WHAT IS THE PROBLEM WITH TMDL STUDIES?

Preamble

Continuing the status quo at the national, state and local levels and relying upon our current practices and control strategies will not support a positive public health and environmental outcome – An Urgent Call to Action – Report of the State – EPA Nutrient Innovations Task Group.

Preface

This paper answers the question "What is wrong with TMDL studies?" as they apply to conditions that exist in the Chambers-Clover Creek watershed (WRIA 12).

What are and why TMDL studies?

The Clean Water Act Section 305 requires that U.S. water bodies be monitored to determine their compliance with state water quality standards. When a water body is found to be out of compliance it must be listed pursuant to CWA Section 303(d) as impaired. Once listed as impaired a Total Maximum Daily Load (TMDL) water cleanup plan must be developed. A TMDL study identifies the pollutant reductions needed from point and nonpoint sources to bring the impaired water body into compliance with state water quality standards. Once approved, TMDL allocations are implemented through NPDES permit limits for point sources and discretionary loading reduction targets for nonpoint sources.

What is the problem with TMDL Studies?

Fundamentally the problem is that after a TMDL water cleanup plan is developed the *discretionary loading reduction targets for nonpoint sources* are voluntary, not enforceable. Where reasonable assurances exist that nonpoint source generators will reduce their nutrient pollutant loading, a state may allocate more of the needed loading reductions to nonpoint source generators, allowing for less stringent point source generator reductions. However, since control of nonpoint sources rely solely on education and voluntary action, and are not enforceable, enforceable nutrient loading reductions stipulated in NPDES permits has fallen heavily and, in some cases, unfairly on point source generators.

Why are TMDLs of limited value in WRIA 12?

In WRIA 12 303 (d) listed stream reaches and lakes receive excess nutrient loading by three means. These means are: (1) atmospheric deposition, (2) surface water runoff into streams and lakes, and (3) nutrient laden water infiltrating into groundwater, its transport to and discharge into streams and lakes. At present 23 out of 29 lakes in Pierce County now experience a fourth means of nutrient loading, i.e., internal nutrient loading. Internal loading is the result of years of exposure of these lakes to external surface and ground

water nutrient loading. When retained nutrient concentration of bottom sediments (a nutrient sink) reaches a critical mass these nutrients go back into solution (a nutrient source) and circulate throughout the overlying water column. The biotic response to internal nutrient loading is an explosion in the population of blue-green algae (cyanobacteria) which result in seasonal and recurring freshwater toxic algal blooms.

TMDL cleanup plans are effective when they function to control point source discharges into surface water bodies, and to a lesser extent groundwater, through enforceable NPDES permits issued to municipal wastewater treatment plants and urban stormwater controls. In WRIA 12 these TMDL constraints to nutrient loading are most effective in controlling external nutrient loading of the salt water of Puget Sound.

TMDLs are ineffective in dealing with nonpoint nutrient sources such as atmospheric deposition, surface water runoff and groundwater discharge into the numerous freshwater wetlands, streams and lakes located throughout WRIA 12 because they rely on the discretionary action (i.e., voluntary compliance) of nonpoint source nutrient generators. Simply put, TMDLs are unenforceable and, for the most part, without any incentives to encourage nonpoint source nutrient generators to comply with TMDL limits.

Conditions that currently exist in WRIA 12

303(d) listed impaired water bodies in WRIA 12 are on the 303(d) list because they fail to comply with State water quality standards. The primarily causes of impairment of WRIA 12 streams and lakes are high water temperature, low dissolved oxygen and/or high total phosphorus concentration.

The first two causes of impairment are related to nonpoint source nutrient loading by virtue of the effects that nutrient fostered excessive aquatic plant and algal growth has on stream and lake temperature and dissolved oxygen concentration. Suspended (plant or algal) matter in a stream or lake absorbs radiant energy from the sun to heat the water in which they are suspended. Warm water holds less dissolved oxygen than cold water. Whereas plants and algae produce oxygen during daylight hours they consume oxygen during non-daylight hours and upon their death and subsequent bacterial decomposition consume dissolved oxygen. However external nutrient loading per se is not the only condition that is resulting in the impairment of streams and lakes in WRIA 12. Internal nutrient loading contributes to the above effects and continues to contribute even though external nutrient loading of a lake is significantly reduced.

Of equal importance as a cause of stream and lake impairment in WRIA 12 has been the historic lowering of the average shallow aquifer water table and more recently its extreme fluctuations. These fluctuations range from groundwater flooding (1996 –1997) to lower than historic average water table levels (2003 through 2005). This has had two effects. One is to change gaining (low temperature/high dissolved oxygen) stream reaches into loosing (high temperature/low dissolved oxygen) or dry stream reaches and high rates (low temperature) of groundwater flow through to low rates (high temperature) of groundwater flow through in WRIA 12 lakes. The second effect has been that nutrient

concentration in groundwater discharging into streams and lakes has been increased as a result of the diminished amount of groundwater into which they are dissolved (dilution is the solution to pollution).

Conclusion

A stream reach or lake specific TMDL study in WRIA 12 would be of little value in identifying nonpoint sources, quantifying their contribution, specifying a total maximum daily load limit and developing a clean up plan. This is because whatever stream reach or lake is selected it is but a reflection (as a microcosm) to the much larger nonpoint nutrient polluted shallow aquifer that sustains it. The nonpoint sources that nutrient load WRIA 12's shallow aquifer have already been identified and are well known. These nonpoint sources are (1) septic system effluent, (2) surface water runoff infiltrated to groundwater, (3) biosolid and fertilizer application on pervious soils, and (4) nutrient releases from lake sediments. There are few regulations governing nutrient disposal to groundwater from these sources, nor are there any financial incentives to encourage voluntary best management practices for controlling these discharges.

What is needed long term is to control nonpoint groundwater nutrient loading at their points of origin, both my regulations and incentives. In the short term groundwater entering streams and lakes and contained within lakes needs to be cleansed of nutrients by plant assimilation and their seasonal harvesting and chemical precipitation and inactivation.

TMDL clean up plans will not achieve the requisite control of nonpoint loading of 303(d) listed stream reaches and lakes or bring them into compliance with state water quality standards until regulations requiring cleanup of nonpoint nutrient pollution sources and financial incentives are implemented to either levy environmental mitigation fees on nonpoint nutrient generators or provide incentives to encourage their adoption of best management practices for preventing or minimizing nutrient discharges at their source.

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