Airborne LIDAR Bathymetry survey of a small study area at Lees Ferry, Arizona, for the USGS. There were three primary objectives of the survey. One was to verify that the SHOALS-1000T Airborne LIDAR Bathymeter would function normally when operated in a rotary wing aircraft. The second was to verify that the SHOALS-1000T system could successfully acquire bathymetry data on the Colorado River in the Grand Canyon during controlled flow conditions, and the third was to collect post-flood bathymetry data and water penetration imagery at the study area.

The pilot survey was very successful success and this presentation will look at technical, operational and logistical challenges that were involved in planning and executing this demanding survey.