Developing thresholds and indicators of seagrass meadow condition using long-term monitoring data

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The use of appropriate indicators to evaluate condition is particularly important for habitats like seagrass meadows where dramatic changes in distribution and species composition can occur. We used annual long-term monitoring data (2002-2014) to develop a report card of seagrass condition for 15 seagrass meadows at Gladstone as part of the Gladstone Healthy Harbours Partnership. The process used expert opinion to determine the best indicators of seagrass condition (above-ground biomass, meadow area, species composition), trialled four approaches to determine baseline condition of each indicator (a running long-term average, a 10-year fixed average, and two 5-year fixed average periods), and defined five threshold levels (very good, good, fair, poor, very poor) to grade each meadow relative to the baseline. Threshold levels for each condition category were adjusted based on the historical stability (variability) in each meadow's biomass and area. The 10-year fixed average was the most appropriate baseline against which to evaluate changes in seagrass biomass and meadow area because this timeframe incorporated the greatest range of environmental conditions known to affect seagrass. Baselines set at 5-year fixed average periods were biased by either El Nino or La Nina conditions, resulting in report card grades being either overly conservative or optimistic. The approach developed for Gladstone was successfully implemented in 2014/15 for Weipa, Karumba, Cairns, Mourilyan, Townsville and Abbot Point where annual long-term monitoring of seagrass occurs. The report card approach allows for the presentation of a large amount of spatial information for each port, including the location, condition, and the reason for each meadow's grade, to be presented within a single map. This allows for rapid comparison of seagrass condition across the range of meadows within a port, and at a broader regional scale. Planned future modifications to the program include applying statistical approaches to threshold levels and weighting meadows to give a "whole of port" grade.