WATERSHED SCIENCE BULLETIN

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Association of Watershed & Stormwater Professionals

Journal of the Association of Watershed & Stormwater Professionals

A program of the Center for Watershed Protection, Inc.

Total Maximum Daily Loads (TMDLs)

Innovations and Implementation

TABLE OF CONTENTS

FEATURED CONTENT

BULLETIN DEPARTMENTS

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This photo was taken along Pocono Creek in Monroe County, PA, near Camelback Mountain. Like many streams in Pennsylvania, it is dominated by a forested watershed and provides critical habitat for trout populations. Some tributaries in the Pocono Creek watershed qualify for the highest level of water quality protection under Pennsylvania regulations. Population growth and the resulting urbanization and hydrologic changes are a threat to the health of the watershed.

List of Sources

Johnson, A., K. Carmack, B. Era-Miller, B. Lubliner, S. Golding, and R. Coots. 2010. Yakima River pesticides and PCBs total maximum daily load: Volume 1. Water quality study findings. Publication no. 10-03-018, April. Olympia, WA: Washington State Department of Ecology.

Joy, Joe, and Barbara Patterson. 1997. A suspended sediment and DDT total maximum daily load evaluation report for the Yakima River. Publication no. 97-321, July. Olympia, WA: Washington State Department of Ecology.

National Association of Conservation Districts. No date. TMDL case study: Washington. http://www.nacd.info/policy/environment/water/tmdl/casestudies/washington.phtml

Rinella, Joe F., Pixie A. Hamilton, and Stuart W. McKenzie. 1993. Persistence of the DDT pesticide in the Yakima River basin Washington. Circular 1090. Reston, VA: US Geological Survey.

Roza–Sunnyside Board of Joint Control. 2009. Water quality improvements in RSBOJC irrigation return waterways, 1997–2008. March. Sunnyside, WA: Roza–Sunnyside Board of Joint Control.

Washington State Department of Ecology. 2008. *Water Quality Program*. Publication no. 08-10-023, April. Olympia, WA: Washington State Department of Ecology.

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Thermal Load Trading in the Tualatin River Basin: A Watershed-based NPDES Permit

The low-gradient Tualatin River, located primarily in Washington County just west of Portland, Oregon, is part of the larger Willamette River basin. Roughly one-third of the watershed has been in agricultural use since the early 20th century, and the lower third of the watershed has been significantly impacted by urbanization. In particular, water temperatures have increased measurably over the past several decades. Warm rivers and streams constitute a major limiting factor for the recovery of salmonids, many species of which are listed in Oregon under the Endangered Species Act. In 2001, the Oregon Department of Environmental Quality (DEQ) issued a total maximum daily load (TMDL) for temperature in the Tualatin River, primarily to address salmonid recovery needs.

Clean Water Services (CWS), a special purpose district utility, provides wastewater collection and treatment and stormwater management services to over 500,000 residents in Washington County. The TMDL included a wasteload allocation to CWS wastewater treatment facilities that mandated a nearly 95% reduction in thermal loads (from 9×10^8 kcal/day down to 4.4×10^7 kcal/day), requiring the effluent temperature to decline from 72°F to nearly 62°F. During the summer months, discharged effluent from CWS facilities can make up over 50% of the flow in the river. The TMDL showed that approximately 40% of the thermal energy input into the Tualatin River comes from the sun's thermal energy reaching the river in altered urban and rural landscapes—essentially a loss of shade.

CWS estimated capital and operational costs of $150 million to install and operate chillers at its wastewater facilities to meet the TMDL requirement. At the same time, it recognized the opportunity to deliver greater ecological benefits by restoring streams and, with the cooperation of DEQ, chose to implement nonstructural methods by developing a thermal load trading program (shade credits) coupled with the release of stored water from two reservoirs to add cool water to the river.

The flexibility to take this approach was provided by CWS' 2004 watershed-based National Pollutant Discharge Elimination System (NPDES) permit, the first in the nation to allow temperature trading (point to nonpoint thermal load reduction credits) to comply with permit requirements. Key elements of the program include a capital improvement program, a Tree-For-All program for cities, and an Enhanced Conservation Reserve Program for rural areas. In the latter, CWS pays farmers with annual riparian land lease payments. This allows CWS, working through local soil and

water conservation districts, to plant and maintain riparian areas on the enrolled land.

Since 2004, 63 urban and rural projects have planted over 1.6 million native trees and shrubs and have established 35 miles of riparian corridor; as of 2007, the riparian part of the trading option had cost $4.3 million. At the end of the five-year NPDES permit cycle, CWS had developed all of its needed credits for permit compliance plus a small surplus for future needs.

Several factors have contributed to the success of the program, including a focus on the highest priorities in the watershed for restoration and water quality improvement, regulatory flexibility, the development of important third-party partnerships, and the capacity to implement and maintain restoration on a large scale.

In response to the strong interest expressed by other utilities in the United States and abroad, Clean Water Services established the Clean Water Institute, a nonprofit 501 c3 organization, to aid other utilities in the development of water quality trading strategies and innovative approaches to watershed management.

For more information contact Bruce Roll, Director of Watershed Management, bruce@cleanwaterinstitute.org

List of Sources

Abdalla, C. 2008. Land use policy: Lessons from water *quality markets. Choices 23(4): 22–28.*

Clean Water Services. 2005. Healthy streams plan. Hillsboro, OR: Clean Water Services.

Clean Water Services. 2007. Tualatin River Flow Management Technical Committee: 2007 annual report. Hillsboro, OR: Clean Water Services.

Clean Water Services. 2009. Temperature management plan, credit trading activities, annual report. Hillsboro, OR: Clean Water Services.

Roll, B., B. Cordon, P. Guillozet, K. Petersen-Morgan, B. Vaughn, and K. Smith. 2008. Sustainable integrated watershed management in the Tualatin basin. Presented at Sustainability 2008: Green Practices for the Water Environment Conference, Washington DC.

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Optimizing Resources To Achieve Pollutant Reductions in Wisconsin

The ultimate goal for many total maximum daily loads (TMDLs) is to implement the load reduction practices and strategies that will achieve the TMDL restoration goal in a cost-effective manner, while sharing the burden of implementation equitably. This is easier said than done. However, the Wisconsin Department of Natural Resources (WDNR), along with its project partners, is steadfastly moving forward to implement such an approach to address total suspended solids (TSS) and total phosphorus (TP) in the Lower Fox River basin (LFRB) and Green Bay.

The TMDL is led by WDNR, which is working in partnership with The Cadmus Group, Inc., US Geological Survey, University of Wisconsin–Green Bay, University of Wisconsin–Milwaukee WATER Institute, University of Wisconsin Sea Grant, Green Bay Metropolitan Sewerage District, Brown County Land and Water Conservation Department, and the Oneida Tribe. As part of a pilot project sponsored by the US Environmental Protection Agency, The Cadmus Group, Inc., designed a watershed-based optimization modeling framework, shown in Figure 1. The modeling framework is intended to identify cost-effective combinations of best management practices (BMPs) to target both point and nonpoint source pollution and to achieve the load reduction goals set by the TMDL.

An initial pilot application of the optimization model (prior to TMDL development) compared agricultural BMPs, along with their implementation costs, and identified the optimal scenario—that is, the most cost-effective combination of BMPs that would achieve the TP load reduction. In addition, the pilot application estimated potential TP load reductions