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DuPage River Salt Creek Workgroup

Letter from the President

Winter 2013

We have a number of new developments to share in this newsletter! We are making steady progress in our core mission of understanding watershed stressors and realizing cost-effective compliance with Clean Water Act regulations, including chlorides and dissolved oxygen Total Maximum Daily Loads (TMDL), and National Pollutant Discharge Elimination System (NPDES) permits for wastewater treatment plants and Municipal Separated Storm Sewer Systems (MS4). The pooling of resources in the Workgroup is a logical investment. That said, it is now necessary to increase our investment in order to maintain local control to make cost effective, data driven actions to produce beneficial environmental outcomes.

We are proposing phased implementation for new or additional NPDES permit limits for DRSCW members in return for implementing and evaluating our priority projects.

Last year, the Workgroup's Board had some very productive meetings with Illinois EPA and US EPA permitting officials regarding our project Identification and Prioritization System (IPS). The IPS tool is a quantitative matrix to prioritize watershed projects much like a pavement rating system does for road repairs. Analysis carried out to build the tool shows the main stressors to aquatic life (i.e. "fishable") at this time are often degraded in-stream and riparian habitat. Projects rise to the top of the list when they promise to efficiently increase the Index of Biotic Integrity (IBI) scores for fish and macro-invertebrates to State thresholds. Just as we share our waterways, we share the legal implications of low IBI scores. The Churchill Woods and Warrenville Grove dam removal projects indicate that such improvements can greatly improve IBI scores. Other proposed projects are described elsewhere in this newsletter.

The DRSCW's focus on local monitoring and prioritizing projects fits with Illinois EPA's and US EPA's desire to encourage local Adaptive Management. The Agencies appear willing to consider slowing additional costly controls on wastewater treatment plants for nutrients, such as phosphorus and nitrogen, to allow us both time and resources to implement priority projects. It is estimated that the wastewater treatment retrofits needed to comply with lower phosphorus controls alone would cost taxpayers in our watersheds between $55M and $85M in capital costs (not including annual operations and maintenance costs of $7.5M). Based on a data analysis of our watersheds, we are confident that such expenditures would result in little to no appreciable increase in IBI scores. While additional nutrient removal may well prove necessary sometime in the future, there is little doubt at this time that area waterways will benefit more from implementing these lower cost watershed management projects.

We are working to ensure that the State of Illinois honors their commitment, made as a result of our lobbying effort, to contribute $2.5M over a three-year period to our priority projects. This figure was based on three years of NPDES permit fees charged by the State to local entities. The Metropolitan Water Reclamation District of Greater Chicago, Forest Preserve District of DuPage County and the County of DuPage (all members of our Workgroup) are supportive of our project approach. If and when our negotiations with the Illinois EPA and US EPA are successful, the DRSCW will establish and maintain a projects fund, the funding mechanism which was discussed at our annual meeting on February 27.

This has been a very productive year. The Board and Committees are excited about the direction we are heading and are thankful for your involvement. As I mentioned at our last meeting, we have widespread support and our approach is setting a standard for others. I encourage you to attend meetings to stay current on DRSCW activities and increase your involvement. Our broad membership, deep expertise and commitment to science are paying off.

Big-Picture Budgeting for Municipal Phosphorus Removal Upgrades — Pavel Hajda, Symbiont

This article is based on the results of the nutrient removal evaluation study led by the author for the Illinois Association of Wastewater Agencies (IAWA, 2011). The primary objective of the study was to assess reliable and cost effective technologies applicable for phosphorus and/or nitrogen removal upgrades at Illinois municipal wastewater treatment facilities. Phosphorus removal performance levels discussed in IAWA (2011) are summarized in Table 1. One of the most important cost-related findings in the IAWA (2011) report was that capital and operating costs of plant upgrades for nutrient removal are heavily dependent on local conditions, such as the existing treatment type/configuration, plant footprint and hydraulics. Nonetheless, general trends can be identified: costs increase with decreasing plant size (for costs/unit of plant capacity or treated volume) and with increasing effluent requirements.

