CASQA's 12th Annual Conference - September 12-14, 2016

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What kind of biological conditions do engineered channels support?

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Abstract

The Stormwater Monitoring Coalition of Southern California (SMC) has estimated that approximately 40% of stream-miles in the region (and two-thirds of urban stream-miles) are modified with a variety of engineered features, such as rip-rap, concrete lining, berms, and levees. These engineered channels often lack the habitat complexity that supports diverse biological communities in non-engineered channels, frequently resulting in poor scores for bioassessment indices, even if water quality is relatively good. Consequently, it is unclear if high scores are attainable in these highly modified environments. Therefore, the SMC initiated a study to explore the range of scores observed in engineered channels to elucidate the factors that may constrain biological conditions. First, the SMC developed a simple protocol for characterizing the features of engineered channels, which can be rapidly applied in the field, or with historic data, combined with aerial imagery. Then, taking advantage of the SMC's ongoing bioassessment survey that began in 2009, we calculated bioassessment scores at over 500 sites for indices based on benthic macroinvertebrates (i.e., the California Stream Condition Index, CSCI), benthic diatoms, and soft algae, and related these scores to a variety of features that characterize engineered channels (such as bed and bank material, size, shape, and presence of low-flow channels). Preliminary results suggest that high scores were rarely observed in engineered for the CSCI, but they were not uncommon for algal indices. These results are consistent with earlier studies showing that CSCI scores have stronger relationships with habitat degradation than do algal indices, which in turn are more responsive to changes in water quality. These findings provide a basis for regulators and stormwater agencies to discuss management strategies that address the constraints imposed by channel modifications. In this presentation, we share the SMC's approach to characterizing engineered channels, their relationships with key management endpoints, and their implications for measuring stream health in highly modified systems.