

**Cape Cod 208 Area Water Quality Planning
Upper Cape West and South Working Group**

Meeting One

Tuesday, September 24, 2013

Falmouth Town Hall - 59 Town Hall Square, Falmouth, MA 02540

Meeting Agenda

- 8:30 am Welcome – *Cape Cod Commission*
- 8:35 Introductions, confirm working group membership and participation – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*
- 9:00 Review 208 goals and process and the goals of today’s meeting – *Cape Cod Commission*
- 9:15 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Patty Daley (Area Manager, Cape Cod Commission)*
- 9:30 Review and add to chronology of work to date – *Working Group*
- 9:45 Discussion: drawing on past work to move forward – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*
- 10:00 Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Patty Daley (Area Manager, Cape Cod Commission)*
- 10:45 Break
- 11:00 Discussion of Baseline Conditions – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*
- 11:30 Framework for Moving Forward: Preview Meetings 2 and 3 – *Patty Daley (Area Manager, Cape Cod Commission)*
- 11:45 Review/Discuss Process Protocols - *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*
- 12:10 pm Public Comments
- 12:30 Adjourn

Upper Cape West & South Group



Baseline Conditions & Needs Assessment

What is the 208 Plan?

Clean Water Act Section 208



The Commission was directed to update the 1978 Plan

The Commonwealth provided \$3 million to fund the project

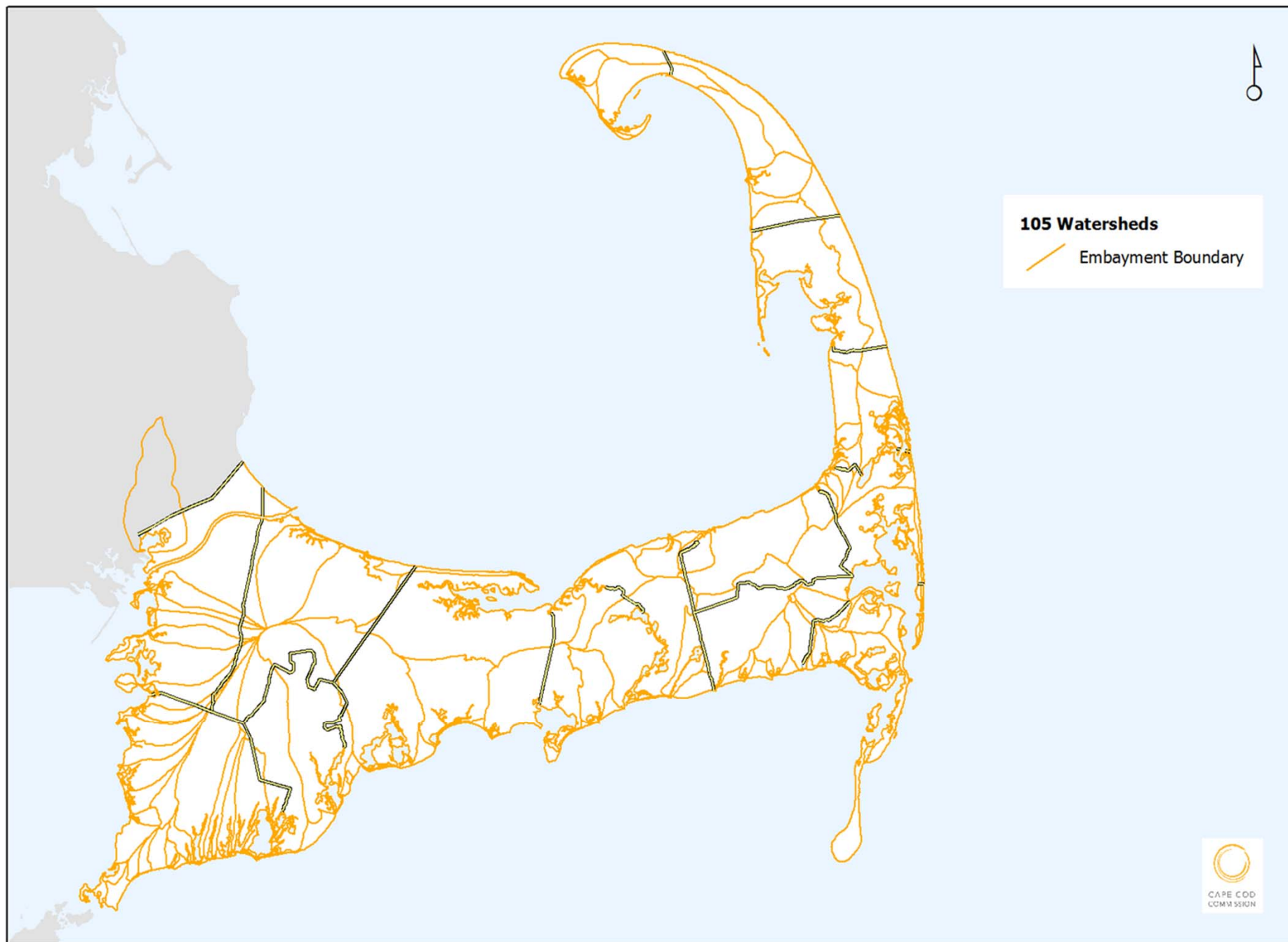
Focus on 21st Century Problems

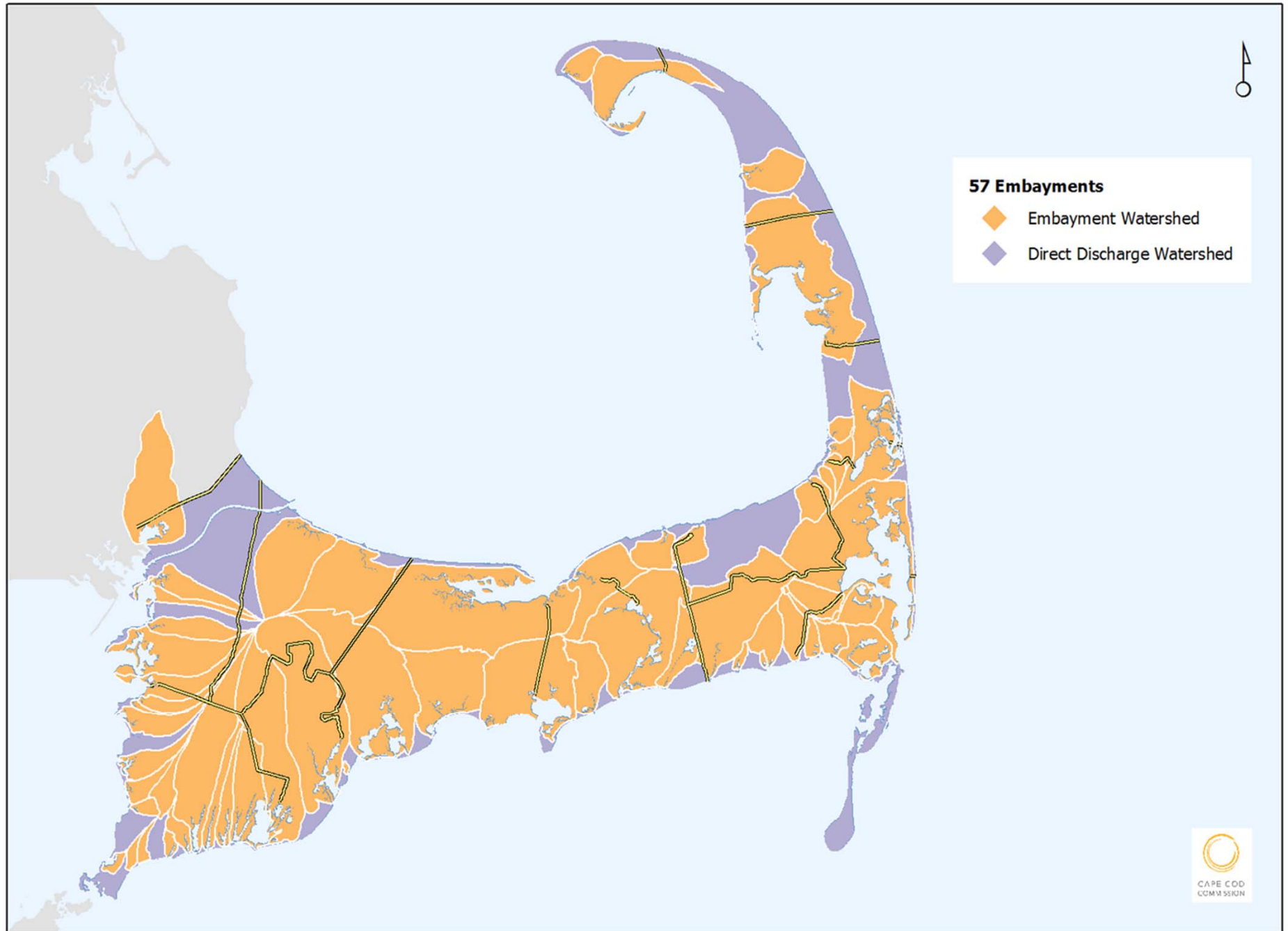


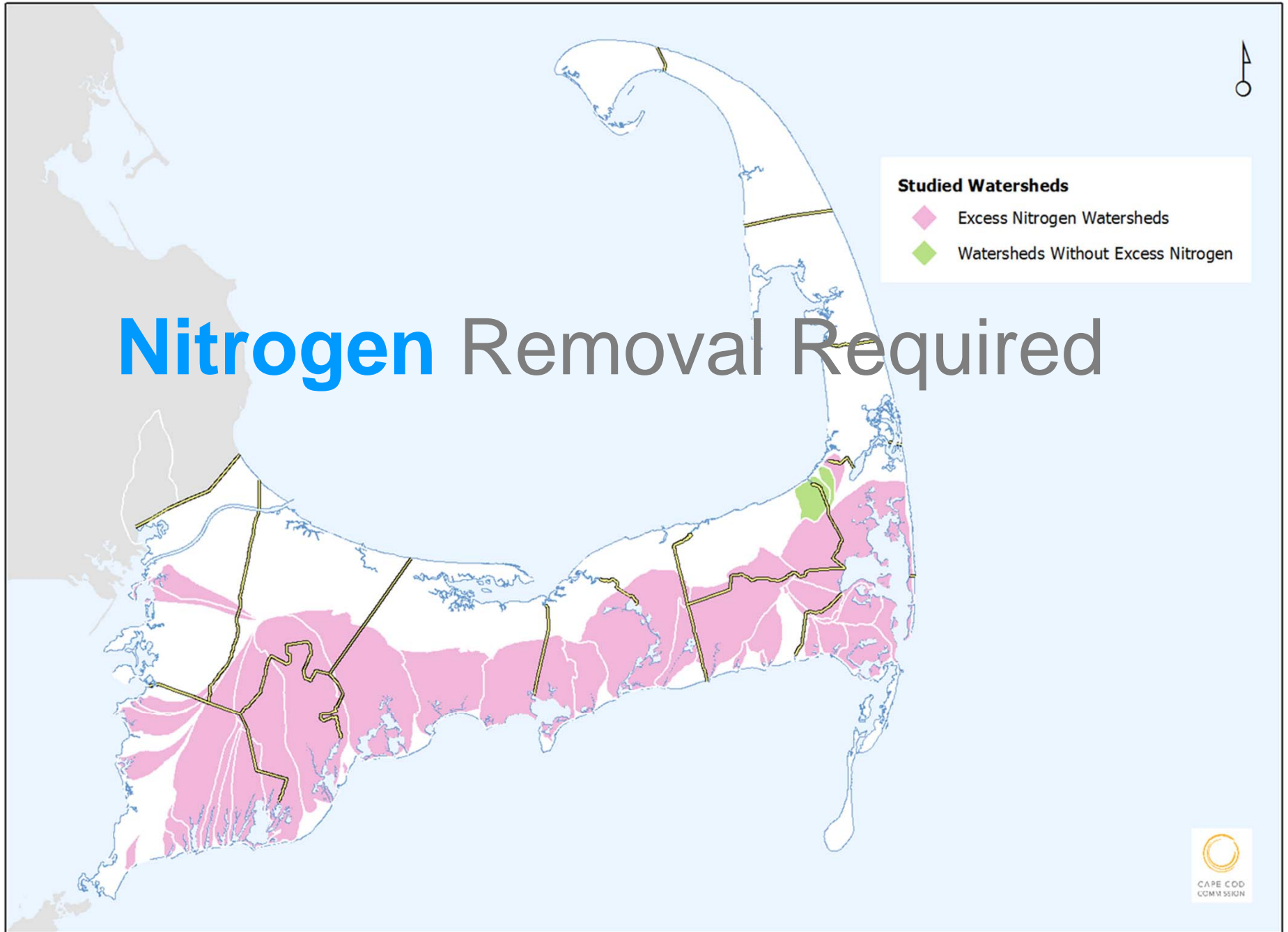
**Nitrogen:
Saline Waters**

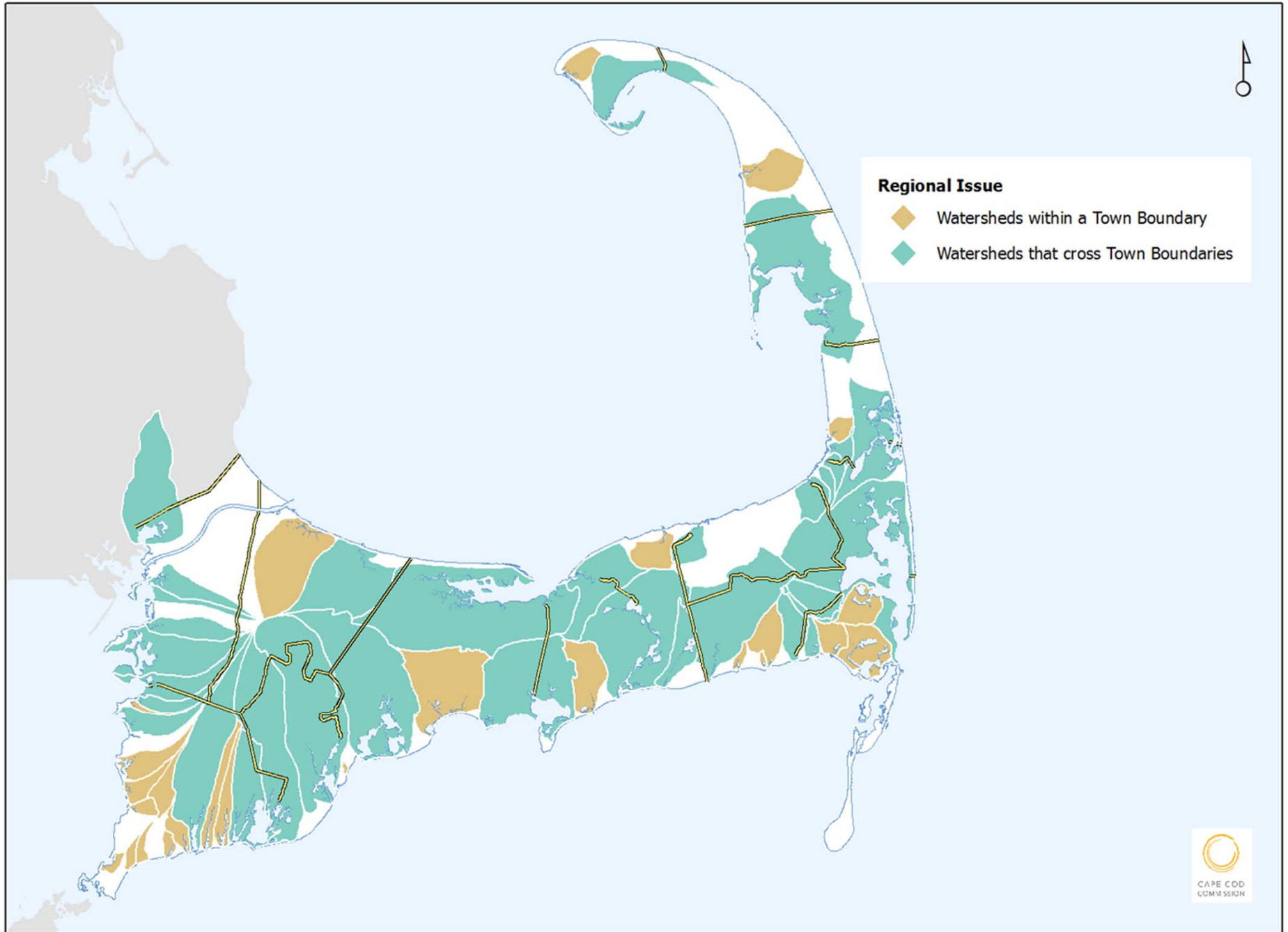
**Phosphorus:
Fresh Waters**

**Growth &
Title 5
Limitations**

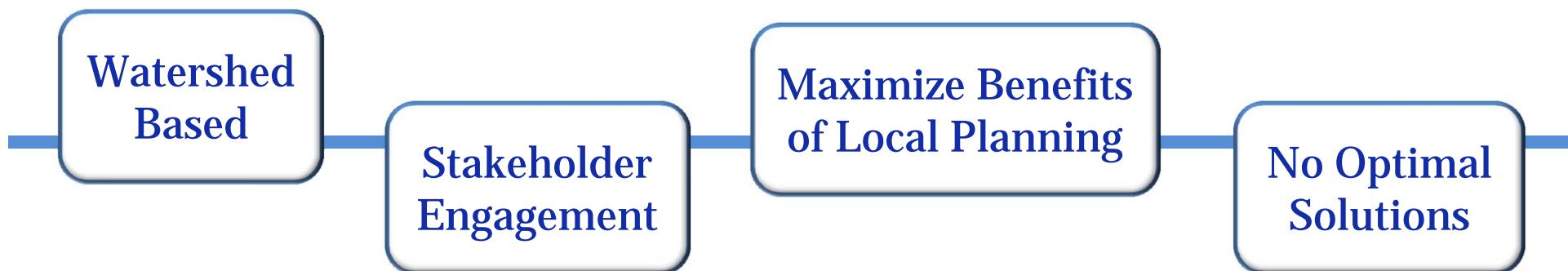






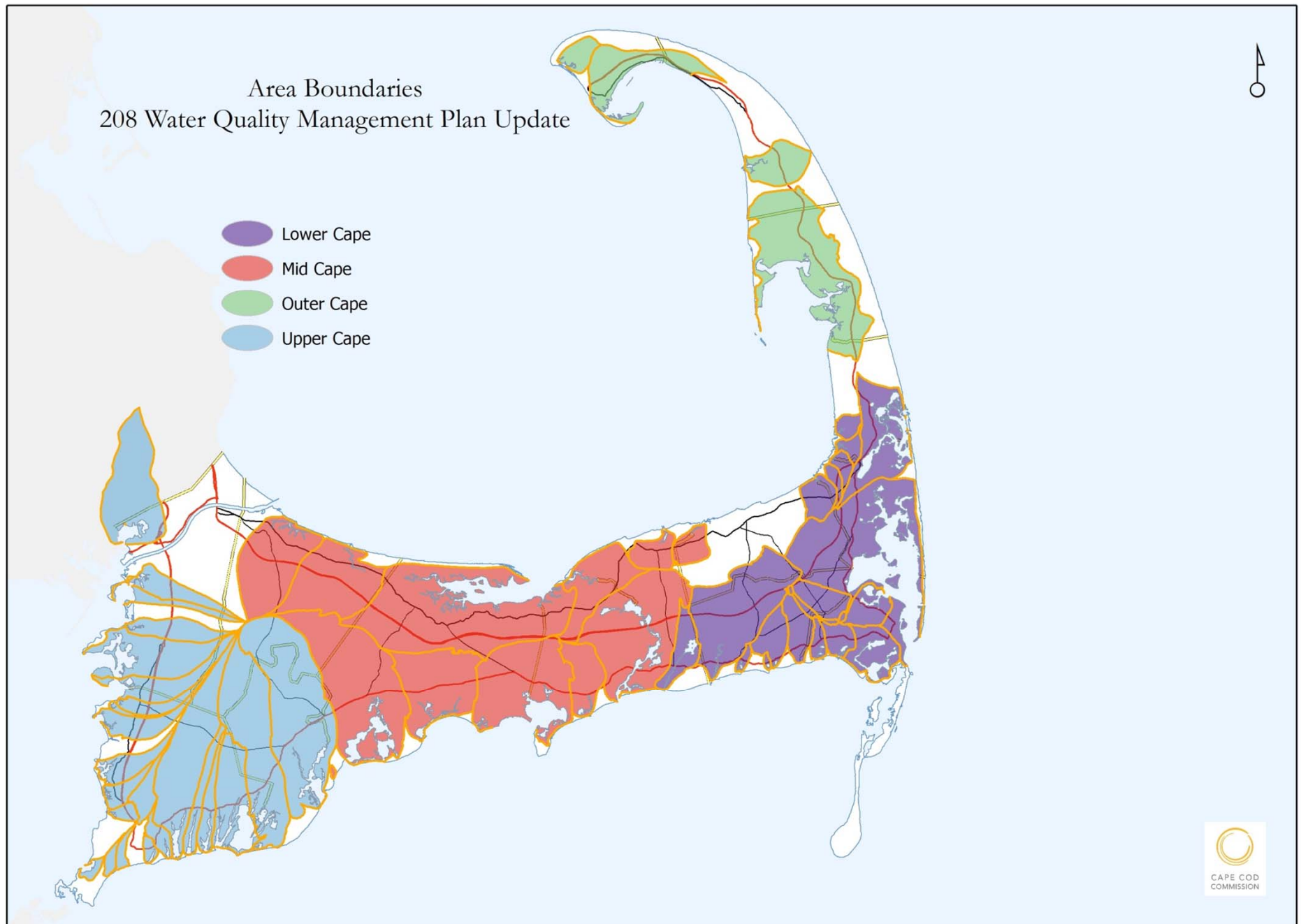


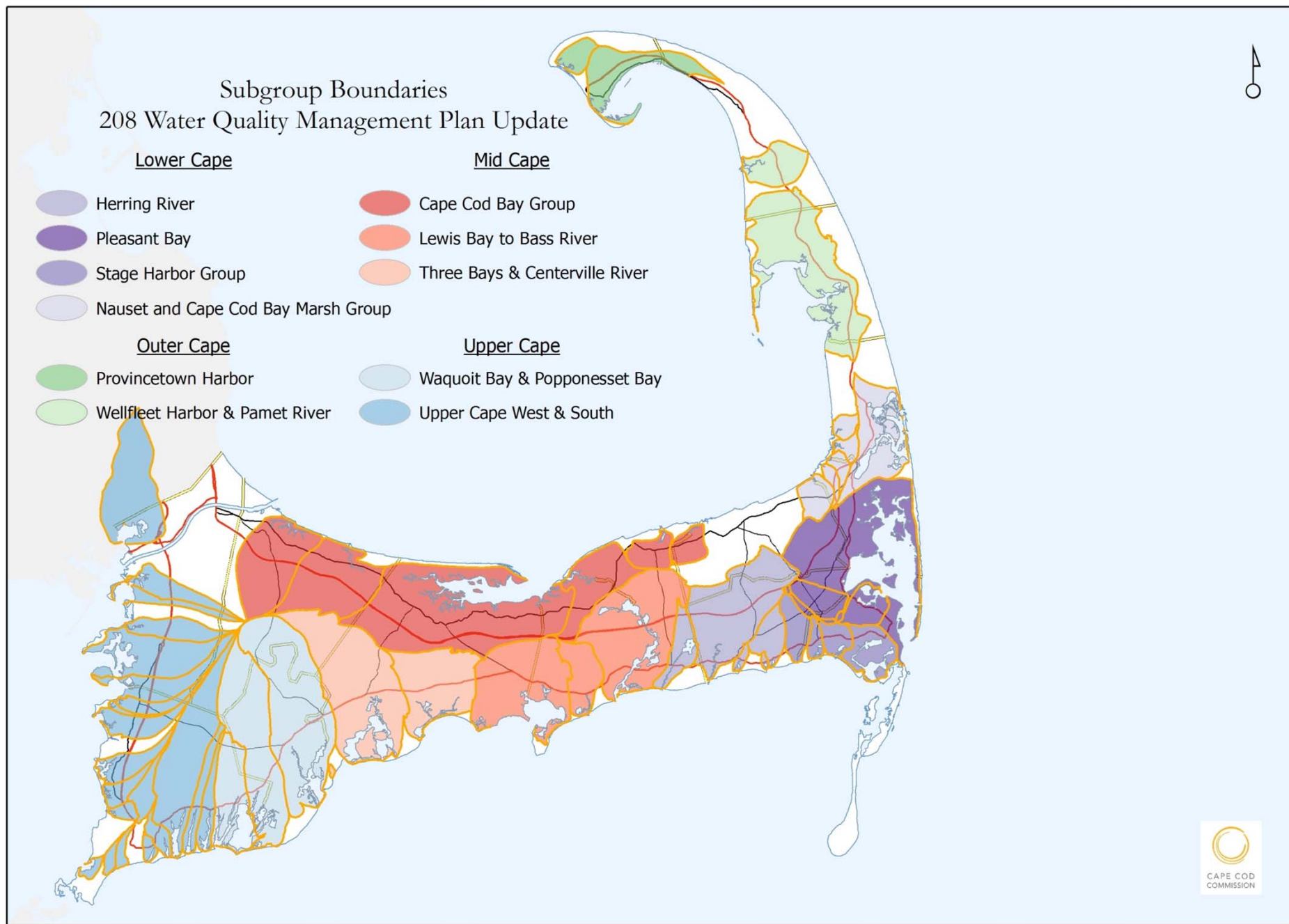
Approach to the 208 Plan Update



Goal:

To generate a series of approaches in each watershed that will meet water quality standards





What is the stakeholder process?

