
Popponesset Bay Watershed Remediation
Responsibility for Cleanup: Mashpee, Sandwich and Barnstable

The Water Quality Problem

- Cape Cod estuary water bodies, including Popponesset Bay, are impaired to varying degrees by nitrogen
- Excess nitrogen causes excessive plant and algae growth, leading to oxygen loss and degraded water quality
- The results are habitat loss, fish kills, poor aesthetics
- Estuaries can't support the uses that they have naturally and historically offered

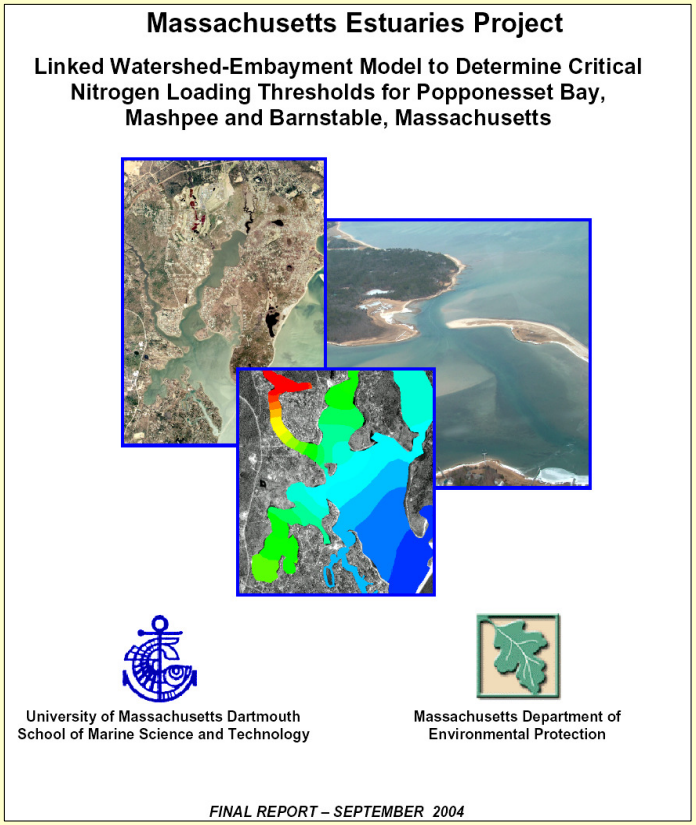
Clean Water Act (CWA)

- Federal Water Pollution Control Act Amendments of 1972 became Clean Water Act in 1977
  - Basic structure for regulating discharges of pollutants into the waters of the United States.
- Clean Water Act mandates that states
  - Identify impaired waters
  - Establish a total maximum daily nitrogen limit (TMDL) to remediate waters
  - Take actions to meet the limit

Key Provision of Clean Water Act: Total Maximum Daily Load

- Amount of pollutant waters can accept and still meet state water quality standards
- Can be nitrogen, phosphorus, bacteria, etc.
- Based on accepted science
- Established through a public process by state Department of Environmental Protection and approved by federal EPA