Certain existing plant types and configurations are much more amenable than others to moderate capital-intensive upgrades including biological phosphorus removal (BPR), a technology that potentially offers reduced operating expenditures and improved environmental sustainability. The operational success and treatment performance of BPR depend on local wastewater characteristics, which may require correction(s), an additional capital expense. The major technological alternative or supplement to BPR, chemical phosphorus removal, offers effluent performance robustness at modest capital expenditures, but has undesirable implications for operating costs and for environmental sustainability due to chemical consumption and disposal for extra solids. Due to the effluent quality requirements likely to apply in Illinois, both engineering practice and regulatory agency policy suggest mandatory inclusion of chemical phosphorus removal in phosphorus removal upgrades, be it as the main technology or to provide a back-up, effluent polishing, or in-plant phosphorus recycle mitigation function. Consequently, BPR becomes an optional component to be used where applicable and expected to offer operating cost or other advantages. Additionally, tertiary filtration may be needed; if already present, it offers effluent performance advantages which may lessen effluent robustness demands on BPR.

Table 1: Phosphorus Removal Technology Levels

Tertiary chemical not required
Tertiary solids removal not required
BPR (mostly) w/o chemical

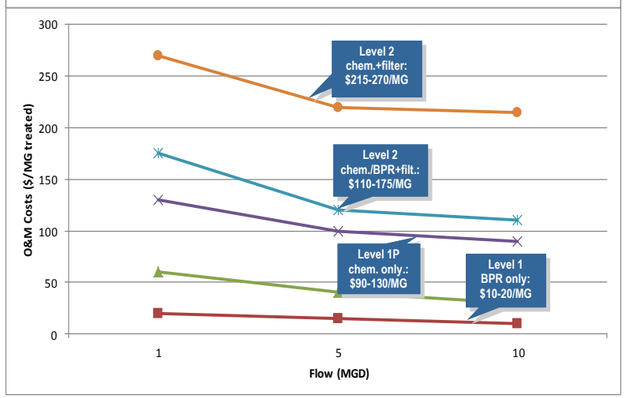
Nutrient	Typical Raw Municipal Wastewater	Level 0: Secondary Treatment	Level 1P: Basic Municipal Phosphorus Removal		Level 2P: Enhanced Phosphorus Removal	Level 3P: Limit of Technology Phosphorus Removal
			Retrofit	New Construction		
Total Phosphorus (TP), mg/L*	4 to 8	4 to 6	1.5	1	0.5	0.1
Relative Removal*	0%	20%	70%	80%	90%	98%

*Annual average/median. From IAWA (2011).

While presenting these findings at the DRSCW's June 2012 meting in Lombard, IL, the author observed that nutrient removal upgrade cost compilations such as USEPA (2008), while not a substitute for plant-specific planning, can serve as helpful tools for relative cost comparisons. This was illustrated using a comparison of capital and operating costs of recent phosphorus upgrade projects executed by the author's employer with the USEPA (2008) costs, indicating that the actual individual project costs could be a factor of two or more higher. USEPA (2008) shows capital costs between $0.47 and $0.90/gpd of capacity for chemical addition, BPR retrofit, and tertiary filter addition, and between $0.03 and $0.29/gpd of capacity for chemical addition only (see capital cost graphic http://www.drscw.org/dissolvedoxygen.html). The USEPA (2008) O&M cost compilations with the author's annotations relating them to phosphorus performance levels are summarized in Figure 1.

In response to the DRSCW's inquiry, the author suggested rough budgeting figures of $0.75 per gallon per day (gpd) of design average flow capacity for capital costs of phosphorus removal plant upgrades to reach approximately a monthly average effluent phosphorus concentration of 1 mg/L, and $1/gpd including both the capital costs and the 20-year present worth of added operating costs related to the upgrades. These figures were intended to represent reasonably conservative, back-of-the-envelope phosphorus removal upgrade budgets for individual facilities.

Figure 1: Phosphorus Removal Retrofit O&M Costs per MG Treated Base Chart Adapted Figure 4.1 from USEPA (2008), Cost Basis 2007



The DRSCW's projects fund structure is based on members' probable extra O&M burdens to achieve monthly average effluent phosphorus concentration of 1 mg/L . The curve for Level 1P, chemical removal only, in Figure 1 suggests for the "average" plant flow of about 4 MGD an added O&M cost of approximately $110/MG treated. Adjusting this figure from its 2007 cost basis to March 2013 results in an estimated added O&M cost of approximately $130/MG treated.

REFERENCES: IAWA (2011). Evaluation of Practical Technology-Based Effluent Standards for Phosphorus and Nitrogen in Illinois. Illinois Association of Wastewater Agencies, October 18, 2011.