Public Meetings

Watershed Working Groups



July

August

September

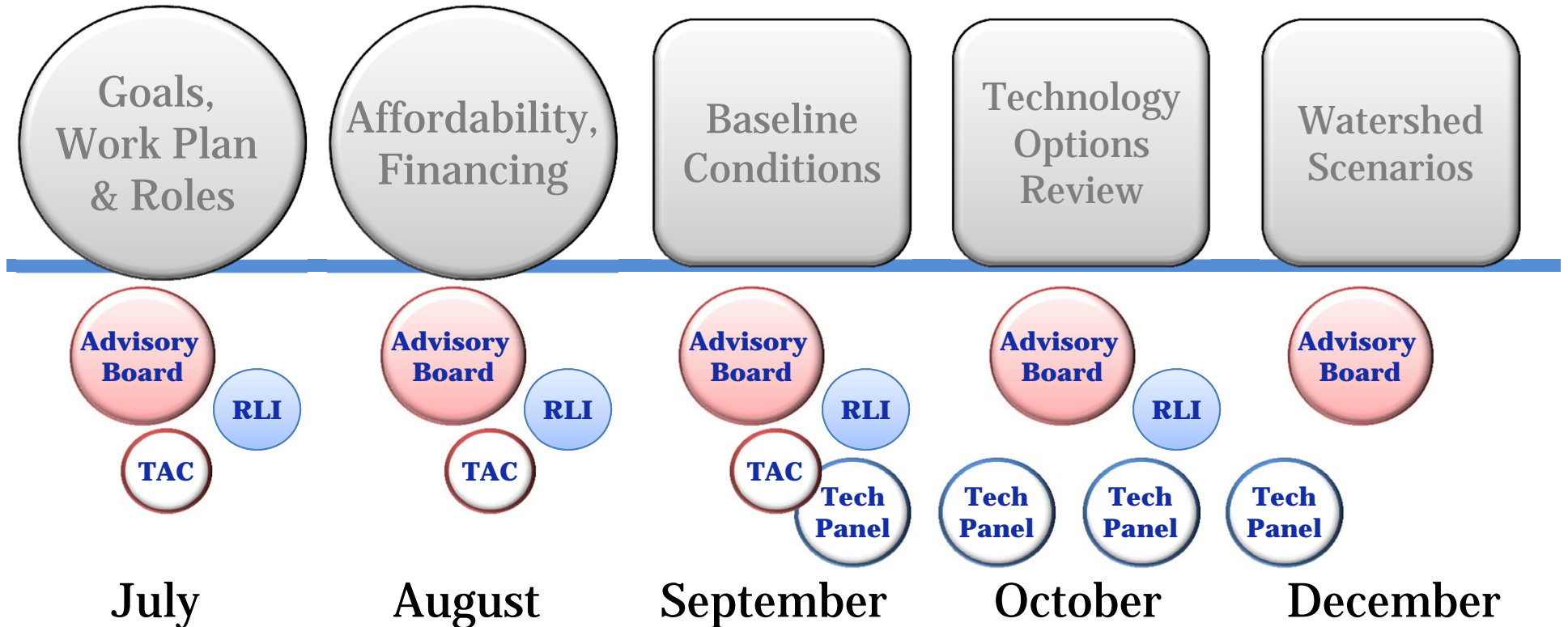
October

December

208 Planning Process

Public Meetings

Watershed Working Groups



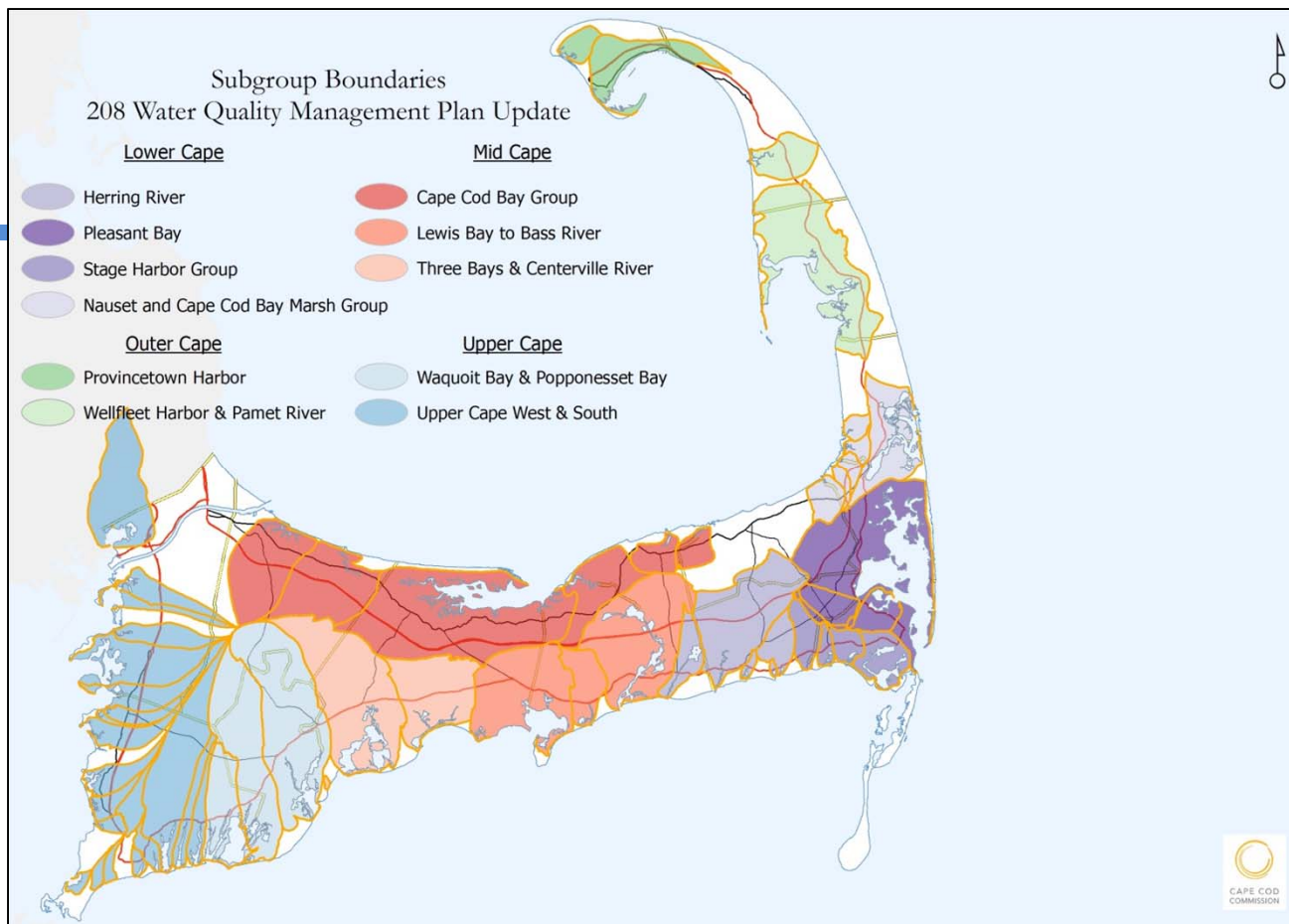
RLI Regulatory, Legal & Institutional Work Group

TAC Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings:
Sept 18-27



208 Planning Process

Baseline Conditions
 11 Working Group Meetings:
 Sept 18-27

Technology Options Review
 11 Working Group Meetings:
 Oct 21-Nov 5



208 Planning Process

Baseline
Conditions

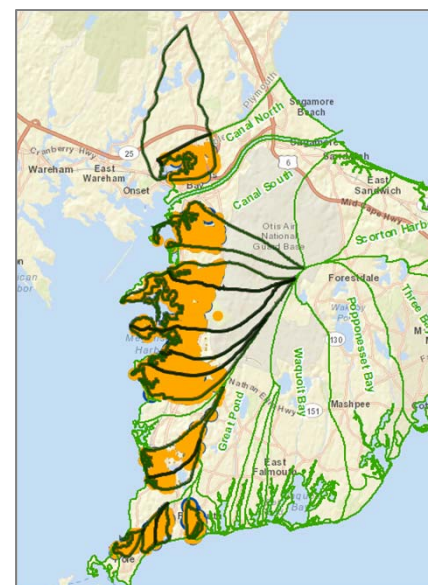
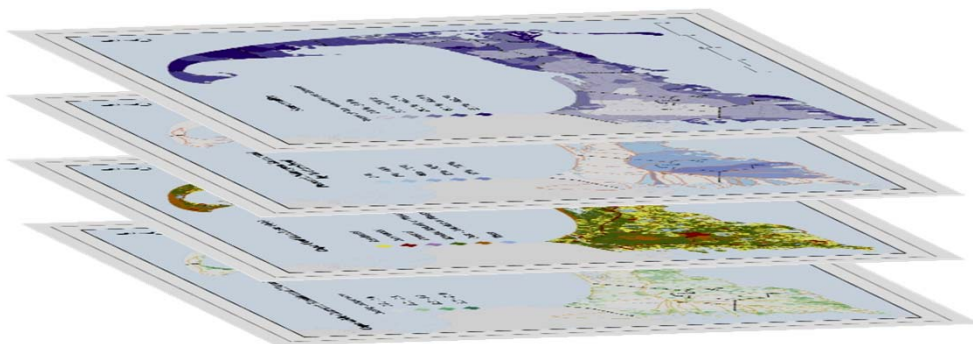
11 Working
Group Meetings:
Sept 18-27

Technology
Options
Review

11 Working
Group Meetings:
Oct 21-Nov 5

Watershed
Scenarios

11 Working
Group Meetings:
Dec 2-11



208 Planning Process

**Baseline
Conditions**

**11 Working
Group Meetings:
Sept 18-27**

Goal of Today's Meeting:

To review and develop shared understanding of the characteristics of these watersheds, the work done to date, existing data and information available, and how to apply all of this to planning for water quality improvements for these watersheds moving forward.

208 Planning Process

Local Progress to Date



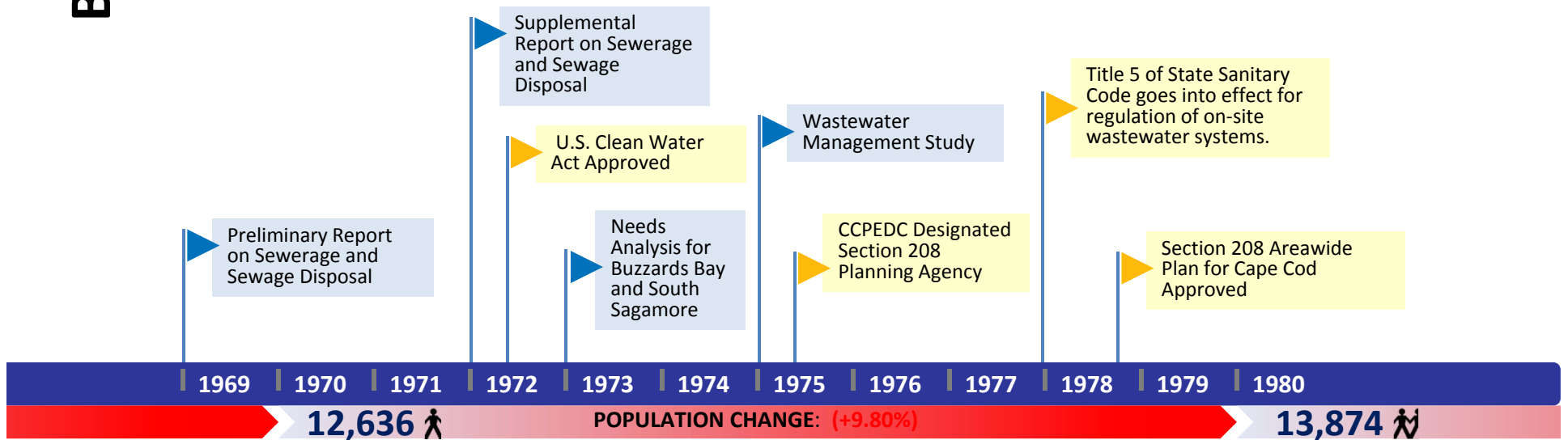
Buttermilk Bay
Phinney's Harbor
Back River/Eel Pond
Pocasset River
Pocasset Harbor
Megansett Harbor
Fiddler Cove
Rands Canal

Wild Harbor
Great Sippewisset Creek
Little Sippewisset Marsh
Falmouth Inner Harbor
Quissett Harbor
Oyster Pond
Salt Pond

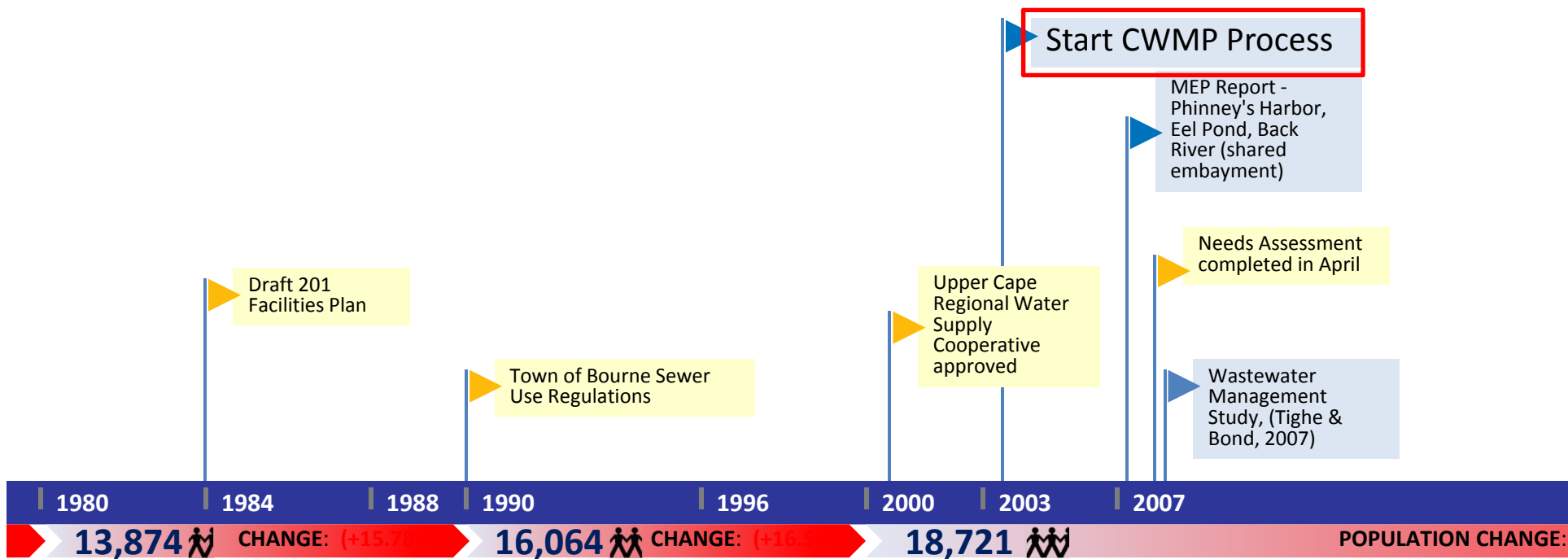
Bourne: 1969-2013

From 1978 Section 208 Plan

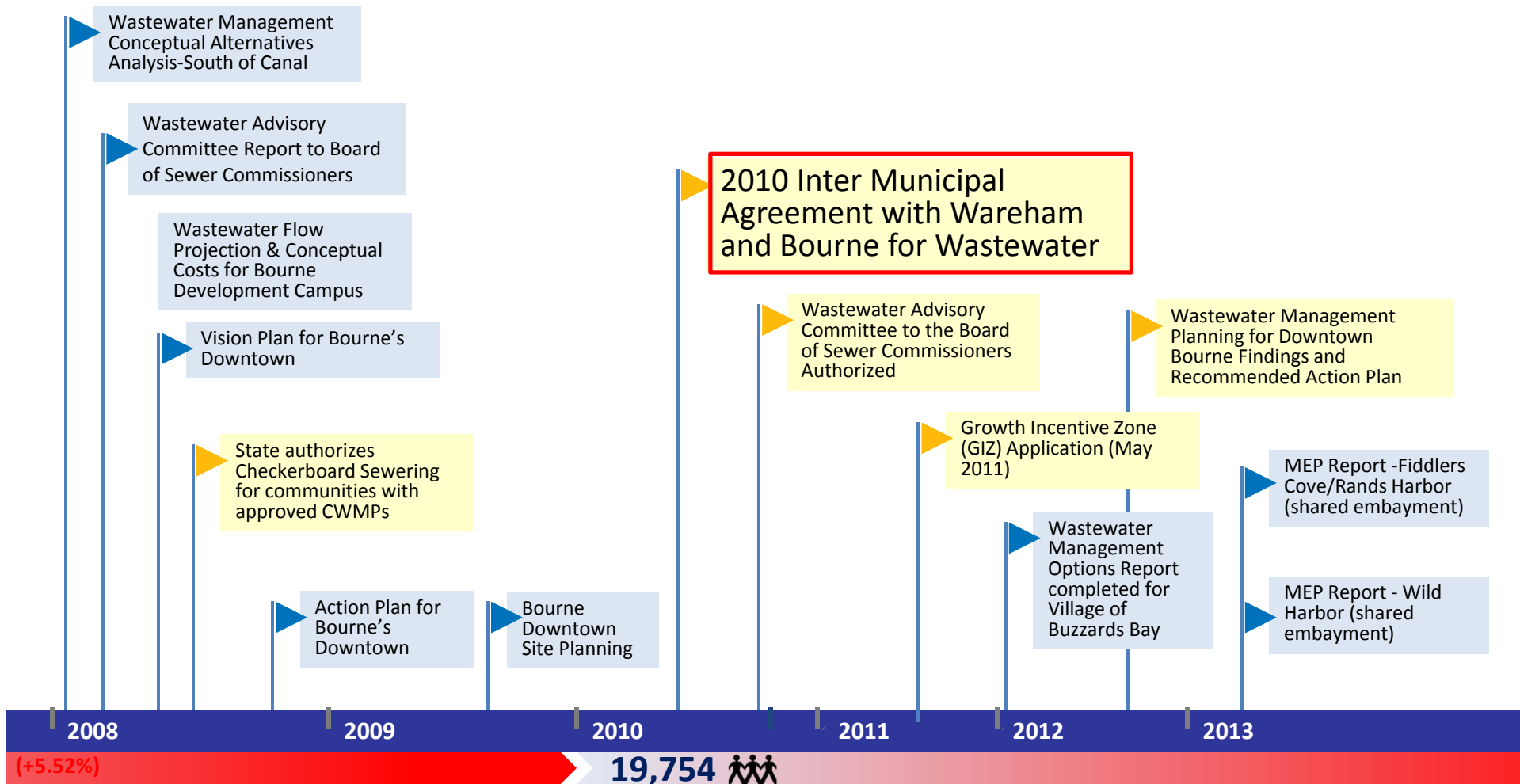
- ▶ The Town of Bourne presents unique geographic difficulties to be overcome in water quality management due to its physical division by the Cape Cod Canal.
- ▶ The Town of Bourne has a major Category 1 problem area in Buzzards Bay, a densely developed commercial area. On-site system failures in this area have been tied to documented groundwater degradation.
- ▶ The Wareham treatment plant is planned to serve the area adjacent to Buzzards Bay and has the capacity to accept sewage from Buzzards Bay.
- ▶ It is likely that watershed protection measures are as important in this area as wastewater management facilities.
- ▶ It is the general recommendation of this plan that the town should apply for 201 facility planning funds to abate existing problems and construct a septage facility.
- ▶ The town prefers the district approach and itself must then assume full responsibility for investigating and correcting problems in remaining problem areas.
- ▶ Should the town be unsuccessful in implementing this approach it should reconsider the possibility of conducting a 201 study.
- ▶ On-site system management should be implemented throughout the unsewered sections of Bourne, including a maintenance pumping program when adequate septage facilities are available.



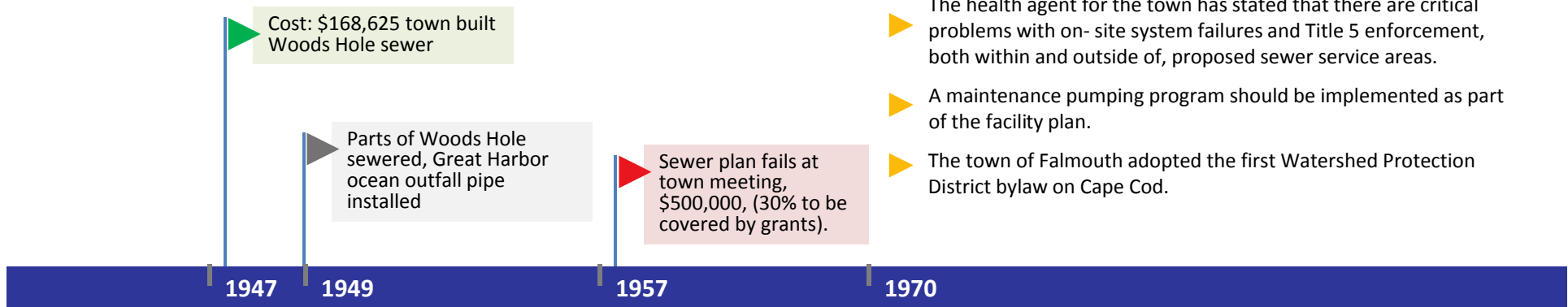
Bourne: 1969-2013



Bourne: 1969-2013



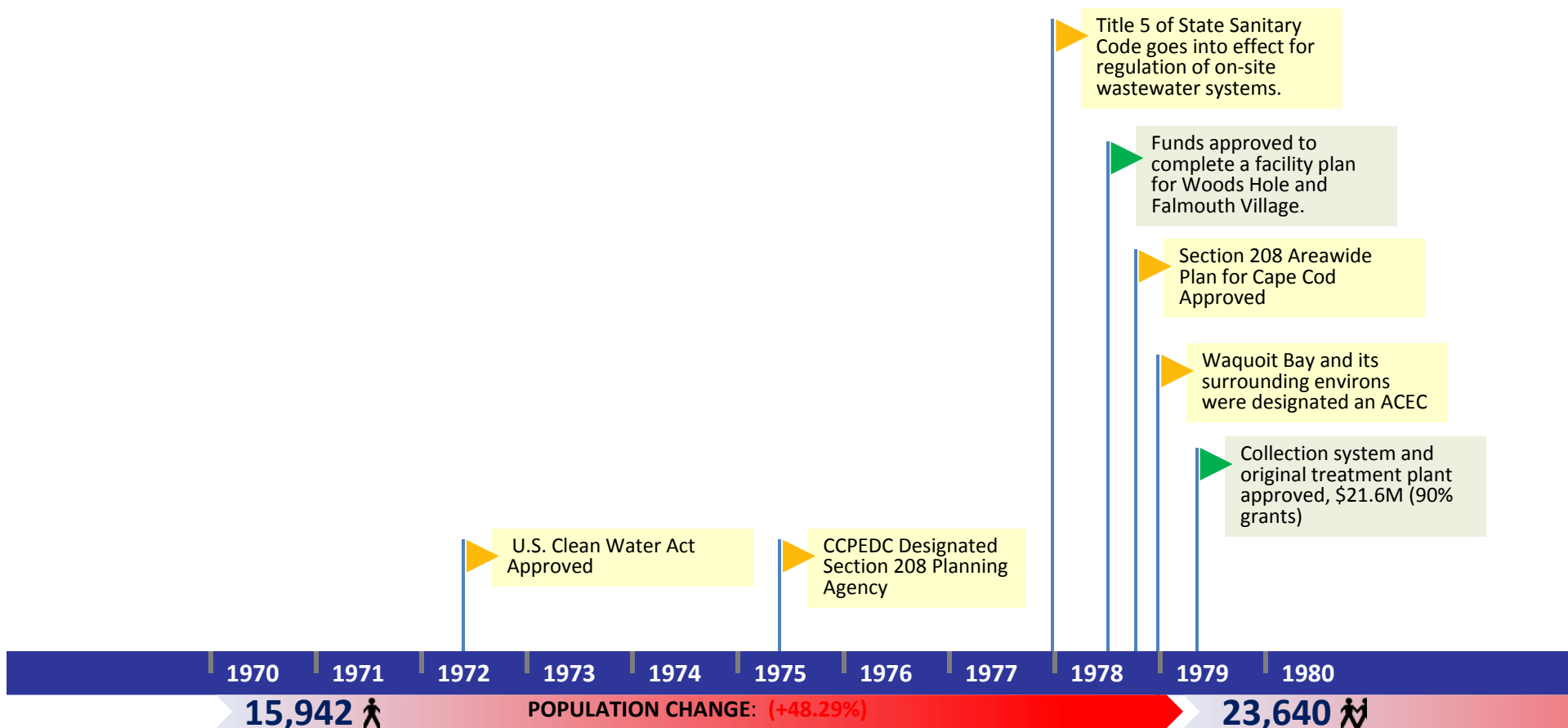
Falmouth: 1947-2013



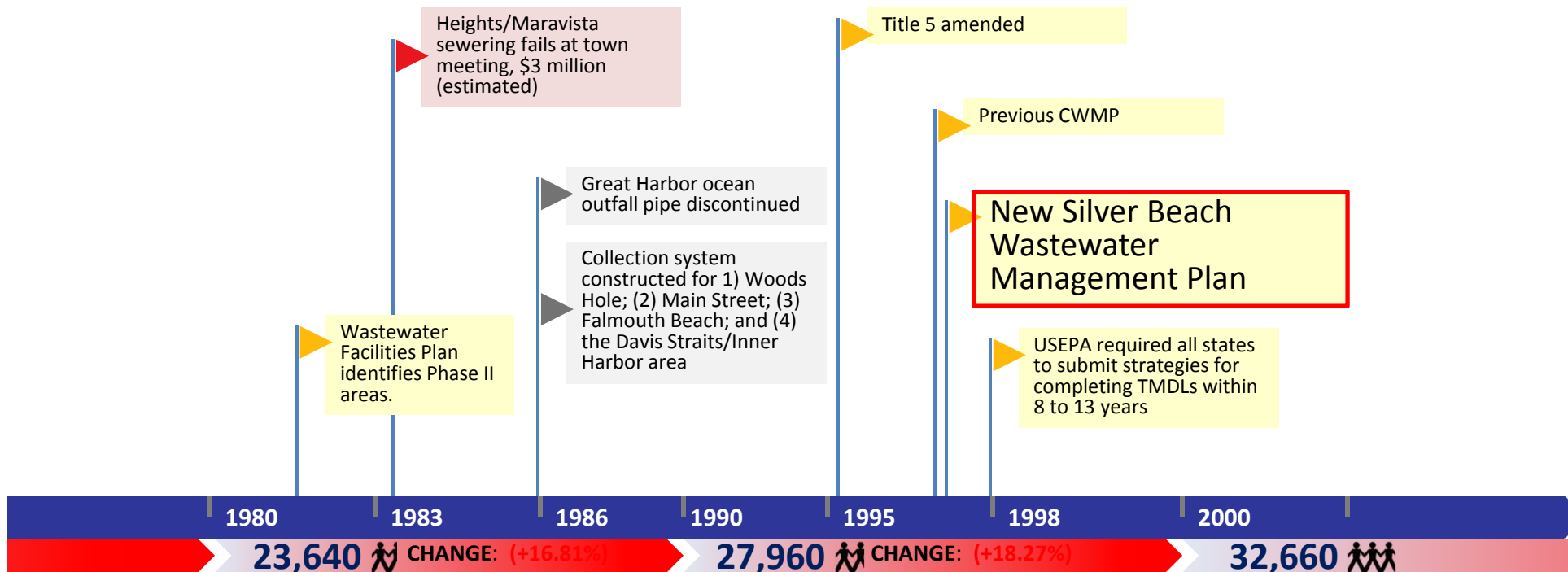
From 1978 Section 208 Plan

- Falmouth's difficulties with sewer system planning and construction have a 30 year history. It is strongly recommended that the town appoint a water quality advisory committee.
- ▶ A survey of residents and potential sewer users was conducted in the summer of 1978 to determine whether they would be willing to pay for sewers.
 - ▶ The DWPC ordered the town to take immediate action to complete a facility plan for Woods Hole or to begin construction of sewers in downtown Falmouth.
 - ▶ Falmouth. Town meeting voted on September 27, 1978 to appropriate additional funds to complete a facility plan for both Woods Hole and Falmouth Village. The plan recommended that DWPC not prosecute the town as long as it is moving in a positive direction towards completion of a comprehensive plan.
 - ▶ The plan also recommended that if town meeting action is not taken expeditiously on the final plan recommendations, the DWPC and DEQE should pursue regulatory actions.
 - ▶ The health agent for the town has stated that there are critical problems with on- site system failures and Title 5 enforcement, both within and outside of, proposed sewer service areas.
 - ▶ A maintenance pumping program should be implemented as part of the facility plan.
 - ▶ The town of Falmouth adopted the first Watershed Protection District bylaw on Cape Cod.