Popponesset Bay
Massachusetts Estuaries Project Technical Report

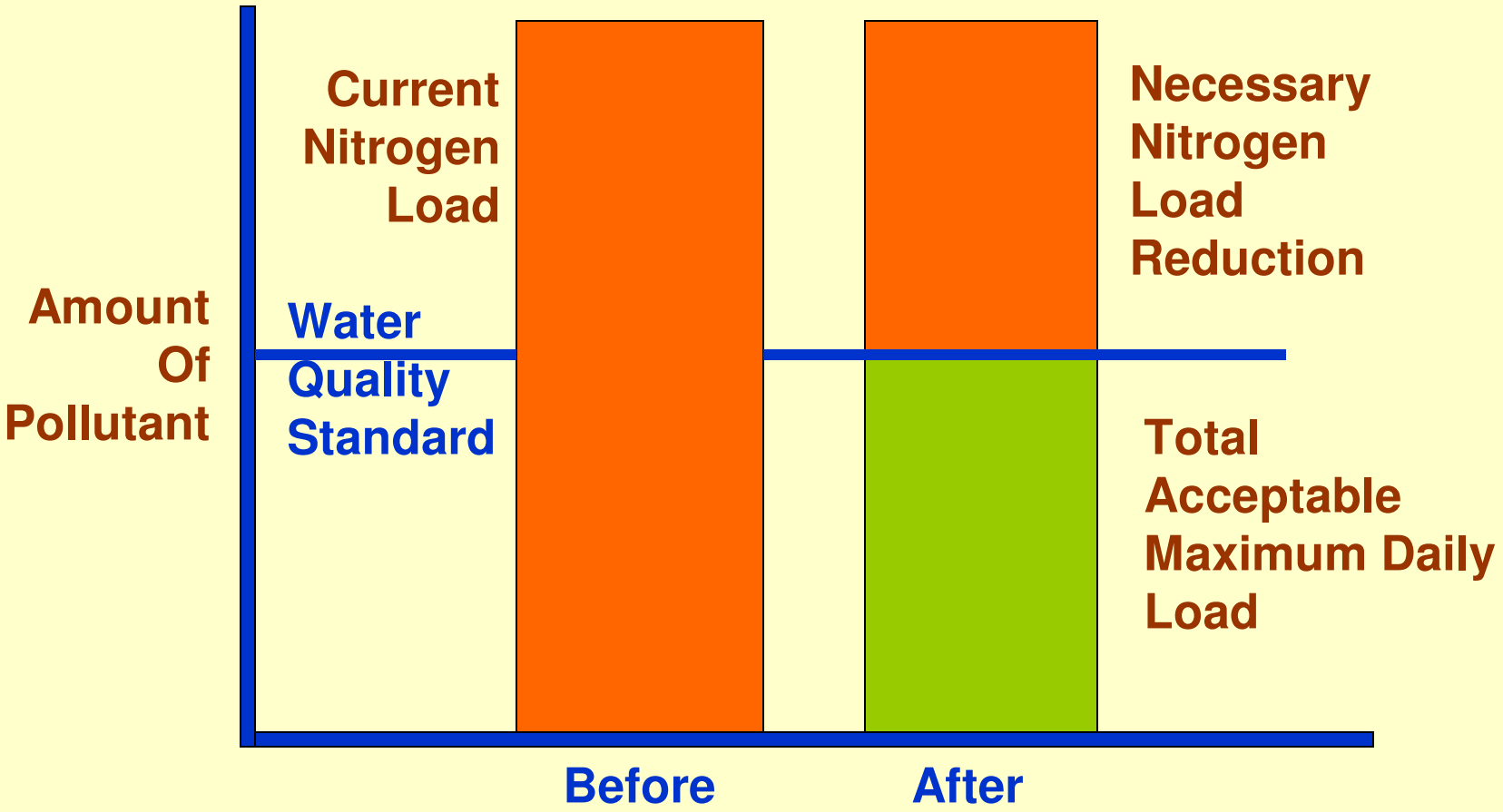


- Identified water quality problems in the Bay
- Problem: too much nitrogen
- Used three years of data to develop a linked watershed estuary model
- Model can be used to develop solutions to fix the problem
- Analysis formally accepted by MassDEP and USEPA
- Popponesset Bay MEP Technical Report finalized in September 2004

