WATER THREAT LEVEL

MODERATE

WATERSHEDS: MID CAPE

Centerville River

The Problem

The Massachusetts Estuaries Project (MEP) technical report (available at www.oceanscience.net/estuaries) indicates the Centerville River system exceeds its critical threshold for nitrogen, resulting in impaired water quality. A Total Maximum Daily Load (TMDL) for nitrogen has been developed and approved.

- **MEP TECHNICAL REPORT STATUS:** Final
- **TMDL STATUS:** Final TMDL
- **TOTAL WASTEWATER FLOW:** 427 MGY (million gal per year)
- **TREATED WW FLOW:** 4 MGY
- **SEPTIC FLOW:** 423 MGY
- **UNATTENUATED TOTAL NITROGEN LOAD (MEP):** 61,745 Kg/Y (kilograms per year)
- **ATTENUATED TOTAL NITROGEN LOAD (MEP):** 48,277 Kg/Y
- **SOURCES OF CONTROLLABLE NITROGEN (MEP):**
  - 87% Septic Systems
  - 6% Lawn Fertilizer
  - 7% Stormwater From Impervious Surfaces

CONTRIBUTING TOWN

- **BARNSTABLE**

THE MEP RESTORATION SCENARIO:

- **WATERSHED TOTAL NITROGEN REDUCTION TARGET:** 28%
- **WATERSHED SEPTIC REDUCTION TARGET:** 34% (The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)

CENTERVILLE RIVER ESTUARY

- **EMBAYMENT AREA:** 218 acres
- **EMBAYMENT VOLUME:** 39.8 million cubic feet
- **2012 INTEGRATED LIST STATUS:** Category 4a
  - Bumps River: fecal coliform
  - Centerville River: fecal coliform, estuarine bioassessments and nitrogen
  - Category 4a, TMDL is completed
  - www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf

CENTERVILLE RIVER WATERSHED

- **ACRES:** 6,739
- **PARCELS:** 7,491
- **% DEVELOPED RESIDENTIAL PARCELS:** 88%
- **PARCEL DENSITY:** 0.9 acres per parcel
- **WASTEWATER TREATMENT FACILITIES:** 0

The Centerville River estuary and embayment system is located wholly within the town of Barnstable. It is comprised of a number of sub-basins, such as East Bay and Scudder Bay/Bumps River and supports a variety of recreational uses including boating, swimming, shell fishing and fin fishing.

- **GROUND WATER DISCHARGE PERMITS:** 1, serving the Cape Regency Health Care facility

Freshwater Sources

PONDS

- **IDENTIFIED SURFACE WATERS:** 39
- **NUMBER OF NAMED FRESHWATER PONDS:** 14
- **PONDS WITH PRELIMINARY TROPHIC CHARACTERIZATION:** 8
  (Listed In Appendix 4C, Ponds With Water Quality Data)
- **2012 INTEGRATED LIST STATUS:** 6 ponds listed in Category 5 requiring a TMDL.
- **DISCUSSION:** Three ponds within the adjacent Three Bay watershed (Shubael Pond, Micahs Pond and Joshuas Pond) also contribute to Centerville River. The Town of Barnstable has been a participant in the Pond and Lake Stewardship (PALS) program that has helped establish baseline pond water quality. The town has benefited from pond assessments prepared by the Cape Cod Commission with funding through Barnstable County. The recent comprehensive wastewater management plan (CWMP) included the preparation of a Pond Action Report. There is an active Lake Wequaquet Association. Additionally, Red Lily Pond is listed as a Category 5 Water for both fecal coliform and eutrophication through nutrients.

STREAMS

- **SIGNIFICANT FRESHWATER STREAM OUTLETS:** 4

Skunknett River:
- Average Flow: 13,925 cubic meters per day (m3/d)
- Average Nitrate Concentrations: 1.113 milligrams per liter (mg/L)

Bumps River:
- Average Flow: 5,679 m3/d
- Average Nitrate Concentrations: 2.207 mg/L

Long Pond Stream:
- Average Flow: 6,518 m3/d
- Average Nitrate Concentrations: 0.199 mg/L

Lake Elizabeth:
- Average Flow: 1,547 m3/d
- Average Nitrate Concentrations: 0.937 mg/L

- **DISCUSSION:** Characterization of fresh water streams like these is a regular part of the MEP technical reports. These concentrations are significantly 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 further evidence of the impact of non-point source nitrogen pollution from residential areas on the aquifer and receiving coastal waters.

