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Key challenges and opportunities in incorporating environmental flows into bioassessment

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Abstract

California's bio-objectives program proposes to regulate stream conditions based on benthic macroinvertebrate community composition. Several approaches are being explored to quantitatively link hydrologic alteration to benthic community changes. To be effective, methods should be applicable statewide, founded on mechanistic flow - ecology relationships, and able to discern hydrologic alteration from covariates. To accomplish these goals, we propose a regional approach for linking specific ecological endpoints with functional aspects of the flow regime. This functional flows framework offers an opportunity to develop mechanistically-based regional flow – ecology relationships, both hydrologically and biologically, through selection of specific hydrologic and biologic metrics. The key steps of this framework are to (1) generate a statewide stream classification, (2) formulate a set of functional components of the natural flow regime and associated metrics relevant to ecological endpoints; and (3) propose and test biological response mechanisms to metric alteration. The expected outcome of this framework is mechanistic stream class- and function-specific flow – ecology relationships to guide scientifically-informed establishment of flow targets, designation of impairment thresholds, and indications of causal assessment relationships. We will demonstrate early products of this effort in support of the state's developing biointegrity program.