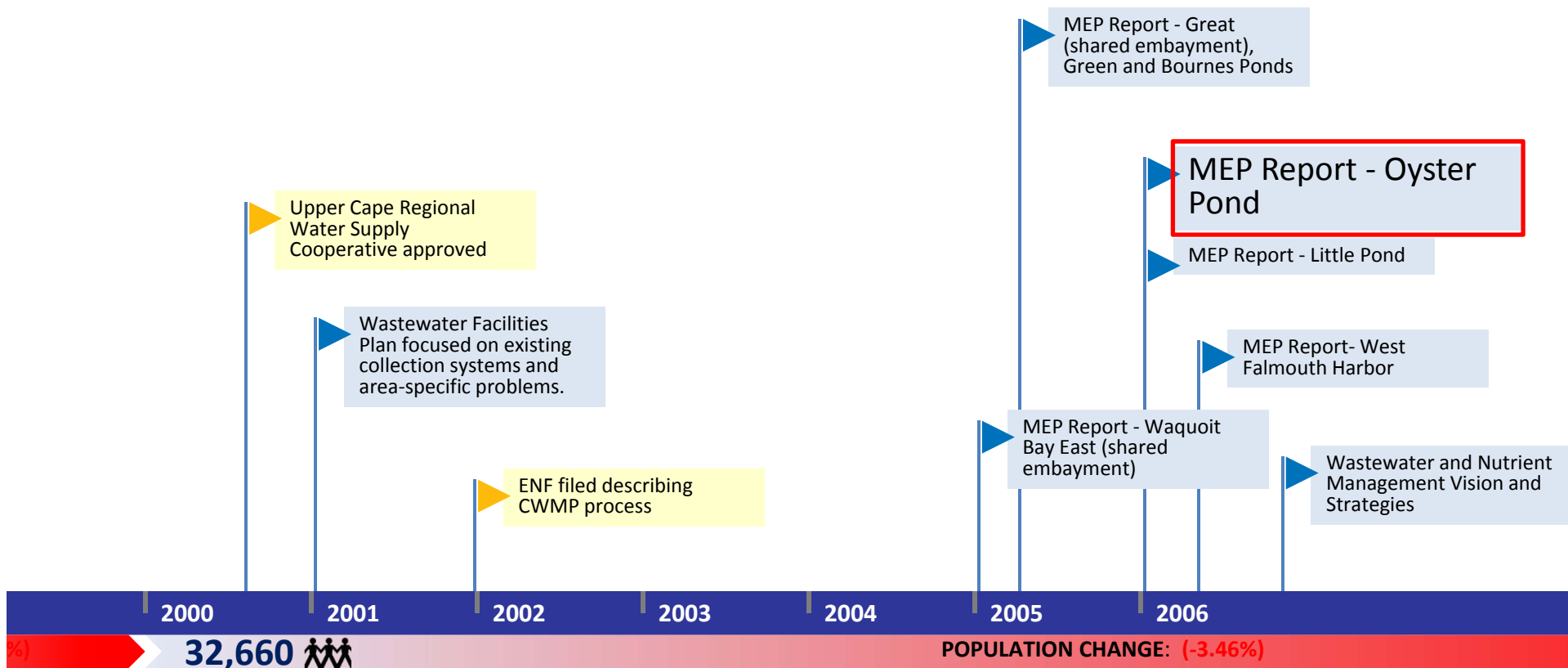
Falmouth: 1947-2013



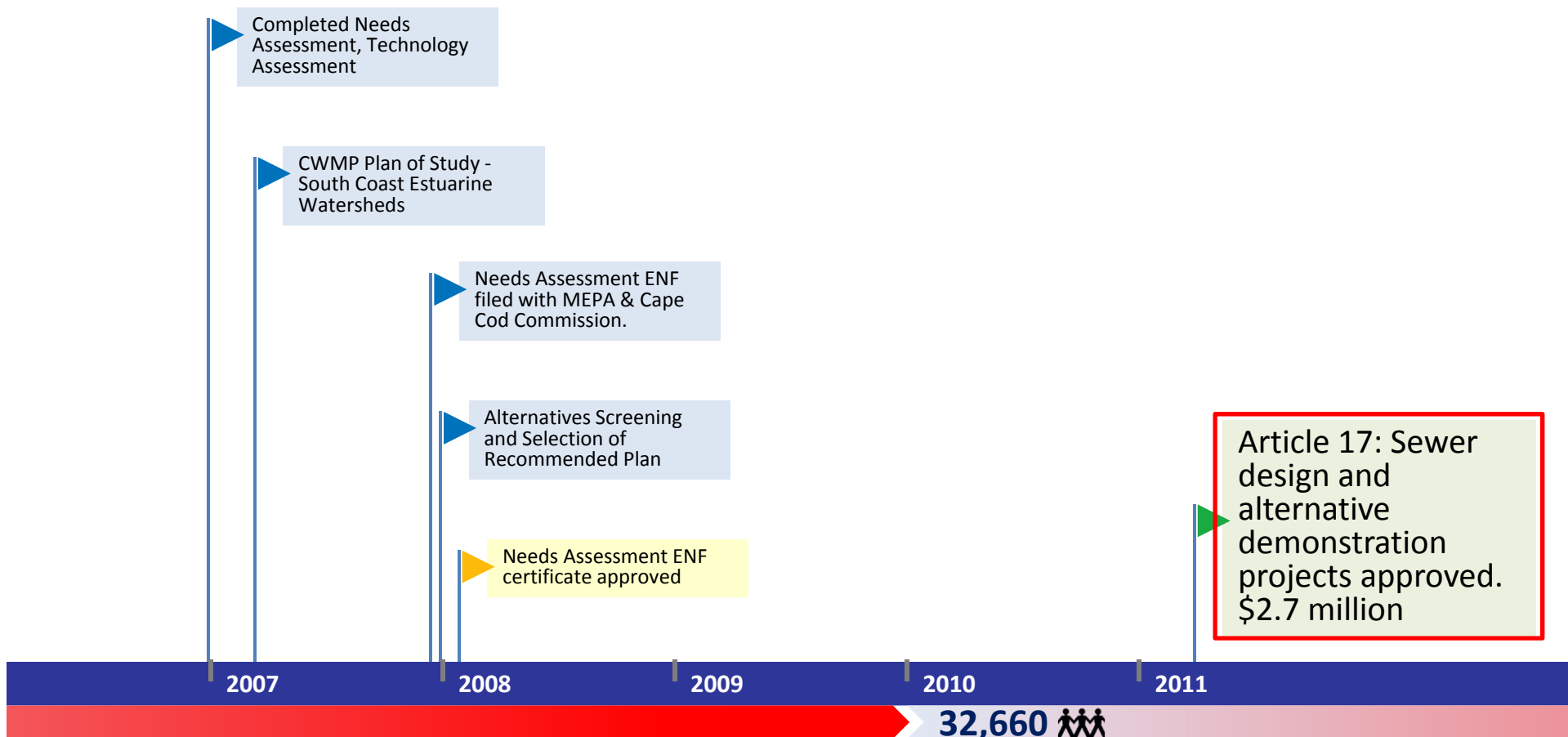
Falmouth: 1947-2013



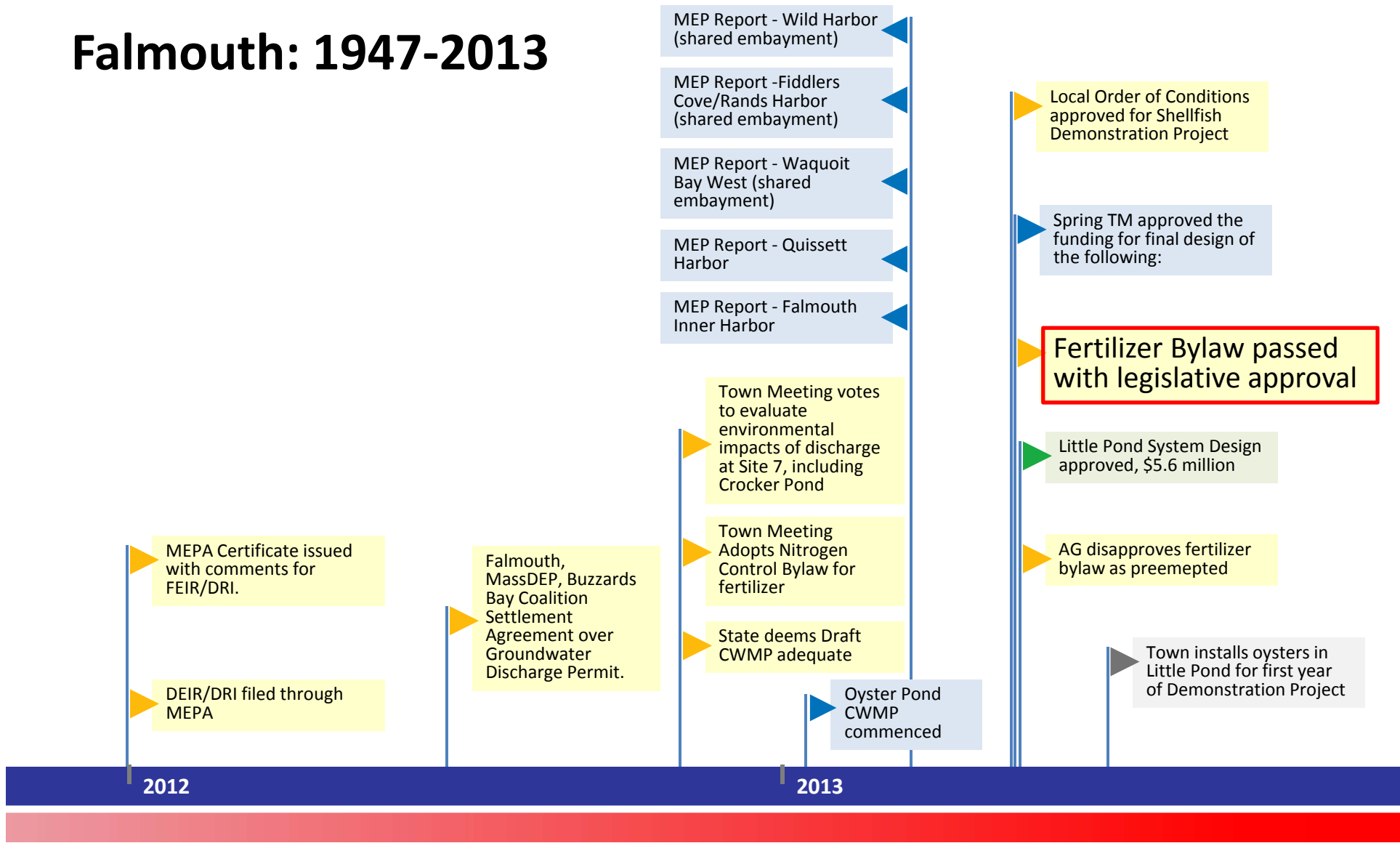
Falmouth: 1947-2013



Falmouth: 1947-2013



Falmouth: 1947-2013



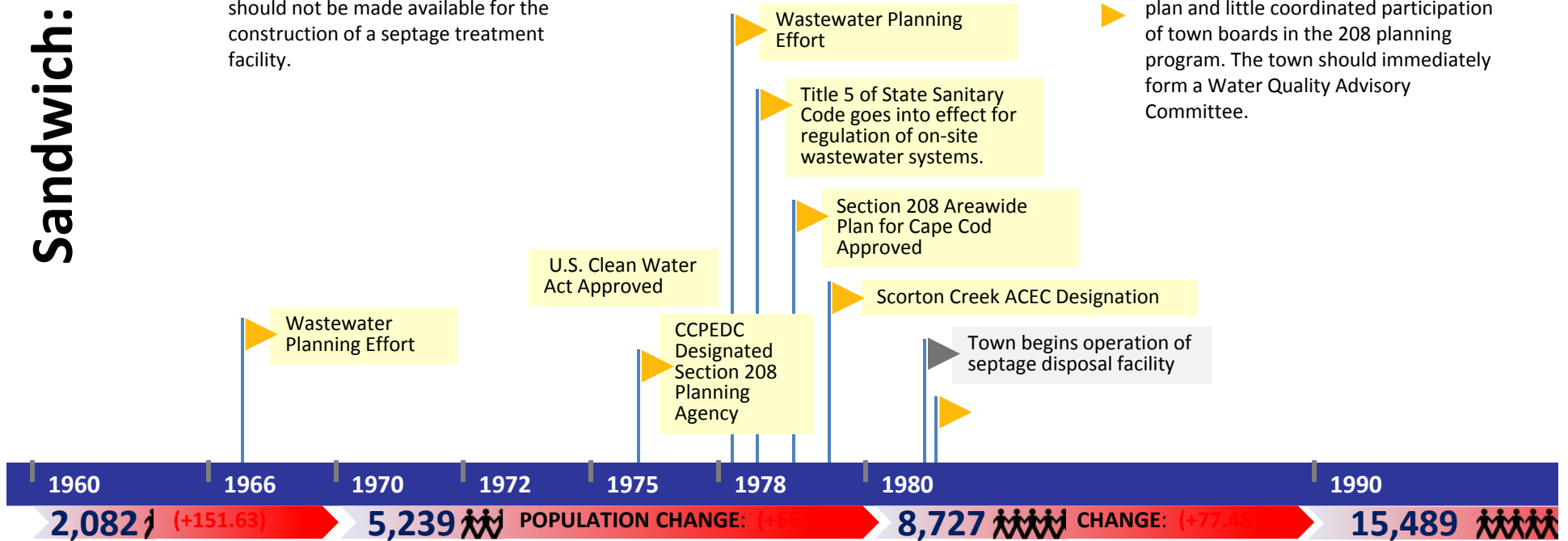
Sandwich: 1960-2013

From 1978 Section 208 Plan

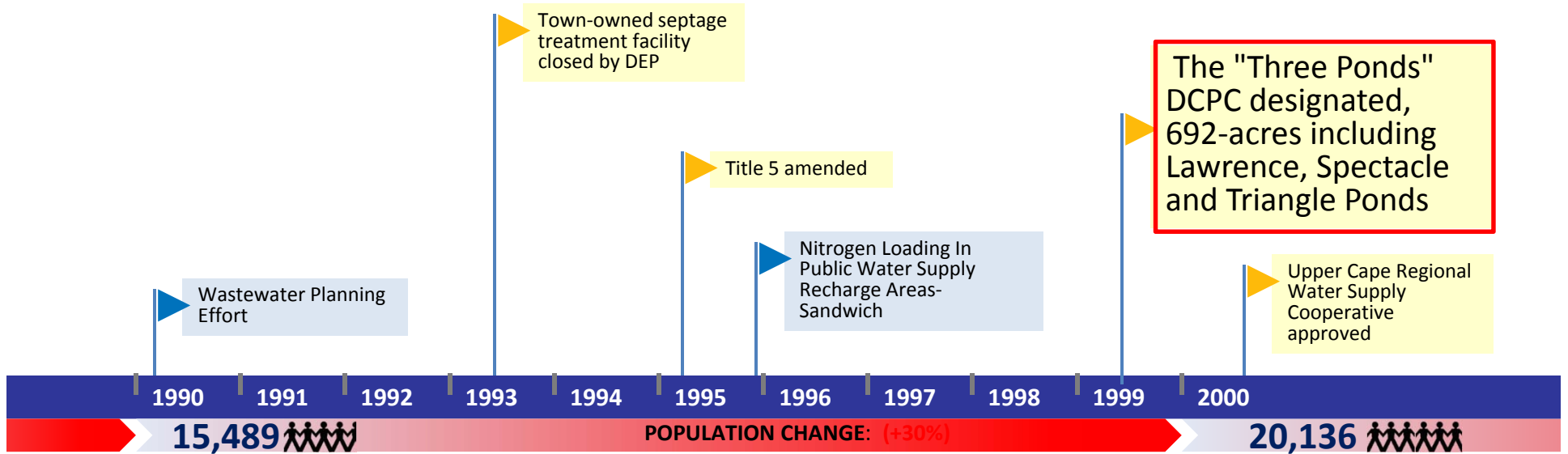
- ▶ A sewer facilities plan was completed for Sandwich in 1978. The plan calls for a small outfall into the Cape Cod Canal, which now could only be allowed through a special act of the legislature.
- ▶ Should the town fail to act by 1980, a DEQE investigation of Title 5 violations should be initiated.
- ▶ A septage treatment facility would not provide a comprehensive solution and could not be considered to be consistent with the 208 plan. Funds should not be made available for the construction of a septage treatment facility.

- ▶ The town health agent should strictly enforce Title 5 and should seek additional qualified personnel to implement the 208 recommended on-site systems management program.
- ▶ The town has taken progressive steps to increase lot sizes to at least one acre in most areas of town. The town has indicated willingness to cooperate with the 208 staff in delineating watershed areas and in adopting Watershed Protection Districts.

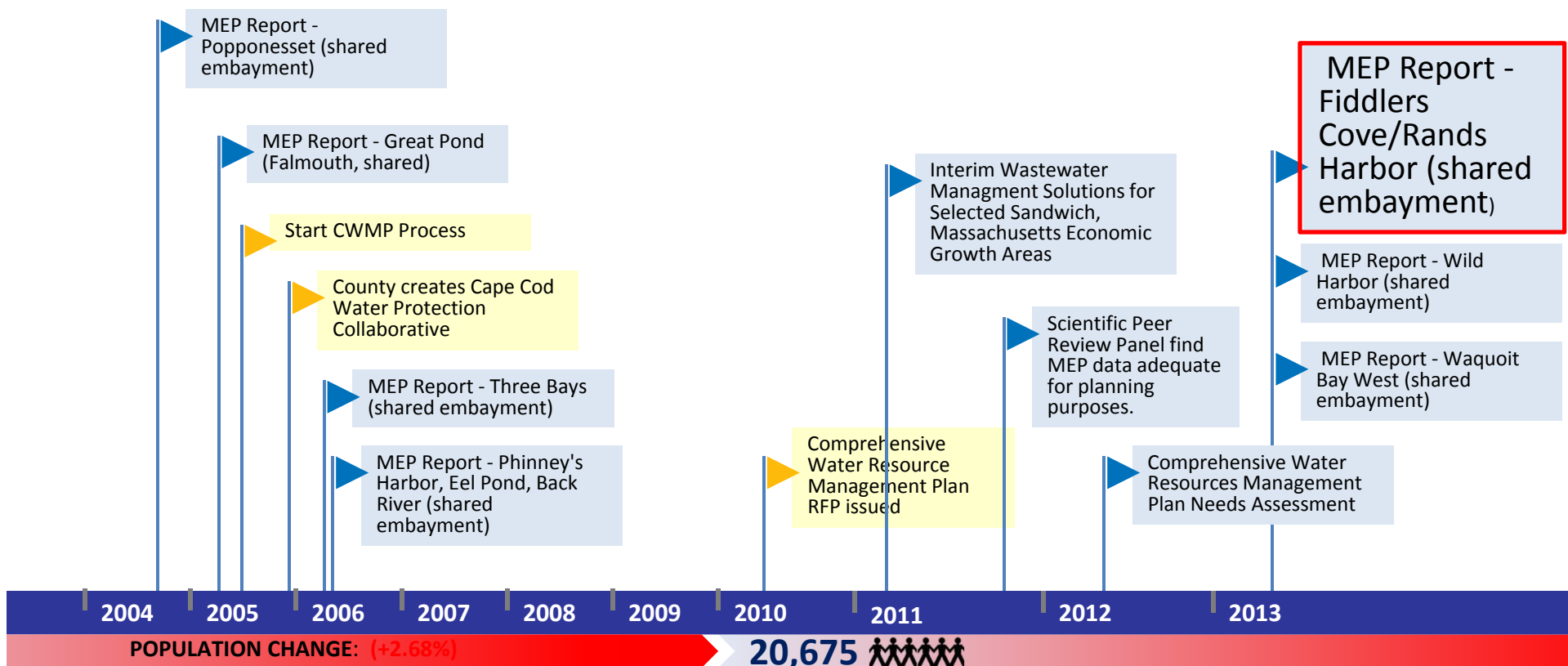
- ▶ The problem of the State Fish Hatchery discharging over half a million gallons of fresh water must be addressed by the Department of Fisheries and Wildlife as recommended in the "Water Conservation" section of the final plan.
- ▶ The town should actively participate in regional solid waste planning to develop a long-range solution to its solid waste management problems.
- ▶ There has been a serious delay in action on the town's proposed sewer facility plan and little coordinated participation of town boards in the 208 planning program. The town should immediately form a Water Quality Advisory Committee.



Sandwich: 1970-2013



Sandwich: 1970-2013



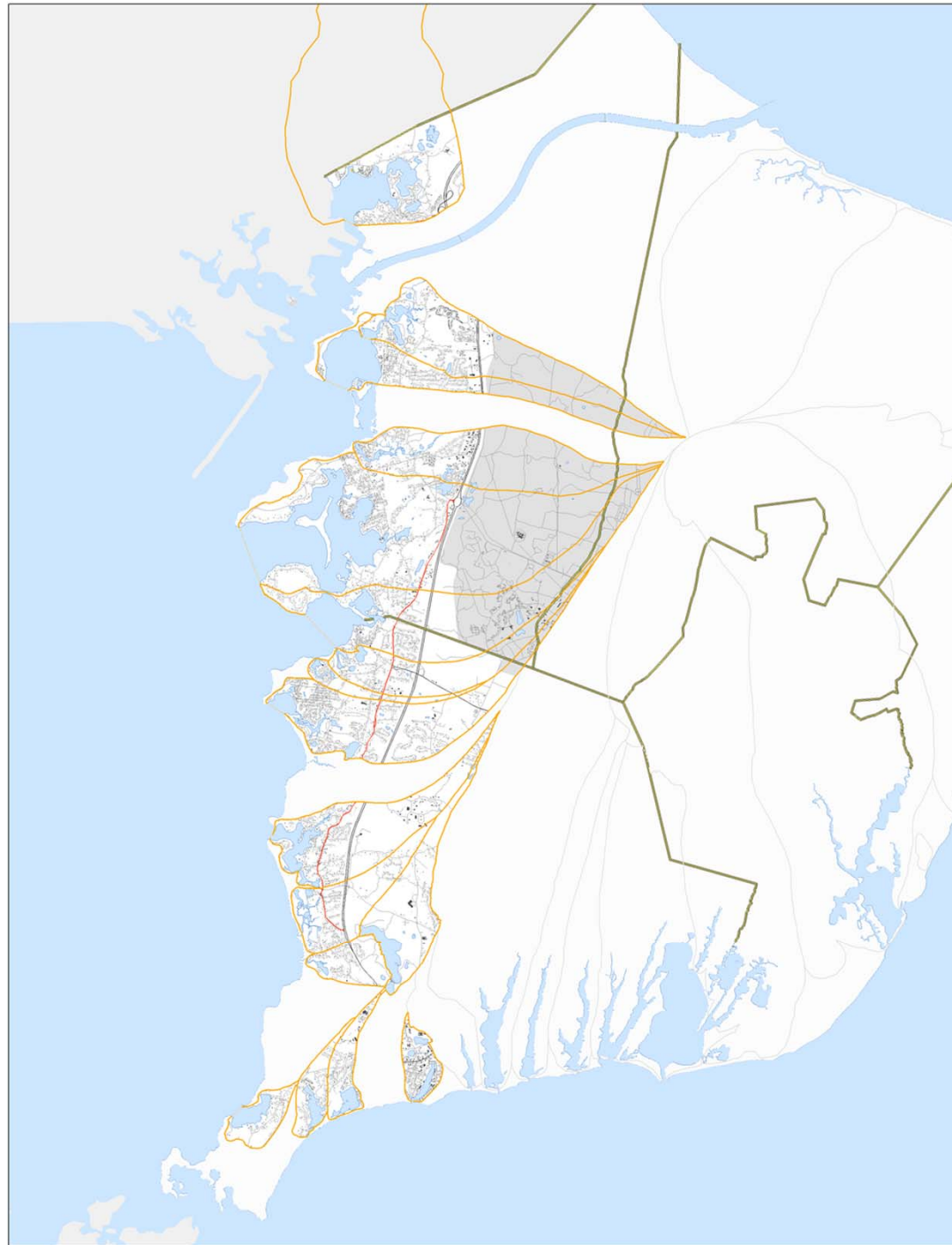
Did we miss anything?

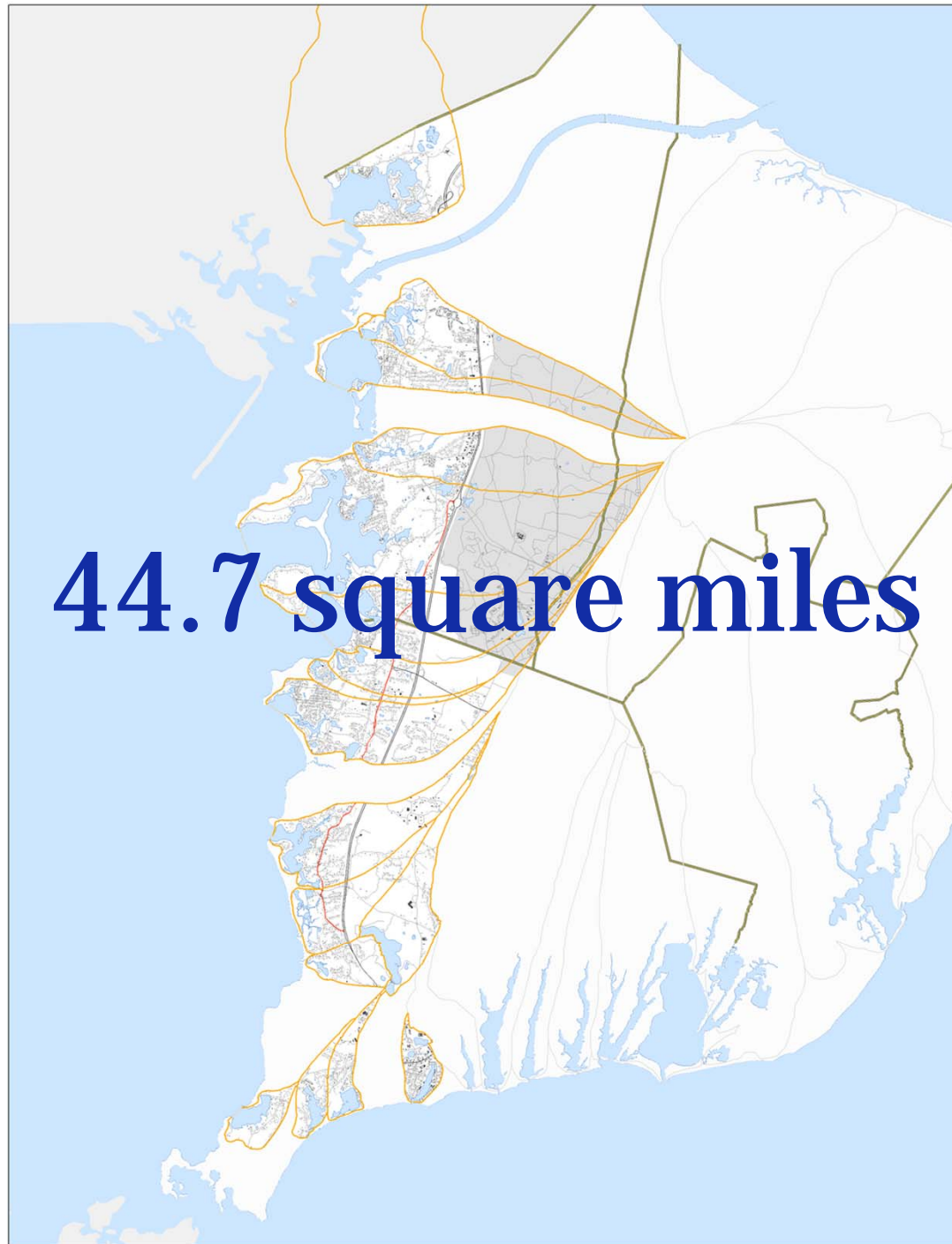
Your Watersheds

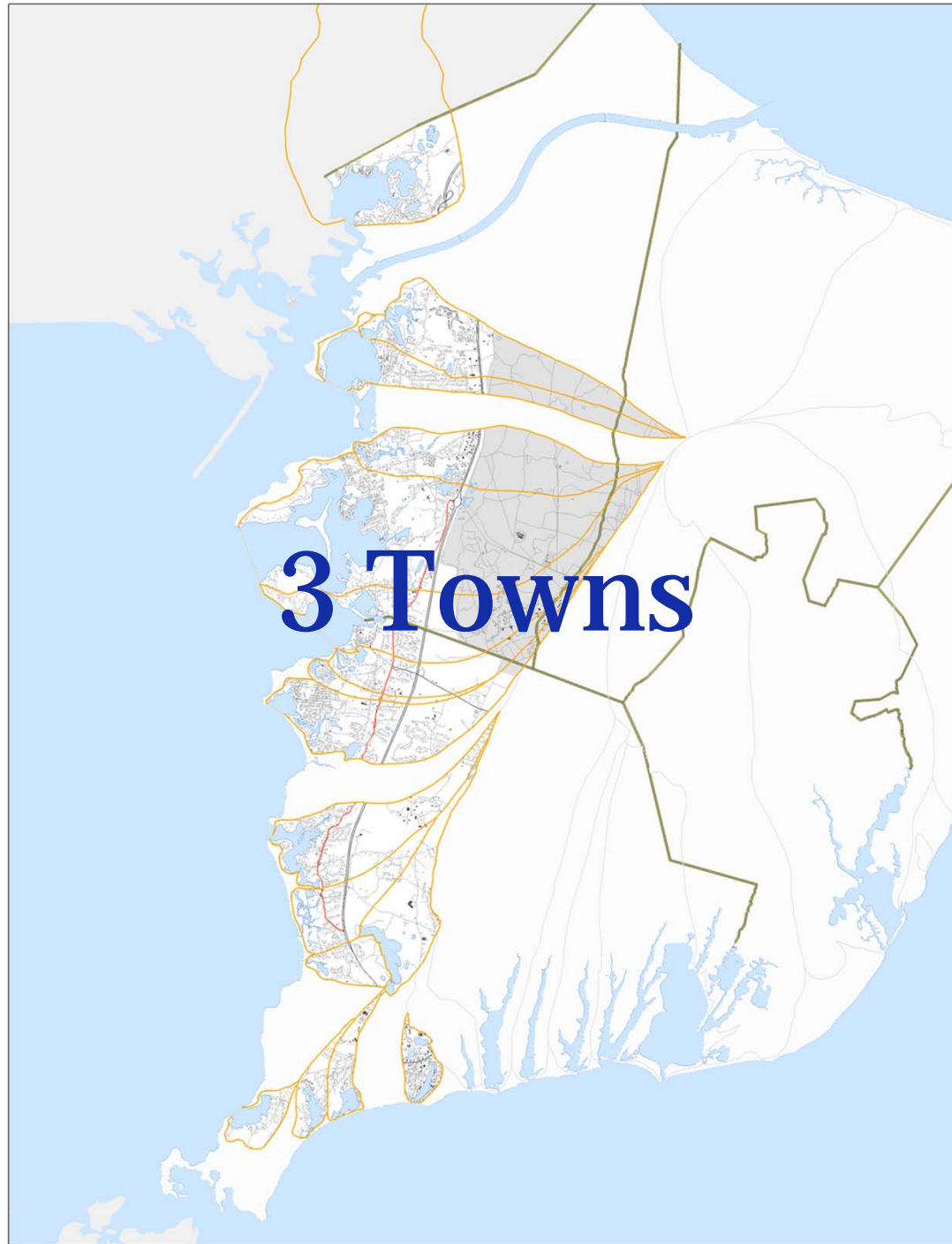


Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond

Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor








Natural Features


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway


 Roads


 Structures

 Ponds

Natural Areas


 Natural Heritage & Endangered Species Program (NHESP) Certified Vernal Pools

 Water Table Contours

 Cranberry Bogs


 Wetlands

 Sea, Lake, & Overland Surges from Hurricanes (SLOSH) Update 2013

 Preliminary FEMA Flood Insurance Rate Map (FIRM) Zones 2013


Managed Surfaces


Base Map

 Town Lines

 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway


 State Highway


 Roads

 Structures


 Ponds

Managed Surfaces

 Approximate Managed Ground Surfaces



 Approximate Residential Managed Lawns

 Approximate Managed Golf Courses


 Approximate Municipal Managed Natural Surfaces

Regulatory


Base Map



-  Town Lines
-  Rivers

Embayment Boundary




-  On Land
-  On Sea

Major Roads




-  US Highway
-  State Highway
-  Roads

-  Structures
-  Ponds


Regulatory

-  Areas of Critical Environmental Concern
-  DEP Approved Wellhead Protection Areas (Zone IIs)
-  Growth Incentive Zone

OpenSpace: Level of Protection

-  In Perpetuity
-  Limited
-  None

Landuse Vision Map

-  Economic Center
-  Industrial and Service Trade Area
-  Village
-  Resource Protection Area
-  Other
-  Undesignated


