Executive **Summary**

WATER ENVIRONMENT & REUSE FOUNDATION

Improving decision making in water quality trading and crediting of stream restoration benefits

Stream Restoration as a BMP: Crediting Guidance (WERF1T13)

The Central Issue

Stream restoration provides a multitude of benefits to ecosystems and communities in both urban and rural areas. Stream restoration projects may also provide pollutant trading and mitigation opportunities where water quality regulatory programs require pollutant reduction within a watershed. A wide range of stream restoration practices have been implemented to achieve multiple purposes; however, not all stream restoration practices are currently well suited for establishing water quality credits. Many utilities and municipalities have an interest in stream restoration and would like to explore a way to obtain credits on water quality benefits from stream restoration efforts (e.g., as pollutant load reduction). However, a technical guidance is not currently available from U.S. EPA and state regulatory agencies.

Context and Background

This Crediting Guidance provides a general technical framework for quantifying the water quality benefits of a specific suite of stream restoration practices, focusing on sediment and nutrients. The researchers conducted an extensive literature review and collaborated with several WE&RF subscribers who served on the Project Steering Committee during the development of this crediting guidance to develop a technical framework for crediting the water quality benefits from stream restoration.

The general technical considerations and challenges for developing stream restoration credits are discussed, along with guidance for credit development. Guidance for assigning credits for each of the four stream restoration practice groups includes background information, project information/data requirements, regional geomorphic considerations, longevity and response time, uncertainty and simplifying assumptions, and recommended crediting approach.

Findings and Conclusions

Stream restoration can provide nutrient removal benefits. However, the magnitude of water quality benefits is highly site-specific and variable, which leads to substantial uncertainty, especially with respect to denitrification processes and long-term pollutant retention and prevention.

Examples of Stream Restoration Practices Potentially Suitable for Water Quality Crediting

Bed and Bank Stabilization	Riparian Buffers	In-Stream Enhancement	Floodplain Reconnection
• Bioengineering • Vanes (partial or full channel span) • Drop structures and weirs (bendway or channel spanning) • Spur dikes • Toe wood • Rock walls • Riprap • Constructed riffle • Guidebanks	• Active planting (grass and/or trees) • Grazing management (livestock exclusion/ fencing)	• Log jams • Beaver dams • See Bed and Bank Stabilization for others	• Breaching levees • Bank lowering • Raising stream bed • Floodplain (e.g., legacy) sediment removal

Direct measurement of the water quality benefits of stream restoration can be very challenging and expensive. For this reason, monitoring approaches that incorporate surrogate (proxy) measures are an important aspect of evaluating the benefits of stream restoration practices. Functional assessment approaches developed in the compensatory wetland arena provide a logical framework and principles that are believed to be transferable to crediting programs for stream restoration.

This crediting guidance focuses on the science supporting crediting for stream restoration projects. There are many policy decisions that must be made based on local objectives and physical setting, which are not addressed in this report. Examples include trading ratios, incentives for project implementation, and methods for prioritizing watersheds and segments for projects that provide the greatest system-level benefits over the long-term.

Management and Policy Implications

This research has established a framework for crediting water quality benefits of stream restoration projects and provided recommended standardized reporting protocols for stream restoration studies, which is not currently available from U.S. EPA and state regulatory agencies. The findings can be incorporated into local/regional settings to evaluate the feasibility for obtaining credits from stream restoration efforts. As a peer-reviewed technical guidance document, it can be used to explore collaboration with federal and state regulatory agencies to improve the decision making on water quality trading and crediting of stream restoration benefits. The guidance also provides information related to verification and monitoring of stream restoration projects, which can be used as a reference.

Related WE&RF Research

Project Title	Research Focus
Stream Restoration BMP Database Module (U5R14)	As a parallel effort, U5R14 adds a stream restoration module to the Stormwater BMP Database. The new Stream Restoration Database (SRDB) is intended to be used as a tool to help support stream restoration water quality crediting programs, stream restoration practice selection and design efforts, and stream restoration performance evaluations. It provides guidance on project characteristics that should be reported with stream restoration projects, provides a project information storage tool for crediting programs, and will serve as a resource to support credit quantification with reasonable, geographically appropriate input values for crediting equations.
Nitrogen Credit Trading in Maryland: A Market Analysis for Establishing a Statewide Framework (97IRM5E)	Explains how different factors can strengthen or weaken a credit market to expand or diminish opportunities for greater cost effectiveness. Provides a replicable, systematic, and scalable approach to evaluating credit trading opportunities.

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