



# Use of Chirp Sub-Bottom Acoustics to Recreate Lost Reservoir Pre-Impoundment Bathymetry Surveys.

## ERDC Dredging Operations Technical Support Program (DOTS)

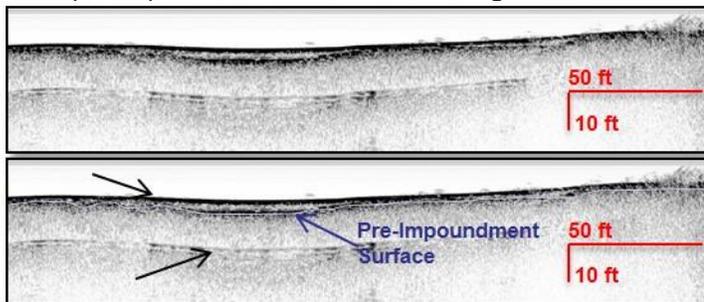
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### Response Summary:

There are approximately 2,700 dams or impoundments in the United States directly managed by the federal government including many of the U.S.' largest dams, and the USACE is directly responsible for managing ~700 (~26%) of them. In cases where original reservoir surveys were not conducted at closure, the pre-impoundment bed topography is considered lost, buried by the continual deposition of sediments delivered to the reservoir from the watershed. Chirp sub-bottom mapping provides 3D maps of sediment layers underlying a lakebed, and may be used to identify the pre-impoundment topography. The challenge, however, is that the larger chirp towfish and associated equipment are not easily used aboard small vessels required to access many of these small, shallow reservoirs. Smaller chirp systems, more suited for surveying from small vessels, often lack the power to transmit the acoustic signal deep enough to reach these pre-impoundment surfaces. The Regional Sediment Management Program recently funded ERDC and NWO to

assess whether chirp sub-bottom data could be used to recreate lost surveys by mapping the original surface underneath the reservoir sediment at both Cherry Creek Reservoir and Shadow Mountain Lake, in CO, using a larger, higher-power chirp system. Due to COVID-19 related travel and meeting safety restrictions, an in-person demo was not determined to be feasible at the time of the survey (August, FY20). Accordingly, DOTS supported NWO, ERDC, and the U.S. Department of Reclamation to develop a video demonstration for dissemination in early FY21.



### Period of Performance:

Filming: 18-25 August 2020; Video to be published in early FY21.

### Benefits of the Response to the USACE Dredging/Navigation Program:



A significant percentage of U.S. reservoirs were either never surveyed pre-impoundment, or the surveys are either limited in scope, or have been lost all together. Without pre-impoundment elevations, modern bathymetric surveys cannot accurately assess the total sediment accumulation, and thus storage volume used, within these reservoirs. The large chirp sub-bottom system (~800 lbs) used by ERDC was designed to be towed at sea by large vessels, and has the power to penetrate up to 100 ft of sediment. To allow safe operation by small, shallow-draft vessels in inland rivers and lakes, ERDC modified the system by mounting it on a small, 16-ft catamaran. This novel USACE technical approach will allow accurate measurement of sediment volumes needed to be dredged to maintain the storage capacity of reservoirs, and has the potential to result in USACE being a unique provider of this type of data collection to Federal and State partners.

### Deliverable:

Video of capability and results to be published in early FY21.



Providing environmental and engineering technical support to the U.S. Army Corps of Engineers Operations and Maintenance navigation and dredging missions

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