

Spring American Fisheries Society Conference – April 5-7, 2017

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Development of environmental flows and flow-ecology relationships: examples and applications across the U.S.

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Abstract

Defining environmental flows to support river-dependent biota is a key strategy for scientists and managers in California and across the nation. The science of environmental flows began with hydrologic index methods and rules of thumb and evolved into hydraulic rating methods and site-specific studies that focused on flow-habitat relationships for individual species and life stages. Over time, scientists have increasingly focused on regional and multi-species approaches to defining environmental flows, with the understanding that faster progress toward developing flow criteria is needed to protect declining native freshwater biota. Current regional approaches include the Ecological Limits of Hydrologic Alteration (ELOHA) framework, based on a spatially comprehensive hydrologic foundation and generalized flow-ecology relationships that can be applied across a region to establish environmental flow standards, and the functional flows approach, focused on identifying and retaining specific components of the flow regime that support key ecological functions. This presentation will provide an overview of flow-ecology approaches and the development of environmental flows and flow-ecology relationships from around the country and places them within the context of a tiered approach to determining environmental flow needs. Ultimately, the appropriate approach depends on the decision context, including the spatial scale of the application, management needs and complexity, information available, time available to make the decision, and specific objectives for the species or ecosystems of interest. The first steps to any environmental flows assessment are to define the decision context and determine specific management objectives.