

Note this TMDL was approved by the United States Environmental Protection Agency on June 4, 2024. The TMDL Information Session powerpoint is for informational purposes. See [Final TMDL](#) for details.

Please Sign Attendance Sheet

THANK YOU!

Zoom meeting recording disclaimer:

Please note that we will be recording this meeting and will retain the recording in accordance with the Commonwealth's records retention rules. The recording will be used internally to review the comments and suggestions provided during the meeting. We will not post the recording online.



Total Maximum Daily Loads (TMDLs): Restoring and Preserving Water Quality through Nitrogen Control Strategies

New Bedford Inner Harbor

- *New Bedford, Fairhaven, Acushnet, Freetown, Rochester and Lakeville*

November 8, 2023



Photo Credit: EPA Integrated Planning
Storymap, Shoreline Arial Photography LLC,
provided by CDM Smith

Federal Clean Water Act Requirements

PROGRAMMATIC OVERVIEW

Watershed Planning Program



Develop and implement the Massachusetts Surface Water Quality Standards (314 CMR 4.00)



Monitor the physical, chemical, and biological characteristics of surface waters in the Commonwealth



Manage our data and report the results of surface water quality monitoring



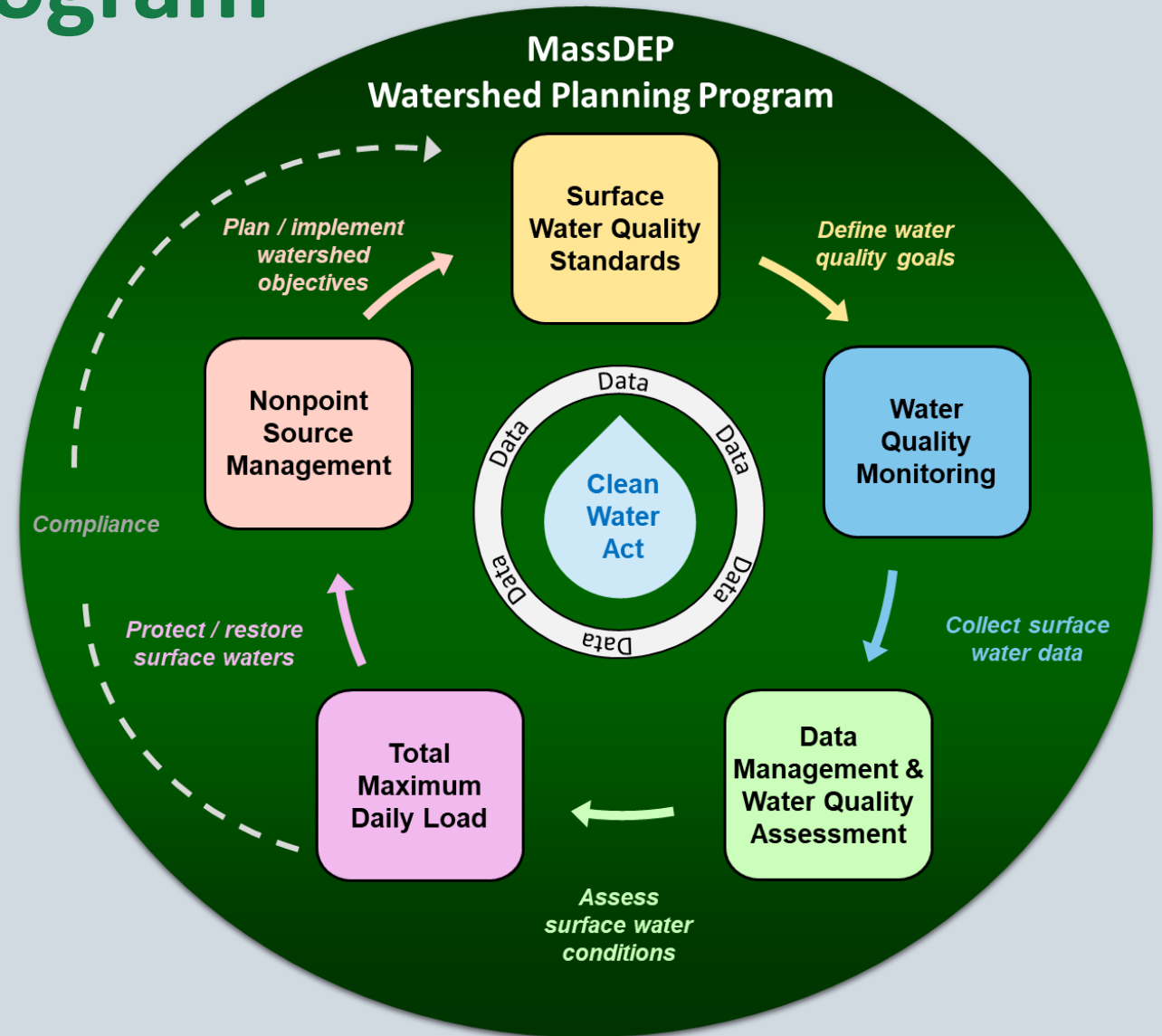
Assess surface water quality conditions and attainment of existing and designated uses as defined in the Surface Water Quality Standards



Develop TMDLs and other plans to restore impaired surface waters and to protect high quality waters.



Watershed planning through implementation of the Nonpoint Source (319) and Water Quality Management Planning (604b) Programs



Total Maximum Daily Load

*Maximum
amount of a
pollutant that can
enter a water
body and still
meet water
quality standards*



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Why do we need TMDLs for estuaries?

