

WATER THREAT LEVEL

**HIGH**

## WATERSHEDS: LOWER CAPE Rock Harbor



### The Problem

The draft Massachusetts Estuaries Project (MEP) technical report (available at [www.oceanscience.net/estuaries/](http://www.oceanscience.net/estuaries/)) indicates that Rock Harbor exceeds its critical threshold for nitrogen, resulting in impaired water quality. A Total Maximum Daily Load (TMDL) has not yet been established for Rock Harbor.

- **MEP TECHNICAL REPORT STATUS:** Final
- **TMDL STATUS:** In Progress
- **TOTAL WASTEWATER FLOW:** 28 MGY (million gal per year)
  - Treated WW Flow: 2 MGY
  - Septic Flow: 26 MGY
- **UNATTENUATED TOTAL NITROGEN LOAD (MEP):** 3,926 Kg/Y (kilograms per year)
- **ATTENUATED TOTAL NITROGEN LOAD (MEP):** 3,299 Kg/Y
- **SOURCES OF CONTROLLABLE NITROGEN (MEP):**
  - 88% Septic Systems
  - 6% Lawn Fertilizer
  - 5% Stormwater from Impervious Surfaces
  - 1% Wastewater Treatment Facilities

### CONTRIBUTING TOWNS

- **ORLEANS**
- **EASTHAM**

### THE MEP RESTORATION SCENARIO

- **WATERSHED TOTAL NITROGEN REDUCTION TARGET:** 59%
- **WATERSHED SEPTIC REDUCTION TARGET:** 69%  
(The scenario represents the aggregated sub-embayment percent removal targets from the MEP technical report)

### Rock Harbor Estuary

- **EMBAYMENT AREA:** 6 acres
- **EMBAYMENT VOLUME:** 5 million cubic feet
- **2012 INTEGRATED LIST STATUS:** Category 4A for fecal coliform
  - Category 4a: TMDL completed
  - [www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf](http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf)

### Rock Harbor Watershed

- **ACRES:** 609
- **PARCELS:** 449
- **% DEVELOPED RESIDENTIAL PARCELS:** 66%
- **PARCEL DENSITY:** 1.4 acres per parcel (approx.)

The Rock Harbor estuary and embayment system is located in the towns of Eastham and Orleans. It is comprised of a small basin, which requires regular dredging to maintain its connection to Cape Cod Bay, and a long riverine segment that extends up to Cedar Pond. The entrance to the harbor is armored and portions of the harbor are heavily used for recreational and commercial fishing.

- **WASTEWATER TREATMENT FACILITIES:** 1
  - A small wastewater treatment facility exists in the Orleans portion of the watershed serving the Orleans Bowling Center.

brackish, with an outlet to Rock Harbor. The Town has committed significant resources to further assess and develop strategies to restore its water quality.

## Drinking Water Sources

- **WATER DISTRICTS:** 1
  - Orleans Water Department
- **GRAVEL PACKED WELLS:** 0
- **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. The technical report indicates that 59% of the total nitrogen load or 69% of the septic nitrogen load needs to be reduced. The technical report indicates that nitrogen removal is not necessary for Cedar Pond. As shown in Figure 4-1 RH Subwatersheds with Total Nitrogen Removal Targets and Figure

## Ponds

- **IDENTIFIED SURFACE WATERS:** 4
- **NUMBER OF NAMED FRESHWATER PONDS:** 1
- **PONDS WITH PRELIMINARY TROPHIC CHARACTERIZATION:** Cedar Pond, eutrophic (Listed In Appendix 4C, Ponds With Water Quality Data)
- **2012 INTEGRATED LIST STATUS:** 1 Listed
- **DISCUSSION:** The Towns of Eastham and Orleans have been participants in the Pond and Lake Stewardship (PALS) program that has helped establish baseline water quality. Cedar Pond is the only named pond in the Rock Harbor watershed and is listed on the 2012 Integrated List as requiring a TMDL. This pond is

## Streams

- **SIGNIFICANT FRESHWATER STREAM OUTLETS:** 1
  - Cedar Pond Stream:
    - Average Discharge: 1,271 cubic meters per day
    - Average Nitrate Concentrations: 0.116 milligrams per liter (mg/L)
- **DISCUSSION:** 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 approximately 15% of the attenuated wastewater nitrogen load to the Rock Harbor watershed. Eastham has formally indicated its support for the 2010 Orleans Comprehensive Wastewater Management Plan (CWMP) and the potential to share the Tri-Town regional facility to treat Eastham's share of its responsibility for Nauset Marsh. The CWMP provides a preliminary sewer collection area. However, both Eastham and Orleans have been directing their efforts

to re-characterize the Rock Harbor embayment system, acknowledging its role as a commercial boat basin, to alleviate requirements to restore the basin to the highest water quality standards. The drinking water quality in the private and small volume wells of Eastham are impacted from septic systems and runoff. The town of Eastham recently voted to construct a limited water supply system to serve the residents downgradient of the landfill and uses along the Route 6 corridor.

