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Evaluation of design-based sampling options for monitoring stream and wetland extent and distribution in California

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ABSTRACT

Accurate estimates of the extent and distribution of wetlands and streams are the foundation of wetland monitoring, management, restoration, and regulatory programs. Traditionally, theses estimates have relied on comprehensive mapping. However, this approach is prohibitively resource intensive over large areas, making it both impractical and statistically unreliable. Probabilistic (design-based) approaches to evaluating status and trends provide a more cost-effective alternative; however, limited information exists about the ability of various design options to meet diverse, state-level information needs such as accounting for both streams and wetlands in a single program. This study utilized simulated sampling to assess the performance of sample design options for monitoring the extent of wetlands and streams in California. Simulation results showed significantly and reliably increased precision and reduced bias with the spatially balanced, generalized random tessellation stratified (GRTS) sampling method compared to simple random sampling. In contrast, results for stratification were mixed and highly dependent on aquatic resource type and geographic region; consequently, there was no clear, broad advantage observed for stratification. This study also demonstrated the utility of a model-based approach for evaluating design options for application in other state, tribal, and regional programs.

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