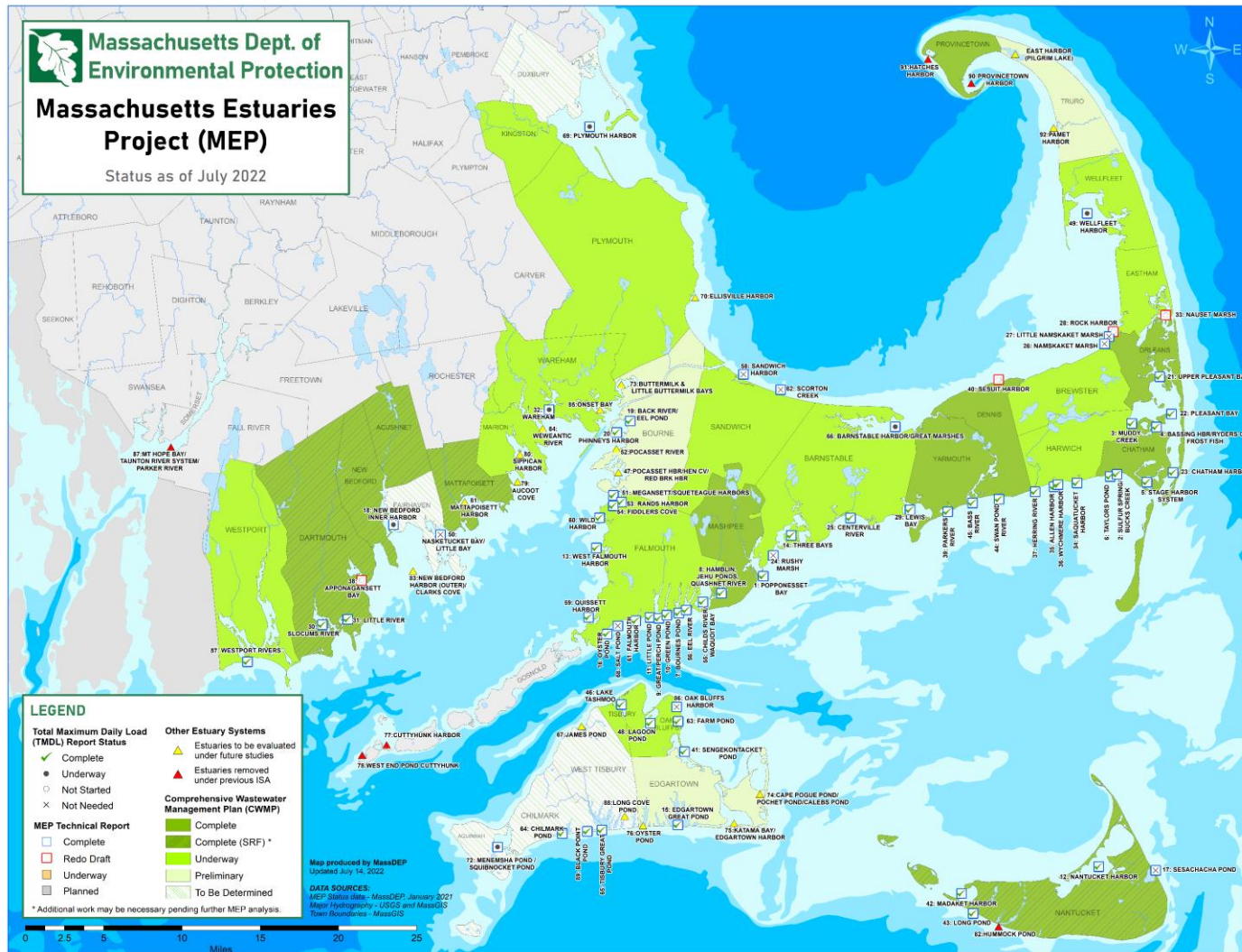
Declining coastal habitat
quality due to increased
nitrogen loading resulting
from changes in watershed
land uses

Massachusetts Estuaries Project

OVERVIEW AND PROCESS

The Massachusetts Estuary Project (MEP)

- Collect data and evaluate 70 embayments
- Science based recommendations to improve water quality