Land Use Change


Base Map

 Town Lines

 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway

 Roads

 Structures


 Ponds


LandUse Change

 Residential

 Commercial

 Industrial

 Wooded, Natural, or Wetlands

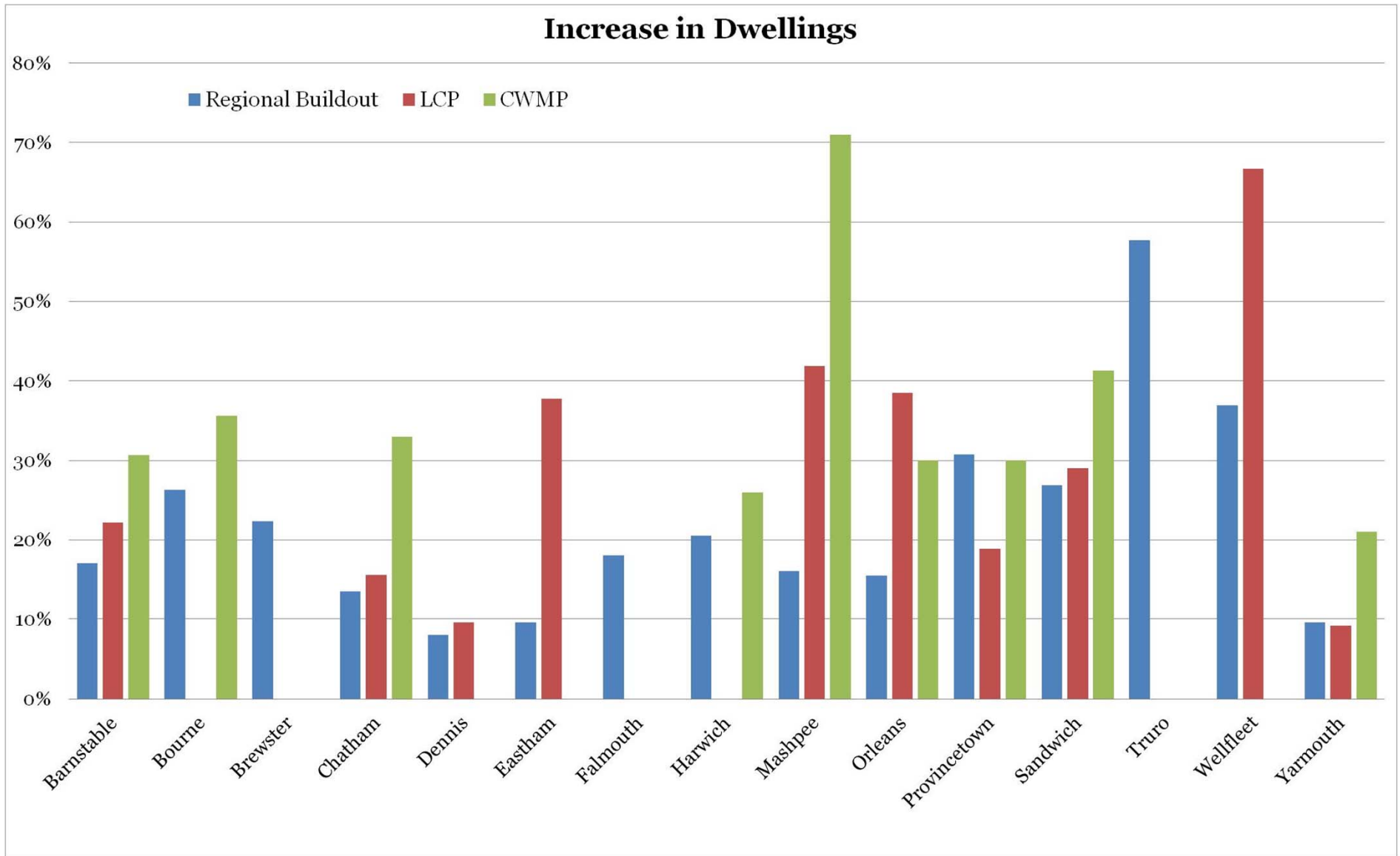
 Open - Disturbed or Managed

 Water

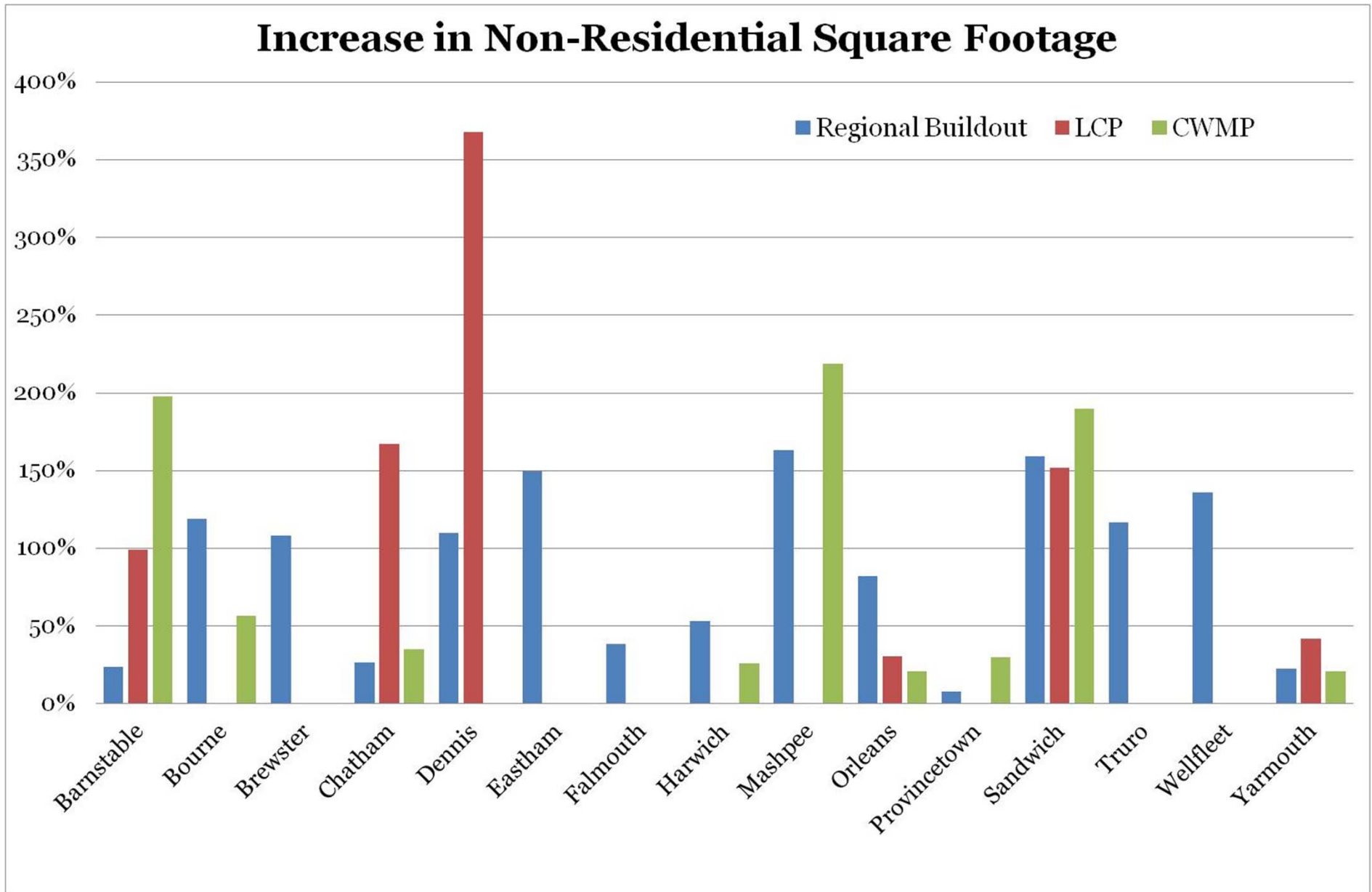
Density

**Cape Wide Cost Estimate:
30% growth will increase
capital costs by 40%**

Buildout



Buildout



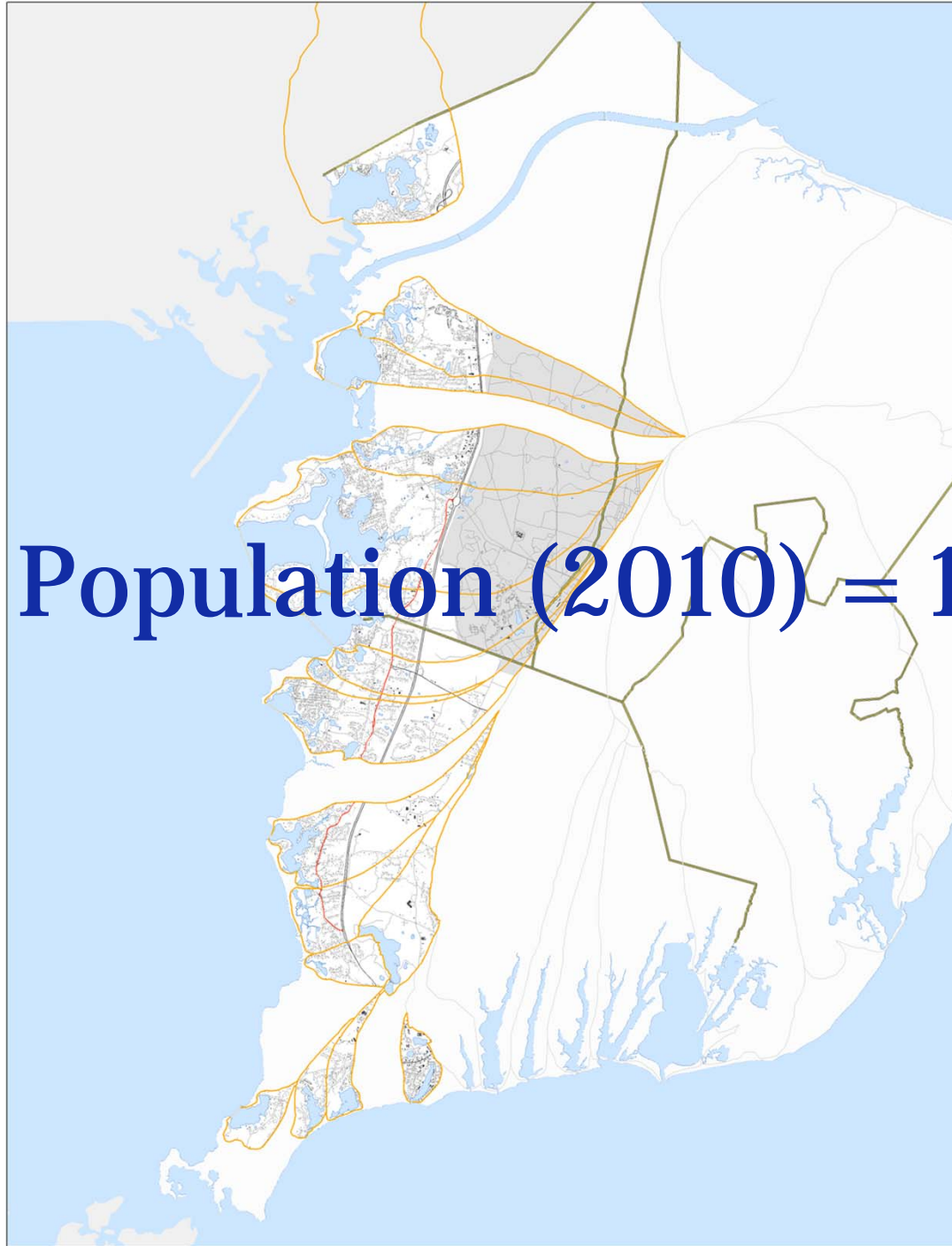
The People

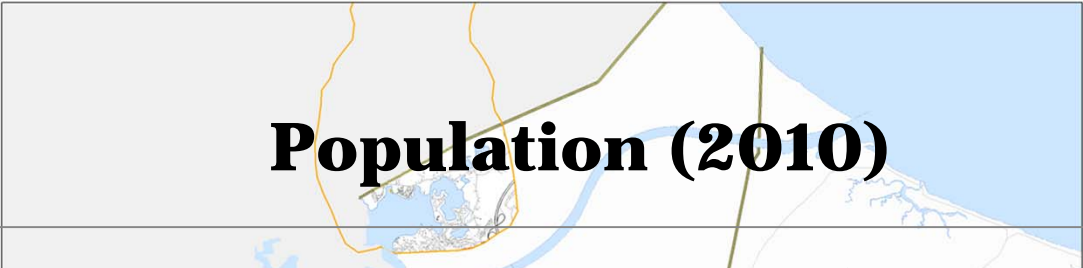


Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond

Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor

Total Population (2010) = 16,516





3,000

2,500

2,000

1,500

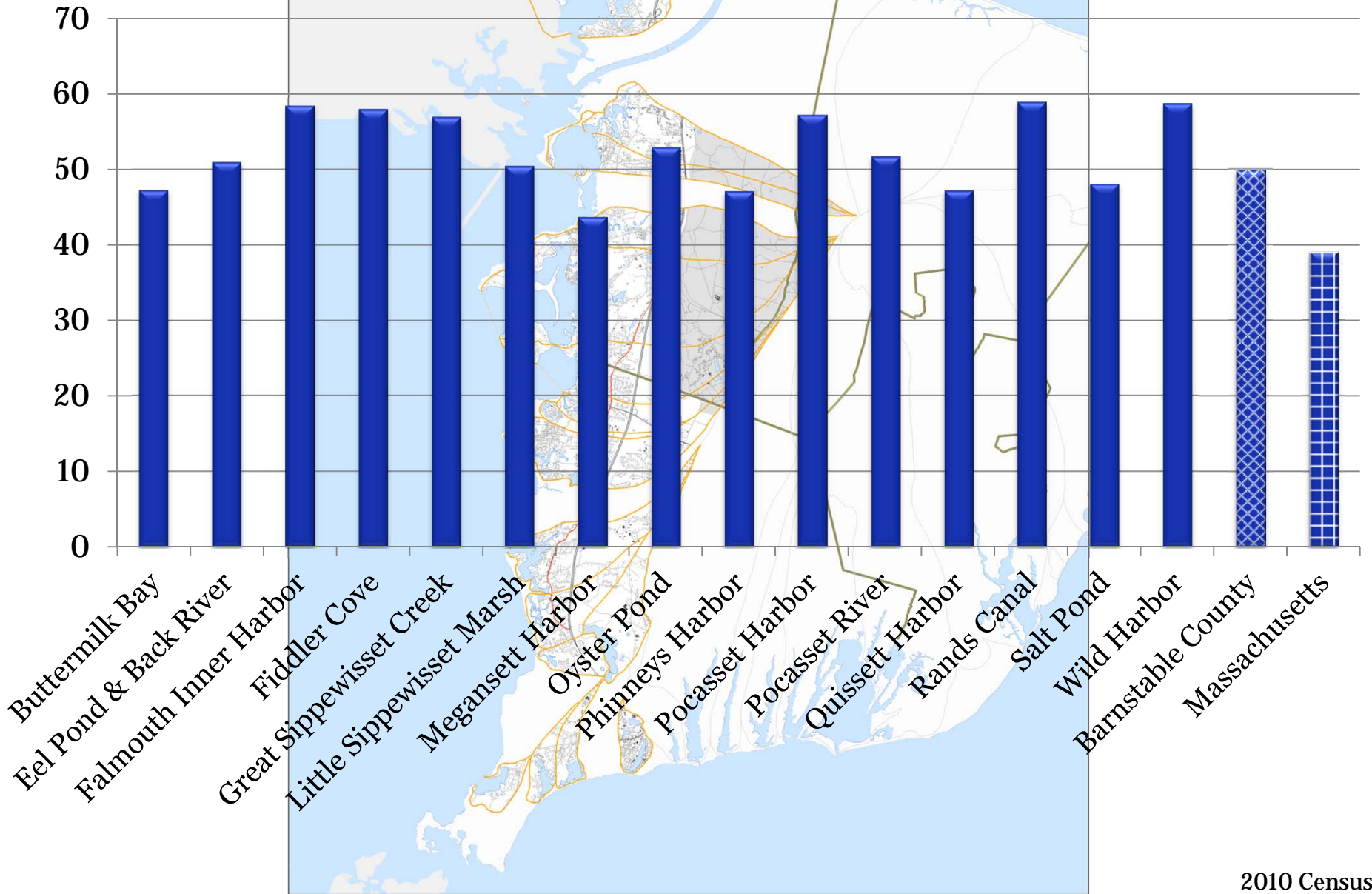
1,000

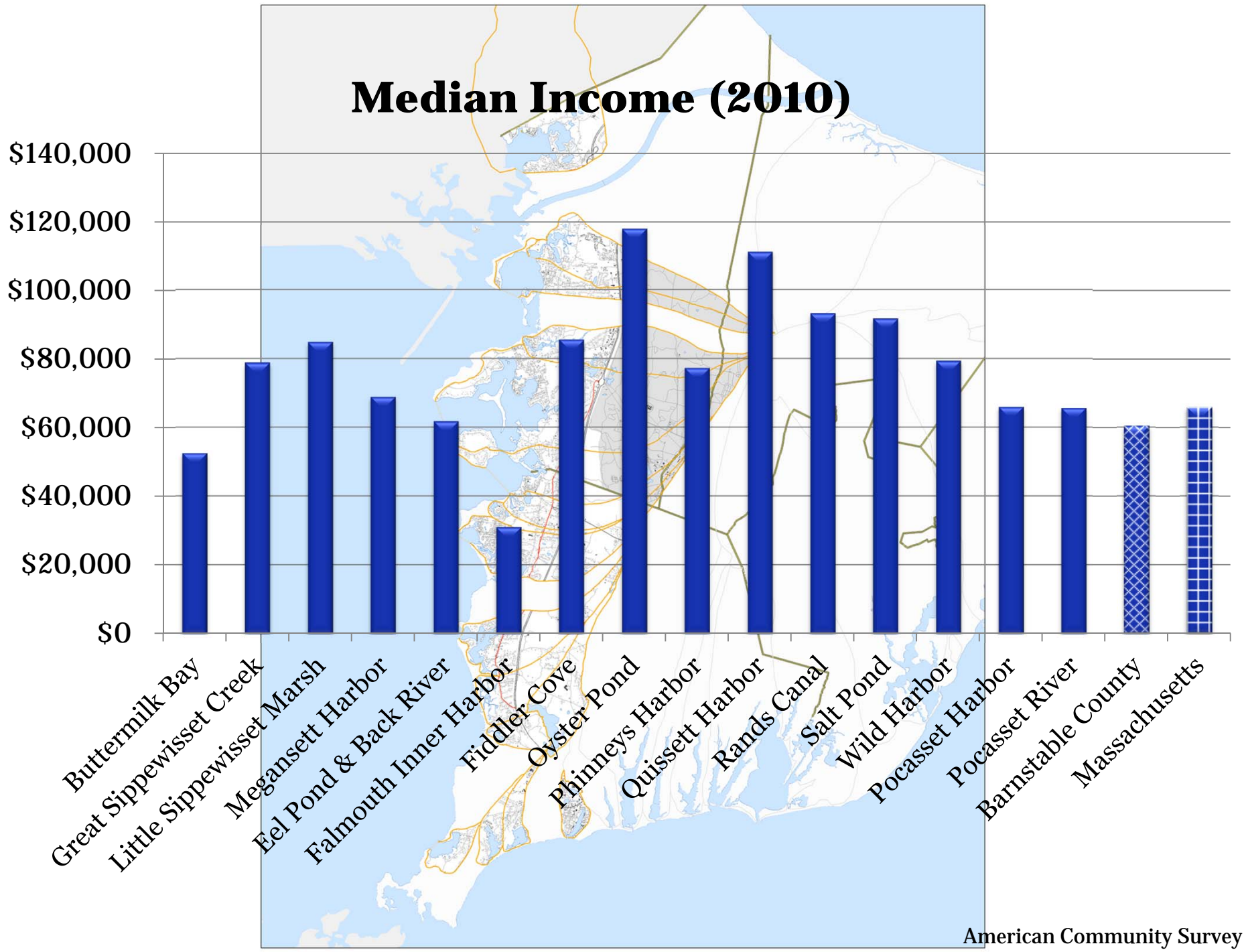
500

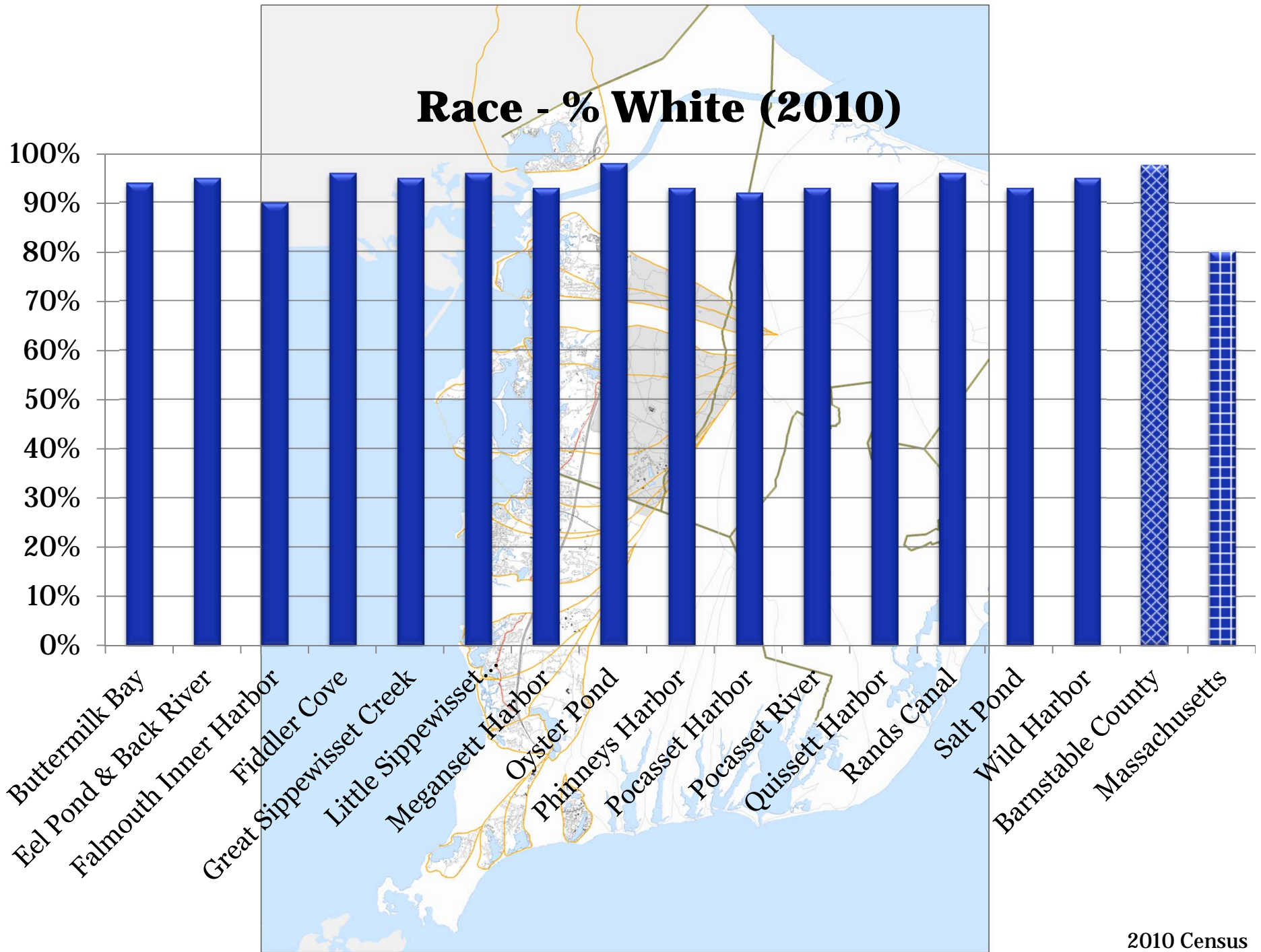
7.3% of the Total Cape Cod Population



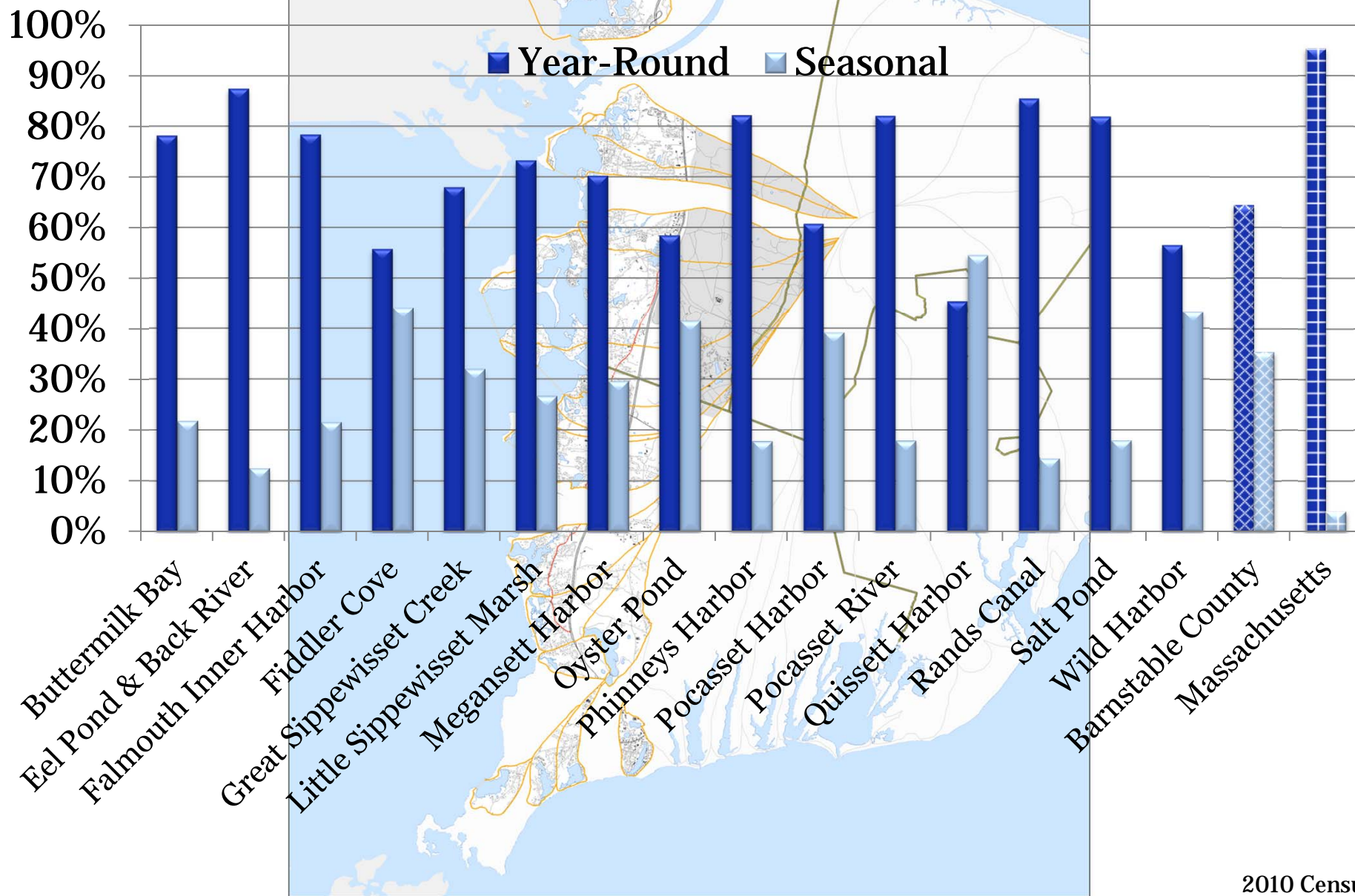
Median Age (2010)







Seasonal vs. Year Round Housing (2010)



Average Assessed Home Value (2010)

\$1,400,000

\$1,

\$1,

\$

\$

\$

\$

Total Assessed Value of
Residential Homes=
\$4,275,621,950

Butte

Eel Pond &

Falmouth Inl.

