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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

Non-diatom benthic algae from 104 streams in southern California were studied. We present a novel quantification method for non-diatom algae that seeks to improve upon existing methods in terms of the following key elements: 1) processing macroalgae separately from microalgae in order to avoid sample blending and consequent loss of macroalgal integrity, and 2) 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 a low degree of 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 red algae proportion 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.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2012AnnualReport/ar12_211_226.pdf