MEP Goals

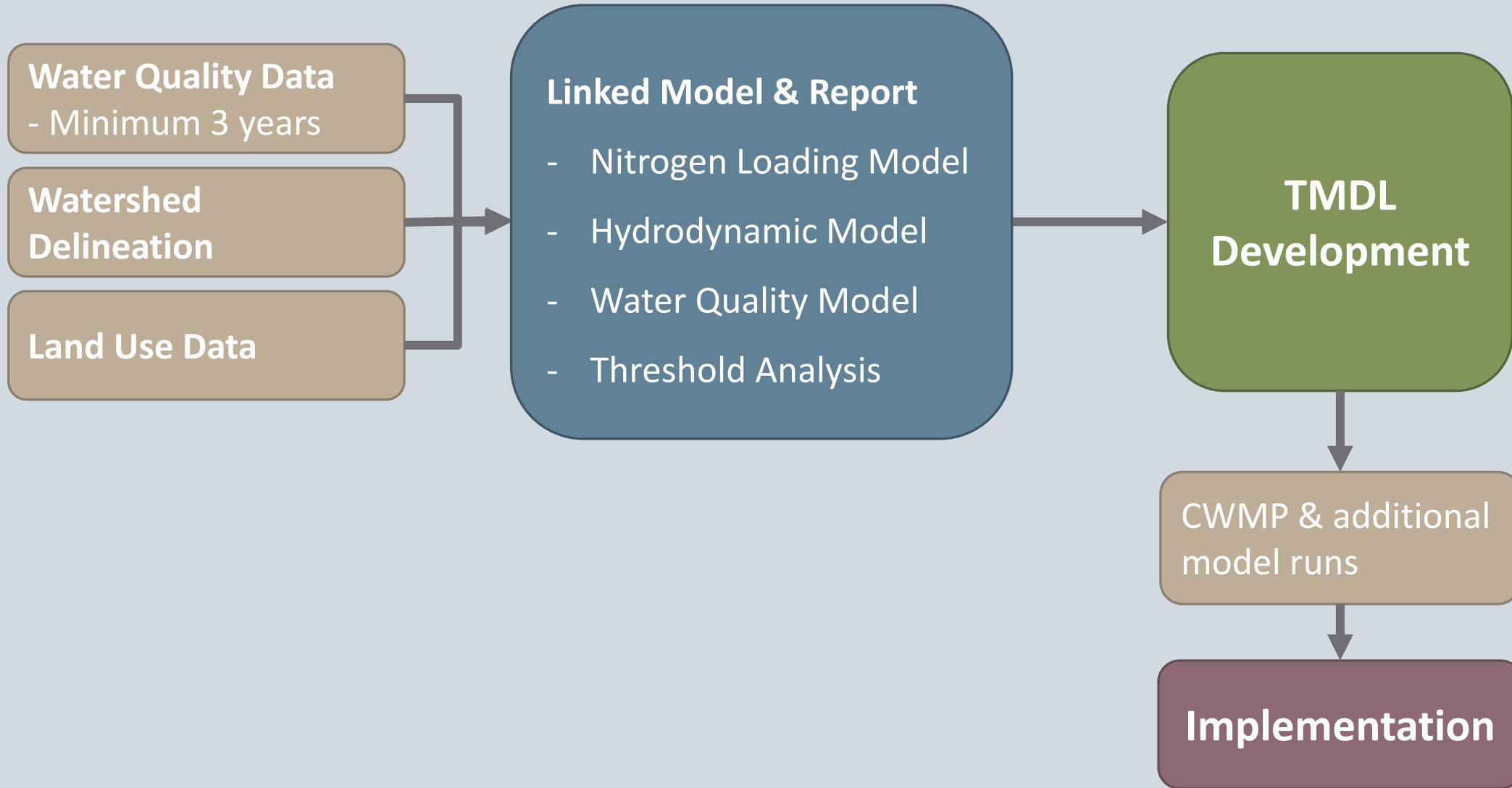
Determine: Nitrogen Loading Limits that are specific to individual estuarine systems in Southeastern Massachusetts

