Society for Freshwater Science Duel Nutrient Control Policy Statement

In order to align freshwater management with the current scientific knowledge, the Society for Freshwater Science (SFS) recommends dual nutrient (nitrogen and phosphorus) criteria development and implementation to restore and maintain the integrity of freshwater ecosystems. Historically, nutrient management strategies in freshwater systems have focused on single nutrient control measures, most notably phosphorus. Single nutrient management relies on the theory that the nutrient in highest demand, relative to its abundance in the ecosystem, will limit productivity. However, the single limiting nutrient concept rarely holds true at larger spatial and temporal scales, or when considering entire aquatic communities that differ in their composition and nutritional requirements.

The single limiting nutrient paradigm ignores the observation that nitrogen and phosphorus concentrations, and demand from aquatic biota, are variable in space and time. Spatially, nutrients and nutrient demand in stream networks vary with factors such as hydrology, climate, land use, and community composition. Nutrients are assimilated, processed, and transported longitudinally to downstream waterbodies where the demand for nitrogen and phosphorus often differs from demand in upstream waterbodies. Temporally, the demand for nitrogen and phosphorus in aquatic systems changes seasonally, with changes in temperature, hydrology, nutrient supply, uptake, and processing rates. Decades of experimental and observational research by SFS member scientists indicates that phosphorus limitation, nitrogen limitation, and co-limitation all occur across space and time within watersheds. A single nutrient control strategy, therefore, would be ineffective in preventing and controlling the effects of eutrophication.

SFS supports the development and application of dual nutrient criteria to protect freshwater ecosystems. Managing both nitrogen and phosphorus pollution in freshwaters is essential to prevent potentially detrimental effects of eutrophication including excess algal growth, harmful algal blooms, shifts in decomposition and nutrient cycling, acute and chronic minimum dissolved oxygen concentrations, altered aquatic community composition, and reduced aesthetics and recreation. Incorporating dual nutrient criteria in water quality standards can help restore and maintain aquatic life, recreation and drinking water uses of local and downstream waterbodies.