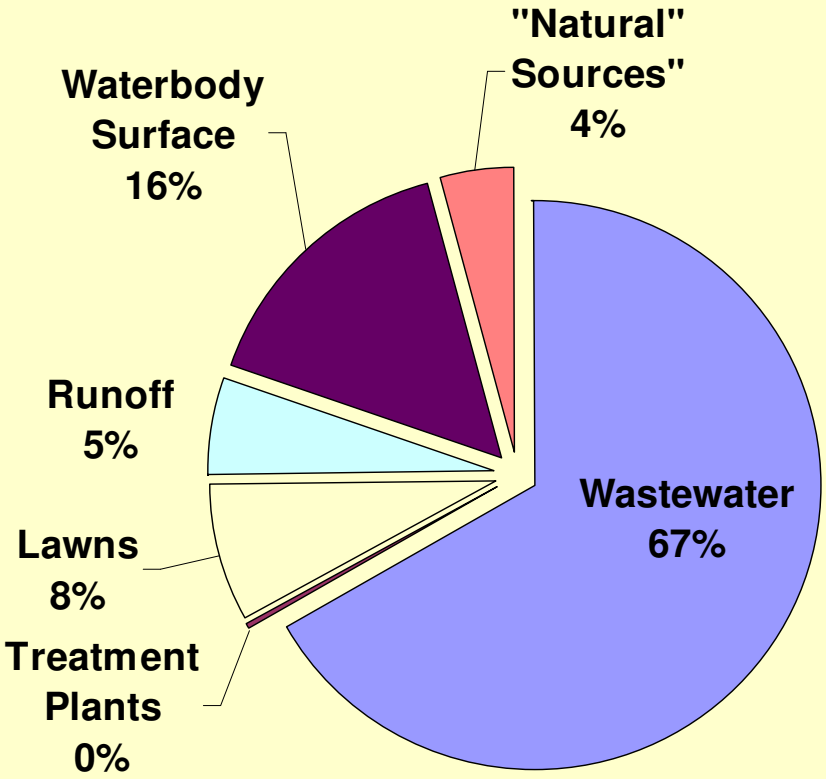
The Problem

- Popponesset Bay is an impaired water body under existing conditions due to an excess of nutrients from nitrogen compounds flowing to the Bay.
- The Bay is located in Barnstable and Mashpee and receives a groundwater input from those Towns plus Sandwich

Total Maximum Daily Load



Popponesset Bay Nitrogen Sources



Source: MEP Popponesset Bay Technical Report

MassDEP TMDL Process

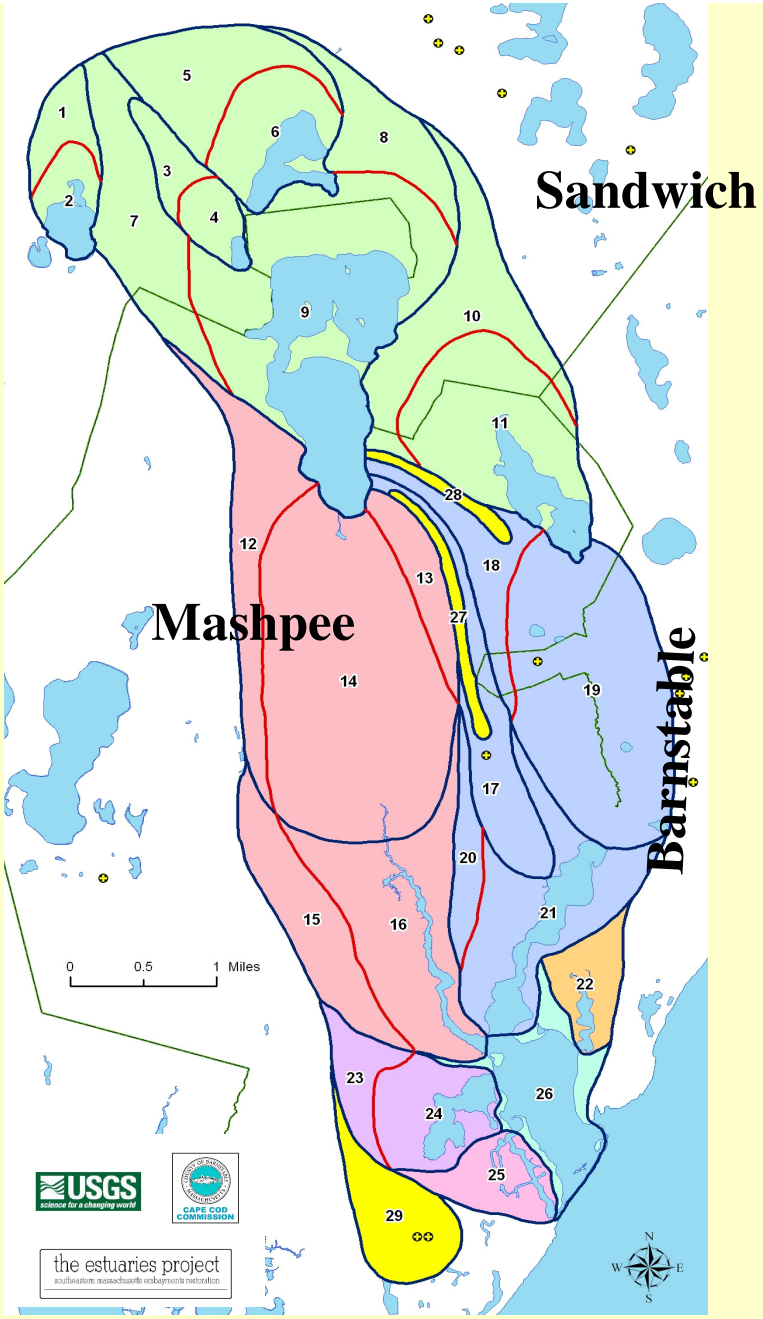
What Happens After TMDL is Issued?

