

EPA is partnering with stakeholders and communities on Cape Cod to evaluate non-traditional approaches for reducing excess nutrients entering coastal waters

EPA is collaborating with the Barnstable Clean Water Coalition (BCWC) in Barnstable, Mass., as well as numerous stakeholders and a team of partner organizations in the Cape Cod region, to explore ways to reduce the amount of nitrogen entering the Cape's estuaries and freshwater ponds. Excess nutrients from human activity are an increasingly serious threat to estuaries, wetlands, and freshwater ponds nationwide, as they contribute to algae blooms, low dissolved oxygen, degradation of seagrass, impaired freshwater and estuarine ecosystems, and, in extreme cases, fish kills.

Cape Cod has several unique characteristics that make its estuaries susceptible to impacts from excess nutrients in the form of nitrate. An estimated 80 percent of nitrogen loading on Cape Cod stems from the use of backyard septic systems. Traditional septic systems are not designed to remove nitrogen. Wastewater treatment plants are not widely used on Cape Cod due to the costs and challenges associated with widely distributed housing and large seasonal fluctuations in population due to summer tourism. Nitrate moves easily from the septic systems to the Cape's groundwater, where it is transported to ponds, streams and

estuaries. In addition to septic systems, lawn fertilization, atmospheric deposition, and storm water also contribute to excess nitrogen in the region.

Collaboration Activities

EPA scientists are partnering with BCWC, U.S. Geological Survey, The Nature Conservancy, and the Massachusetts Alternative Septic System Test Center, and are engaging additional local and state stakeholders, including the Massachusetts Department of Environmental Protection, Massachusetts Division of Ecological Restoration, the town of Barnstable, and the Cape Cod Commission, to examine ways to reduce excess nutrients. The partners are exploring both traditional technologies (i.e., centralized wastewater treatment facilities) and alternative technologies to reduce excess nutrients. An initial stakeholder engagement and problem formulation workshop revealed key knowledge gaps and opportunities for collaboration. Based on the insights from this workshop, the team will be:

- Conducting a benthic survey of the Three Bays estuary in Barnstable to determine the current condition of the estuary, which includes North Bay, West Bay and Cotuit Bay.

- Designing pilot-scale interventions to evaluate the effectiveness of nitrogen removal, including:
 - Designing a neighborhood-scale innovative septic system experiment to field test new low-nitrogen septic system designs and demonstrate resulting changes in groundwater nitrogen levels;
 - Collaborating on a study to evaluate the nitrogen reduction potential of various cranberry bog wetland restoration approaches.
- Performing greenhouse experiments to investigate the potential re-use of nitrogen-rich sediments dredged from nearby ponds and the Three Bays estuary.
- Investigating the benefits of improved water quality provided by shellfish aquaculture. Oysters and other shellfish filter water, consume phytoplankton, and remove nitrogen from the environment.
- Comparing the ecological, economic, and social benefits and barriers of the various alternative technologies.
- Evaluating how increased stakeholder engagement can improve research planning and outcomes.

Anticipated Results

Preliminary results are anticipated in 2021, and ultimately will be used to:

- Determine the effectiveness of alternative technologies for removing nitrogen from Cape Cod's waters and understand which solutions will work best in the region;
- Assist the Cape's communities with evaluating the benefits and tradeoffs of implementing different nitrogen removal technologies.

How can I help reduce excess nutrients?

Contact your local municipality to learn more about their wastewater management plans and options to reduce your personal contribution of nutrients to the watershed. Engage with local organizations such as the Barnstable Clean Water Coalition, Cape Cod Commission, and the Association to Preserve Cape Cod.

Some quick tips include reducing use of lawn fertilizer and planting rain gardens of native plants, shrubs and trees to provide ways for water to soak more slowly into the ground.

Where can I learn more?

Learn more about the Cape's Section 208 Area Wide Water Quality Management Plan:
www.capecodcommission.org/our-work/208

Learn more about excess nutrients:
www.epa.gov/nutrientpollution

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