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Ecological Success in Stream Restoration: Case Studies from the Midwestern United States

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Abstract Despite rapid growth in river restoration, few projects receive the necessary evaluation and reporting to determine their success or failure and to learn from experience. As part of the National River Restoration Science Synthesis, we interviewed 39 project contacts from a database of 1,345 restoration projects in Michigan, Wisconsin, and Ohio to (1) verify project information; (2) gather data on project design, implementation, and coordination; (3) assess the extent of monitoring; and (4) evaluate success and the factors that may influence it. Projects were selected randomly within the four most common project goals from a national database: in-stream habitat improvement, channel reconfiguration, riparian management, and water-quality improvement. Roughly half of the projects were implemented as part of a watershed management plan and had some advisory group. Monitoring occurred in 79% of projects but often was minimal and seldom documented biological improvements. Baseline data for evaluation often relied on previous data obtained under regional monitoring programs using state protocols. Although 89% of project contacts reported success, only 11% of the projects were considered successful because of the response of a specific ecological indicator, and monitoring data were underused in project assessment. Estimates of ecological success, using three criteria from Palmer and others (2005), indicated that half or fewer of the projects were ecologically successful, markedly below the success level that project contacts self-reported, and sent a strong signal of the need for well-designed evaluation programs that can document ecological success.

Keywords Adaptive management In-stream habitat. Riparian. River Water quality Watershed

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Introduction

The restoration of streams and rivers has become a major enterprise in the United States and worldwide (Malakoff 2004; Bernhardt and others 2005; Giller 2005). The National River Restoration Science Synthesis (NRRSS) has built a database of >37,000 mostly small projects in the United States and classified approximately 13 major goals and many more categories of activities intended to achieve those goals (Bernhardt and others 2005). This national study reached the unsettling conclusions that because data reporting was inadequate, only approximately 10% of projects received any monitoring; and because dissemination of information on restoration methods and outcomes was limited, the potential to learn from experience and improve future restoration practice was severely compromised.

The importance of appropriate preproject and postproject monitoring has been advocated repeatedly (Kondolf 1998; Jungwirth and others 2002; Downs & Kondolf 2002), and a few studies have documented improvements in stream condition by evaluating completed restoration projects with preproject and postproject data or using comparison sites. When sections of Austrian streams that had experienced decreases in spatial heterogeneity because of river