

## CEE-USV™ Used for Extreme Shallow Lagoon Survey

*CEE HydroSystems USA assisted beach and coastal survey specialists Coastal Frontiers Corporation when a small system of extremely shallow lagoons needed surveying. Using their own RTK GNSS receiver on the CEE-USV™ with HYPACK® software, Coastal staff were surprised to learn that the acquisition process using the unmanned boat was practically identical to their manned boat surveys.*

As part of a coastal restoration program related to the expansion of road and rail links in the North County of San Diego, Coastal Frontiers Corp. were asked to conduct a series of hydrographic surveys by local engineering firm Moffat. & Nichol.

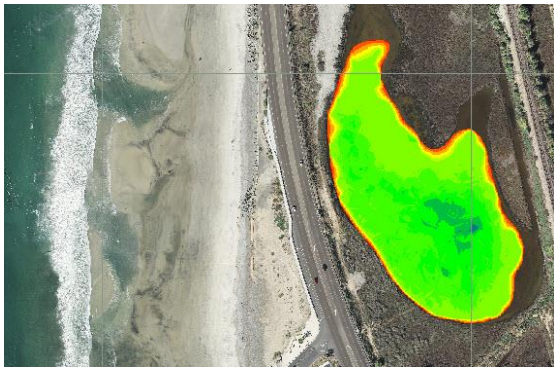


The lagoon environment has no tidal exchange and soft mud banks presented an impossible task for a manned boat survey and so a USV was the obvious solution. Local control was provided for the survey using a Hemisphere S320 GNSS base station with UHF radio, transmitting corrections to Coastal's own S320 RTK rover installed on the USV. GNSS data were incorporated into the USV's CEESCOPE-LITE™ control system using a Bluetooth link from the S320 rover

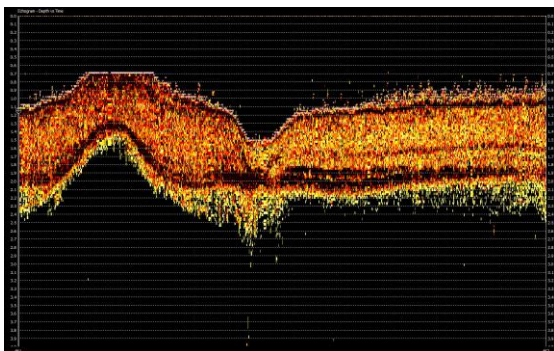
receiver to the CEESCOPE. HYPACK® was used to acquire the survey data and report bottom elevations using the RTK tide configuration.



After launching the CEE-USV™, a perimeter was established by walking with the boat around the lagoon. Thereafter, a set of repeatable planned lines were followed within the perimeter boundary. Having more power than necessary for this small survey was useful as the USV was able to simply drive right through the soft surface sediment instead of getting stranded.



The 200kHz water column echogram trace visible in HYPACK® during the survey and available later during data editing indicated the thicker mud layer clearly, and the soundings reported the upper interface as required.



With the transducer blanking distance set at just 10cm (4") and a draft of only 10cm, the CEE-USV™ was able to provide sounding data over almost all of the lagoon area. The only alternative survey method would have been a

surfboard and a GNSS rod taking point shots – a far more laborious procedure.

The use of the CEE-USV™ presents an alternative deployment option for shallow water single beam surveys, but it does not require a change in methods. The line planning, execution, data checking and quality control remain identical to a conventional manned boat survey. The design of the CEE-USV™ has been thoughtfully executed to prevent any unnecessary additional complexity resulting from remote data collection.