Great Sippewic

Little Sippewic

Megans

Phinne

Pocas

Poc

Quiss

Re

Barnsta

Mas

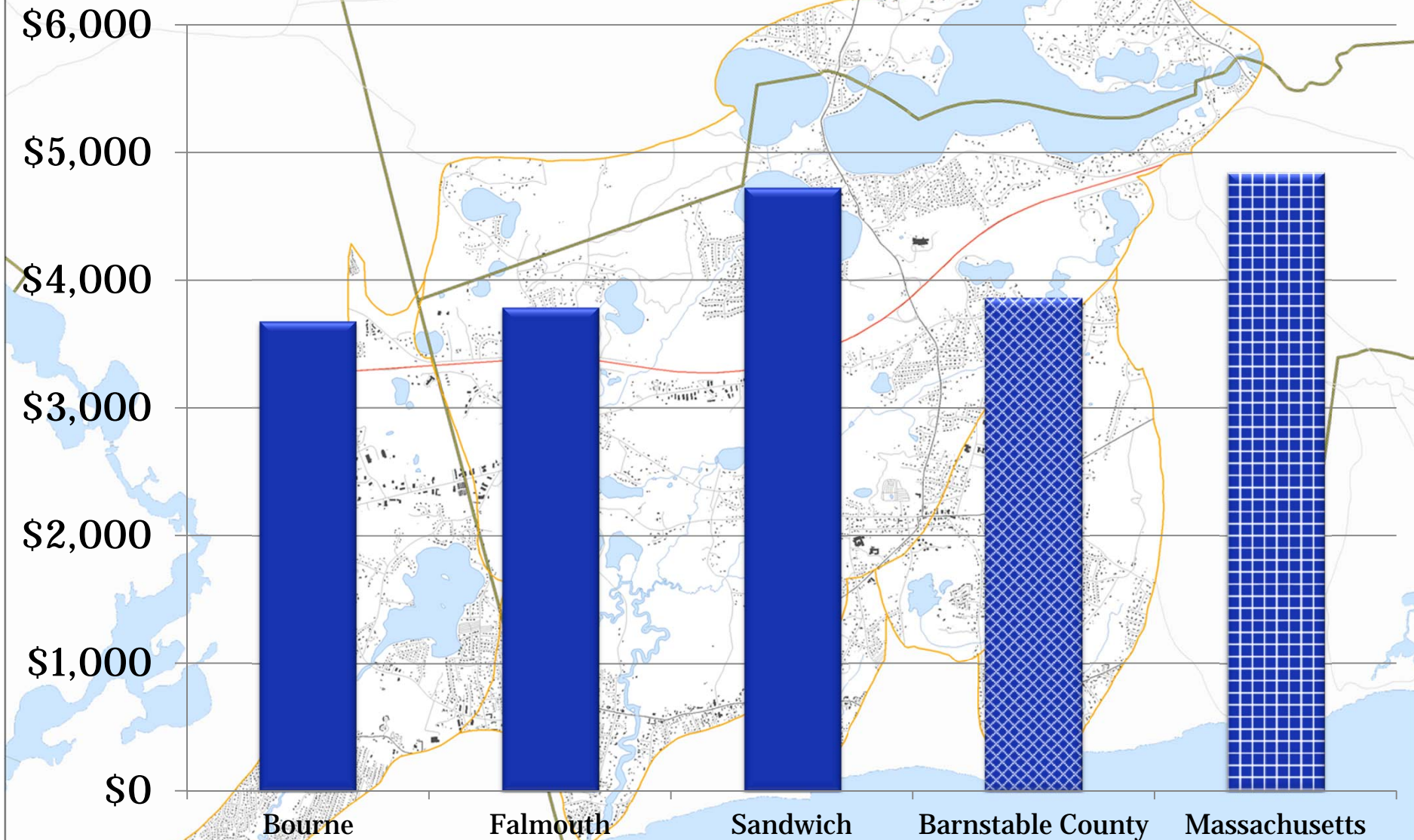
Your Government & Taxes



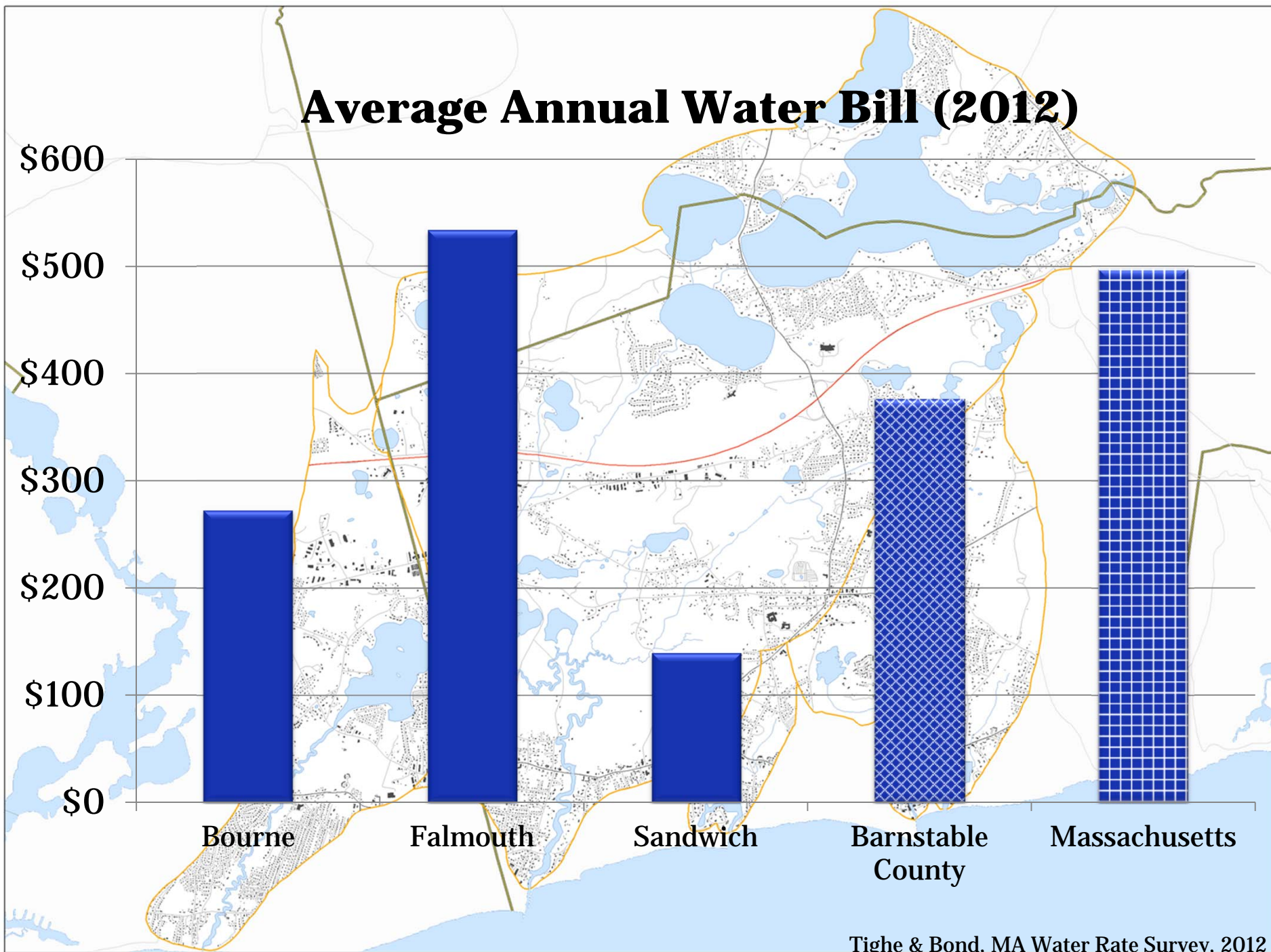
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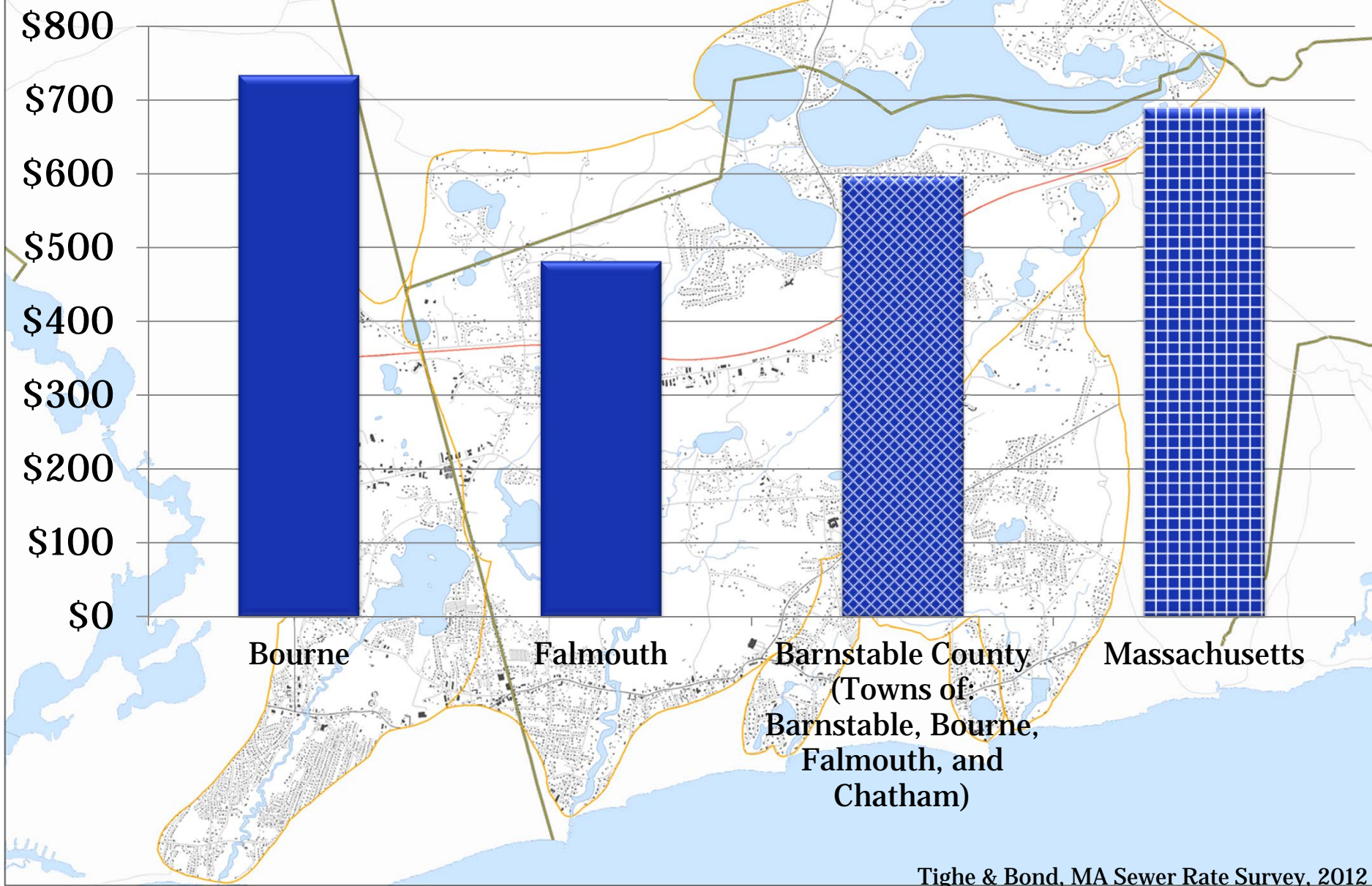
Average Single Family Property Tax Bill (2013)



Average Annual Water Bill (2012)



Average Annual Sewer Bill (2012)



The Problem



Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond

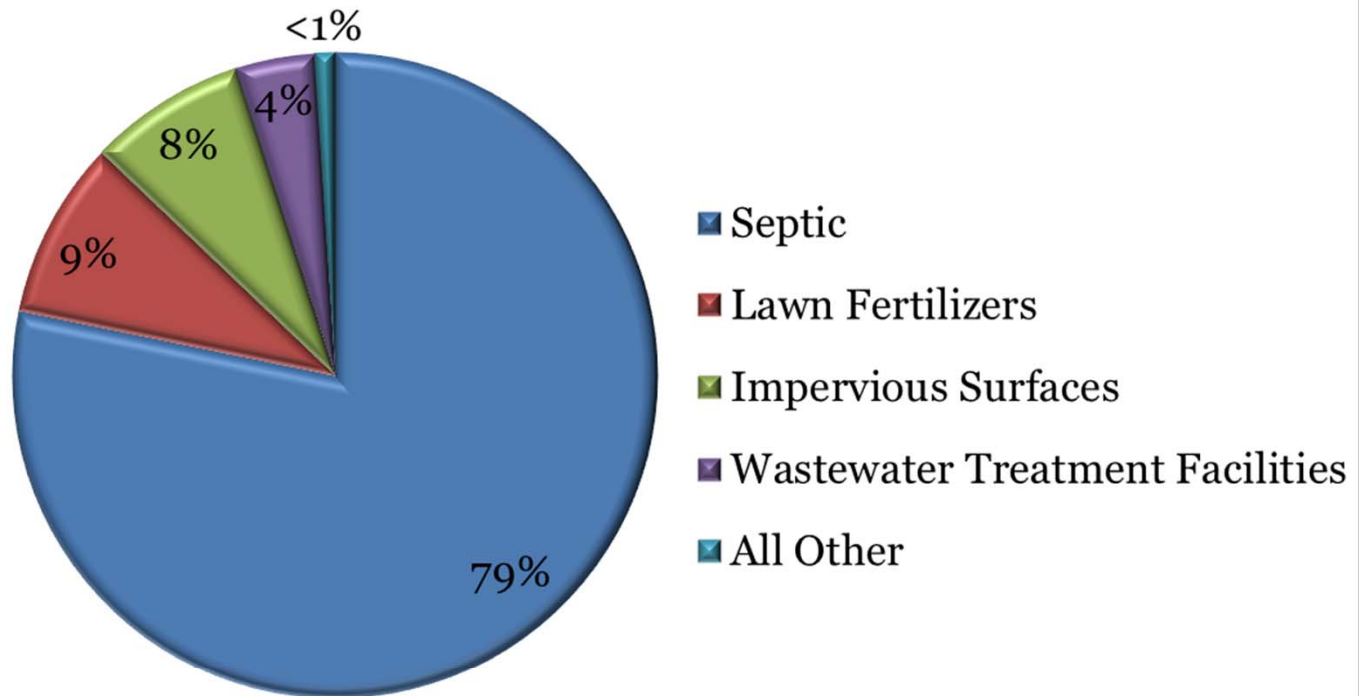
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Massachusetts Estuaries Project

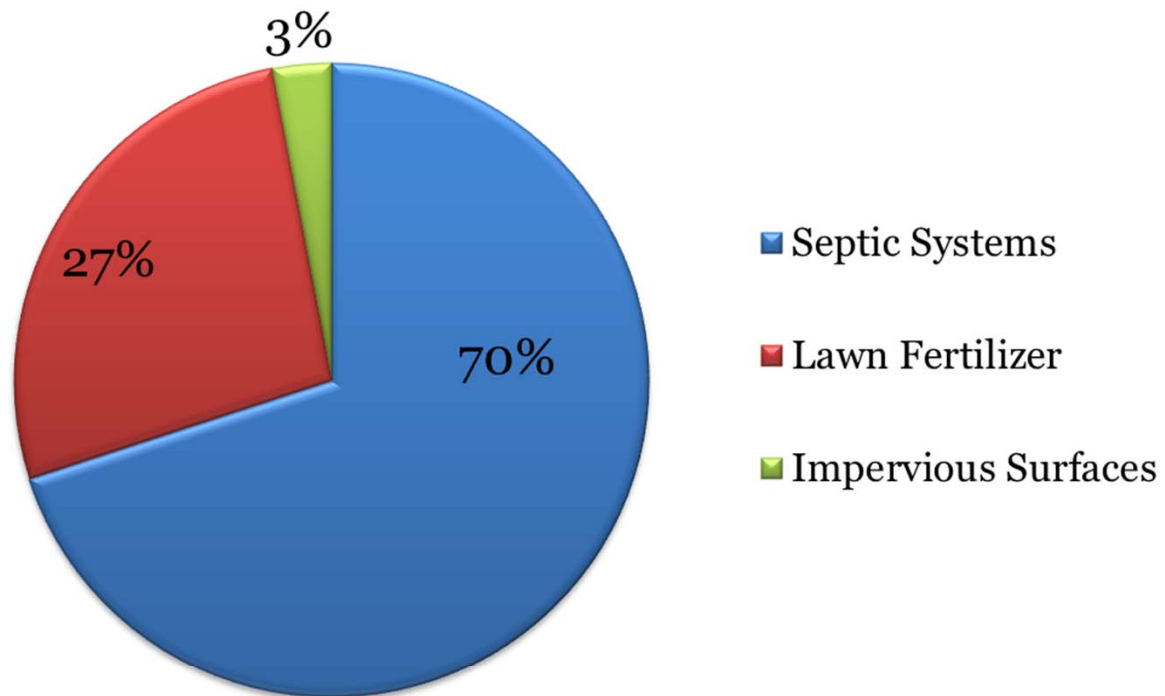
- Opportunity for towns to obtain independent analysis of nitrogen loading and its impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to nitrogen loads

Cape-Wide Controllable Nitrogen Loads



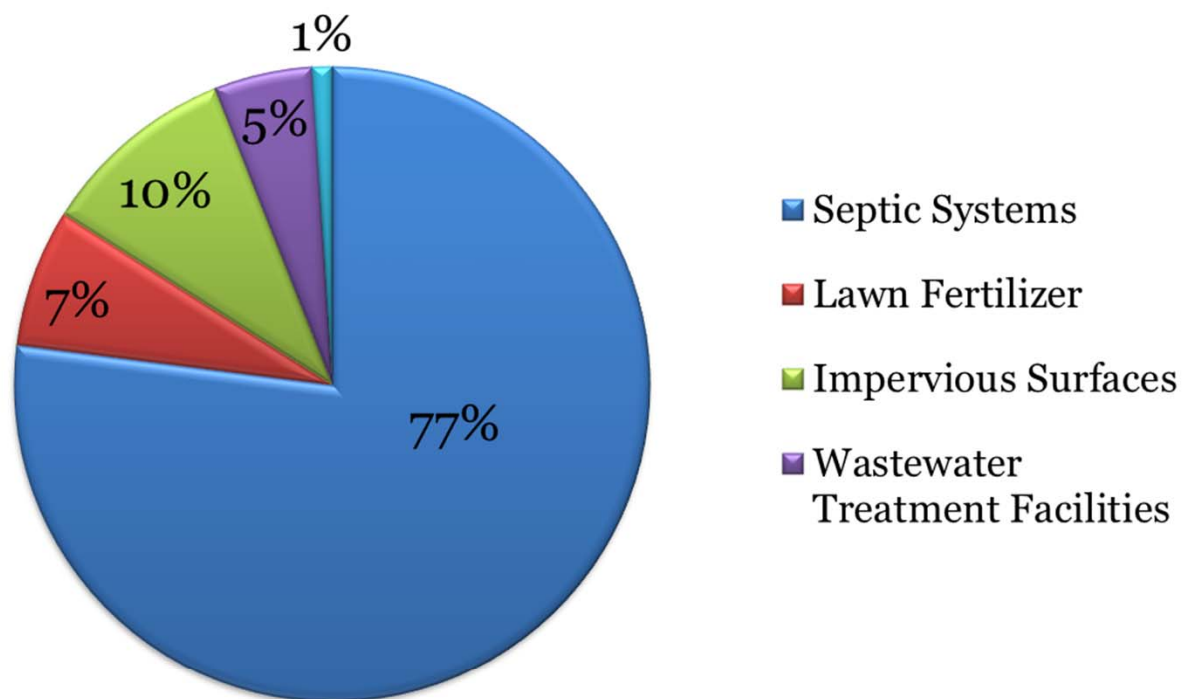
Note: Data averaged from existing Massachusetts Estuaries Project Reports

Back River/Eel Pond Controllable Nitrogen Loads



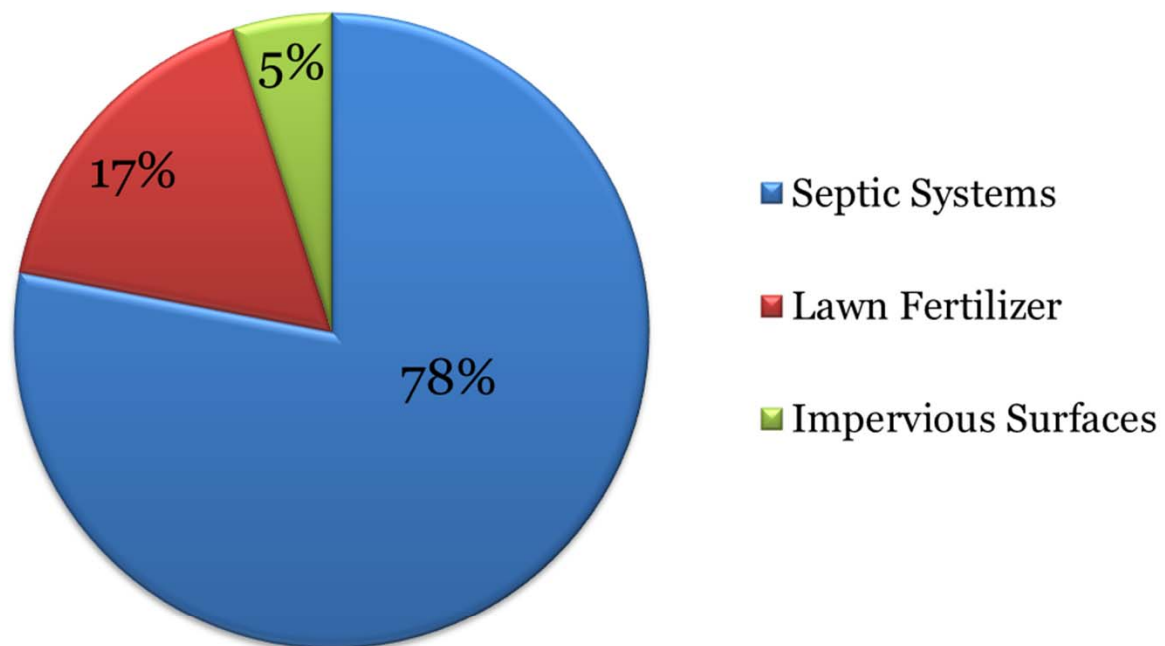
MEP 2006

Falmouth Inner Harbor Controllable Nitrogen Loads



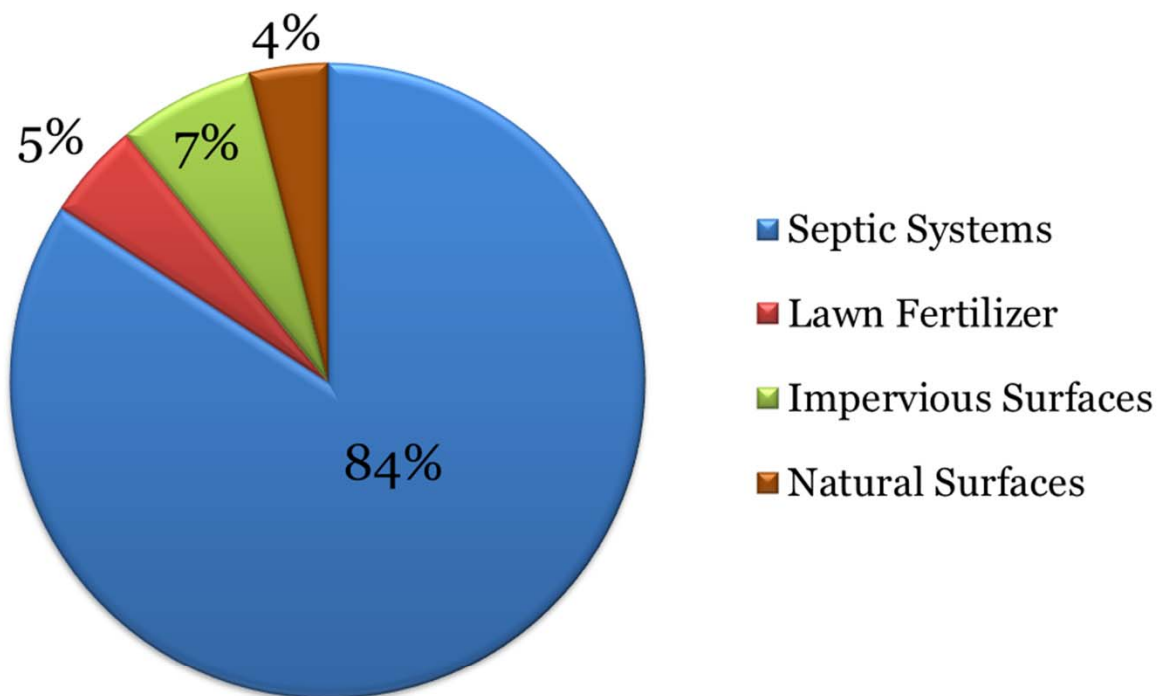
MEP 2013

Fiddlers Cove Controllable Nitrogen Loads



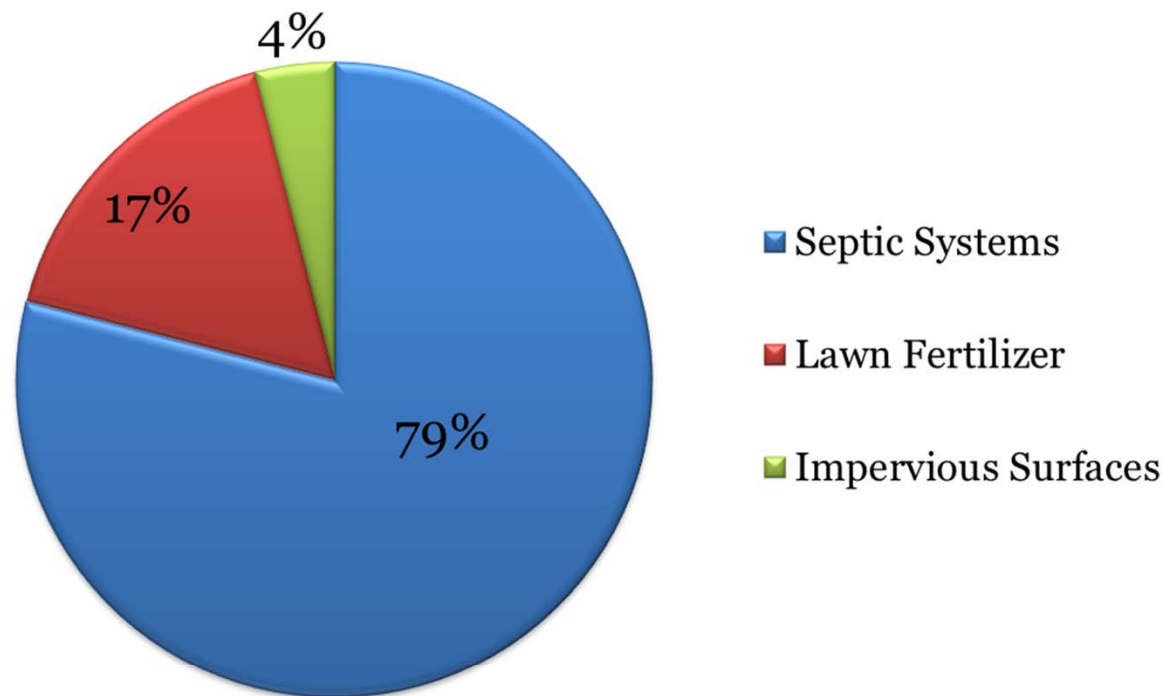
MEP 2013

Oyster Pond Controllable Nitrogen Loads



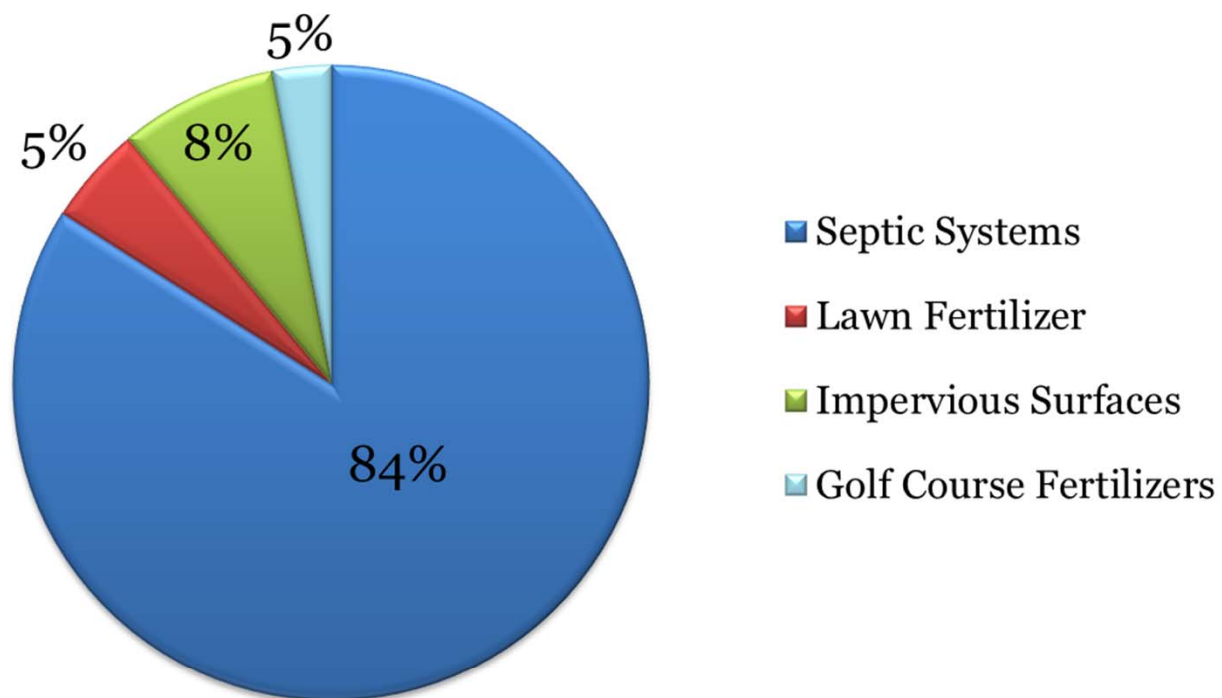
MEP 2006

Phinney's Harbor Controllable Nitrogen Loads



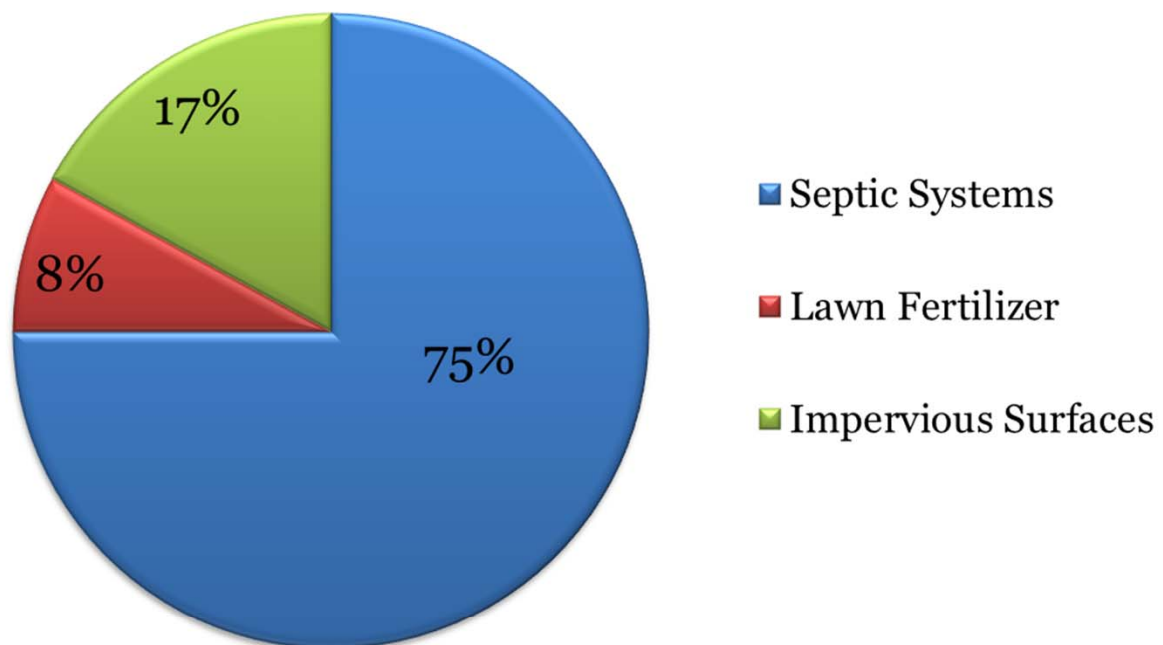
MEP 2006

Quissett Harbor Controllable Nitrogen Loads



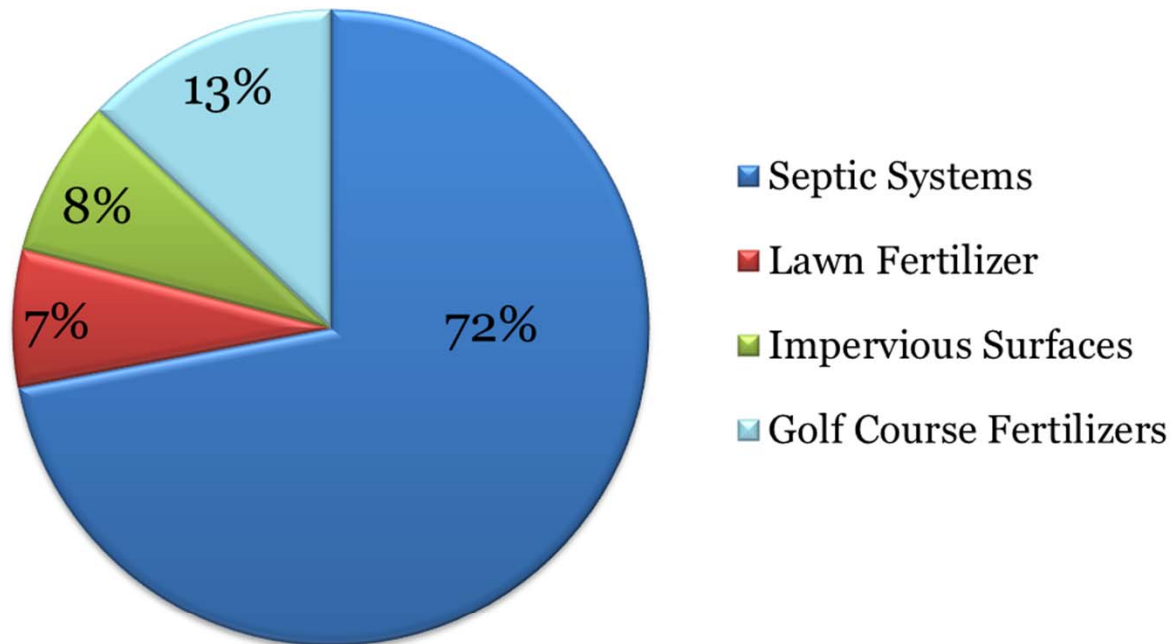
MEP 2013

Rands Canal Controllable Nitrogen Loads



MEP 2013

Wild Harbor Controllable Nitrogen Loads



MEP 2013


Nitrogen Problem


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway




 Roads

 Structures





 Ponds

Nitrogen

Water Quality Stations






-  Healthy
-  Healthy/Moderately Impacted
-  Healthy/Significantly Impacted
-  Moderately Impacted
-  Moderately Impacted/Significantly Impacted
-  Significantly Impacted
-  Significantly Impacted/Significantly Degraded
-  Significantly Degraded

