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Evaluating Alternative Temporal Survey Designs for Monitoring Wetland Area And Detecting Changes Over Time In California

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ABSTRACT

Evaluation of wetland extent and changes in extent is a foundation of many wetland monitoring and assessment programs. Probabilistic sampling and mapping provides a cost-effective alternative to comprehensive mapping for large geographic areas. One unresolved challenge for probabilistic or design-based approaches is how best to monitor both status (e.g., extent at a single point in time) and trends (e.g., changes in extent over time) within a single monitoring program. Existing wetland status and trends (S&T) monitoring programs employ fixed sampling locations; however, theoretical evaluation and limited implementation in other landscape monitoring areas suggest that alternative designs could increase statistical efficiency and overall accuracy. In particular, designs that employ both fixed and nonfixed sampling locations (alternately termed permanent and temporary samples), termed sampling with partial replacement (SPR), are considered to efficiently and effectively balance monitoring current status with detection of trends. This study utilized simulated sampling to assess the performance of fixed sampling locations, SPR, and strictly nonfixed designs for monitoring wetland S&T over time. Modeled changes in wetland density over time were used as inputs for sampling simulations. In contrast to previous evaluations of SPR, the results of this study support the use of a fixed sampling design and show that SPR may underestimate both S&T.

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