Provide: Nitrogen Management Strategies to achieve these limits

Information, Sources & Participants



The MEP Process



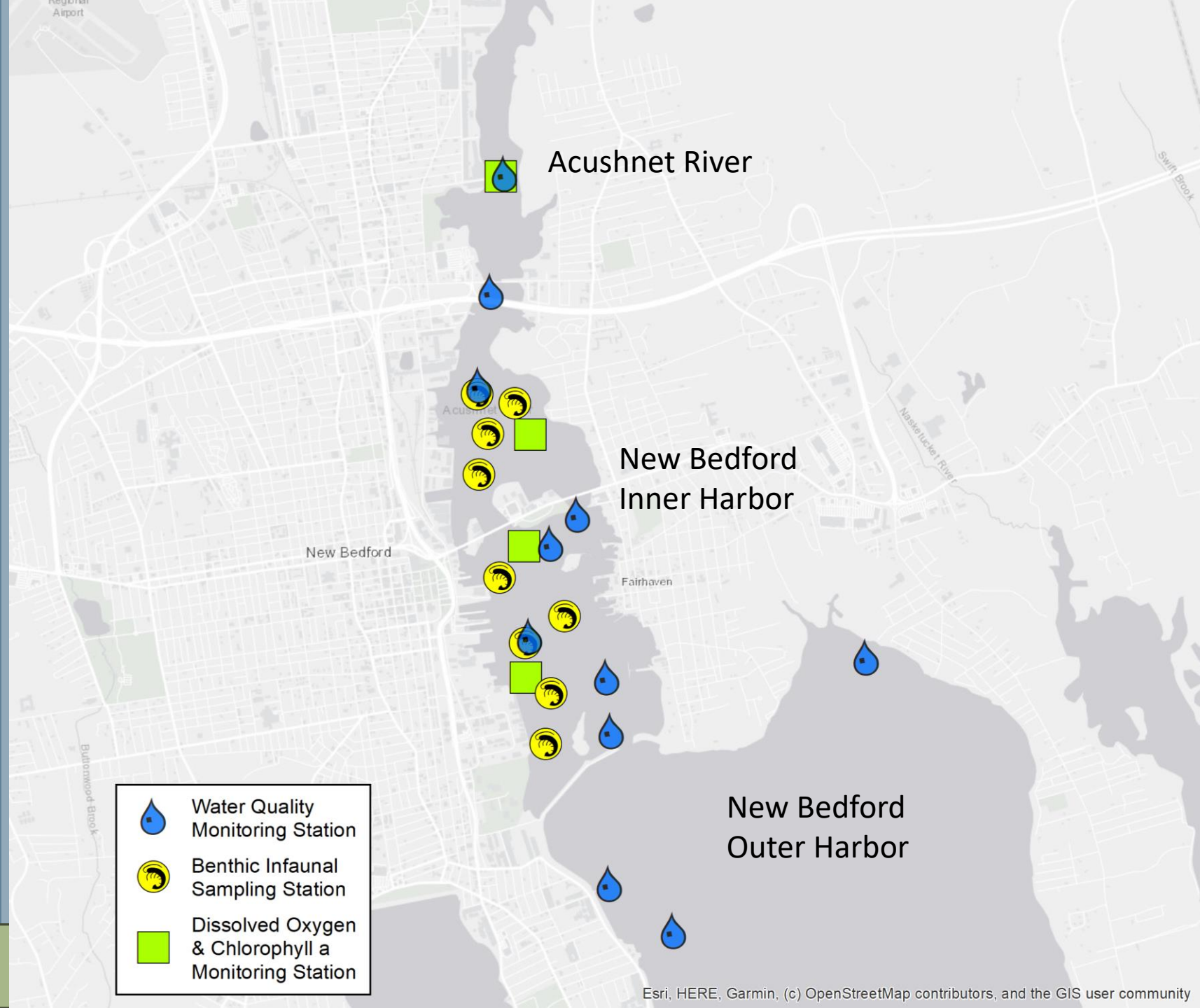
MEP Technical Report

DATA AND MODEL

Water Quality Monitoring & Data Collection

Data collected

- Total Nitrogen
- Benthic Infauna
- Dissolved Oxygen
- Chlorophyll *a*



Nutrient Related Waterbody Impairments

Symbols: Concentration; high chlorophyll, Eelgrass Loss, Concentration: low dissolved oxygen, courtesy of: Tracey Saxby, Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/imagelibrary/). Symbol: Worms courtesy of : Dieter Tracey, Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/imagelibrary/).

Acushnet River

-  Low Dissolved Oxygen
-  Impaired Benthic Fauna
-  Elevated Chlorophyll
-  Macroalgae

New Bedford Inner Harbor

-  Low Dissolved Oxygen
-  Impaired Benthic Fauna
-  Elevated Chlorophyll

New Bedford Outer Harbor

MEP Linked Modeling Approach



Nitrogen Loading to Groundwater



Groundwater Flow to Estuaries



Estuary Circulation, Tides & Currents



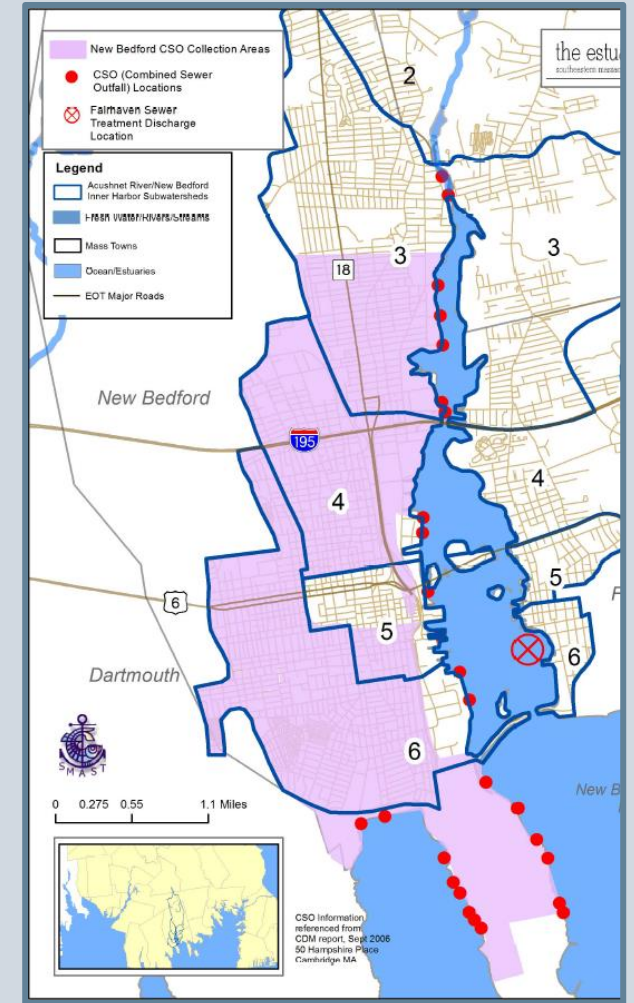
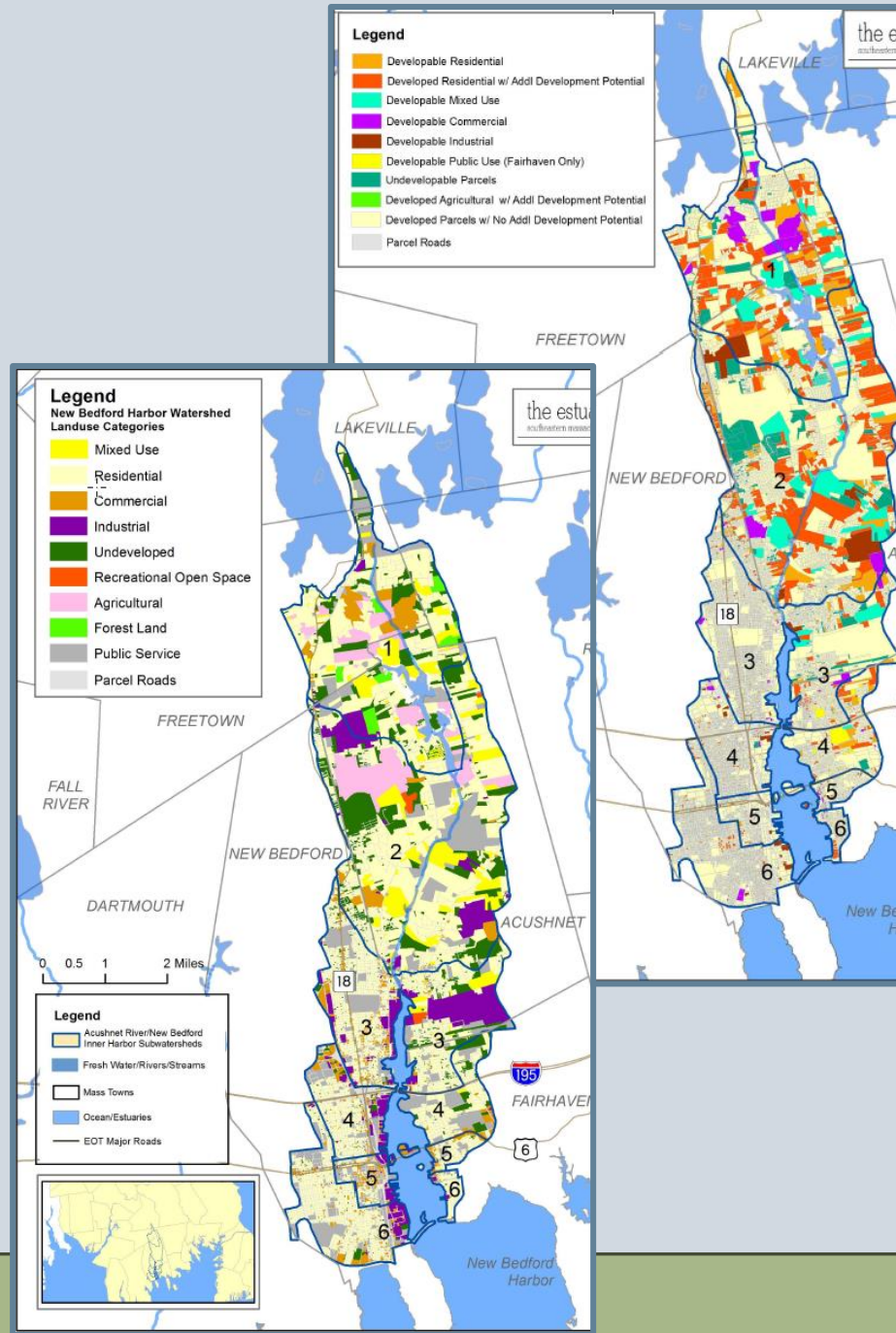
Nitrogen Concentrations in Estuaries



