



Title: Acoustic Profiling System for Sediment Surveys of Flood Control Reservoirs

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Theme: Watershed Management

Situation: Over the next 10 years 1,800 of the nearly 11,000 flood control reservoirs built in the U.S. by the USDA-NRCS since 1948 will reach their design life and will require some form of rehabilitation. Prioritizing these reservoirs for rehabilitation and choosing between rehabilitation strategies will require assessment of the amount of sediment they contain, and the physical and chemical properties of the sediment. Because of the sheer number of flood control reservoirs, their small size, and limited water depth, conducting the needed surveys by conventional methods is not possible.

Objectives: The object of this project is to develop a new acoustic profiling system for surveying aging flood control reservoirs. The surveying system needs to be small and lightweight so that it can be deployed in small water bodies without provisions for boat access. Surveys should require no more than a few hours to complete. To provide adequate spatial coverage in shallow reservoirs, the system needs to produce usable data in a few centimeters of water as well as in water many meters deep. To measure sediment volume, the system needs to clearly image the water bottom and the base of sediment fill.

Methods: The approach taken will combine multiple, widely spaced acoustic frequencies into a single optimum image of the water and sediment column. This approach is analogous to multispectral photographic methods used in remote sensing. The profiler electronics, plus a differential GPS navigation system will be integrated into one briefcase-size box. Special processing and interpretation software will be developed to make post-survey analysis efficient. Field tests will be conducted over the range of U.S. physiographic and geologic provinces that contain flood control reservoirs.

Partnerships: This project is being done in collaboration with Specialty Devices Inc. of Plano Texas (SDI), a company that builds acoustic surveying systems for a range of applications. Once the project is complete, further copies of the system will be built and maintained by SDI on a commercial basis.

Research: Students are involved in this research at every level. Students are helping in testing equipment, software development, and field trials of prototype systems. Once they complete their degrees, the students will be thoroughly versed in reservoir surveying. Some trial surveys are being done for scientific reasons. Many others will be done to directly aid local authorities by assessing the status of PL-534 and PL-566 structures used as municipal water supplies and others that have been classified as hazardous and require immediate rehabilitation.

Resources: SDI is providing system design time at no charge and has donated the use of conventional survey systems. Special equipment, such as a test tank and a vibracoring system has been purchased by Baylor University. Where possible, expenses for trial surveys are being shared by local Authorities.

Results: In the first year of the project we surveyed five flood control reservoirs to test aspects of the new survey system. SDI has built and delivered a complete flood control reservoir survey system based on the prototype design to the USGS. The delivered system includes a custom shallow water survey vessel and coring device.



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