

Using Science to Support Management Decisions in Waquoit Bay, MA

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Abstract

Watershed ecological risk assessment principles were used to organize, analyze and present scientific information to help protect the ecological resources of the Waquoit Bay watershed, in Massachusetts. Through a series of meetings with the general public and local and state managers an environmental management goals and objectives were established for the watershed. An interdisciplinary and interagency workgroup identified manmade stressors, exposure pathways, dose/response relationships, and assessment endpoints. A conceptual model was used to better clarify the pathways by which stressors such as nutrient enrichment, physical alteration of habitat, altered freshwater flow, and toxic chemicals impacted several assessment endpoints. A comparative risk analysis and an evaluation of the impacts of stressors identified nutrient enrichment as the major stressor within the watershed. This justified focusing on the assessment endpoints most impacted by nitrogen loading, eelgrass cover and scallop abundance. A nitrogen loading and an estuarine loading model were developed to link land use changes to changes in water quality. By comparing increases in nitrogen loads to losses in the area of eelgrass cover over the last 60 years, it appears that eelgrass disappears once nitrogen loads reach 20 kg ha⁻¹ yr⁻¹. Both the increase in nitrogen load and the decrease in eelgrass can be correlated to decreases in the annual harvest of scallops. Developed models provide the opportunity for managers to assess a variety of options to reduce nitrogen loads to their estuaries and to achieve the loads that could allow the return of eelgrass to the target area.

Keywords: watershed ecological risk assessment, multiple stressors, eutrophication, watershed management

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