

Estuarine and catchment disturbance indicators and the response of the zooplankton biomass size frequency distribution

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A wide variety of indicators are used to monitor the ecosystem health of diverse estuaries in south-eastern Australia, from concentrations of nutrient and chlorophyll-a, to abundance of seagrass, mangroves and fish assemblages. Zooplankton has been overlooked as being too expensive to sort and identify, but the size-structure has great potential as an aquatic indicator by integrating temporal variation and several trophic levels, and across vast differences in estuarine geomorphology. We first examined the significant monthly variation in the biomass size frequency distribution of zooplankton in two estuaries, revealing shifts in the size-spectrum from winter to summer. We then compared 12 diverse estuaries with summer collected zooplankton, using 3 size-based metrics from normalised biomass size spectrum (NBSS) – the slope, geometric mean size, and biomass of small sizes. In estuaries ranked as least disturbed using traditional methods, the NBSS slope was significantly steeper (i.e. more negative) than estuaries with more disturbed catchments; and smaller zooplankton characterised least disturbed estuaries, but with chlorophyll-a concentration a significant co-variate. With some caveats, zooplankton size-structure has great potential for long-term monitoring of estuaries with citizen science programs.

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