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Validation of a Wetlands Rapid Assessment Method: Application of the EPA's Level 1-2-3 Framework for method testing and refinement

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ABSTRACT

Wetland rapid assessments have been gaining popularity for use in a variety of monitoring and assessment applications. Because rapid assessments rely on observable field indicators as surrogates for direct measures of condition, they must be calibrated and validated against independent measures of condition in order to establish their scientific defensibility. In this paper, we present as a case study of this process through the calibration and validation of the California Rapid Assessment Method (CRAM). CRAM was validated in terms of its responsiveness to "good" vs. "poor" wetland condition, its ability to represent a range of conditions, internal redundancy between its component metrics, alternative models to integrate the metrics into overall scores, and in terms of reproducibility of results between independent assessment teams. As is often the case, an independent, concurrently collected measure of condition that directly reflects the same elements as the CRAM attributes was not available. Consequently, we took advantage of data from existing monitoring and assessment programs and demonstrated how they can be used for calibration and validation. Existing assessment data based on avian diversity, benthic macroinvertebrate indices, and plant community composition were used to calibrate CRAM. Results for riverine and estuarine wetlands indicate that CRAM is an effective tool for assessing general wetland condition based on its correspondence with multiple independent assessments of condition. Most CRAM attributes captured a range of wetland conditions. The one exception, Buffer and Landscape Context, was modified based on the calibration analysis to improve its representativeness. Several metric combination models were tested for each CRAM attribute, and in most cases the "neutral" model (i.e., a linear combination of metrics) was comparable to alternative models based on more complex computations. Reproducibility analysis revealed several problematic metrics where ambiguous language or metric construction led to high interteam error rates. Clarification of metric construction and inclusion of additional guidance rectified these problems and improved the overall average error between independent assessment teams to ±5%. This study demonstrated that when calibrated and validated, rapid assessment methods provide a reliable tool for assessing wetland condition. Such tools have potential application for general condition assessments, screening-level evaluations, and assessment of program performance.

Full Text

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