

De-Coupling the Total Phosphorus Nutrient Paradigm

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The middle Snake River and other Idaho rivers are challenged by nuisance levels of aquatic plants. Designated beneficial uses such as primary/secondary contact recreation, cold water biota and salmonid spawning are subsequently compromised by these plants requiring development of TMDL's. In the middle Snake River, rooted macrophytes were identified as the primary nuisance aquatic plants and a nutrient TMDL was developed for total phosphorus and total suspended solids. The Mid Snake/Upper Snake Rock TMDL uses a water column total phosphorus concentration (0.075 mg/L) as a surrogate target rather than a specific macrophyte abundance reduction. The TMDL was fully implemented in 2008. Since then, substantial reduction in phosphorus loading from point sources (aquaculture reduced by 60%) and non-point sources have occurred. In 2010, IDEQ conducted a 5 year review determining the target water column total phosphorus concentration was not being achieved. Suspicion was cast on a decline in water flow. Subsequent data presentation by an EPA contractor supported that suspicion. Using an aquatic plant truck load metric, it is believed significant macrophyte growth continues. However, other independent analyses indicate the surrogate water column total phosphorus target was being met. Correlation analysis on IDEQ and other independently collected data indicated there was no scientific relationship between water column total phosphorus concentration and water flow in the river. It is proposed other factors are responsible for the behavior of total phosphorus in the water column. Possible factors include an internal sediment phosphorus pool and unaccounted loads from poorly monitored tributaries. Since macrophytes are the primary cause of deteriorated beneficial uses and macrophytes obtain 100% of their nutrients from sediments, further actions need to be focused, outside the TMDL, on factors more likely to impact macrophyte abundance, improved water flow and depletion of sediment phosphorus.