Estuary Habitat Health

Nitrogen Loading Modeling

- Watershed delineation
- Land cover & use
- Property parcels
- Water usage
- Combined Sewage Overflow (CSO)
- Municipal WWTF



Hydrodynamic Modeling

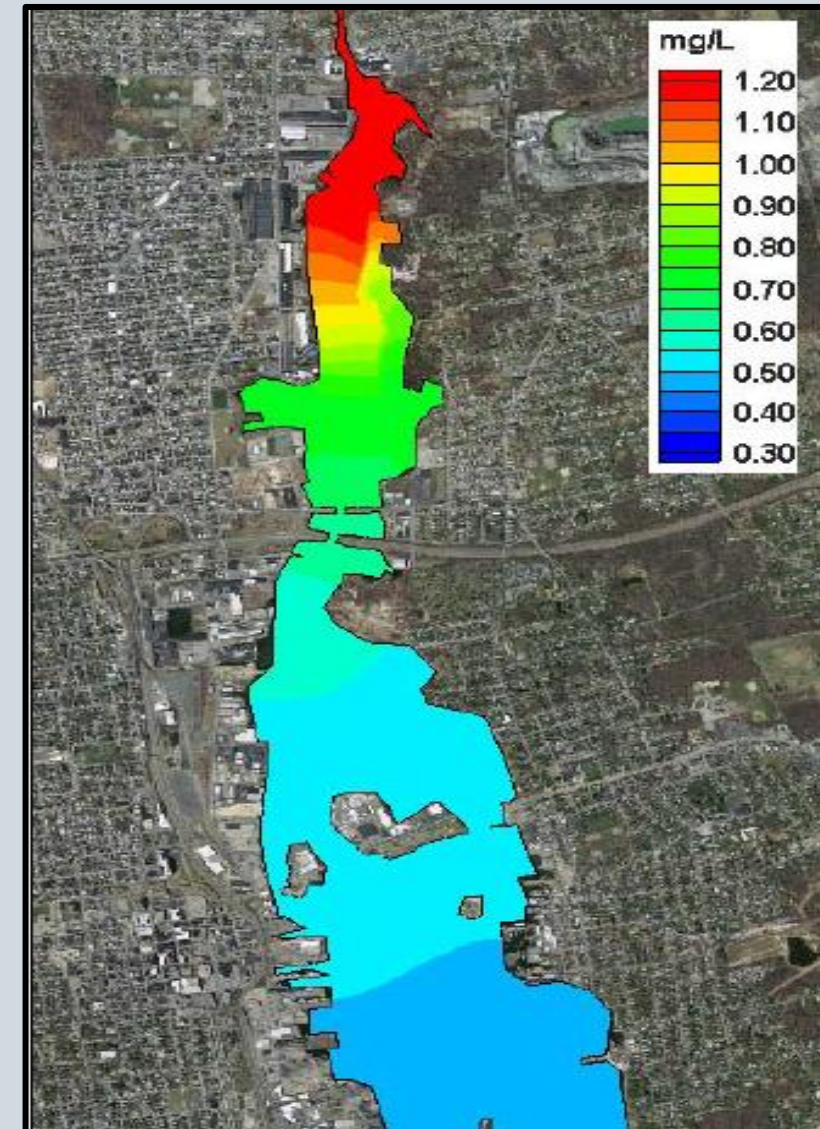
- Bathymetry
- Surface water discharge
- Tidal elevation

