ABSTRACT

Eelgrass *(Zostera marina)* is an important benthic flowering plant used by many marine species *as* a nursery and food source; it also sequesters carbon, and the beds provide some protection for shorelines from coastal erosion by slowing water movement. In the past century, approximately 90% of eelgrass beds have been lost from natural and anthropogenic causes. Eelgrass was once a major component of the shorelines of Long Island Sound, USA, which has experienced many of these effects, including rain runoff carrying pesticide and fertilizer residues. Knowledge and analysis of the water quality parameters in Long Island Sound influencing eelgrass distribution will enhance restoration efforts in the future. A GIS model was created that estimates the habitat suitability for all areas in Long Island Sound with respect to key environmental variables. The habitat model has two parts. First, the study area was limited to regions where eelgrass growth is possible based solely on water depth, assuming that other conditions are suitable. Second, this suitable area was ranked by weighting each of 11 environmental parameters: percent light reaching bottom (0--30), sediment grain size (0--15), Chlorophyll *a* (0--10), Total Suspended Solids (0--10), Total Dissolved Nitrogen (0--5), Total Dissolved Phosphorous (0--5), surface temperature (0--10), saliuity (0--5), pH (0--5), dissolved oxygen (0--5), and sediment percent organics (0--5). The resulting sum indicates the suitability of areas with a weighted sum of 100 being most suitable and 0 being least suitable. The model produced weighted sum scores ranging from 43 to 93.5. Areas that are scored higher than 75 within the suitable band should be locally tested to decide if the area is ready for habitat restoration to proceed. Regions below this threshold should be further tested to identify which parameter scores reduced the overall score. This identification of the parameter contributing to the low score could help prioritize policies to reduce these influences in the future.