J. Strom Thurmond Lake Analysis and Summary of Sediment Range Survey

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A hydrographic survey of sedimentation ranges in Thurmond Lake was performed in June 1999 by Continental Aerial Surveying, Inc., under contract to the U. S. Army Corps of Engineers. ER-1110-2-4001 directs that sedimentation surveys be performed at flood control projects every ten years, however budget constraints have prevented that goal from being achieved. The initial surveys were performed in 1951 and 1952, prior to, and during reservoir filling. A few lines were resurveyed in 1959, and an overall survey was performed in 1973. Because the 1973 survey reflected relatively minor change in the cross-sections, there was a little interest in resurveying the lines in the intervening 26 years.

There were initially 64 sediment ranges, numbered 1 through 62, plus 2A and 41A. Ranges 2 and 2A, originally surveyed as separate ranges because there was a small island in the middle, have been combined into one range. Ranges 36 and 37, formerly in the headwaters of Thurmond Lake, are now within Richard B. Russell Lake, and thus have been deleted from this survey. That leaves a total of 61 sediment ranges that were surveyed in June 1999. The prior sediment range surveys were digitized for easy comparison with the new data.

When the ranges were initially set, 3-foot tall, 7-inch square concrete monuments with bronze caps were set in place, embedded about six inches deep in the ground, at each end of every range line. Over the years these monuments have been disturbed, both by shoreline erosion and by human activities. During the 1977 survey, many were found lying along the shoreline near their original positions. By 1999, there were almost no traces remaining of these monuments.

The sediment range locations were estimated based on a file listing of horizontal coordinates for one end-point of each range. The approximate bearing of the range line was estimated from the Sediment Range Map, located in the 1974 Reservoir Regulation Manual. The length of the line was known from the initial survey. Using the Microstation program, the sediment range lines were fitted onto digital topographic maps, based on one endpoint, line length and approximate bearing. Both endpoints and the bearing were computed and furnished to the survey contractor. Other adjustments to the lines were made in the field, where necessary.

For purposes of comparison, we have subdivided the sediment ranges into six groups, as follows:

(1) Main Savannah River channel (sections 1, 3-5, 7, 8, 10, 23-25, 29, 30, 34, 35)
(2) Little River, Georgia, and tributaries (2, 43-64)
(3) Little River, SC and Long Cane Creek (14-22)
(4) Soap and Fishing Creeks (11-13, 26-28)
(5) Broad River and tributaries (38-41A)
(6) Other minor tributaries (6, 9, 31-33, 42)

It should be noted that these sections are not totally representative of the entire lakebed topography. The sections, when originally placed, appear to generally be between two peninsulas extending out into the lake area. This was probably done as a cost-saving measure – the location of the sections minimized the length and provided prominent features to guide the section alignment, thus saving survey time and cost. However it results in no ranges in the widest portions of the lake as well as the coves, where water velocity is expected to be the lower, and therefore, sedimentation rates higher. Thus the sedimentation rates indicated from these sediment ranges are probably a best case scenario.

The main Savannah River Channel shows little evidence of sedimentation. At the far upstream end, section 35 showed some sediment accumulation in 1977, before the construction of Russell Dam. However, the recent survey indicates very little change since 1977. This is as would be expected. Sediment in the mainstream is captured in the upstream lakes. Sediment in tributaries drops out before it reaches the main channel.

Along the Little River, Georgia, conditions are similar to the mainstream Savannah River, with minimal deposition, until the upper reaches of the lake in McDuffie and Wilkes Counties. As the Little River and its tributary, Big Creek, flow into Thurmond Lake, their sediment load drops out. The original river channel is partially to mostly filled, with sediment depths of three to fifteen feet. The lost storage volume is predominantly in the dead storage zone, and is confined to relatively narrow portions of the lake.

The original channel of Long Cane Creek, tributary to Little River, SC, once up to 20 feet deep, has been filled. Some sections in upper Little River, SC also show signs of siltation. Again, most of the volume lost is in the dead storage zone, although some is in the bottom of the conservation pool.

The Broad River has a drainage area of more than 1400 square miles where it enters Thurmond Lake. It is by far the largest sediment contributor to Thurmond Lake. As much as 30 feet of sedimentation has occurred in the upper reaches of Thurmond Lake on this tributary. The sedimentation appears to be occurring steadily; approximately half of the accumulation occurred before the 1973 survey; the remainder since then.

Smaller tributaries to Thurmond Lake on which sediment ranges are located include Catfish and Benningsfield Creeks in South Carolina, and Keg, Pistol and Oxford Creeks in Georgia. No significant changes have occurred in any of these creeks other than some of the original channels, which were relatively small, have filled in.

Significant amounts of sedimentation appear to be occurring in Broad River, Soap Creek, and Long Cane Creek. A rough estimate of Conservation Storage lost is 3000 acre-feet, a number which sounds sizeable, but is actually less than 0.3% of the total conservation storage. Most of this lost conservation storage is in the lower part of the Conservation Pool, below elevation 320, and is seldom used. Fortunately, the majority of the sedimentation is in the dead storage zone, below elevation 312 feet. At this time, the sedimentation is more of a nuisance and/or aesthetic loss to lakeside residents and recreationists in the shoaling areas. The actual volume of storage lost should not significantly impact any project purposes, other than recreation in spot locations.

Local governments should be encouraged to develop erosion control guidelines and regulations, if they have not already done so. The lake resource manager might develop a partnership with the Natural Resource Conservation Service (NRCS), formerly known as the Soil Conservation Service (SCS), to distribute educational materials to lake area residents, since they are the stakeholders most impacted by sediment accumulation. Developmental pressures on the Thurmond drainage basin appear to be increasing. New construction, combined with loss of woodland, may increase erosion and thus the sediment load into the lake.

It is noteworthy that this survey was performed using global positioning technology, greatly enhancing the ease and speed of the field work. This allowed it to be completed for less than 40% of the cost estimated several years ago using traditional surveying methods. Additional savings can be realized for future surveys provided that electronic copies of this data are readily available. To facilitate that, a copy of this report and the cross-sectional data will be available through menu selection on the Savannah