

## **Assessing reservoir sedimentation using bathymetric comparison and sediment loading measurements**

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**Abstract.** Halligan Reservoir is located on the North Fork Cache la Poudre River in north central Colorado and has a maximum storage capacity of  $7.9 \times 10^6 \text{ m}^3$  (6,400 acre-feet). Sediment accumulation within Halligan Reservoir continues to challenge reservoir managers and influences plans for future enlargement of the dam. Reservoir sedimentation was assessed by two methods; bathymetric comparison and sediment loading measurements. Comparison of the 2003 reservoir bottom topography with historical contour maps indicates that the total amount of water storage lost to sediment over a 62-year operational history of Halligan Reservoir is approximately  $382,300 \text{ m}^3$  (310 acre-feet). Three years of field measurements on sediment transport into and out of the reservoir captured below, average and above average snow melt and sediment transport rates. Suspended sediment transport into the reservoir during snow melt runoff for 2002-2004 ranged from 2.0 – 554.0 g/s, whereas bedload transport ranged from 0.1 - 14.0 g/s. Overall, suspended sediment comprises nearly 80 percent of the total load transported into Halligan Reservoir. A small volume of suspended sediment is transported through the reservoir and discharged downstream during annual fall drawdown. A maximum suspended sediment transport rate of 44 g/s was measured from the base of the dam during the annual drawdown over the period of study. The overall small volume loss within Halligan Reservoir is attributed to a combination of low sediment production within the upstream granitic bedrock basin and to sediment management practices implemented by the reservoir operators over the 92-year life of the dam.