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### Evaluating the adequacy of a reference site pool for the ecological assessment of streams in environmentally complex regions

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#### ABSTRACT

The characterization of reference conditions is now widely accepted as an essential element of stream bioassessments. Many of the advances in this field have focused on approaches for objectively selecting reference sites, but less emphasis has been placed on evaluating the suitability of the reference pool for its intended applications. We present an approach for evaluating the adequacy of a reference pool for supporting biotic index development in environmentally heterogeneous and pervasively altered regions. We screened 1,985 candidate stream reaches to create a pool of 590 reference sites for assessing the biological integrity of streams in California, USA, following standard approaches for selecting sites with low levels of anthropogenic stress. We assessed the resulting pool of reference sites against two primary types of performance criteria. First, we evaluated how well the reference pool represented the range of natural gradients present in the full stream population as estimated by sites sampled through probabilistic surveys. Second, we evaluated the degree to which we were successful in rejecting sites influenced by anthropogenic stress by: a) measuring the biological variance associated with remaining human activity at reference sites, and: b) comparing biological metric scores at a subset of near-pristine reference sites that passed very strict screens with scores at sites that passed less stringent (standard) screening thresholds. Using this approach, we validated a reference pool with minimal human-associated stress that also provided nearly full coverage of environmental heterogeneity. This approach should be widely applicable and customizable to particular regional or programmatic needs.

#### Full Text

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