

Cape Cod Collaboration Creates Strategies to Reduce Nutrient Pollution

During the summer months, the tourist mecca of Cape Cod, Massachusetts, attracts nearly three times as many visitors as its year-round residents. This shift in population, while an important economic driver, puts stress on the Cape's water resources. Up to 80% of Cape Cod's nutrient pollution, specifically nitrogen pollution, comes from residential septic systems. Other sources of nutrient pollution include stormwater runoff and fertilizers.

Excess nitrogen ends up in local waters, contributing to algal blooms and fish kills and decreasing the recreational value of the area. This pollution has resulted in 31 watersheds on Cape Cod with Total Maximum Daily Loads (TMDLs) for nitrogen. A TMDL defines the maximum amount of a pollutant that a waterbody can receive while still meeting water quality standards. To tackle this ongoing and critical issue, federal and state partners, towns, and local organizations are making strides to restore and protect water quality.

In 2015, the Cape Cod Commission, a regional land use planning and regulatory agency, developed a comprehensive plan to meet nitrogen reduction goals set by the TMDLs and required by the Clean Water Act. The EPA-approved [Cape Cod 208 Plan](#), created in cooperation with state, federal and community partners, outlines how these organizations work together to improve the water quality of embayments on Cape Cod. Some of the nutrient mitigation strategies include coastal habitat restoration, stormwater best management practices, aquaculture, and fertilizer management.

Additionally, individual towns have created and maintained state-approved Comprehensive Wastewater Management Plans to reduce nutrient pollution from wastewater to levels consistent with the TMDL. For many communities, these plans include a 30+ year timeline for installing sewer lines to replace septic systems.

Innovative Strategies to Reduce Nitrogen Pollution

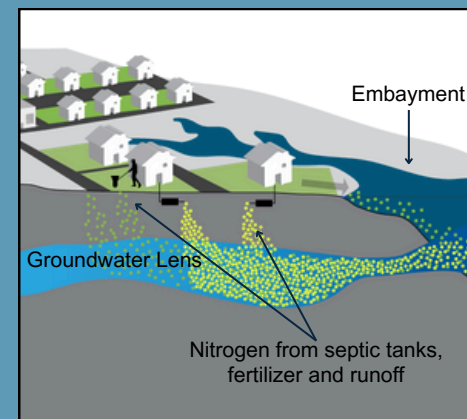
Cranberry Bog Restoration

The Barnstable Clean Water Coalition (BCWC) is combating nitrogen pollution by restoring 55 acres of cranberry bogs to a natural freshwater wetland in support of the Three Bays Estuary TMDL. Once restored, native plants will uptake, or attenuate, nitrogen in the water before it flows into the estuary. In September 2023, BCWC received a \$1.6 million grant to purchase additional land for the restoration, and they are working with area cranberry farmers to explore ways to further protect water resources.



EMBAYMENT

An embayment is a shallow, protected area of the ocean that is usually found at the mouth of a river or stream where it meets the ocean.



Map inset and diagram courtesy of the Cape Cod Commission.



IA Septic Systems

Alternative septic systems, also known as innovative/alternative or IA septic systems, are designed to remove nitrogen from wastewater, something regular septic systems cannot do. The denitrification unit within an IA septic system reduces nitrogen from the effluent before it reaches the groundwater and surrounding water bodies. IA septic systems can prevent the release of approximately 80-90% of nitrogen to groundwater. The BCWC, in collaboration with the Massachusetts Alternative Septic System Test Center, the EPA and others, installed IA systems as a pilot project in the Shubael Pond neighborhood in Barnstable. The project is monitoring nitrogen in groundwater to inform the cost-effectiveness of IA as well as more widespread use of this technology.

New Regulations

Massachusetts adopted a new legal strategy to help restore water quality when the Massachusetts Department of Environmental Protection made revisions to its septic system regulations to define “Nitrogen Sensitive Areas,” effective in July 2023. The regulations state that towns within a Nitrogen Sensitive Area may file for and obtain a Watershed Permit. The permit establishes performance standards, authorized activities, and timeframes that will be utilized under an adaptive management framework to achieve nutrient load reductions and enables towns to implement wastewater solutions that meet their specific needs. These may include centralized wastewater treatment, IA septic systems, wetland and cranberry bog restoration, and aquaculture. If a town fails to file notice to obtain a Watershed Permit, homeowners in the affected area would be required to upgrade their septic systems with enhanced nitrogen reducing treatment technology within five years.

Funding Infrastructure Projects

Replacement septic systems and sewer extensions are generally paid for by residents. To help pay for these costs, partners in Cape Cod, Martha’s Vineyard, and Nantucket collaborated to establish a new fund. The [Cape Cod and Islands Water Protection Fund \(CCIWPF\)](#) collects revenue from an excise tax on traditional lodging and short-term rentals in all Cape Cod towns. Between 2018-2024, a total of \$204 million has been allocated for water quality and wastewater infrastructure projects in these member communities.

Preserving the Legacy of the Cape

Clean water is paramount to Cape Cod’s environmental quality and economic vitality. Federal and state agencies, and regional and local entities, have come together to identify pathways for solutions to meet the TMDL nutrient targets across the Cape. Progressive regulatory changes, innovative technologies, research, and funding are propelling protection and restoration of water quality.



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