



The Problem

According to the Massachusetts Estuaries Project (MEP) technical report (available at <http://www.oceanscience.net/estuaries/>), the nitrogen load from the watershed exceeds the threshold for Nauset Harbor, resulting in impaired water quality. A Total Maximum Daily Load (TMDL) for nitrogen has not yet been established.

- **MEP TECHNICAL REPORT STATUS:** Final
- **TMDL STATUS:** In Progress
- **TOTAL WASTEWATER FLOW:** 180.2 MGY (million gal per year)
 - Treated WW Flow: 4.2 MGY
 - Septic Flow: 176 MGY
- **UNATTENUATED TOTAL NITROGEN LOAD (MEP):** 17,276 Kg/Y (kilograms per year)
- **ATTENUATED TOTAL NITROGEN LOAD (MEP):** 15,675 Kg/Y
- **SOURCES OF CONTROLLABLE NITROGEN (MEP):**
Nauset Marsh
 - 83% Septic Systems
 - 6% Lawn Fertilizer
 - 9% Stormwater from Impervious Surfaces
 - 2% Wastewater Treatment Facilities

- Town Cove
 - 86% Septic Systems
 - 5% Lawn Fertilizer
 - 8% Stormwater from Impervious Surfaces
 - 1% Wastewater Treatment Facilities
- Salt Pond
 - 72% Septic Systems
 - 6% Lawn Fertilizer
 - 9% Stormwater from Impervious Surfaces
 - 13% Landfill

CONTRIBUTING TOWNS

- **EASTHAM**
- **ORLEANS**
- **DISCUSSION:** A portion of the land area in this watershed is within the boundaries of the Cape Cod National Seashore and any nitrogen load that results is not within control of the towns.

THE MEP RESTORATION SCENARIO

- **WATERSHED TOTAL NITROGEN REDUCTION TARGET: 47%**
- **WATERSHED SEPTIC REDUCTION TARGET: 55%**
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)

The Nauset Harbor estuary and embayment system is located in the towns of Eastham and Orleans. It is comprised primarily of two segments - Town Cove and Nauset Marsh. Sub-systems include Salt Pond, Nauset Bay, Woods Cove, and Mill Pond, which contribute to Nauset Marsh and Nauset Stream, and Rachel Cove, which contribute to Town Cove. The estuary supports a variety of recreational uses including boating, swimming, shell fishing and fin fishing.

NAUSET HARBOR ESTUARY

- **EMBAYMENT AREA:** 1,513 acres
- **EMBAYMENT VOLUME:** 596 million cubic feet
- **2012 INTEGRATED LIST STATUS:** Category 2
 - Category 2: Attaining some uses; other uses not assessed
 - www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf

NAUSET HARBOR WATERSHED

- **ACRES:** 4,751
- **PARCELS:** 3,276
- **% DEVELOPED RESIDENTIAL PARCELS:** 78%
- **PARCEL DENSITY:** 1.5 acres per parcel (approx.)
- **WASTEWATER TREATMENT FACILITIES:** 1
 - Small commercial facility serving Salt Pond, Eastham area

Freshwater Sources

PONDS

- **IDENTIFIED SURFACE WATERS:** 34
- **NUMBER OF NAMED FRESHWATER PONDS:** 9
- **PONDS WITH PRELIMINARY TROPHIC CHARACTERIZATION:** 9
(Listed In Appendix 4C, Ponds With Water Quality Data)
- **2012 INTEGRATED LIST STATUS:** None listed
- **NOTE:** The Nauset Harbor watershed shares Baker and Cliff ponds with the Pleasant Bay watershed. Both towns participate in the Pond and Lake Stewardship Program (PALS). The Towns of Eastham and Orleans have benefited from Barnstable County funded ponds assessments through the Cape Cod Commission and the School of Marine Science and Technology (SMAST) at UMASS Dartmouth. Orleans has an active citizens group, the Orleans Ponds Coalition that provides sampling, education and advocacy. Eastham also has

an active Water Quality Advisory Board that coordinates fresh water pond assessment and restoration efforts.

STREAMS

- **SIGNIFICANT FRESHWATER STREAM OUTLETS:** 1
Nauset Stream:
 - Average Flow: 1,871 cubic meters per day (m³/d)
 - Average Nitrate Concentrations: 0.15 milligrams per liter (mg/L)
- **DISCUSSION:** Due to the highly permeable soils present in the Nauset Marsh and Town Cove estuaries the majority of freshwater contributions are from groundwater discharge. Characterization of fresh water streams like these is a regular part of the MEP technical reports. These concentrations are higher than areas of the aquifer with less than 0.05 mg/L background concentrations that are evident in public supply wells located in pristine areas. This provides evidence of the impact of non-point source nitrogen pollution from residential areas on the aquifer and receiving coastal waters.

LOCAL PROGRESS

EASTHAM

Eastham contributes 49% of the attenuated wastewater nitrogen load to the Nauset Harbor watershed. Eastham has formally indicated its support for the 2010 Orleans Comprehensive Wastewater Management Plan (CWMP) and the possibility of sharing the CWMP's proposed Tri-Town regional wastewater facility to potentially treat Eastham's portion of wastewater load within the

Nauset Harbor watershed. The drinking water quality in private and small volume wells are impacted from septic systems and runoff. The town of Eastham recently voted to construct a limited water supply system to serve the residents down gradient of the landfill and uses along the Route 6 corridor.

