Sedimentation in Small Black Hills Ponds

Abstract

Sedimentation of local waters is a problem for all reservoirs in the Black Hills of South Dakota. As a precursor to working on sediment removal, a survey on the extent of the sediment needs to be taken. Four sample lakes were used to determine which of three interpolation methods gave the most accurate results. Inverse Distance Weighted was the most accurate interpolation method followed by spline and kriging. This study also attempted to determine if fewer samples could be taken while still providing similar results. The smaller samples would mean less field time and thus lower costs. Subsamples of 50%, 33% and 25% were taken from the total samples and evaluated for the lowest Root Mean Squared Error and Relative Root Mean Squared Error values. These results were inconclusive as some lakes were more accurate with the 33% or 25% subsamples while others were more accurate with the greater subsamples. However, when these volume estimates were expressed with a dollar value for removal other results became more obvious. In most cases, the dollar amount for removal was underestimated when using the lower sample sizes. Values of this underestimation ranged from $7,525 to $132,425 for total sediment removal compared to what the total samples produced. It is suggested that future sediment surveys gather as much data as is reasonably possible in order to have the most accurate results. Inverse Distance Weighted is the preferred interpolation method for these studies, but in some cases spline proved nearly as accurate. Results from these surveys are used in prioritization of available funds for reclamation activities.