Water Quality Modeling

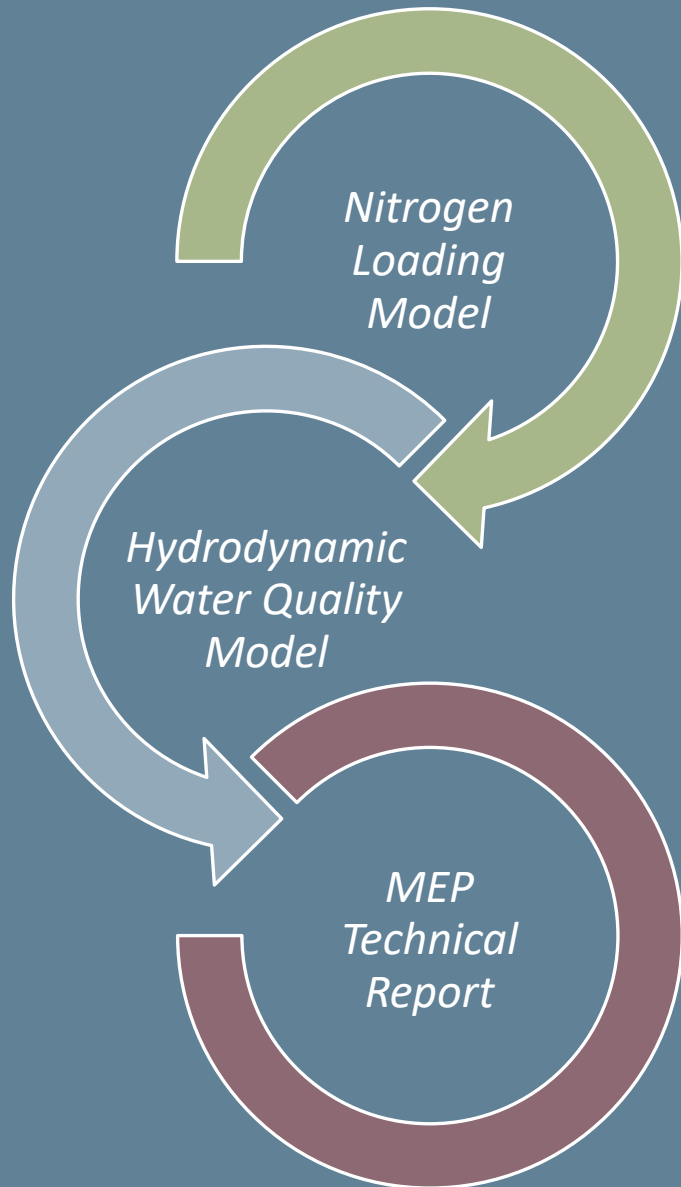
- Simulates nitrogen concentrations within the embayment in response to the existing flushing conditions and nitrogen loadings



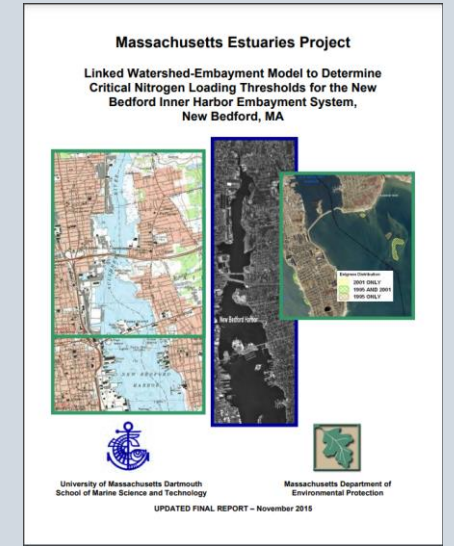
*Hydrodynamic Model Grid Mesh
& Example Model Output*



*Nitrogen Concentration Contour
from Water Quality Model*



MEP Linked Model Target Nitrogen Threshold Analysis



Identify Target Nitrogen Threshold for each Estuary



Determine Location of the Sentinel Station(s)



Determine Watershed Nitrogen Loading Limits

Sentinel Station

THE AVERAGE
NITROGEN
CONCENTRATION IN
THE WATER COLUMN
THAT WILL SUPPORT
THE HABITAT QUALITY
GOAL.



Located at or near a long-term monitoring station



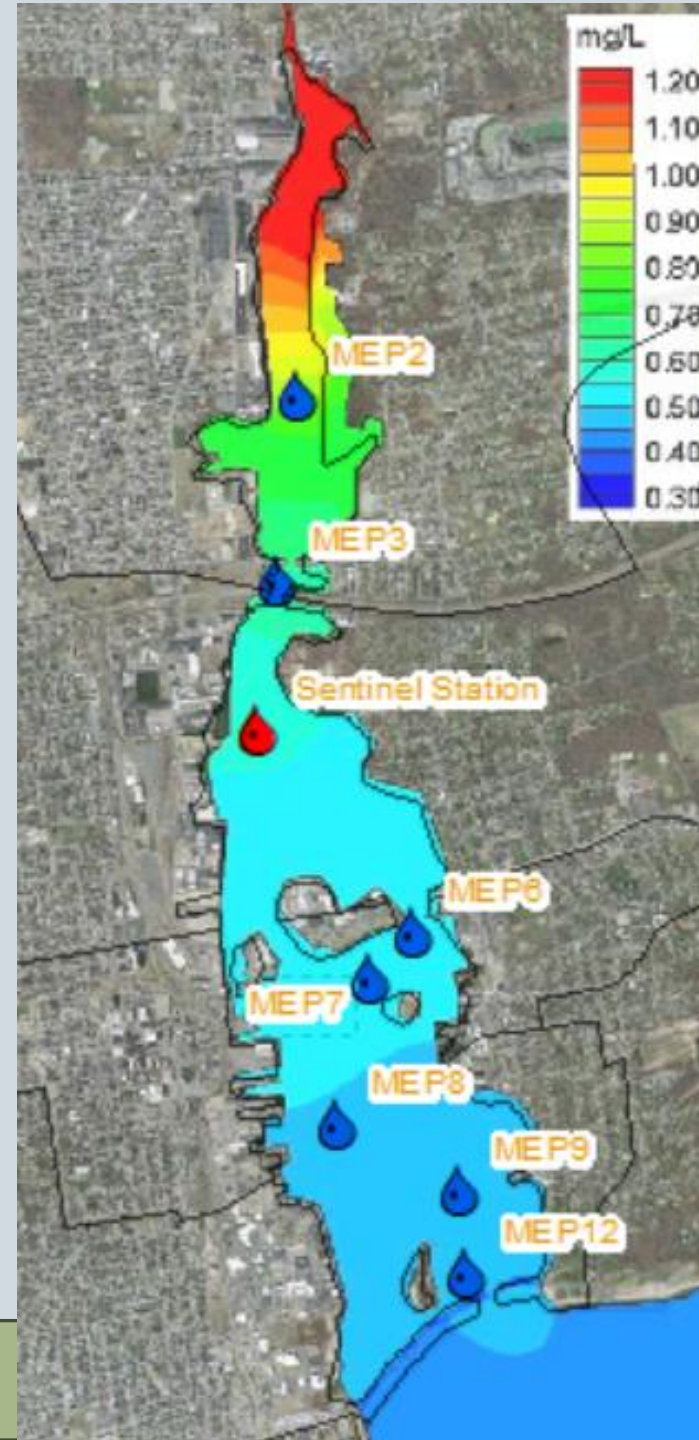
Location based on historic eel grass and macroinvertebrate information



