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## **Evaluating the adequacy of a reference-site pool for ecological assessments in environmentally complex regions**

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### **ABSTRACT**

Many advances in the field of bioassessment have focused on approaches for objectively selecting the pool of reference sites used to establish expectations for healthy waterbodies, but little emphasis has been placed on ways to evaluate the suitability of the reference-site pool for its intended applications (e.g., compliance assessment vs ambient monitoring). These evaluations are critical because an inadequately evaluated reference pool may bias assessments in some settings. We present an approach for evaluating the adequacy of a reference-site pool for supporting biotic-index development in environmentally heterogeneous and pervasively altered regions. We followed common approaches for selecting sites with low levels of anthropogenic stress to screen 1985 candidate stream reaches to create a pool of 590 reference sites for assessing the biological integrity of streams in California, USA. We assessed the resulting pool of reference sites against 2 performance criteria. First, we evaluated how well the reference-site pool represented the range of natural gradients present in the entire population of streams 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 comparing biological metric scores at reference sites with the most vs fewest potential sources of stress. Using this approach, we established a reference-site pool with low levels of human-associated stress and broad coverage of environmental heterogeneity. This approach should be widely applicable and customizable to particular regional or programmatic needs.

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