Yearly Nitrate Concentration Averages

-  0 - 0.5 mg/l **in Public Water Supply Wells**
-  0.5 - 1 mg/l
-  1 - 2.5 mg/l
-  2.5 - 5 mg/l






Embayments with Removal Target

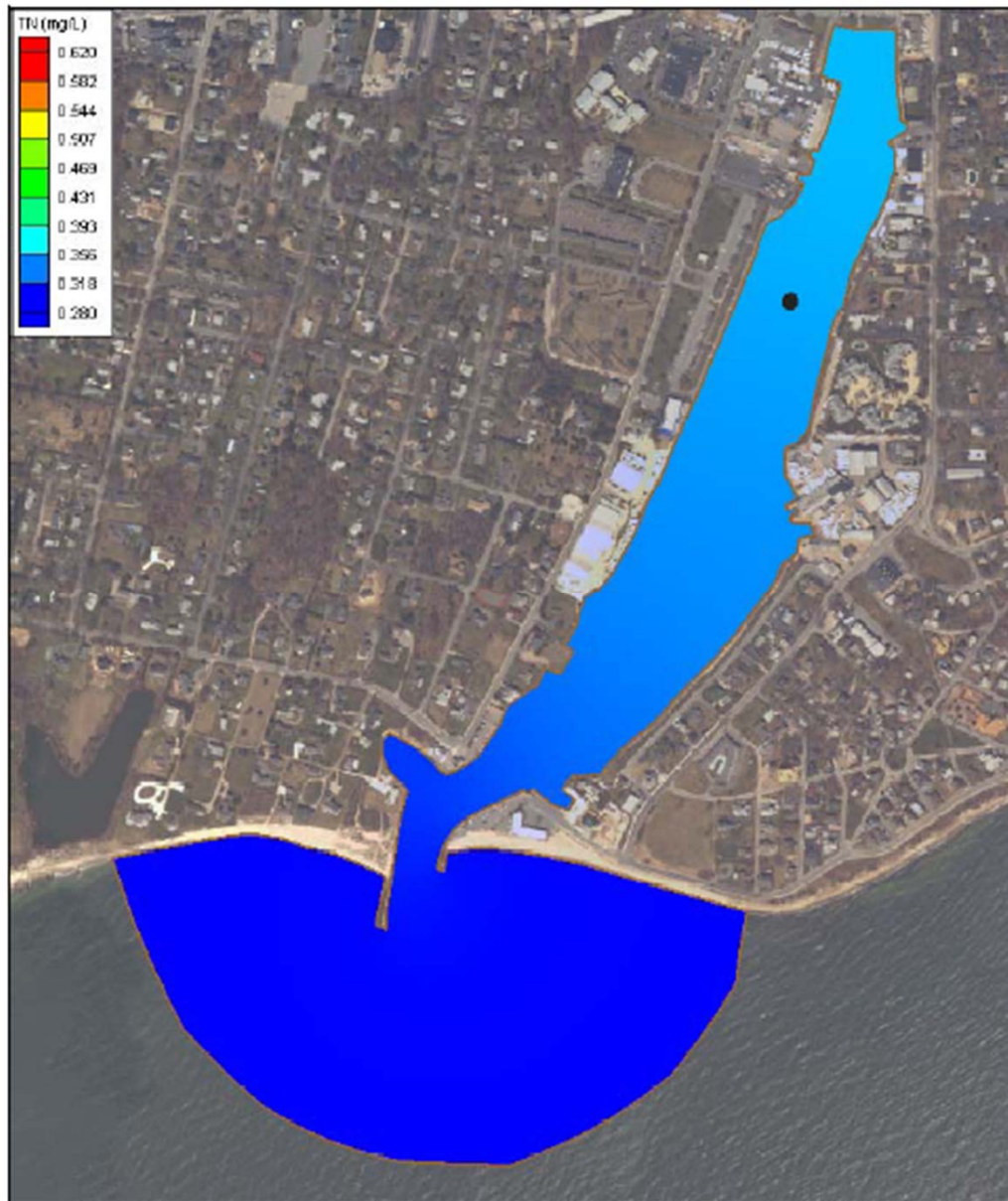
Total NLoad Percent Removal

-  0 %
-  1 - 52 %
-  53 - 72 %
-  73 - 86 %
-  87 - 100 %

Subwatersheds with Removal Target

Total NLoad Percent Removal

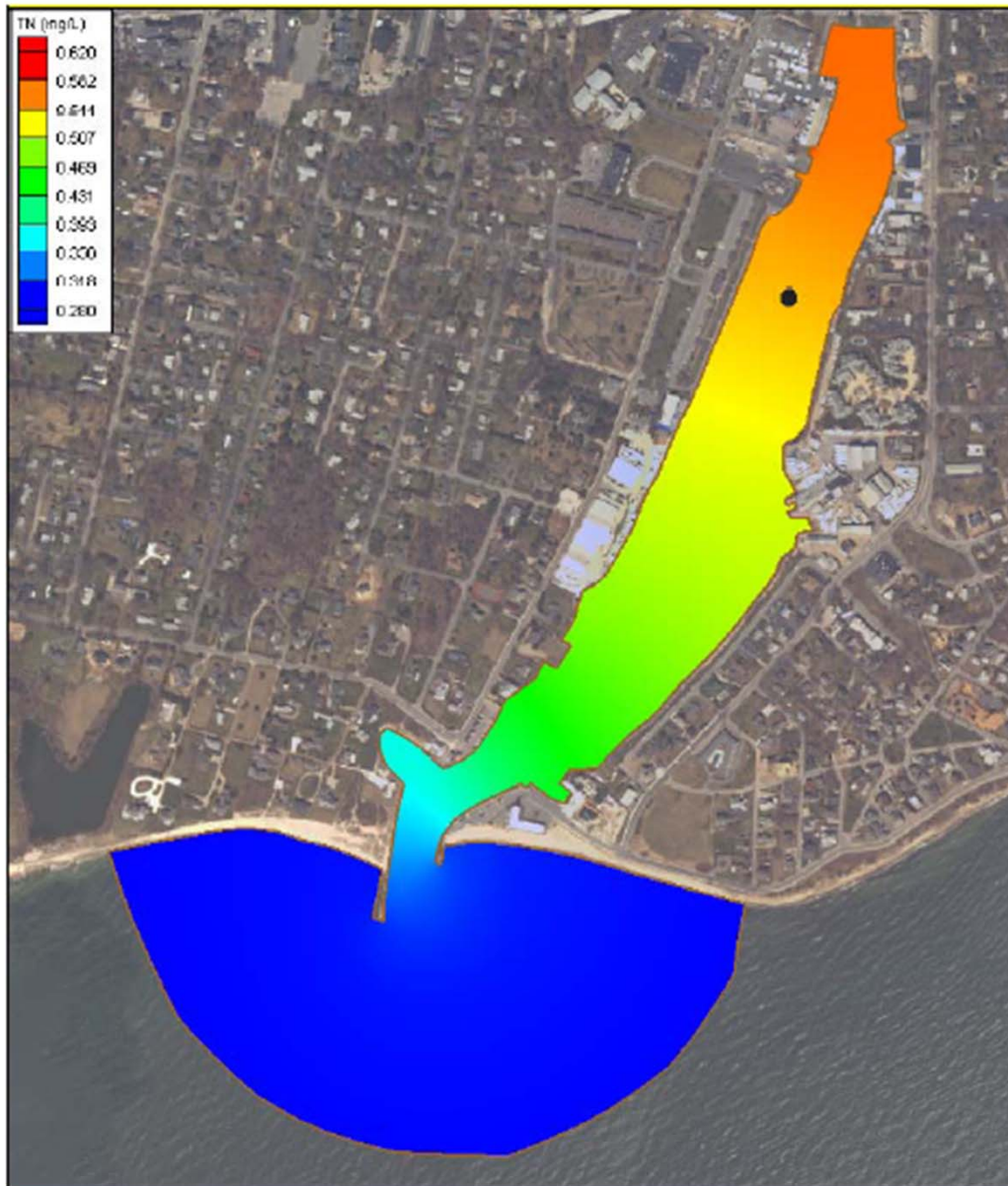
-  0.1 % - 9%
-  9.1 % - 38 %
-  38.1 % - 62 %
-  62.1 % - 86 %
-  86.1 % - 100%



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Falmouth Harbor estuary system, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold stations for Falmouth Harbor estuary system is shown by the black symbol.

(Source: MEP 2013)

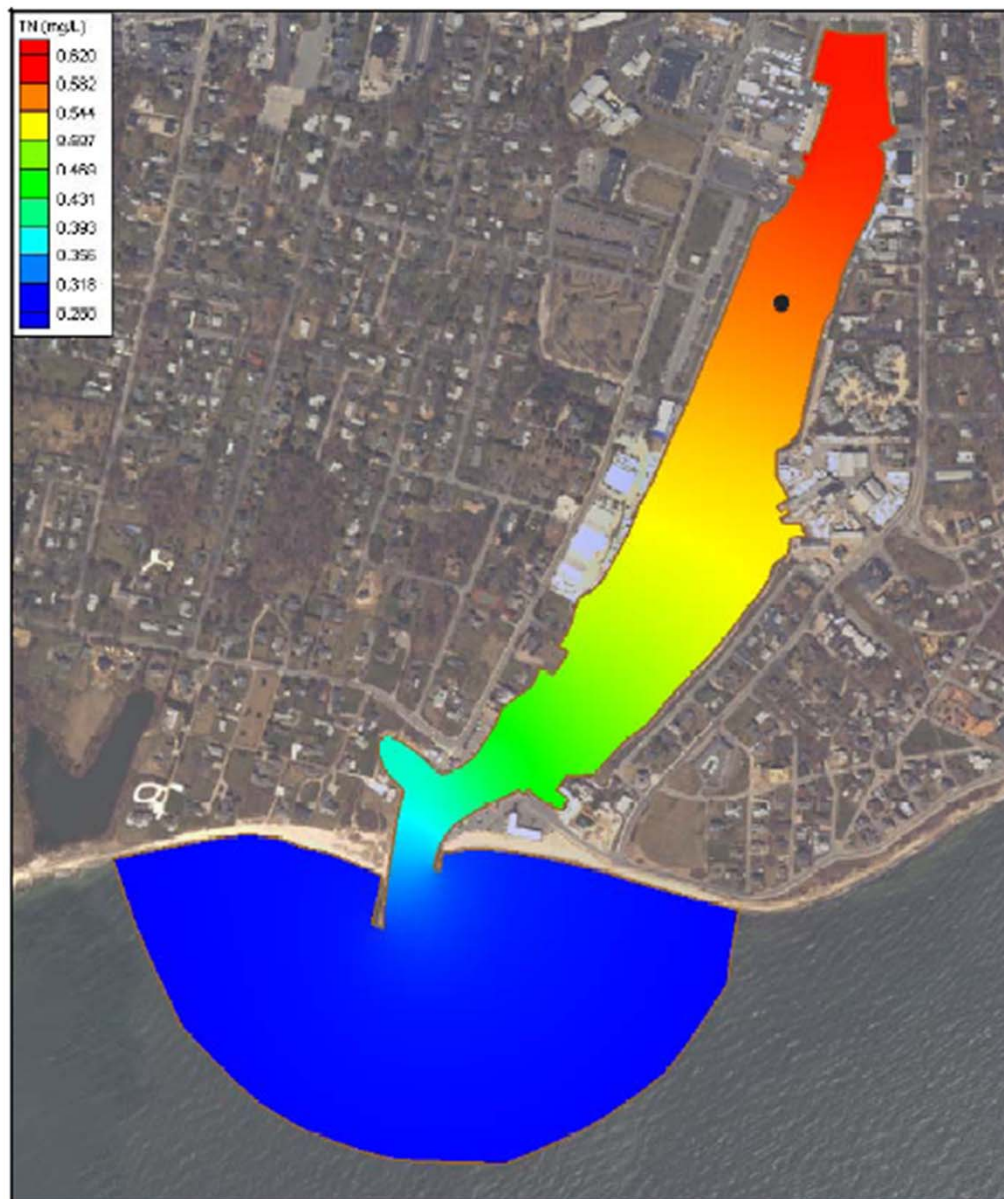
Pre-Colonial Conditions: Falmouth Inner Harbor



Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Falmouth Harbor estuary system. The approximate location of the sentinel threshold station for Falmouth Harbor estuary system is shown by the black symbol.

(Source: MEP 2013)

Present Conditions: Falmouth Inner Harbor



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Falmouth Harbor estuary system, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Falmouth Harbor estuary system is shown by the black symbol.

(Source: MEP 2013)

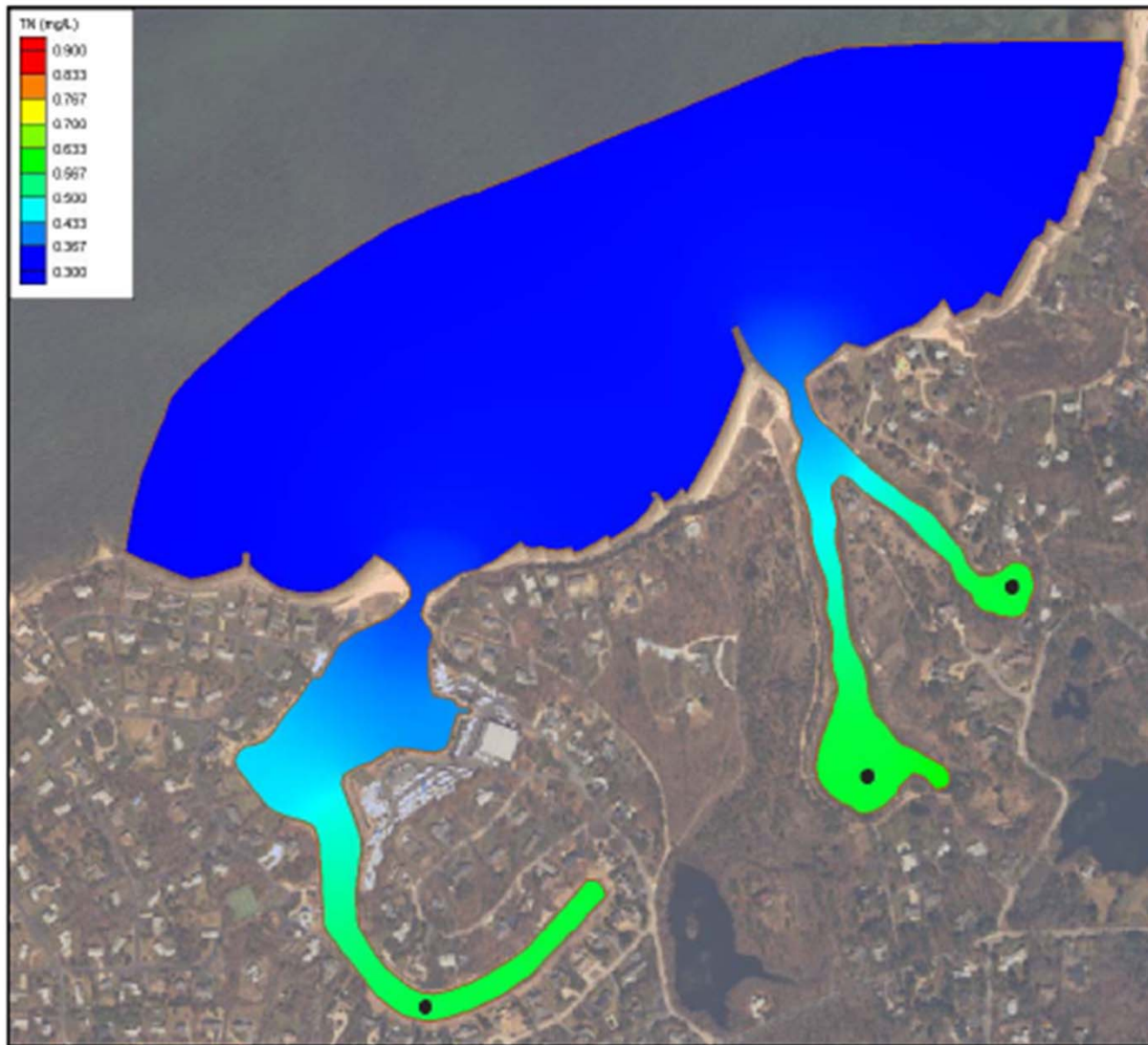
Buildout Conditions: Falmouth Inner Harbor



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Fiddlers Cove and Rands Harbor estuary systems, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold stations for Fiddlers Cove and Rands Harbor estuary systems are shown by the black symbols.

(Source: MEP 2013)

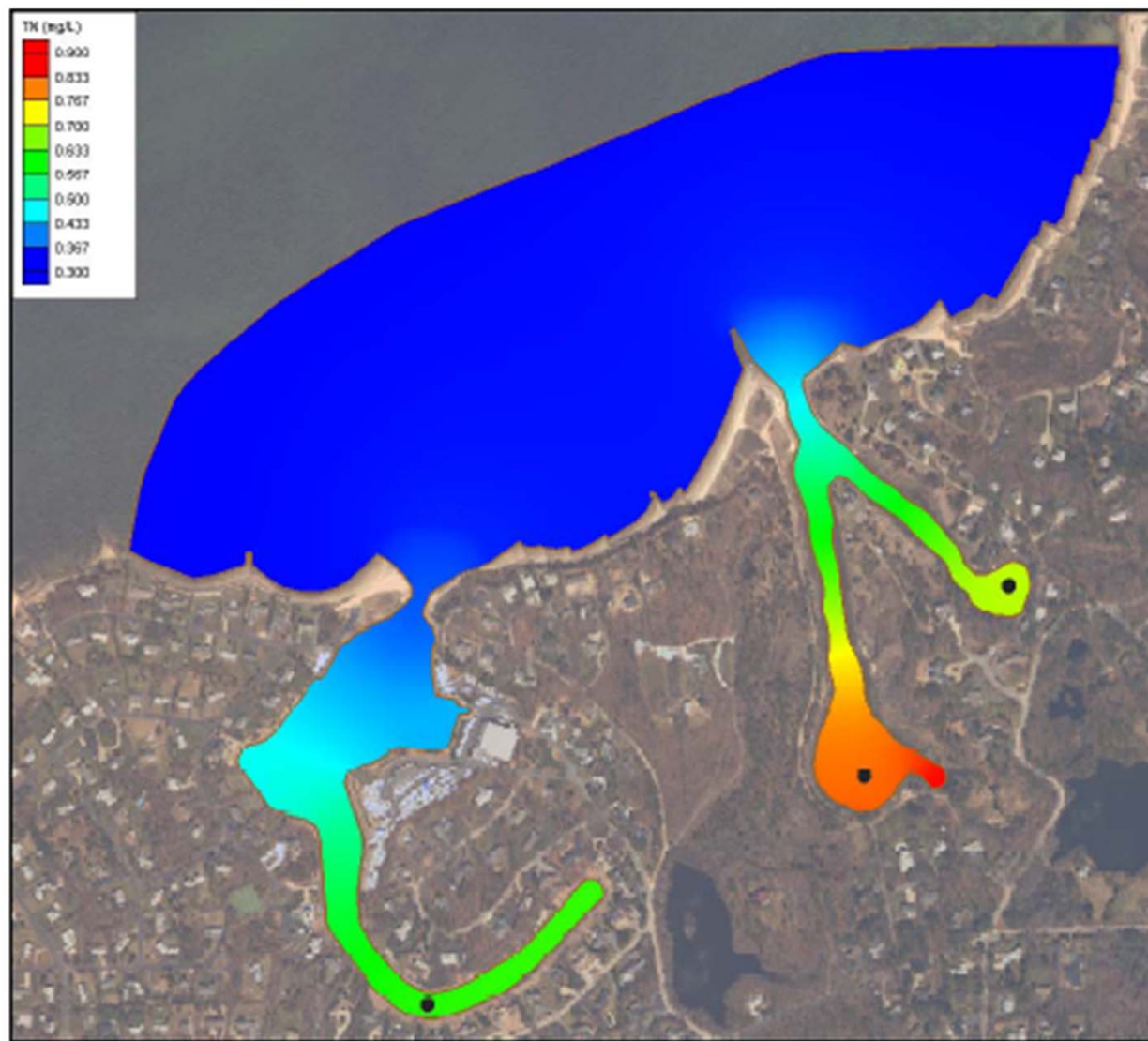
Pre-Colonial Conditions: Fiddler Cove and Rands Harbor



Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Fiddlers Cove and Rands Harbor estuary systems. The approximate location of the sentinel threshold stations for Fiddlers Cove and Rands Harbor estuary systems are shown by the black symbols.

(Source: MEP 2013)

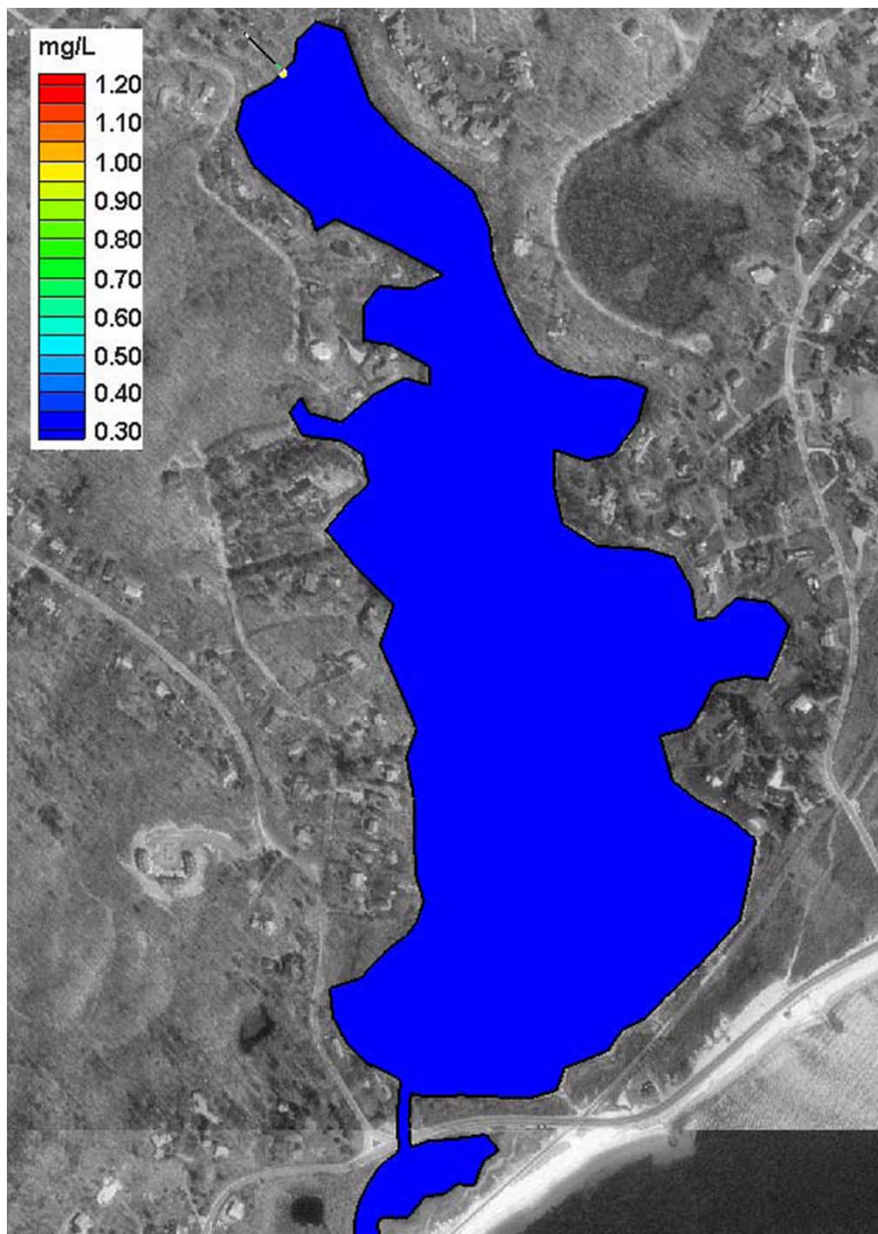
Present Conditions: Fiddler Cove and Rands Harbor



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Fiddlers Cove and Rands Harbor estuary systems, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold stations for Fiddlers Cove and Rands Harbor estuary systems are shown by the black symbols.

(Source: MEP 2013)

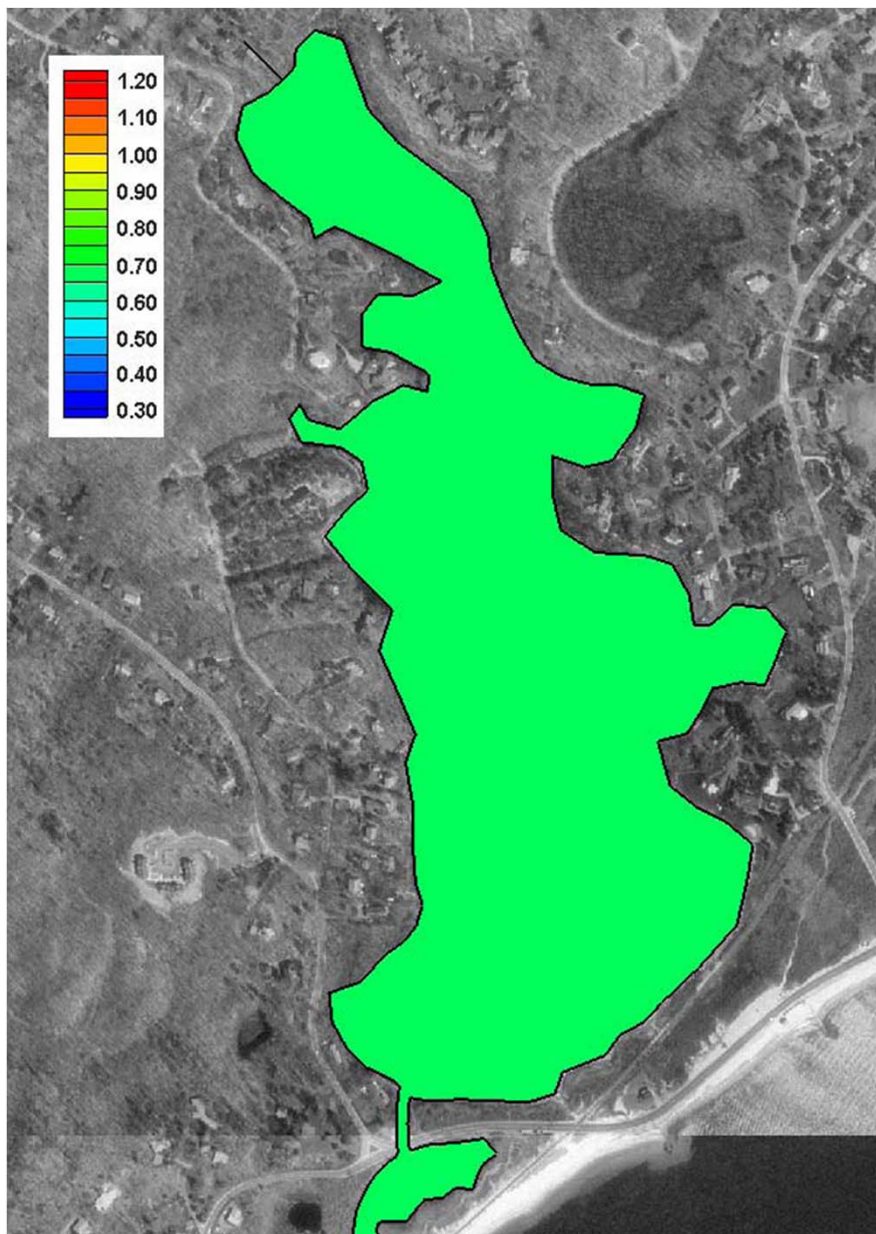
Buildout Conditions: Fiddler Cove and Rands Harbor



Contour plot of **modeled total nitrogen concentrations (mg/L)** in Oyster Pond, for no anthropogenic loading conditions.