### ORLEANS

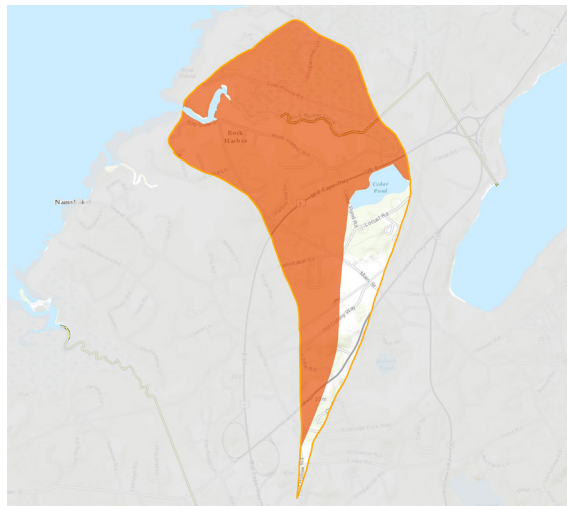
The Town of Orleans contributes approximately 85% of the attenuated wastewater nitrogen load to the Rock Harbor watershed. The town's CWMP was approved in 2011. The CWMP characterizes nitrogen reduction needs pursuant to the Massachusetts Estuaries Project (MEP) technical report for Rock Harbor. The Needs Assessment completed in 2009 identified other wastewater needs to address Title 5 compliance and economic development needs.

Local efforts in the towns of Eastham and Orleans are described in Chapter 6

## ROCK HARBOR

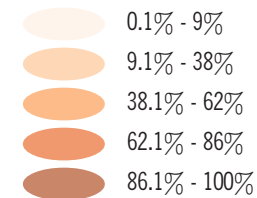
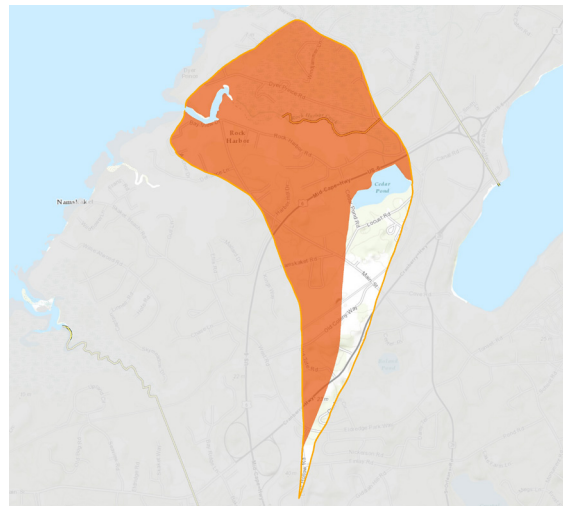
### 4-2 RH Subwatersheds with Septic Nitrogen Removal Targets.

The nitrogen load from the watershed exceeds the threshold for Rock Harbor, resulting in impaired water quality and habitat. 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. Habitat in the upper head waters of Rock Harbor are healthy. The lower portion of the embayment is indicated as impaired, partially due to its low standing volume relative to the high nitrogen load. This is contrary to many of the other embayments where the upper head waters are impaired and the waters of the main body are healthier.



## MEP ECOLOGICAL CHARACTERISTICS AND WATER QUALITY

- **OVERALL ECOLOGIC CONDITION:** Healthy to significantly impaired
- **UPPER SALT MARSH:** Healthy
- **LOWER HARBOR BASIN:** Significantly impaired
- **SENTINEL STATIONS:**
  - Total Nitrogen Concentration Threshold: 0.50 mg/L
  - Total Nitrogen Concentration Existing: 0.69 mg/L (As reported at the MEP sentinel water-quality monitoring stations)



Subwatersheds with Total Nitrogen Removal Targets

Figure 4-1 RH

Subwatersheds with Septic Nitrogen Removal Targets

Figure 4-2 RH