USEPA (2008). Municipal Nutrient Removal Technologies Reference Document, Volume 1 – Technical Report, and Volume 2 – Appendices. U.S. Environmental Protection Agency, Office of Wastewater Management, Municipal Support Division, Municipal Technology Branch, EPA 832-R-08-006, September 2008.

Village of Hanover Park Recognized for Chloride Reduction Program

The Village of Hanover Park, a DRSCW member, received The Conservation Foundation's 2012 Low Salt Community Award for reducing the amount of salt they use in snow-fighting operations, thereby reducing chloride loadings in area waterways. The Village of Hanover Park developed an impressive anti-icing program over the past few years by experimenting with, adopting, and expanding their use of liquid anti-icers. Their anti-icing "Safety Stripes" public awareness campaign helped inform residents of their program and increased citizens' feelings of road safety during the snow season.

Village of Hanover Park officials (pictured L-R): Howard Killian, Director of Public Works; Mayor Rodney Craig; Juliana Maller, Village Manager

What's your fish score? Why managers should know...

The Village of Itasca opened a new wastewater treatment plant last year, no small feat given that it discharges into a 303 (d) listed waterway. What is a 303 (d) listed waterway? It is a waterway that fails to meet State thresholds indicating healthy communities of fish and insects. When a river fails to meet these thresholds, NPDES permit holders discharging to that stream are exposed to a raft of regulatory actions to fix the problem, including TMDLs and tighter NPDES permits. Therefore it is vital that wastewater and stormwater managers understand these local populations. However, State assessments of fish and insect populations are infrequent and supply relatively little data. Mapping out these populations in detail has been a priority for the DRSCW.

Walleye found in East Branch DuPage River

A Tool to Rebuild Aquatic Life

There is scant evidence of improvement in Illinois' streams and rivers from the mid 1990's on and the Clean Water Act's fishable goal has remained stubbornly out of reach. The Act's current regulatory system relies exclusively on regulating wastewater treatment plants, failing to consider other factors such flow, habitat, fish passage and nonpoint source pollutants despite abundant evidence that such factors play an essential role in healthy streams. This fragmented approach also fails to treat watersheds as a whole creating additional inefficiencies.

The adaptive management plan developed by the DRSCW (the IPS tool) aims to maximize improvements in IBIs by targeting resources on the most pressing problems facing these communities. It does this by using multiple statistical analyses to map out relationships between fish and insect populations and various impediments in detail. The strongest relationships are then ranked and, along with other factors such as confidence in reaching the State's aquatic life goals and the ability to implement physical projects, used to allocate resources across all three watersheds in a prioritized manner.

The table below lists the top three IPS ranked projects, as well as a fourth (Oak Meadows Golf course dam removal) that is being carried out as part of a Total Maximum Daily Load (TMDL) agreement with the Illinois EPA.

Project	River	Project Description	Objectives
Southern Salt Creek River Habitat Restoration	Salt Creek	Naturalize stream habitat in 1.5-2 miles of stream corridor, install meanders, channel modifications, pool and riffle sequences.	Raise fIBI from 19 to 25. Raise mIBI from 18 to > 42 for 1.5 miles of river and introduce new fish species further upstream.
Fawell Dam Fish Passage Modification and Lower West Branch Restoration	West Branch DuPage River	Dam modification to allow fish species passage to the 24 miles of upstream river. Rebuild stream habitat for 3.0 miles.	Raise fIBI from 17.5 to 27 for 2 miles upstream of project.
Southern East Branch Stream Enhancement Project	East Branch DuPage River	Rebuild stream habitat for 2 miles of stream corridor.	Raise fIBI from 27-35 to 42.
Oak Meadows Golf Course Dam Removal and Stream Restoration	Salt Creek	Rebuild stream habitat for 1.5 miles of stream corridor.	Raise mIBI from 21 to > 35 for 1-1.5 miles of river. Raise fIBI from 19 to 24 for 1.5 miles of river.

The analyses also identified chlorides as one of the most important stressors to aquatic life in the three watersheds. Chloride reduction activities include rationalizing winter deicing operations, calibrating salt spreading equipment and moving away from the application of dry salt. As with other activities, the DRSCW suggested that specific goals be used by Illinois EPA to measure member participation in chloride reduction activities, which must be carried out on a watershed basis to be effective.