(Source: MEP 2006)

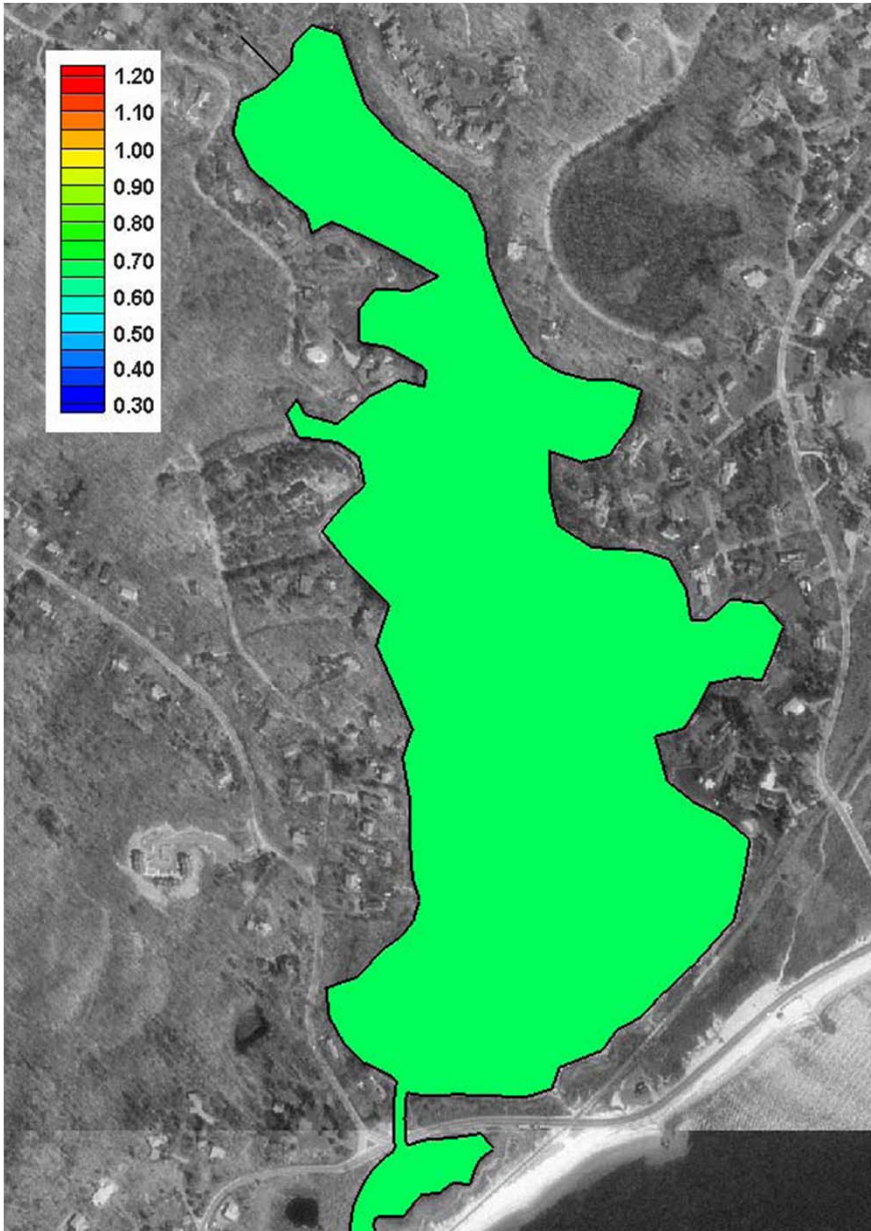
Pre-Colonial Conditions: Oyster Pond



Contour plot of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Oyster Pond.

(Source: MEP 2006)

Present Conditions: Oyster Pond



Contour plot of **modeled total nitrogen concentrations (mg/L)** in Oyster Pond, for projected build-out loading conditions.

(Source: MEP 2006)

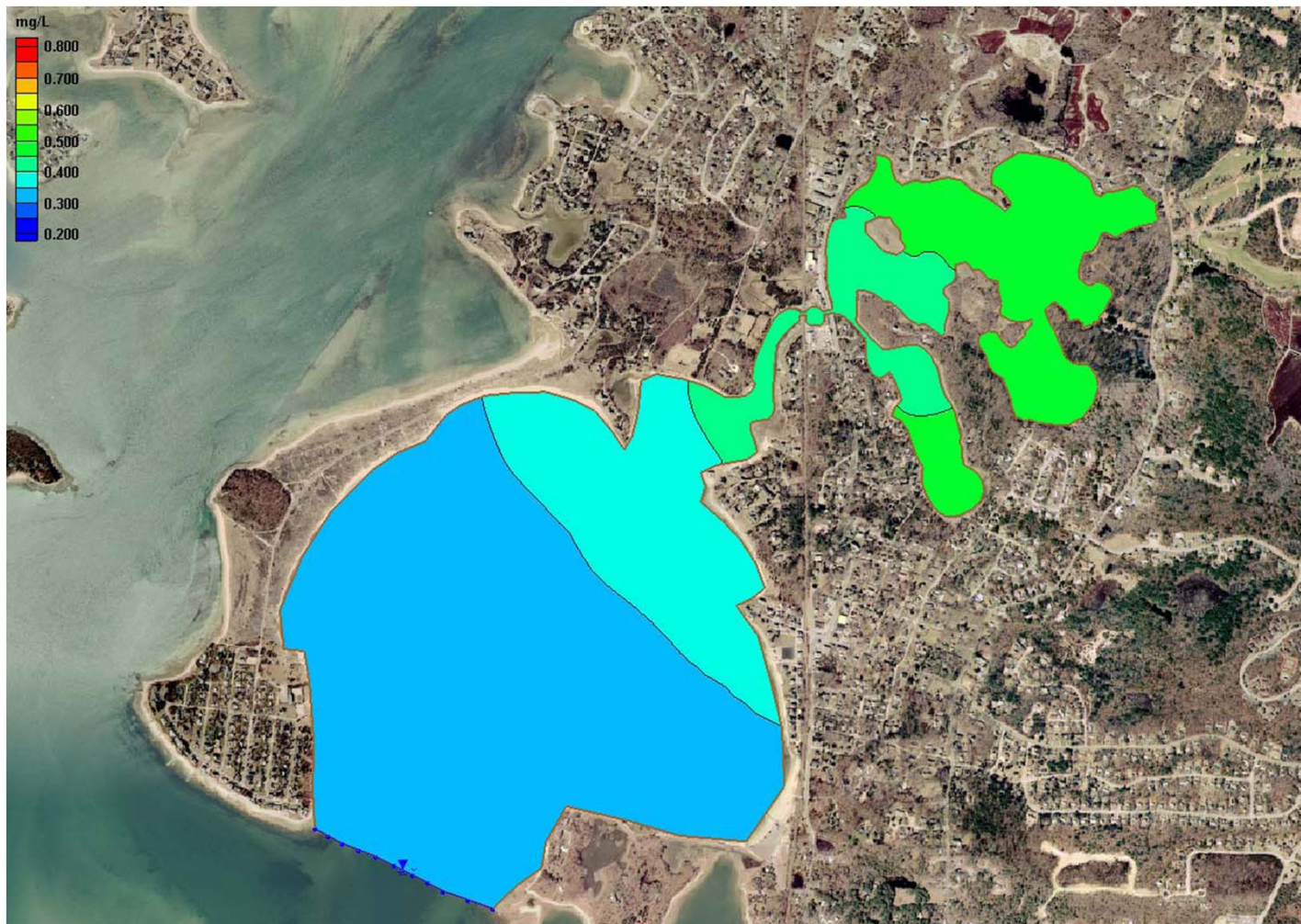
Build-out Conditions: Oyster Pond



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Phinney's Harbor estuary system, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Phinney's Harbor estuary system (PH4) is shown.

(Source: MEP 2006)

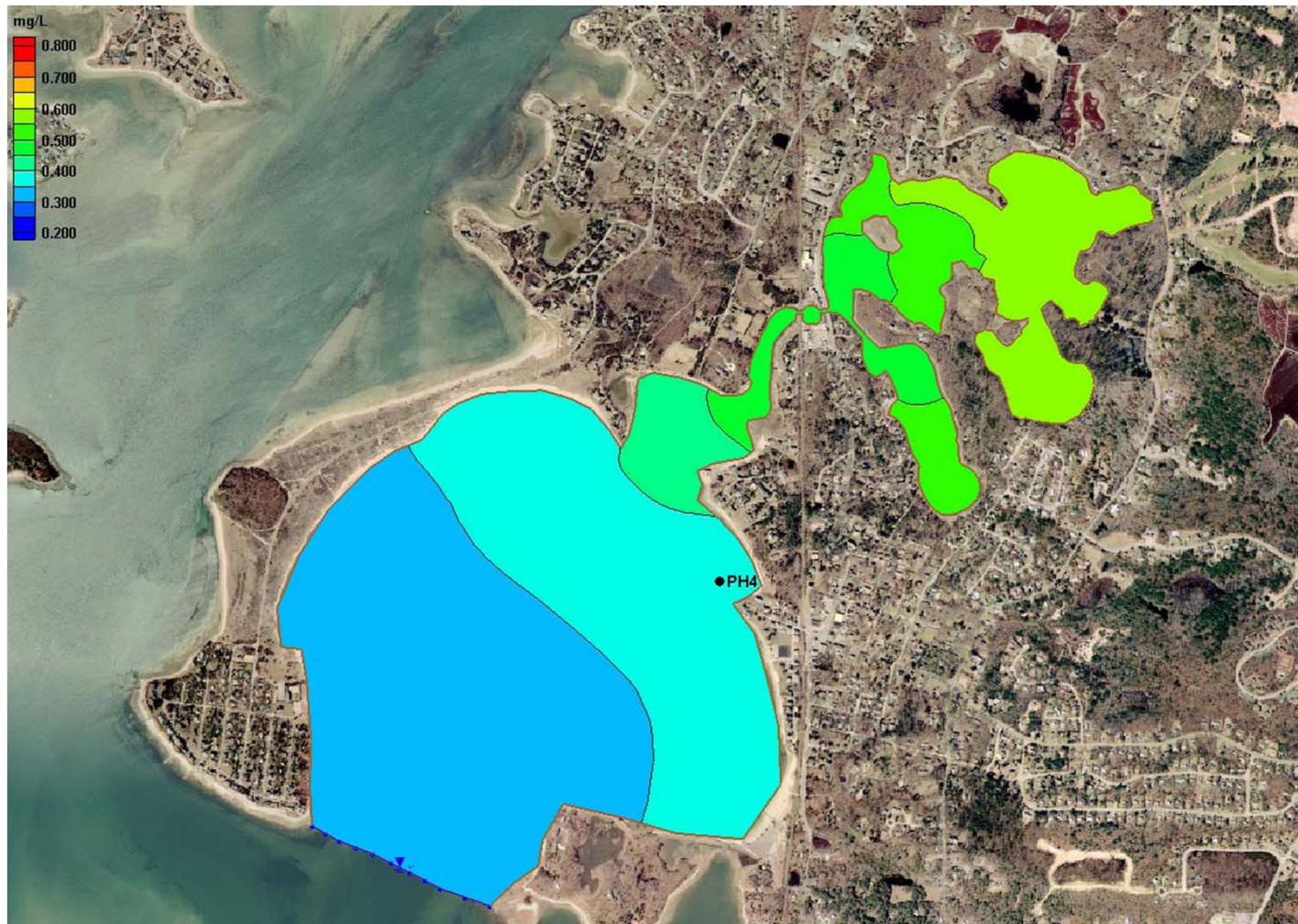
Pre-Colonial Conditions: Phinney's Harbor, Back River & Eel Pond



Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario and the bathymetry, for Phinney's Harbor system. The approximate location of the sentinel threshold station for Phinney's Harbor estuary system (PH4) is shown.

(Source: MEP 2006)

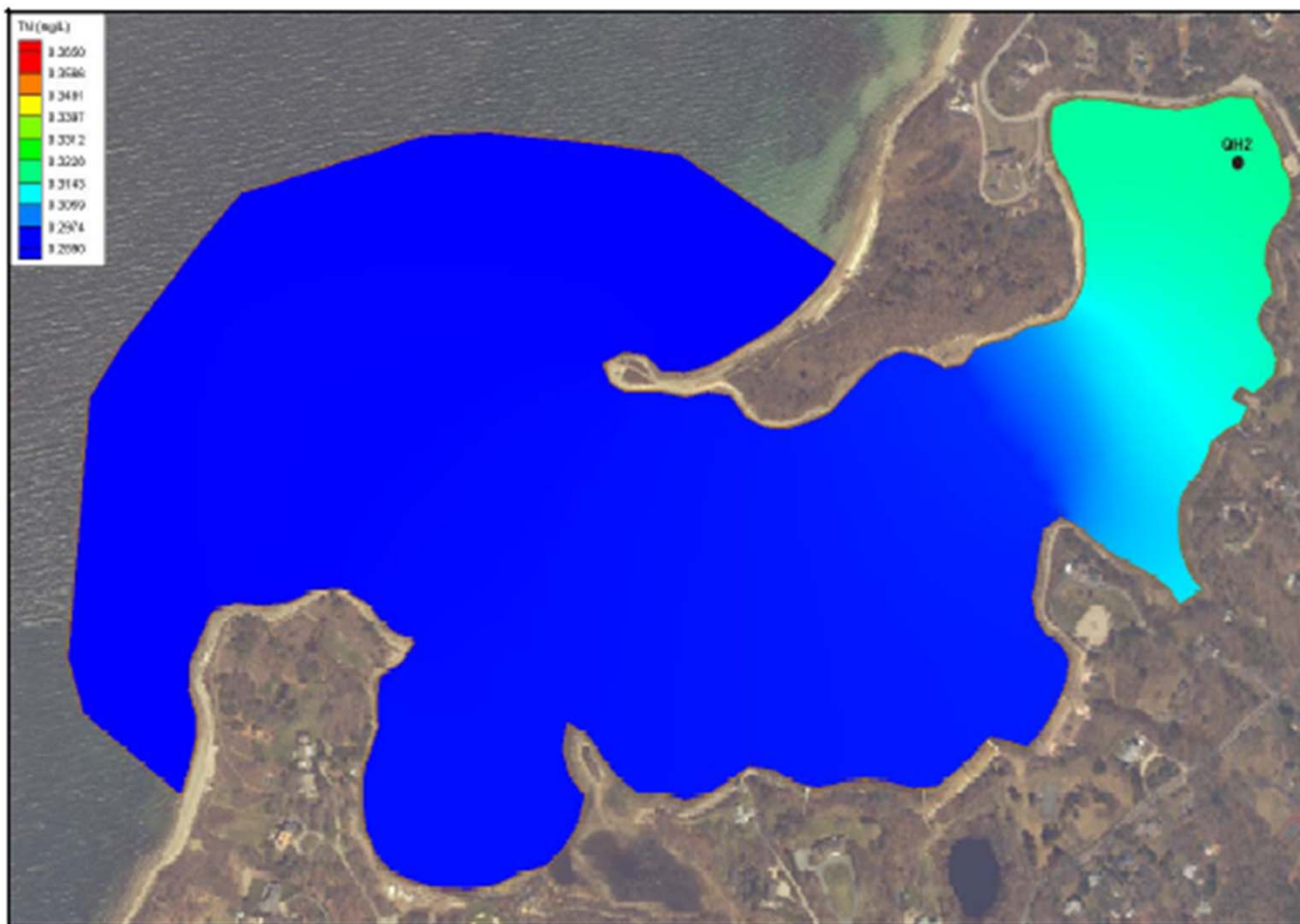
Present Conditions: Phinney's Harbor, Back River & Eel Pond



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Phinney's Harbor estuary system, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Phinney's Harbor estuary system (PH4) is shown.

(Source: MEP 2006)

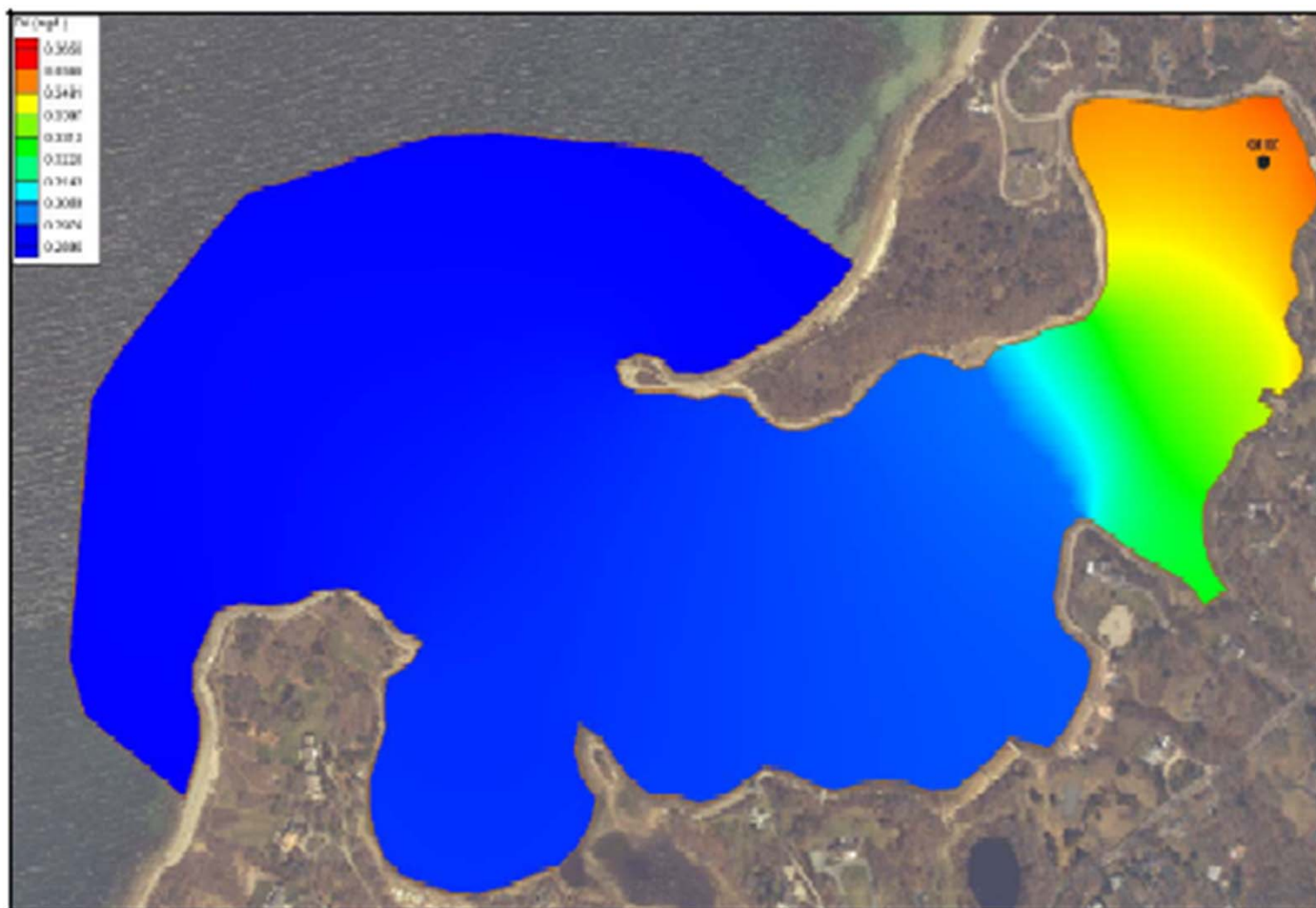
Build-out Conditions: Phinney's Harbor, Back River & Eel Pond



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Quissett Harbor System, for no anthropogenic loading conditions and bathymetry. The approximate location the sentinel threshold station for Quissett Harbor System (QH2) is shown.

(Source: MEP 2013)

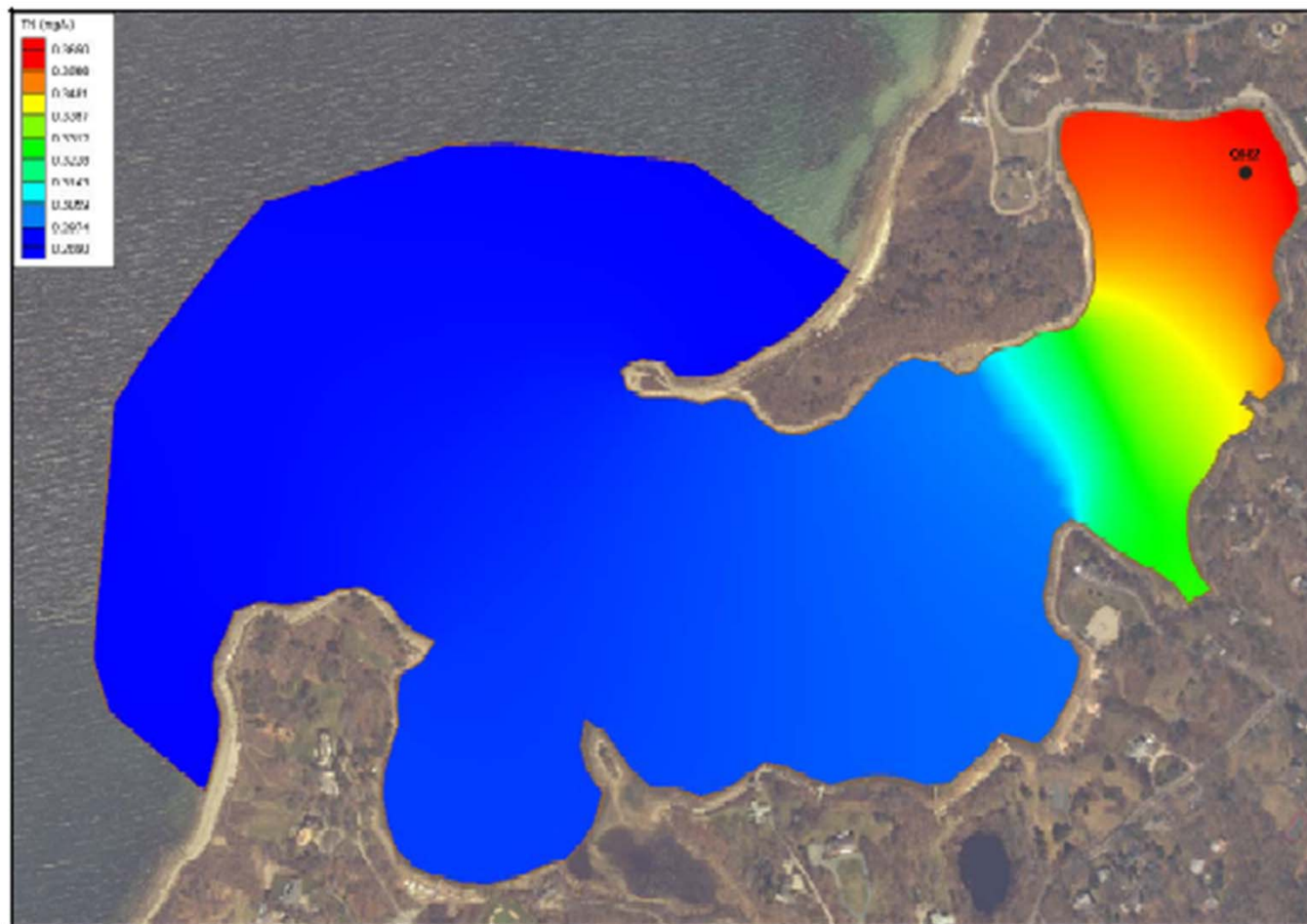
Pre-Colonial Conditions: Quissett Harbor



Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Quissett Harbor System. The approximate location the sentinel threshold station for Quissett Harbor System (QH2) is shown.

(Source: MEP 2013)

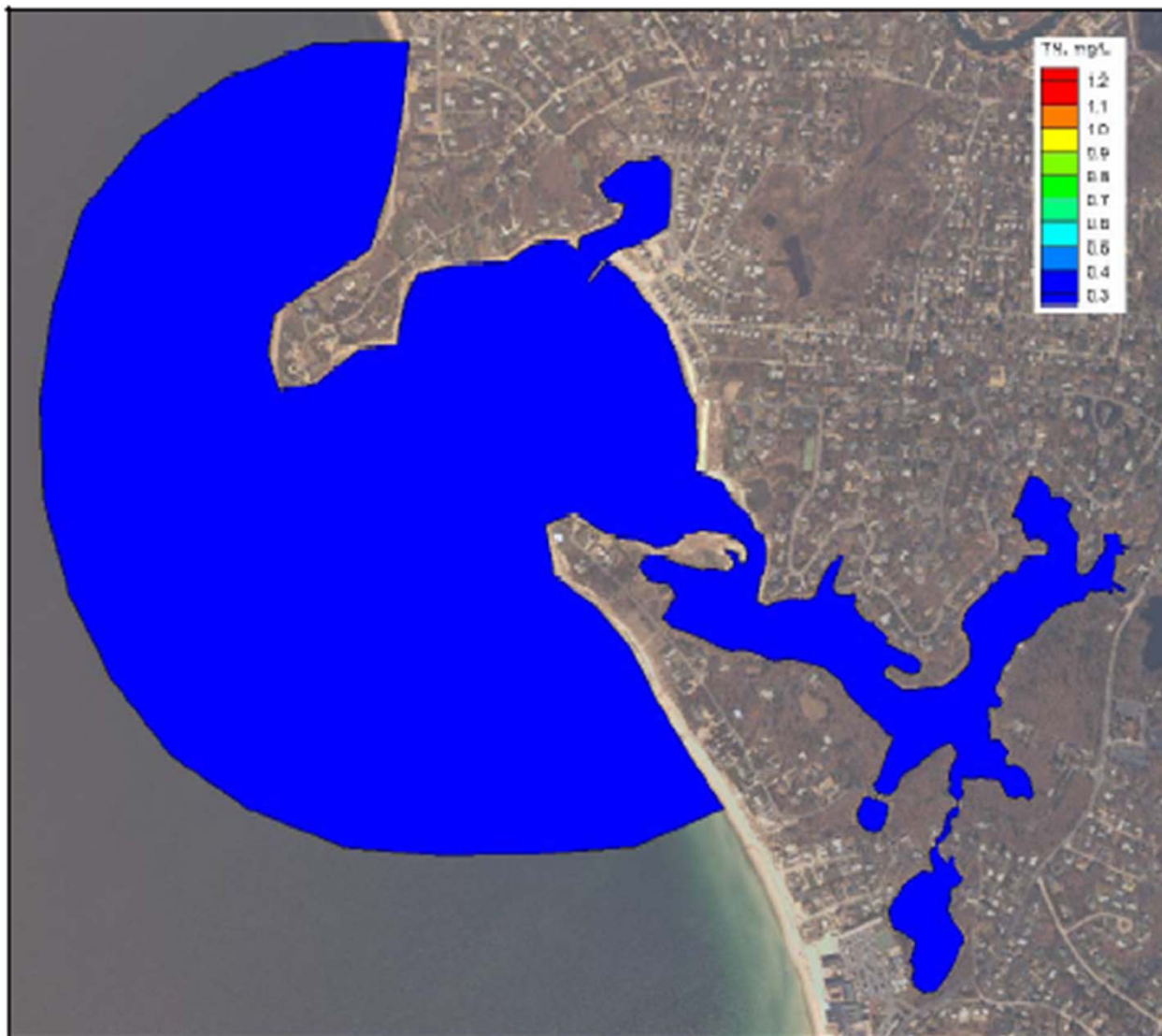
Present Conditions: Quissett Harbor



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Quissett Harbor System for projected build-out loading conditions, and bathymetry. The approximate location the sentinel threshold station for Quissett Harbor System (QH2) is shown.

