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A novel quantification method for stream-inhabiting, non-diatom benthic algae, and its application in bioassessment

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ABSTRACT

Abstract Non-diatom benthic algae from104 streams in southern California were studied. We present a novel method for quantification of non-diatom algae that seeks to improve upon two important aspects of existing methods: separate processing of macroalgae and microalgae to avoid sample blending and consequent loss of macroalgal integrity, and for better viewing, counting a well-mixed microalgal subsample on a standard microscope slide instead of using a counting chamber. Our method provided high-quality taxonomic and quantitative data with low uncertainty. A total of 260 algal taxa were recorded, 180 of which were identified to species level. The median total algal biovolume per site was 22.7 mm^3 cm^{-2} (range: <0.001–836.9 mm^3 cm^{-2}), the median species number was 11 (range: 2–43). Total algal biovolume and species number correlated with canopy cover (negative) and water temperature (positive), but not with measured water chemistry constituents. The proportion of heterocystous cyanobacteria and Zygnemataceae were strongly negatively correlated with nitrate concentrations and TN. The proportion of red algae was negatively correlated with TP. Species optima calculations combined with indicator species analysis identified >40 algal species as potential indicators of nutrient conditions. Proposed here is a practical tool for non-diatom algal quantification that enhances its application to stream bioassessment.