ORLEANS

The Town of Orleans contributes 51 % of the attenuated

wastewater nitrogen load to the Nauset Harbor watershed. The town's CWMP was approved in 2011. The CWMP characterizes nitrogen reduction needs pursuant to the Massachusetts Estuaries Project (MEP) report for Nauset Harbor. The Needs Assessment identifies a preliminary sewer area. The CWMP identifies other wastewater needs to address drinking water, Title 5 compliance and economic development needs.

Local efforts in these towns are described in Chapter 6.

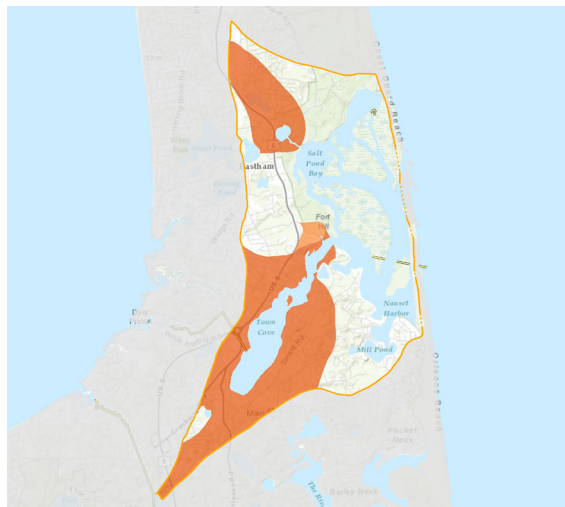
NAUSET HARBOR

DRINKING WATER SOURCES

- **WATER DISTRICTS:** 1
 - Orleans Water Department
- **GRAVEL PACKED WELLS:** 0
- **SMALL VOLUME WELLS:** 40
- **NOTE:** Orleans provides public water to a small number of Eastham properties. Eastham is primarily served by private wells. A municipal system is in development for a portion of town.

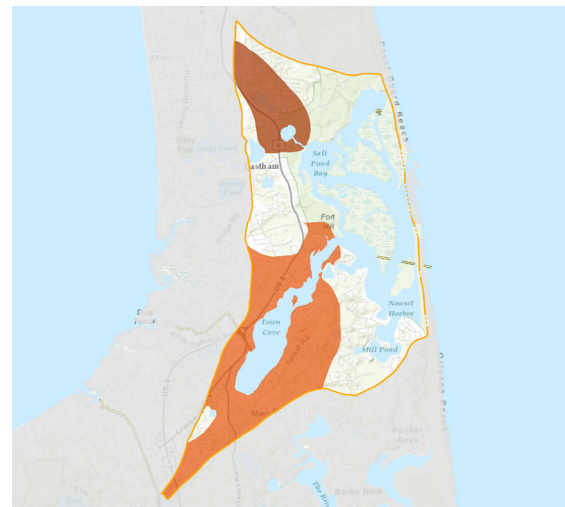
Degree of Impairment and Areas of Need

For the purposes of the §208 Plan Update areas of need are primarily defined by the amount of nitrogen reduction required as defined by the TMDL and/or MEP technical report. These are listed above as 47% of the total load and 55% of the septic load and, more specifically, as the targeted amount of nitrogen reduction required by subwatershed, as shown in Figure 4-1



NH Subwatersheds with Total Nitrogen Removal Targets and Figure 4-2 NH Subwatersheds with Septic Nitrogen Removal Targets. Subwatershed removals range from 75% for Town Cove (as depicted by the polygon in the lower portion of Figure 4-2 NH) to 100% for Salt Pond (as depicted by the polygon in the upper portion of Figure 4-2 NH).

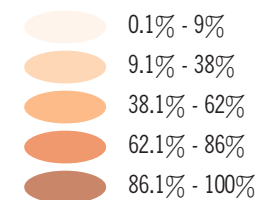
The nitrogen load from the watershed exceeds the threshold for Nauset Harbor, resulting in impaired water quality. The upper head waters are particularly impaired. Although the lower portions of the embayment are healthy, due to the severe conditions of the upper headwaters, the Nauset Harbor system is categorized as significantly impaired. The ecological health of a water body is determined from water quality, extent of eelgrass, assortment of benthic fauna, and dissolved oxygen and ranges from 1-severe degradation, 2-significantly impaired, 3-moderately impaired, 4- healthy habitat conditions.



WATERSHEDS: LOWER CAPE

MEP ECOLOGICAL CHARACTERISTICS AND WATER QUALITY

- **OVERALL ECOLOGIC CONDITION:** Healthy to Significantly Impaired
- **NAUSET MARSH:** Healthy
- **NAUSET BAY:** Healthy
- **SALT POND BAY:** Significantly Impaired
- **TOWN COVE:** Significantly Impaired
- **SALT POND:** Significantly Impaired
- **WOOD COVE:** Significantly Impaired
- **MILL POND:** Significantly Impaired
- **SENTINEL STATIONS:**
 - Total Nitrogen Concentration Threshold: 0.45 mg/L
 - Total Nitrogen Concentration Existing: 0.53 mg/L (As reported at the MEP sentinel water-quality monitoring stations)



Subwatersheds with Total Nitrogen Removal Targets

Figure 4-1 NH

Subwatersheds with Septic Nitrogen Removal Targets

Figure 4-2 NH