

WATERSHED SCIENCE BULLETIN



Journal of the Association of Watershed & Stormwater Professionals
A program of the Center for Watershed Protection, Inc.

FALL 2010

Total Maximum Daily Loads (TMDLs)
Innovations and Implementation

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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.

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Optimization modeling has provided important information regarding the feasibility and costs of meeting the TMDL goals to guide local decisions about how to effectively target implementation funds. Getting the right combination of practices and costs, however, is only one part of the implementation equation. Achieving the restoration goals also requires a commitment by individuals and organizations to implement practices and change behaviors. The TMDL Outreach Team for the LFRB and Green Bay engages in extensive efforts to keep the community informed about the TMDL and to provide opportunities for input. Two mail-in surveys have helped focus outreach efforts by generating a greater understanding of pollutant sources and by developing messaging as part of implementation. The TMDL Outreach Team developed the two surveys and mailed them to 600 dairy farmers throughout the basin and 640 urban residents in the East River subwatershed. The response rate was 58% and 49% for the farming and urban surveys, respectively. The results informed the TMDL Outreach Team that, in general, extensive education and outreach is needed to better inform

the public about the pollutants of concern, their contributing sources, and practices that could be implemented to improve water quality in the LFRB and Green Bay.

For More Information

For more information, visit <http://dnr.wi.gov/org/water/wm/wqs/303d/FoxRiverTMDL/> or http://basineducation.uwex.edu/lowerfox/tmdl_outreach.html or contact Nicole Clayton, Water Quality Specialist, Wisconsin Department of Natural Resources, at nicole.clayton@wisconsin.gov, or Laura Blake, Senior Associate, The Cadmus Group, Inc. at lblake@cadmusgroup.com.

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Lake Clarity Crediting Program for Lake Tahoe: An Adaptive Management Approach for Water Quality Crediting

Lake Tahoe is prized by both residents and visitors for its remarkably clear blue water. This famed lake clarity, however, has been in decline for decades. The Lake Tahoe total maximum daily load (TMDL), currently being adopted, identifies urban stormwater as the source of 72% of fine sediment (the primary pollutant of concern), 38% of phosphorus, and 16% of nitrogen pollutant loading (California Water Boards and Nevada Division of Environmental Protection, 2010). However, after investing some \$500 million in water quality restoration, stormwater managers and regulators do not have an understanding of the benefits from the pollutant controls implemented. The Tahoe basin is experiencing what a National Research Council (2008, 2) report, *Urban Stormwater in the United States*, had found across the nation: “the stormwater program has suffered from poor accountability and uncertain effectiveness at improving the quality of the nation’s waters.”

With this knowledge—and funding from a US Environmental Protection Agency Targeted Watershed Initiative Grant—the California Water Quality Control Board, Nevada Division of Environmental Protection, and Tahoe Regional Planning Agency focused on the development of a flexible stormwater program that rewards prioritization, innovation, and

multijurisdictional cooperation. The Lake Clarity Crediting Program (Crediting Program) establishes the framework that connects on-the-ground actions to the goal of restoring Lake Tahoe clarity. It defines a comprehensive TMDL accounting system to track and report pollutant load reductions using Lake Clarity Credits that are a function of the impact of fine sediment, phosphorus, and nitrogen on clarity. Annually increasing credit targets in National Pollutant Discharge Elimination System stormwater permits and memoranda of agreement are used to define achievable goals and drive accountability.

Stormwater managers and maintenance personnel make the frontline decisions that prevent pollutants from entering the lake. Therefore, the Crediting Program puts an integrated set of modeling and condition assessment tools in the hands of engineers and field staff. The program awards credits to jurisdictions that implement and maintain structural and nonstructural pollutant controls where they are most effective. It also allows jurisdictions to distribute credits awarded for load reductions in specific urban catchments to any other jurisdiction in the Lake Tahoe basin, enabling cooperation and water quality trading.

Like typical ecosystem services accounting and water quality trading programs, the Crediting Program defines the credit by (1) using available scientific information to relate restoration actions to environmental goals and (2) embodying this scientific understanding in reasonably easy-to-use tools that generate consistent results. The resulting load reduction estimates provide an ideal hypothesis of expected environmental outcomes that can be tested by monitoring to improve the credit definition and the calibration of load reduction estimation tools.

In many programs, changing credit definitions and credit calculation tools can create regulatory compliance complications and financial ramifications for regulated entities. This uncertainty leads to a reluctance to invest resources in restoration actions and can stifle adaptive management. Without active adaptive management, the credit definition does not accurately reflect the best understanding of environmental reality over time; this ultimately undermines the program overall.

The Crediting Program enables adaptive management and continual improvement by employing a unique accounting

and reporting structure and by establishing a transparent and predictable management system. A parallel load reduction and credit accounting structure creates a self-correcting mechanism whereby the credit definition and load reduction estimation tools can change without immediately changing the number of credits awarded for previously verified actions. The management system defines an annual schedule for reporting results, defining scientific and operational improvements, and updating tools and protocols. By eliminating uncertainty related to near-term regulatory compliance, stormwater managers and project developers can innovate and invest resources to achieve load reductions with confidence, and the Crediting Program can ensure that it is motivating effective actions to improve lake clarity over time.

The Crediting Program models critical features that should be included in any watershed-based ecosystem services or water quality accounting program in which (1) science and monitoring findings can improve restoration effectiveness, (2) significant public or private dollars are being invested, (3) innovation and flexibility can reduce costs, and (4) stakeholder attention requires clear reporting of results. The Lake Clarity Crediting Program ensures that credits can be trusted to reflect the best understanding of the environmental system and inspires conservation, innovation, and investment to achieve environmental goals.

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California Water Boards and Nevada Division of Environmental Protection. 2010. Lake Tahoe total maximum daily load technical report. June 2010 California Water Boards and Nevada Division of Environmental Protection.

National Research Council. 2008. Urban stormwater management in the United States. Washington, DC: The National Academies Press.

For More Information

To find more information, including the Lake Clarity Crediting Program Handbook and associated tools, visit www.EnviroIncentives.com or contact Jeremy Sokulsky, PE, MBA, President, Environmental Incentives, LLC, at jsokulsky@enviroincentives.com or 530-541-2980.

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