

EPA scientists assess habitat conditions in the Three Bays estuary, Barnstable, Massachusetts

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Overview

EPA scientists recently published results from a survey of benthic habitat condition in the Three Bays estuary in Barnstable, Massachusetts, which has a history of water quality and ecosystem impairment.

The goals of the survey were to assess recent changes in benthic (seafloor) condition in the estuary and establish a baseline for evaluating the impact of planned interventions to reduce nutrient loading in the watershed.

The survey was designed in consultation with the Massachusetts Department of Environmental Protection, the Town of Barnstable and the Barnstable Clean Water Coalition.

Methods

The survey included previously assessed and new randomized locations throughout the Three Bays estuary, which includes North Bay, West Bay and Cotuit Bay.

EPA scientists took measurements of water column temperature, salinity, pH, dissolved oxygen, and Secchi depth (a measure of water clarity) and collected sediment grab samples. Sediment samples were analyzed for grain size, total organic carbon content and for counts and species of macroinvertebrates.

Aquatic macroinvertebrates are small animals without a backbone that are found in and around water bodies. Examples include worms, snails, and clams. These organisms are relatively immobile and their relative tolerance for pollution serves as an important indicator of overall ecosystem health.

Researchers summarized the macroinvertebrate data using a common index of benthic habitat



Left: Sediment grab sample immediately after collection.
Right: A sample is sieved to collect macroinvertebrates.

condition (known as M-AMBI), and standardized condition classes for U.S. coastal waters.

Results

Survey results indicated that habitat conditions vary considerably across the Three Bays estuary. Poor to bad benthic conditions were found in the more confined northern subembayments. Higher quality habitats were found in the southern, seaward embayments that experience greater tidal flushing, though each embayment had some evidence of poor condition. Relative to the most recent benthic assessment in this estuary conducted over 15 years ago, conditions for marine life are similar or worse at revisited stations.

More information on the methods and results of this survey is available in the Related Links section of this fact sheet.

Impact

As actions are taken to address excess nutrients in the Three Bays watershed and others like it across Cape Cod, researchers and stakeholders are interested in finding out how effective they are.

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Benthic surveys like this one provide valuable raw data and integrative metrics with which to assess conditions over time and across locations. Results serve as indicators of progress towards or away from goals for improving estuarine water quality and ecosystems.

Related Links

1. EPA 2019 benthic survey of the Three Bays estuary, Barnstable, MA:
cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=351217&Lab=CEMM
2. Raw data from this survey are also available at the National Water Quality Monitoring Council's Water Quality Portal (WQP):
www.waterqualitydata.us
3. Reducing Excess Nutrients Research Pilot:
www.epa.gov/water-research/reducing-excess-nutrients-research-pilot

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