Water Quality Analysis of the Gulpha Creek Watershed

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This study provides an assessment of the overall water quality of Gulpha Creek and three distinct points of concern within the watershed. It was hypothesized that water quality would be poorest at sites within close proximity to two man-made impoundments within the Hot Springs National Park and a former vanadium mine near Lake Catherine, into which Gulpha Creek flows. Water samples were analyzed for pH, dissolved oxygen, nitrate, phosphorus, turbidity, biological oxygen demand, and total dissolved solids, and assessed using a Water Quality Index for each station. A mean WQI indicated Gulpha Creek is of average quality (70.41/100). The lowest WQIs were found at Station 1 within the Rick's Pond impoundment (66.4), Station 7 downstream of input from the Middle Branch tributary to Gulpha Creek (67), and Station 13 downstream of the former vanadium mine (57.5). A comparison to data from 1978 demonstrated the eutrophication of Rick's Pond over time, with dissolved oxygen decreasing in Q-value from 92 to 58 and phosphorus from 99 to 35. Additionally, an anoxic zone was found at depths greater than 1.5 meters within the Rick's Pond and Sleepy Valley impoundments. Heavy metal analysis of the mine showed concerning levels of iron (2.44 mg/L) and arsenic (0.484 mg/L) which exceeded EPA standards. These results demonstrate the extent to which eutrophication and mining activities influence the watershed and supports the hypothesis that the area in the immediate vicinity of such activities would have the poorest water quality.

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