- Popponesset Bay final TMDL approved April 2006
- Municipalities develop Comprehensive Wastewater Management Plan (CWMP) to meet TMDL
- MassDEP, Cape Cod Commission, and MEPA approve the CWMP
- Monitor implementation progress and water quality in Bay

Popponesset Bay
Nutrient Responsibility

- Each town is responsible for reducing their nitrogen load to meet the TMDL

Popponesset Bay
Towns in the Watershed



Popponesset Bay

6 Sub-embayments

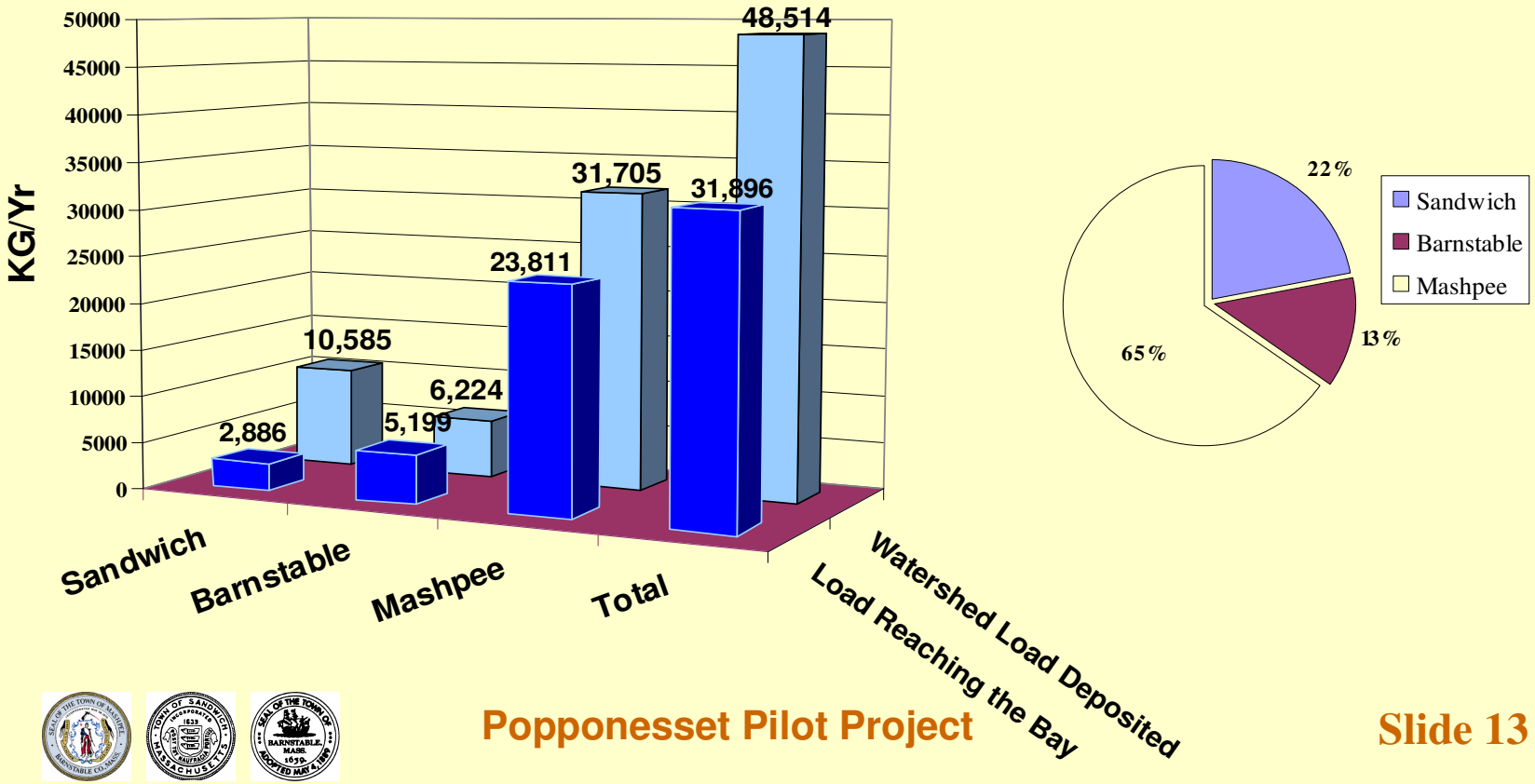
Popponesset Bay
Popponesset Creek
Pinquickset Cove
Ockway Bay
Mashpee River
Shoestring Bay

