Abstract 250 words

SPANAWAY LAKE SEDIMENT PHOSPHORUS STUDY

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University of Washington Tacoma was contracted to conduct direct measurement of internal phosphorus loading rates in Spanaway Lake; to accomplish this, 30 microcosms were created with Lake surface sediment, and water, incubated in the dark at 13°C, mimicking summer, sediment-water interface. After confirming hypoxia/anoxia in the microcosms using internal oxygen sensors, 3 unopened microcosms were sampled for soluble reactive P (SRP), total P, and total Mn/Fe every other day for 14 days. We estimated a mean flux rate of 1.29 ± 0.70 mg P m-2 dy-1 using SRP, this is consistent with a flux estimate we calculated (1.2 mg P m-2 dy-1) using the change in hypolimnetic TP concentrations from June-July (2021 by Herrera Environmental Consultants). A non-settling solid in the microcosms affected TP, indicating the potential presence of extracellular polymeric substances. Average total P, Mn, and Fe in the anoxic mesocosm water for the duration of the experiment (0.37 ± 0.13 mg P L-1, 0.47 ± 0.08 mg Mn L-1, and 3.64 ± 1.24 mg Fe L-1) stayed relatively constant likely due to the non-settling solid material. Our directly measured internal phosphorus loading rate (1.29 mg P m-2 dy-1) was significantly lower than the previous estimate (7.5 mg P m-2 dy-1) which was based solely on sediment P concentrations. Recognizing phosphorus isn't mainly internal, shifts priorities to consider external sources. Microcosms provide a direct way to estimate internal phosphorus loading creating more accurate lake management models.