Stormwater BMP Effectiveness Assessment Toolkit

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US EPA has identified stormwater BMP effectiveness as a priority research need. Effective protection of biotic integrity requires that processes maintaining the diversity of physical habitats be protected. Methods are needed to evaluate the effectiveness of existing Stormwater Best Management Practices (BMPs, including conservation measures) and to predict the relative effectiveness of proposed stormwater management plans in maintaining the habitat components (flow, thermal regime, substrate) and biotic integrity of streams in New England. This research project is developing a suite of tools for assessing effectiveness of stormwater BMPs. The toolkit includes ecological classification, predictive models of community composition, empirical derivations of species optima and tolerances, and development of community- and habitat-response curves along development gradients by ecological region and watershed class. These components will help define habitat expectations for New England watersheds under natural conditions and evaluate the effect of watershed development on selected habitat features. The toolkit will facilitate both the assessment of BMP and conservation effectiveness and the extrapolation of outputs from mechanistic models predicting BMP effects on water quality and quantity to predict ecological impacts and remediation. The project is creating macroinvertebrate-, fish- and habitat- (flow, thermal and substrate) response functions along development gradients. Available monitoring data for sites downstream of existing green infrastructure stormwater BMP and Low-Impact Development (LID) projects in New England will be plotted against response functions to determine the degree to which habitat and biotic integrity have been protected. Species presence/absence models and tolerance or optima values will be used to assess the rate of species loss along development gradients that can be attributed to habitat degradation. The toolkit will allow modeling of flow regime attributes under different water resource management scenarios and monitoring of the effect of stormwater BMPs on thermal regimes, which in turn affects biological communities.

Keywords: Stormwater; BMP effectiveness; Fish; Habitat