(Source: MEP 2013)

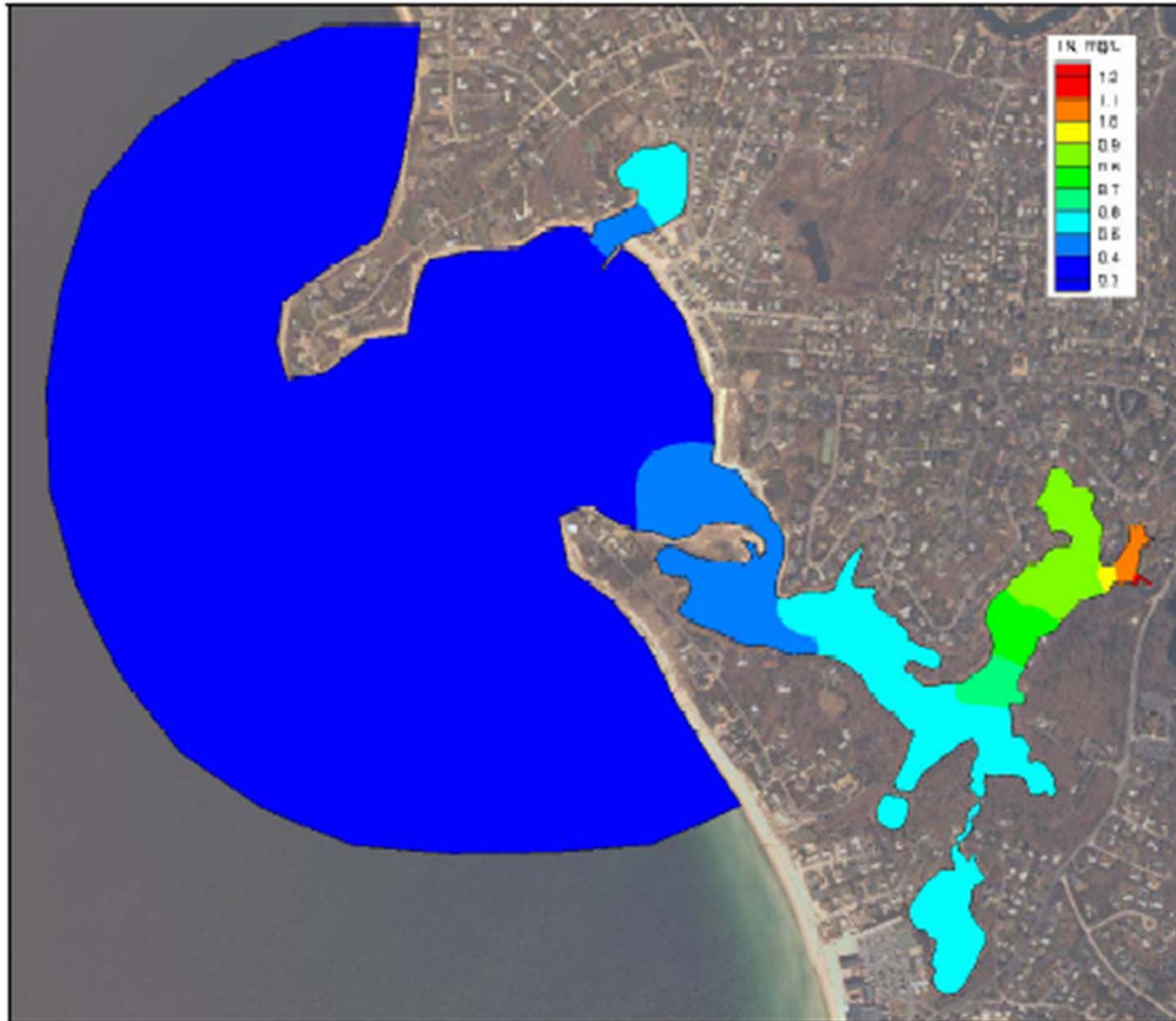
Build-out Conditions: Quissett Harbor



Contour plot of **modeled total nitrogen concentrations (mg/L)** in Wild Harbor, for no anthropogenic loading conditions.

(Source: MEP 2013)

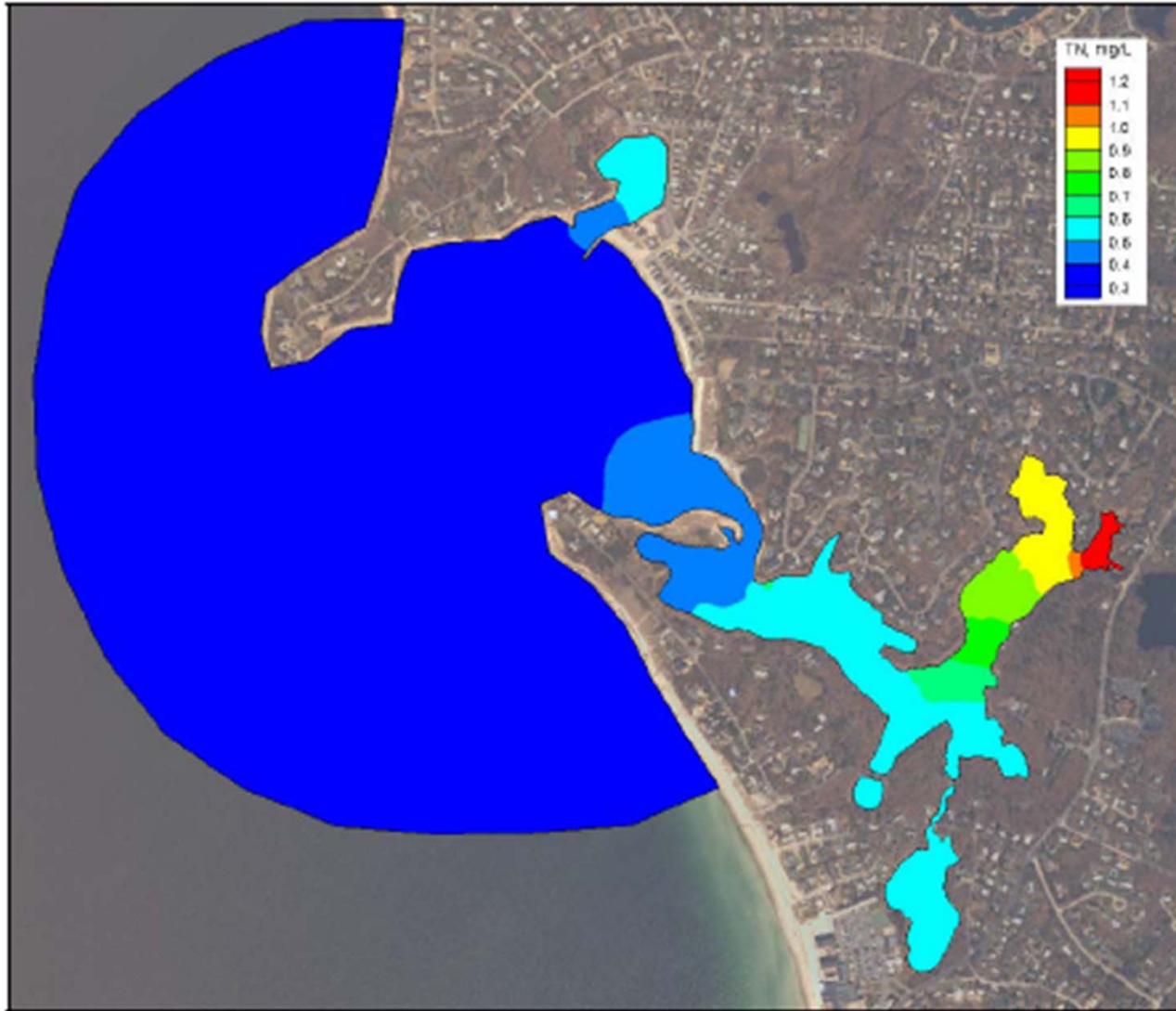
Pre-Colonial Conditions: Wild Harbor



Contour plot of **average total nitrogen concentrations** from results of the present conditions loading scenario, for the Wild Harbor System.

(Source: MEP 2013)

Present Conditions: Wild Harbor



Contour plot of **modeled total nitrogen concentrations (mg/L)** for results of the projected buildout loading scenario, for the Wild Harbor System.

(Source: MEP 2013)

Present Conditions: Wild Harbor


Nitrogen Problem


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway




 Roads

 Structures





 Ponds

Nitrogen

Water Quality Stations






-  Healthy
-  Healthy/Moderately Impacted
-  Healthy/Significantly Impacted
-  Moderately Impacted
-  Moderately Impacted/Significantly Impacted
-  Significantly Impacted
-  Significantly Impacted/Significantly Degraded
-  Significantly Degraded

Yearly Nitrate Concentration Averages

-  0 - 0.5 mg/l **in Public Water Supply Wells**
-  0.5 - 1 mg/l
-  1 - 2.5 mg/l
-  2.5 - 5 mg/l






Embayments with Removal Target

Total NLoad Percent Removal

-  0 %
-  1 - 52 %
-  53 - 72 %
-  73 - 86 %
-  87 - 100 %

Subwatersheds with Removal Target

Total NLoad Percent Removal

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


Eelgrass Extent


Base Map

 Town Lines


 Rivers

Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway


 State Highway

 Roads

 Structures

 Ponds

Eelgrass

 Eelgrass Extent


Phosphorus Problem


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway

 Roads

 Structures


 Ponds


Phosphorus


Priority Ponds

Trophic Status

 Eutrophic *Most Impacted*


 Mesotrophic

 Oligotrophic *Least Impacted*

 Not Interpreted


Title 5 Compliance Issues


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway


 State Highway


 Roads

 Structures

 Ponds


Existing Conditions

 Approx. Locations of Loans Issued for Title 5 Repair

 Potential Title 5 Compliance Issues

 Wastewater Treatment Facility

 Groundwater Discharge Points

 Sewered Parcels

Existing & Proposed Solutions



Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond

Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor


Existing Infrastructure


Base Map

 Town Lines

 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway


 State Highway


 Roads

 Structures

 Ponds


Existing Conditions

 Approx. Locations of Loans Issued for Title 5 Repair

 Potential Title 5 Compliance Issues

 Wastewater Treatment Facility

 Groundwater Discharge Points


 Sewered Parcels

Enhanced Attenuation Sites

 Pipe


 Stormwater


Public Supply Wells

 Public Water Supply Well

 Small Volume Wells, Non-Transient


 Proposed Public Water Supply Well

 Surface Water Supply

 Small Volume Wells, Transient

Proposed Infrastructure


Base Map

 Town Lines

 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway

 Roads

 Structures

 Ponds

Proposed Conditions

Natural Attenuation Sites

 Bridge

 Culvert


 Inlet

 Pipe


 Sewer Alternatives


 Stormwater


CWMP Sewershed Phasing


 No Date Set


Phase Date

 2001 - 2010

 2011 - 2020

 2021 - 2030

 2031 - 2040

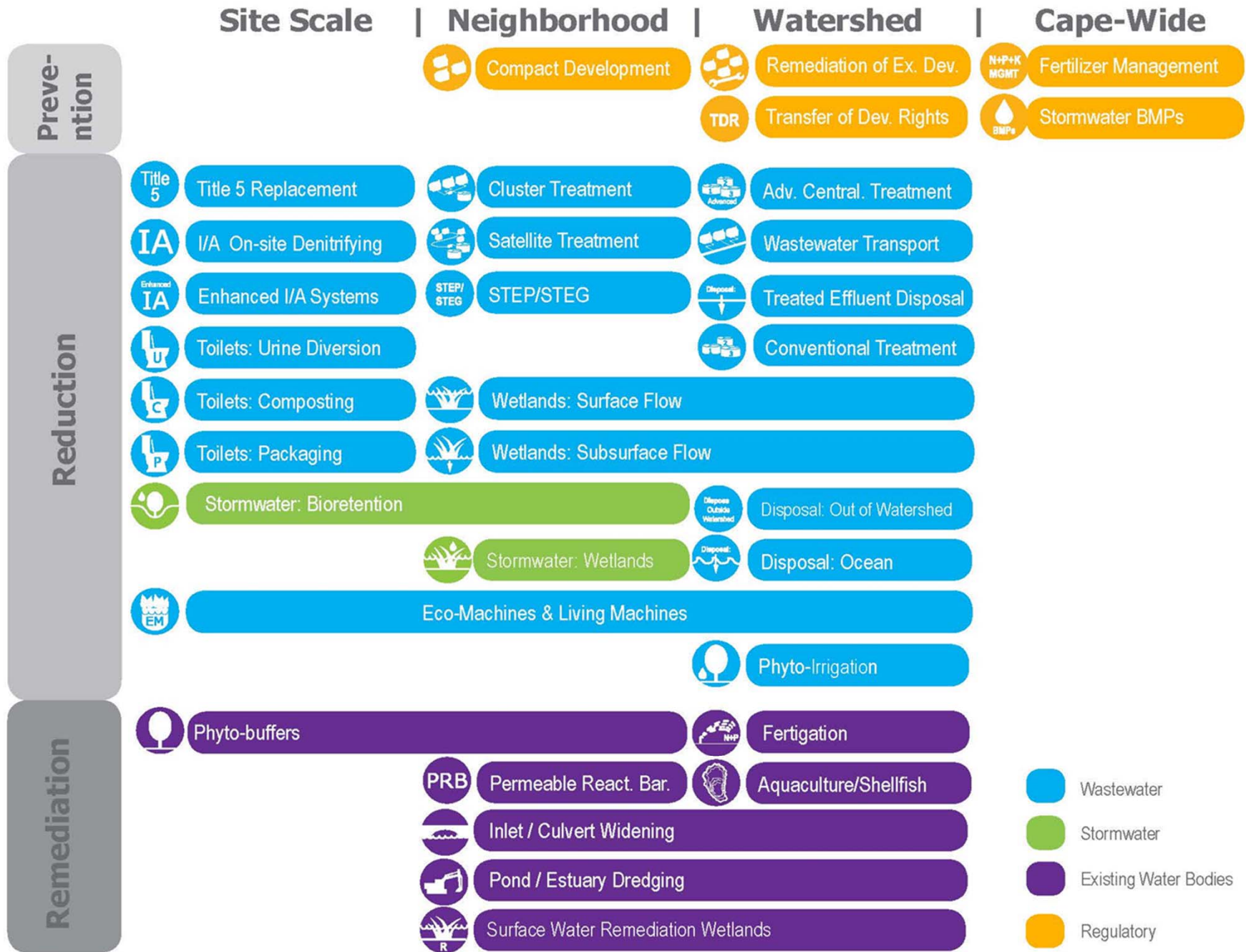
 2041 - 2050



Framework for Addressing Solutions Moving Forward

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond

Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor



- Wastewater
- Stormwater
- Existing Water Bodies
- Regulatory

Alternatives: Screening Method

1
2
3
4
5
6
7



Wastewater



Existing Water Bodies



Regulatory

Targets/ Goals

Present Load: X kg/day **Target:** Y kg/day **Reduction Required:** N kg/day

Composite Target Areas

- A. High Nitrogen Reduction Areas
- B. Pond Recharge Areas
- C. Title 5 Problem Areas

Low Barrier to Implementation

- A. Fertilizer Management
- B. Stormwater Mitigation



Watershed/Embayment Options

- A. Permeable Reactive Barriers
- B. Inlet/Culvert Openings
- C. Constructed Wetlands
- D. Dredging



Alternative On-Site Options

- A. Eco-toilets (UD & Compost)
- B. I/A Technologies
- C. Enhanced I/A Technologies
- D. Shared Systems



Priority Collection/High-Density Areas

- A. Greater Than 1 Dwelling Unit/acre
- B. Village Centers
- C. Economic Centers
- D. Growth Incentive Zones



Supplemental Sewering



All materials and resources for the Herring River Group will be available on the Cape Cod Commission website:

<http://watersheds.capecodcommission.org/index.php/watersheds/upper-cape/upper-cape-west-south>

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
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Little Sippewisset Marsh
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Oyster Pond

Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor

**Cape Cod 208 Area Water Quality Planning
Upper Cape West and South Working Group**

**Meeting One
Tuesday, September 24, 2013
Falmouth Town Hall - 59 Town Hall Square, Falmouth, MA 02540**

DRAFT SUMMARY NOTES

ACTION ITEMS

The following action items were captured during the meeting:

- Create a distinct chronology for MMR
- Get greater clarity about how to fold MMR into the process
- Address the threshold/"*de minimis*" issue
- Incorporate the sticky notes that were posted on the chronologies
- Address the seasonal baseline issue
- Check on the potentially incorrect eelgrass data
- When referring to the amount of nitrogen that needs to be removed to achieve TMDL, list the units in absolute kilograms or pounds as well as relative percentages
- Distribute the group members' email addresses to all members

WELCOME AND INTRODUCTIONS

Ms. Patty Daley of the Cape Cod Commission opened the meeting with a welcome. All of the representatives around the table introduced themselves. Appendix A contains a list of the group members who were in attendance.

REVIEW OF GOALS AND PROCESS

Ms. Patty Daley, Cape Cod Commission (Commission), introduced the goals of the meeting and provided background on the process of updating the 208 plan. The process will focus on 21st century problems such as nitrogen, phosphorus, growth, and Title 5 limitations. Ms. Daley stated that the goal of today's meeting was: To review and develop shared understanding of the characteristics of these watersheds, the work done to date, existing data and information available, and how to apply all of this to planning for water quality improvements for these watersheds moving forward.

Ms. Daley explained that the Planning Process: will be watershed based, will engage stakeholders, and maximize the benefits of local planning. She stated that the Commission is not searching for an optimal plan for the Cape, but rather seeking to generate a series of approaches in each watershed that meet water quality standards.

Ms. Daley reviewed the 208 Planning Process, including the following basic timeline:

- July – Goals, Work Plan, and Roles

- August – Affordability/Financing
- September (now) – Baseline conditions
- October – Technology Options Review
- December – Watershed Scenarios

Ms. Daley noted the other groups and organizations involved in the process: the Advisory Board; the Regulatory, Legal and Institutional Work Group; the Technical Advisory Committee of the Cape Cod Water Protection Collaborative which will give input on the potential technologies; and, the Technical Panel, comprised of state, national, and international experts who will give high-level review of the potential technologies.

LOCAL PROGRESS TO DATE

Ms. Daley reviewed the chronologies for Falmouth, Sandwich, and Bourne. The chronologies include notation of: regulatory/town meeting actions, appropriations, reports/studies, infrastructure/plan implementation, and negative votes/stopped actions.

Working Group members were given time to examine timelines of water-quality developments for the Upper Cape West and South towns (Falmouth, Sandwich, and Bourne). Mr. Thompson, the facilitator, asked the Working Group to provide input about amendments and additions that should be made to the timelines. Working Group members provided the following input:

- Create a separate chronology for the Massachusetts Military Reservation (MMR); add the Base's history of sewerage.
- Clarify exactly how many square miles of the watershed are covered by MMR.
- Correct the mistake on the Sandwich chronology regarding Fiddler's Cove.
- Include stormwater in the process.
 - The Commission responded that it will be looking at stormwater, fertilizers, and other issues. They will be covered in more detail later in the meeting.
- Although the Cape Cod Canal watershed is a direct discharge watershed, the Canal needs attention because it could be seen as a watershed to Upper Buzzard's Bay, which is experiencing higher nutrient levels and plankton blooms.
 - The Commission responded that, while this process focuses on embayment areas, they will be planning holistically to include the direct discharge watersheds as well.
- Change the title of the "Nitrogen removal required" slide in the presentation to reflect the fact that the slide only denotes embayments which have been previously studied; there will be other embayments that will need action and this should be made clearer on the slide.
- Other specific notes and corrections were listed on sticky notes collected by the Commission.
- Address the "*de minimis*" factor where one small parcel of a watershed nicks into another town. Set a definite limit in order to decide when a town should be involved.

Further comments on MMR

The working group discussed MMR in more detail. The group did not have exact specifications, but MMR might comprise a quarter or a third of the watershed. Group members voiced their appreciation that an MMR representative is part of the Working Group. The working group agreed

that it and the Commission need to get clarity on how they will fold MMR into the 208 update process. Group members also mentioned that the base cemetery should be considered in the planning. Ms. Daley added that there has been a study of the wastewater treatment plant at the Base and discussion of possible municipal use. There may be opportunities for disposal sites and the plant.

BASELINE CONDITIONS

Ms. Daley and the Cape Cod Commission presented slides on the water quality challenges the Cape faces, and some of the data the Commission uses for its modeling and analysis. The working group members were asked to identify anything they believed was missing from the data, as well as any differences of opinion they had with the Commissions' analysis or approach. The Upper Cape West and South towns encompass 44.7 square miles. Ms. Daley noted that the watersheds included in Falmouth's WWMP were not reflected in these slides.

Mr. Jay Detjens of the Commission covered the natural features slide and GIS layers, including information about the Sagamore Lens Water Table, cranberry bogs, DEP wetlands layer, vernal pools, and the 2013 SLOSH (Sea, Lake and Overland Surges from Hurricanes) update. Ms. Daley and Mr. Detjens introduced the managed surfaces slide and GIS layers and explained that this category includes man-made and natural surfaces including lawns and pavement. Tracking lawns helps them figure out where fertilizer might be in use. The managed ground use layer includes structures, driveways, roads, gravel pits, and other disturbed areas. Ms. Daley described the different layers included in the regulatory maps, including Growth Incentive Zones. There is one growth incentive zone in this watershed, in Bourne. Mr. Detjens discussed the land use change layers that show how much growth has occurred from 1951 to 1971 and to 1999. These data come from UMass Dartmouth. Mr. Detjens walked through the density maps and explained that density is measured in dwelling units per acre in a quarter mile grid. Density is important primarily because it markedly impacts the cost of collecting wastewater for treatment. Collecting from individual units can be up to 70% of the cost of treatment. Density will play into how new growth occurs on the Cape.

Ms. Daley and Mr. Detjens turned next to buildout. Ms. Daley explained every buildout that is done produces very different outcomes depending on the assumptions and parameters used. The Commission has done a Cape-wide buildout for this process because they need to have a standardized measurement for planning across watersheds. The Commission has estimated that 30% growth across the Cape will increase capital costs by 40%. The buildout that they will be using in this process takes into account current zoning about new growth on undeveloped lots and the redevelopment potential of built lots. Ms. Daley noted that the Cape needs growth for its economic health, while also determining how to meet water quality requirements in the future.

A group member asked if the Commission thinks that 30% growth is the most likely number. Ms. Daley responded that between 20%-30% looks likely in most towns. Group members asked if the 40% increase in costs referred to sewerage and if it covered operation and maintenance costs. Ms. Daley responded that this number was based on sewerage, but the Commission is open to many different solutions; 40% only includes capital costs not operation and maintenance. A working group member commented that buildout will be impacted by what motivations people have to move to the Cape in the future, including employment opportunities, commuter rail, and other factors. Ms. Daley made a

distinction between population and buildout of buildings. Homeowners may decide that the Cape is a desirable place to build a second home, which would not translate into year-round population numbers.

Ms. Daley discussed demographics and stated that this area has a population of 16,516. The data comes from the 2010 census. Ms. Daley stated that, related to demographics, home value will affect what types of wastewater solutions are affordable for Cape Codders and how the issue is framed to the State and Federal government. Mr. Detjens explained that seasonality is one of the main demographic issues. The Commission has been analyzing many different pieces of data over the years to get a sense of seasonality, but given the complexities of measurement, it does not have a completely accurate picture of the issue. A working group member added that seasonality is complicated by the fact that some people who live here in the summer rent their house in the winter, so there is still someone living there year-round. Working group members requested that the Commission clarify whether the 16,516 population number includes the people living on MMR or not. A working group member stated that the population of MMR might change in the future with privatization and with the military encouraging people to live off base.

Ms. Daley described the key challenges facing Cape Cod and the Upper Cape West and South area with regard to wastewater treatment and water quality. She explained that the Massachusetts Estuaries Project (MEP) provides water quality, nutrient loading, and hydrodynamic information,. Ms. Daley explained the distinction between non-controllable nitrogen loads that cannot be impacted by the 208 plan versus controllable nitrogen loads available for reduction. A working group member asked whether the working group would be discussing the MEP numbers as part of this process. Ms. Daley responded that some watershed groups will be having a deeper discussion about them. For the purposes of this planning effort, the Commission will be aiming to meet the TMDLs that are based on the MEP work. The MEP was peer reviewed and found accurate for planning purposes. Regulatory law also requires that we meet the TMDLs based upon the MEP.

The working group discussed the seasonal nature of water quality and ecological problems, including source reduction versus seasonal reduction and the need to treat peak flows. A group member noted that the seasonal nature of the problem needs to be understood as part of the baseline data. The group member stated that, for example, Falmouth experiences more serious water quality issues during the summer months, which may mean that a shellfish aquaculture installation may be a good solution, even though it is not active in the winter. Ms. Daley responded that ecological solutions are being discussed in other towns as well and the Commission is interested in alternative options like this.

Mr. Detjens displayed GIS layers that specified the locations of the water quality testing stations used for the MEP studies. Ms. Daley described the change over time in water quality conditions in the Upper Cape West and South area, showing GIS layers for pre-colonial, present, and buildout conditions. In most instances the upper reaches of the embayments have diminishing water quality with current and anticipated development.

Mr. Detjens displayed GIS layers for the estimated extent of eelgrass in 1951, 1995, and 2012. He explained that the presence of eelgrass correlates well with the health of the ecosystem. The 2012 layer showed that there was no eelgrass on the south and west shores. The working group members discussed the extent of eelgrass in these areas and agreed that some eelgrass exists along the south and west shores. They requested that the Commission verify the data for the GIS layer. Ms. Daley explained that phosphorus is the main water quality problem in the Cape's lakes and ponds. The GIS layer includes information about which ponds are eutrophic (most impacted), mesotrophic, and oligotrophic (least impacted).

Mr. Detjens explained that the Title 5 compliance GIS layer displays locations where homes have applied for a loan or assistance to make system repairs. It also displays places where there has been a potential Title 5 compliance issue. A working group member commented Title 5 currently only takes into account bacteria levels, not nitrogen load although in the future Title 5 may cover the latter as well. Mr. Detjens displayed both the existing and proposed infrastructure GIS layers. He clarified that an attenuated area is an area where they have already installed natural attenuation strategies such as catch basins, leaching chambers, etc. The infrastructure GIS layers are a work in progress so he asked the working group members to share their knowledge of local infrastructure projects with the Commission. A working group member pointed out that many of the infrastructure projects listed do not serve a nitrogen reduction function. Ms. Daley responded that this layer simply tries to capture all water quality projects. Another participant added that it is helpful to be aware of all infrastructure projects because existing infrastructure can sometimes be modified to be nitrogen-reducing. Group members also discussed the issue of affordability, noting that it is important to be aware of the impacts the 208 update will have on lower income homes.

A working group member raised the issue of nutrient recovery, stating that, although the discussion thus far has mainly revolved around removing nutrients, resources recovery should play a bigger part in the working group's conversation. Working group members also raised concerns about whether the 208 update would take into account water pollution sources such as pharmaceuticals.

NEXT STEPS

Ms. Daley reviewed the framework for the upcoming second and third meetings. She discussed the technologies matrix and explained that it will be dealt with more thoroughly in meeting two. The technologies are arranged by scale, including: site/parcel level, neighborhood, watershed, and Cape-wide. The Technical Advisory Committee of the Cape Cod Water Protection Collaborative and the Technical Panel are reviewing the technologies. They will identify the land use characteristics for which each technology is appropriate, what levels of nitrogen removal each might achieve, and the lifecycle costs. Information about each of the technologies will be distributed before the second meeting.

Ms. Daley also walked through the steps through which the group will progress during the three meetings:

1. Discussing target goals so we know the goals we need to reach.
2. Looking at high nitrogen reduction areas, Title 5 problem areas, and pond recharge areas.

3. Examining solutions that are easier to implement, such as fertilizer management and stormwater mitigation. Golf courses are already doing a lot of fertilizer management, and every town on the Cape is engaged in an active stormwater mitigation process.
4. Discussing innovative and lower-cost solutions, such as permeable reactive barriers, inlet/culvert openings, constructed wetlands, and dredging.
5. Looking at alternative on-site options such as eco toilets, I/A technologies and shared systems, among others.
6. Examining priority collection/high-density areas like village centers, economic centers, etc.
7. Considering supplemental sewerage.

She stated that the Commission will attempt to look at all potentially feasible options rather than going straight to sewerage. A group member asked where shellfish fit in to these numbered steps. Ms. Daley responded that they fall under number four: innovative and lower-cost solutions.

A group member raised the issue of Cape Cod's aging population and commented that this population may not readily pay increased taxes for something that will primarily affect future generations. Group members commented that affordability will have to be at the forefront of the whole process and, in order to instill altruism throughout the Cape population, the process will have to encourage everyone to work together and take ownership over the issue. For instance, encouraging all citizens to make sure they're not over-fertilizing will help save everyone money down the line.

A group member asked how energy-use issues would be included in the planning process. Ms. Daley responded that the discussion of lifecycle operation and maintenance will touch on energy issues. Additionally, the Commission is working with the Harvard Graduate School of Design, Zofnass program, to create a framework that will help the working group rank each of the technologies and solutions in terms of their sustainability and energy use. Ms. Daley also added that while the Commission is required by regulation to comply with the TMDLs, the working group has input over how significant a role sustainability will play in the 208 update process. Working group members agreed that, during the process, they should consider the large-scale environmental issues at stake, in addition to local water quality issues. A group member reminded everyone that one of Falmouth's town goals is to reduce their carbon footprint by 50% over time.

OPERATING PROTOCOLS

Mr. Thompson reviewed a draft of the operating protocols and asked the group for their feedback. In addition to the official protocols, Mr. Thompson added a few other guidelines:

- Share the floor and other common courtesies
- First, listen to understand
- Keep "beginner's mind." Let expertise inform, not constrain
- Seek opportunities for mutual gain

Mr. Thompson confirmed that working group members could send any comments on the protocols to him and that all of the meeting summaries will be available on the website.

PUBLIC COMMENTS

A participant asked if public comment periods would become more limited as the process progresses. Mr. Thompson replied that meetings two and three would also include a public comment segment at the end. A participant asked what they should do if they feel that there is an interest group who should be at the table but is not present. Mr. Thompson replied that they should inform him and the Commission.

**Appendix A
Attendance**

Name	Affiliation
Cynthia Coffin	Bourne Board of Health
Steve Carr	Pocasset Golf Club
Matt Toomey	Town of Bourne
Hilda Maingay	FEAT
Ron Zweig	WQMC
Earle Barnhart	[Can't read]
Karrin Petersen	Buzzard's Bay Coalition
Virginia Valiela	WQMC
Nathan Jones	Town of Sandwich
Michael Ciaranca	JBCC, CMMRD
Thomas Porece	Decon
Wesley Ewell	Bourne Wastewater Coordinator
Cheryl Holden	F.A.C.E.S.
Gerald Potamis	Falmouth DPW
Sia Karplus	Resident / Science Wares
Charles Passios	Golf
Sallie Riggs	Bourne WW Committee
Mark Rasmussen	BBC
Dan Milz	PhD Candidate, University of Illinois
<i>Staff</i>	
Patty Daley	Deputy Director, Cape Cod Commission
Jay Detjens	GIS Analyst, Cape Cod Commission
Doug Thompson	Facilitator, Consensus Building Institute
Carly Inkpen	Facilitator, Consensus Building Institute