

ASSESSING VOLUMETRIC AND SEDIMENTATION SURVEYING TECHNIQUES FOR TEXAS RESERVOIRS

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Abstract In order to correctly manage surface water supplies for the State of Texas, it is vital that managers and state water planners understand the rate of reservoir capacity loss due to sedimentation. To address these issues, the Texas Legislature, in 1991, authorized the Texas Water Development Board (TWDB) to develop a cost-recovery hydrographic surveying program. The program is charged with determining reservoir storage capacities, sedimentation levels, sedimentation rates, and available water supply projections to benefit Texas. Since its inception, staff members within the hydrographic survey program have completed more than 125 volumetric surveys, producing survey reports generally within 3-6 months of the survey completion. Included in each report are updated elevation-area-capacity tables, bathymetric contour maps, and survey cross-sections. These products have been used by engineering firms and planners to determine reservoir yield and manage reservoir operation, and by TWDB, the United States Army Corps of Engineers (USACE), and the United States Geological Survey (USGS) in reporting statewide reservoir contents. The Texas Commission on Environmental Quality (TCEQ) has also used the results of TWDB hydrographic surveys in developing Texas water use permits.

Although TWDB staff go through every effort to assure the accuracy of their surveying and volumetric computations, each set of survey results contains some amount of uncertainty. Based on a 1997 study, estimates of TWDB survey accuracy range from 1-3% of the computed reservoir volume for any given water level (Payne and Holly, 1997). Similar estimates were derived from analyses of recently completed surveys of Cedar Creek Reservoir and Lake Kemp, although the sources of error identified in these studies differ from those enumerated in Payne and Holly (1997). The combination of errors from both sets of sources suggest that TWDB surveys may err from 1-6% of the computed volumes, and such levels of error may limit the extent to which reservoir sedimentation rates may be determined.

To fully address the issue of accuracy within its hydrographic survey program, a detailed study was conducted of Lake Lyndon Baines Johnson (Lake LBJ) in the Colorado River Basin of Central Texas. The objectives of this study, aside from providing a highly accurate volumetric analysis of Lake LBJ, were to:

- 1) Provide estimates of the uncertainties associated with TWDB's standard methods for conducting hydrographic surveys
- 2) Provide estimates of survey uncertainty obtained through variation of the survey/data collection methodology
- 3) Refine the survey methodology to reduce levels of uncertainty in the survey results, and
- 4) Assess and improve TWDB's data processing capabilities for determining reservoir volume from sounding data.

This presentation outlines the summary findings from the detailed analysis of the Lake LBJ survey, and describes methods being undertaken to improve hydrographic surveying accuracy in Texas.