

Application of regional flow-ecology relationships to inform watershed management decisions: Application of the ELOHA framework in the San Diego River watershed, California, USA

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ABSTRACT

Relationships between changes in streamflow and changes in biological condition are important considerations for water resources management decisions. The Ecological Limits of Hydrologic Alteration (ELOHA) framework offers a way to protect stream health by managing flow conditions. We demonstrate application of a regionally derived ELOHA framework to inform stakeholder defined management challenges in the San Diego River Watershed in southern California, USA—a large semi-urbanized watershed that is undergoing land use changes. Using previously defined flow-ecology relationships based on benthic invertebrate community composition, we: (1) assess how future land use changes will affect flow conditions and impact biological endpoints in the watershed; (2) demonstrate how flow–ecology relationships can be used to prioritize regions of the watershed into various flow management classes that can inform future planning decisions; and (3) evaluate how two future management decisions (specifically, modification of reservoir operations and implementation of low impact development strategies to reduce stormwater runoff) will affect in-stream flow conditions in the watershed. Our study shows a successful transition of regionally derived flow targets to inform local decisions at a catchment or watershed scale, thereby avoiding the need to develop local flow–ecology relationships for every stream of interest (as would be required by other instream flow methods). Case studies are a critical bridge between the science of flow-ecology and real-world implementation, and this work illuminates an example of how to navigate technical and management challenges and provide road maps for broader applications by including local stakeholders in defining, interpreting, and implementing products of flow-ecology analyses.

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