3 Rivers

Mashpee
Santuit
Quaker Run

1 Sentinel Station

Popponesset Bay Nitrogen Load Sources by Town



Popponesset Bay Watershed Pilot Project

Massachusetts Department of Environmental Protection

University of Massachusetts Dartmouth
School of Marine Science and Technology

CAPE COD COMMISSION

Popponesset Bay
Pilot Project Results

<u>GOAL</u>: Promote Intermunicipal Cooperative Planning to address Nitrogen TMDL

- Regular Meetings with representatives from each town over four years to develop understanding of TMDL and town shares of current Nitrogen load
- Development and funding of scenario runs of MEP model to understand options

The Solution

Reduce existing nitrogen inputs to an acceptable level by decreasing the watershed load to a quantity that meets the Sentinel Station requirement

Nitrogen Management Options Discussed

- Equal percent reduction among towns
- Share based on area
- Trading nitrogen credits based on better treatment in one area (save $$$$)
- Watershed Based District(s)

Approach Proposed

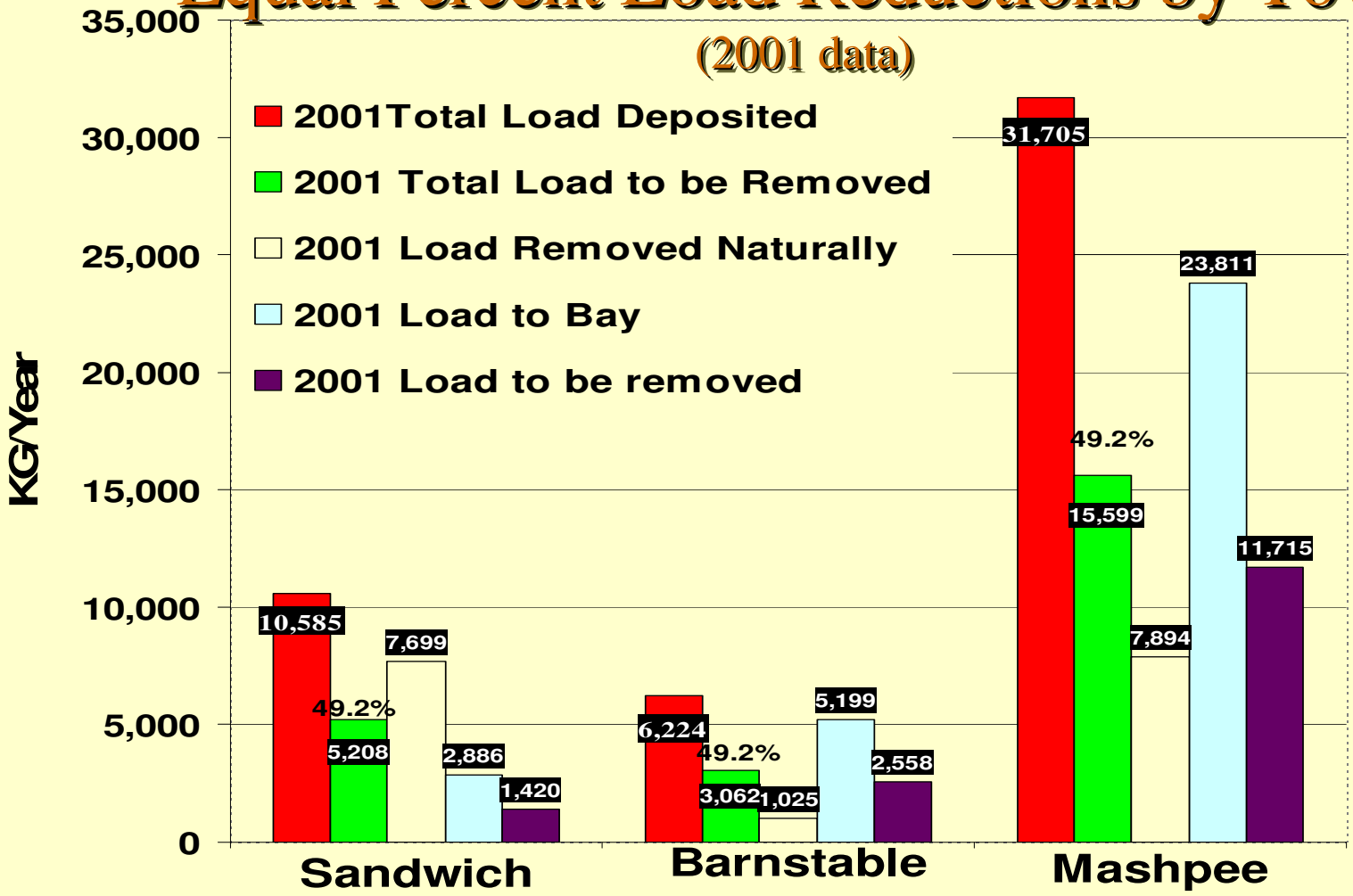
Determine percent of total existing load at sentinel station that must be eliminated and apply to all sub-watersheds. Trade where meaningful.

