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Elevated levels of cadmium, copper, lead, and nickel were found within the waters of Wilgreen Lake during a preliminary survey in 2007. Accumulation of heavy metals in freshwater systems is a known problem. Heavy metals enter the lake in the dissolved phase or adsorbed onto sediment particles and may be linked to industries within the lake's watershed. Under certain geochemical conditions such as anoxia, heavy metals may detach from sediment particles and diffuse into overlying lake waters, causing a renewed influx of heavy metals into the ecosystem. We hypothesize that heavy metals should decrease in concentration upcore as a result of improving industrial practices and strengthening of heavy-metal regulations over time.

To test our hypothesis, we took 1-meter-long cores of lake sediment in each of the two major tributaries to see if metal concentrations changed with depth. We sub-sampled the core, freeze-dried the samples, and extracted metals from the sediments using hydrogen peroxide and trace-metal-grade nitric acid according to established Environmental Protection Agency (EPA) protocols. Samples were sent to Activation Laboratories and analyzed for a host of metals using ICP/OES.

Most trace metals (Sb, As, Cd, Co, Ni, Se, Ag, Tl, Th) showed no patterns with core depth or between tributaries. However, lead increased markedly upcore at both sites, being more concentrated within Taylor Fork sediment by ~30%. We are investigating the possible effect of lithology on heavy metal concentration, in addition to identifying plausible heavy metal sources in each watershed.

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