Target threshold nitrogen concentration applied at sentinel station

Target Nitrogen Threshold Concentration

- Target Concentration of 0.50 mg/L
- Threshold set for Benthic Habitat Recovery
- Sentinel Station set in the Middle Basin



Achieving the Target Threshold N Concentration at the Sentinel Station will result in:

Reduced Algal Blooms

Improved Dissolved Oxygen Concentration

Healthy Benthic Animal Assemblages

TMDL Report

Total Maximum Daily Load



Summarizes information from the MEP Technical Report

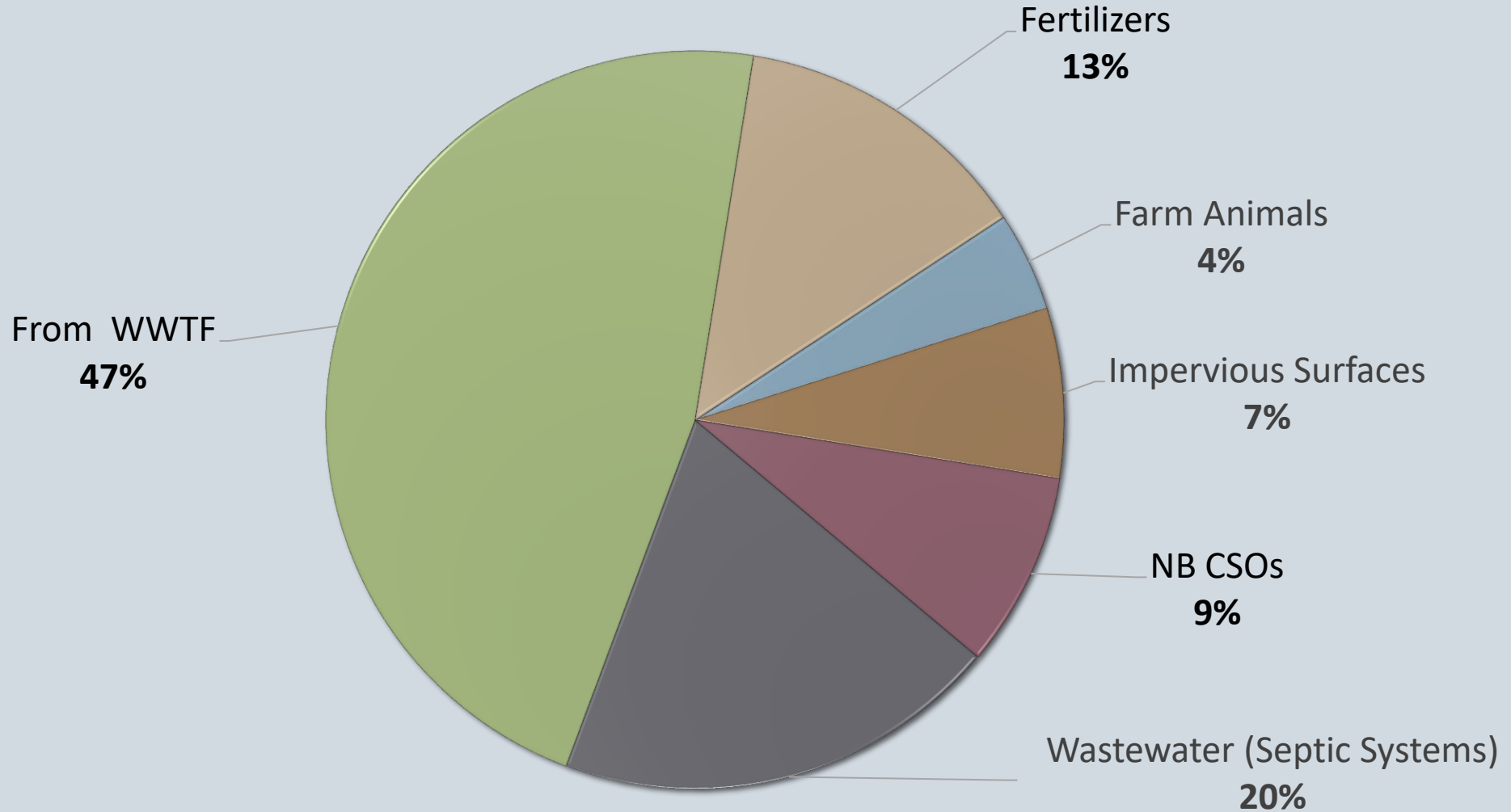


Documents the basis for the TMDL number



Allocates the allowable loadings to point and nonpoint sources of nitrogen.