SMaST Modeling determined that a 50.8% reduction from 2001 nitrogen loads would be required to meet the TMDL.

Equal Percent Load Reduction

- Provides an equal percent reduction for all
- Larger sources provide larger volume reductions
- Enables Trading
- Simplifies calculations and explanations
- Existing load is documented in Estuaries Report

Proposed Approach:
Equal Percent Load Reductions by Town



Resulting Allowed N Loads for Each Town:

- Mashpee: 16,106 Kg/yr deposited
  11,796 Kg/yr to the Bay
- Barnstable: 3,162 Kg/yr deposited
  2,641 Kg/yr to the Bay
- Sandwich: 5,377 Kg/yr deposited
  1,466 Kg/yr to the Bay

Loads to the Bay are the Key Number –

The Maximum N load from each Town allowed forever and the target to be reached through N reductions

Nitrogen Trading Considerations

- **Intra-municipal Nitrogen Trading:**
  - **Requires an inter-municipal agreement**
  - **Helps reduce overall sewering costs by removing N at locations where the contributing loads to the Bay are the greatest**
  - **Development of details will have to involve completion of the CWMP**

Next Steps

- **PROPOSAL**
  - Representatives from each town in the watershed
  - Task with developing an inter-municipal agreement
  - Identify how each town will reduce N in the watershed.