

Application of a Eutrophic Condition Index to Benthic Macroalgal Accumulation in Pacific Northwest Estuaries

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Studies of benthic macroalgal accumulation in coastal estuaries of the Pacific Northwest, USA, were conducted over a 12-year period, including aerial mapping and ground surveys. The results were applied to an assessment framework for eutrophication developed by the European Union and recently used to evaluate macroalgal accumulation in the Southern California Bight. A detailed five-year, fixed-transect survey in Yaquina estuary, Oregon revealed large temporal and spatial variations in average accumulation and corresponding eutrophic condition index (ECI) values during the summer-fall period of highest percent cover and biomass. Two sites with similar average macroalgal accumulation and ECI values had very different levels of sediment pore water sulfides, known to be highly toxic to benthic organisms. Thus, other factors (e.g., water flow, sediment porosity, bioturbation) not included in the ECI may be important in determining the impact of high macroalgal accumulation on the benthic environment. However, application of this ECI to macroalgal results from probabilistic field surveys of 13 PNW coastal estuaries conducted between 2004 and 2009 generally yielded ratings between “good” and “high” indicating little or no eutrophication in these systems, in contrast to results reported for many of the southern California estuaries. Further, aerial monitoring of summer macroalgal extent in Yaquina estuary between 1997 and 2009 revealed no indication of a systematic increase in abundance of this benthic macrophyte.