DRINKING WATER SOURCES

- **WATER DISTRICTS:** 2
  - Hyannis Water District
  - Centerville-Osterville-Marstons Mills (COMM) Water District
- **GRAVEL PACKED WELLS:** 6
  - 1 has nitrate concentrations between 1 and 2.5 mg/L
  - 5 have nitrate concentrations between 2.5 and 5 mg/L
- **SMALL VOLUME WELLS:** 0

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. For the Centerville River, this amount is 34% of the septic load or 28% of the total load. The MEP technical report also provides a specific targeted amount of nitrogen reduction required by subwatershed (Figure 4-1 CR Subwatersheds with Total Nitrogen Removal Targets and Figure 4-2 CR Subwatersheds with Septic Nitrogen Removal Targets).

The nitrogen load from the watershed exceeds the threshold for the Centerville River, resulting in impaired water quality. Lower portions of Centerville River have generally good water quality supported by tidal flushing and significant attenuation

LOCAL PROGRESS

BARNSTABLE

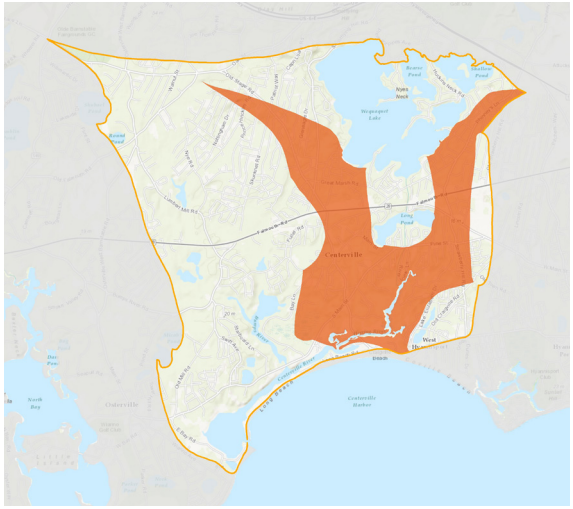
The Town of Barnstable submitted a Draft Comprehensive Wastewater Management Plan (CWMP) in 2012, which characterized the wastewater needs of the Centerville River watershed in terms of required nitrogen reduction according to the Massachusetts Estuaries Project (MEP) and Total Maximum Daily Loads (TMDLs). The earlier 2007 CWMP and its predecessor, the 1993 Needs Assessment identified other wastewater needs according to Title 5 conditions.

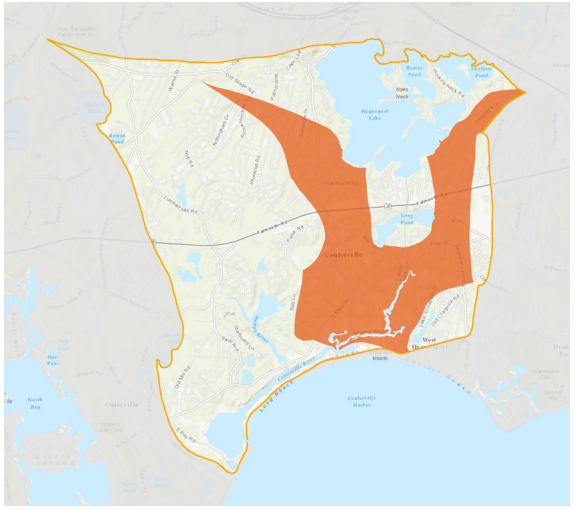
Local efforts in Barnstable are described in Chapter 6.

to contributing areas, while the upper reach of Centerville River, Centerville River East, has decreased water quality. 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.

ECOLOGICAL CHARACTERISTICS AND WATER QUALITY

- **OVERALL ECOLOGIC CONDITION:** Healthy to Significantly Impaired
- **UPPER CENTERVILLE RIVER:** Healthy
- **MID CENTERVILLE RIVER:** Healthy to Moderately Impaired
- **LOWER CENTERVILLE RIVER:** Healthy to Significantly Impaired
- **EAST BAY:** Moderately to Significantly Impaired
- **BUMPS RIVER:** Healthy
- **SCUDDER BAY:** Moderately Impaired
- **SENTINEL STATIONS:**
  - Total Nitrogen Concentration Threshold: 0.37 mg/L
  - Total Nitrogen Concentration Existing: 0.41 mg/L (As reported at the MEP sentinel water-quality monitoring stations.)





0.1% - 9%
9.1% - 38%
38.1% - 62%
62.1% - 86%
86.1% - 100%

Subwatersheds with Total Nitrogen Removal Targets

Figure 4-1 CR

Subwatersheds with Septic Nitrogen Removal Targets

Figure 4-2 CR