ACCOUNTING FOR GROUNDWATER/SURFACE WATER INTERACTIONS IN SQUARE LAKE, WASHINGTON COUNTY, MINNESOTA

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Biological Sketch of Author

Karen Kill is employed as a Water Resource Technician at the Washington Soil and Water Conservation District. In this position, the author is involved in county-wide lake and stream water quality and quantity monitoring. The author has contributed to the better understanding of water resources by local units of government and the development of water resource management plans.

Abstract

Square Lake, considered the clearest of 950 metropolitan (Minneapolis/St. Paul) lakes, is ranked in the top 1% for water clarity in the north central hardwood forest ecoregion of Minnesota. Square Lake owes much of its excellent water quality to a small watershed-to-lake ratio of 2.5:1, the abundance of planktivorous zooplankton, and the large groundwater contribution to the lake. The project goal was to develop a plan to protect and maintain the long-term Secchi transparency of seven meters. To achieve this goal, biannual in-lake groundwater monitoring is recommended. Data collected in this study indicated that groundwater inflow contributed 70% of the hydrologic inflow and 70% of the phosphorus load. Many other studies determine groundwater contributions by modeling; however, in this study, the half-barrel seepage meter method (Lee 1972) was used to measure groundwater seepage directly. Fifty-five gallon drums were inserted into the lake bottom at 500-foot intervals around the lake. A plastic bag was partially filled with a known volume of water and attached to the drum. After a measured amount of time, the bag was removed and the difference in volume was used to determine the direction and rate of seepage. Groundwater inflow contributions were collected for chemical analysis and loading calculations. The long-term protection of Square Lake will require a better understanding of groundwater contribution trends in order to protect this valuable resource.