Percent Contribution of Controllable Watershed Nitrogen Sources



Total Maximum Daily Load (TMDL)

Sub-embayments	Present Watershed Load (kg/day)	Target Threshold Watershed Load (kg/day)	Direct Atmospheric Deposition (kg/day)	Load from Sediments (kg/day)	TMDL (kg/day)
Upper Basin	47.899	22.948	2.668	45.081	70.70
Mid Basin	17.600	12.219	3.403	0	15.62
Lower Basin	165.512	62.668	6.674	52.147	121.49
Acushnet River (fresh water)	99.444	68.820	-	-	68.82
System Total	330.455	166.656	12.745	97.228	276.63

Present Watershed Nitrogen Loading Rates and the Percent Reductions of the Existing Loads Necessary to Achieve the Target Threshold Loadings

Sub-watershed	Present Attenuated Watershed Load (kg/day)	Target Threshold Watershed Load (kg/day)	Percent watershed reductions needed to achieve threshold loads
Upper Basin	47.899	22.948	-52.1%
Mid Basin	17.600	12.219	-30.6%
Lower Basin	165.512	62.668	-62.1%
Acushnet River (fresh water)	99.444	68.820	-30.8%
System Total	330.455	166.656	-49.6%

Summary of the Present Septic System Loads and the Loading Reductions that Would be Necessary to Achieve the TMDL by Reducing Septic System Loads

Sub-embayment	Present Septic Load (kg/day)	Threshold Septic Load (kg/day)	Threshold Septic Load % Change
Upper Basin	7.562	2.268	-70.0%
Mid Basin	2.137	0.641	-70.0%
Lower Basin	5.973	1.792	-70.0%
Acushnet River – fresh water	38.279	7.656	-80.0%
System Total	53.951	12.357	-77.1%

TMDL Implementation

RESTORING IMPAIRED WATERS

Modeling the Options for Achieving the Target Threshold Nitrogen Concentration

Conventional Approaches

- Sewering
- Package treatment plant
- General use approved I/A systems
- Nonpoint source controls

Non-traditional Approaches

- Constriction/dike removal
- Enhanced natural attenuation
- Aquaculture

Implementation

Watershed-Wide Focus

Prioritize Efforts

Technical Approaches

Planning Approaches



Technical Approaches

Sewering

Enhanced Wastewater Treatment

Stormwater Runoff Control and Treatment

Inlet Widening/Culvert Opening

Enhanced Nitrogen Attenuation

Planning Approaches

Local Zoning (guided development)

- Bylaws

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Planning Approaches

Financing Opportunities

- State Revolving Fund (SRF) can cover planning & construction
- USDA Rural Development Grants
- SRF Points for a Wastewater Management District
- 604(b) Water Quality Management Planning Grants
- 319 Nonpoint Source Pollution Grants
- Buzzards Bay National Estuary Program Grants
- CZM Coastal Pollution Remediation Grants
- SNEP Watershed Grants

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Comprehensive Wastewater Management Plan (CWMP)

Based on acceptable nitrogen loading

Identifies wastewater management options

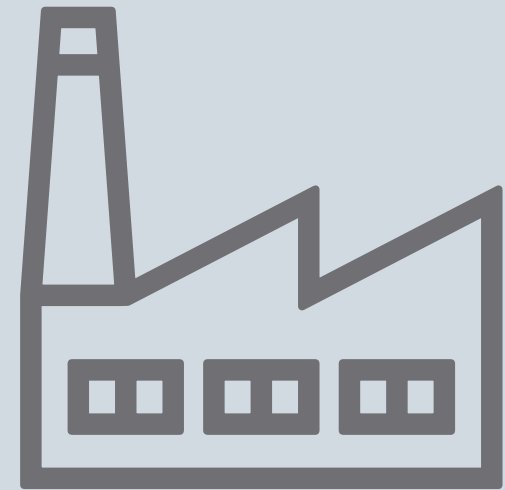
Schedules implementation

Watershed-wide approach



Fairhaven Water Pollution Control Facility

- 47% of N load from Fairhaven WPCF
- NPDES permit renewal in 2017
- Permit implements MEP technical report
- TN permit limit aligns with MEP
- 57 kg/day = 3 mg/L TN at design capacity



New Bedford 'Integrated Plan' Goals

- Address management goals in the pathogen TMDL
- Reduce nitrogen and phosphorus to increase dissolved oxygen concentrations
- Control/reduce discharges of oil, grease, and trash
- Ensure the wastewater treatment facility is operated to reduce nitrogen discharges
- Prioritize control of CSOs in sensitive areas; and
- Meet the requirements of the city's stormwater permit.



Next Steps

PUBLIC COMMENT PROCESS

Where Do We Go From Here?

Public/Municipalities:

Submit comments to MassDEP on draft TMDL by **December 8, 2023**

MassDEP:

Submit final TMDL to EPA

Municipalities:

Continue Comprehensive Wastewater Management Planning

MassDEP:

Revise TMDL document (based on public input)

EPA

reviews and approves final TMDL within 30 days of receiving

Questions/Comments on TMDL

Written comments due by
Friday, December 8, 2023, at 5:00 pm

Email	Regular Mail
dep.wpp@mass.gov Subject: NBIH TMDL (CN 544.0) Comments	MassDEP – Watershed Planning Program Attention: Holly Brown 8 New Bond Street Worcester, MA 01606