

Water Quality Assessment of Small Water Supply Reservoir Using Statistical and Analytical Methods

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Abstract. We evaluated twenty-eight years (1980-2007) of spatial-temporal water quality data from Deer Creek reservoir in Utah. The data came from three sampling points representing the lotic, transitional and lentic zones. We used data that defined climatological, hydrological, and surface water quality conditions in the reservoir. The time frame included data collected before and after the completion of the Jordanelle Reservoir (1987-1992), approximately fourteen miles upstream of Deer Creek. However, the reservoir demonstrated changed conditions prior to dam construction. On average chlorophyll-*a*, nitrogen and phosphorus levels have dropped since 1984; dissolved oxygen levels have remained steady. A traditional month distribution following standard seasons was not effective in characterizing the measured conditions; we developed a more representative seasonal grouping by performing a Tukey-Kramer multiple comparison adjustment to determine how to group the data. Based on this analysis, the groupings used were Fall (Oct), Winter (Nov-Mar), Spring (Apr-May) and Summer (Jun –Sep). Analyses of variance (ANOVA) calculations were used to determine whether the temporal and spatial variations were statistically different. Significant spatial variation in chlorophyll-*a* and nutrients concentrations were found and in general were higher on average in the lotic zone than the lentic zone. A principal component analysis was performed to determine principal parameters associated with the water quality of the reservoir. This study help confirm these findings, showing the lentic and lotic zones as separate.

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