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Setting Instream Flow Targets in California Using Biological Community Health Indices

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Abstract

Competition for water resources is ever increasing due to urban expansion and climate induced exacerbation of drought cycles. Demands for capture and use of stormwater place stress on streams through direct capture and diversion of runoff and through decreased discharge of treated effluent. Both these practices result in changes to instream flow patterns that can threaten the integrity of instream aquatic resources, particularly in arid and semi-arid climatic regions where sensitivity to changing flow is high. To protect the broad suite of beneficial uses provided by streams, many regulatory programs increasingly rely on biological endpoints to assess compliance and the effectiveness of management and mitigation efforts. There is a need to develop and improve tools that can help environmental managers better understand and ultimately predict the relationship between flow (and its associated hydrologic and physical impacts) and ecosystem health. The southern California flow ecology project has developed an approach for establishing instream environmental flow requirements necessary to meet ecological benchmarks as defined by measures of benthic macroinvertebrate community composition and structure. The relationships used to develop ecological flow targets depend on a series of flexible watershed models and on the extensive bioassesssment data already available through the State's ambient monitoring programs. The identified in-stream flow needs can be used to help establish management targets for use in hydromodification management, nutrient numeric endpoints, and the freshwater Biological Integrity policy. We will demonstrate the application of these tools through the results of a case study in the San Diego River watershed and engage the audience in a discussion about how outputs from this analysis can be used to prioritize management decisions involving reservoir management, stormwater capture, and LID implementation.