

**Cape Cod 208 Area Water Quality Planning
Three Bays/Centerville River Watershed Working Group**

**Meeting One
Thursday, September 26, 2013 | 8:30 am – 12:30 pm
COMM Fire Headquarters, 1875 Falmouth Road, Centerville, MA**

Meeting Agenda

- 8:30 am Welcome – *Cape Cod Commission*
- 8:35 Introductions, confirm working group membership and participation – *Carri Hulet (Facilitator) 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 – *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 – *Carri Hulet and Working Group*
- 10:00 Presentation and Discussion on Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Scott Horsely (Area Manager), Carri Hulet, and Working Group*
- 10:45 Break
- 11:00 Continuation of Presentation and Discussion – *Scott Horsely (Area Manager), Carri Hulet, and Working Group*
- 11:45 Framework for Moving Forward: Preview Meetings 2 and 3 – *Scott Horsely*
- 12:00 Review/Discuss Process Protocols – *Carri Hulet and Working Group*
- 12:10 Public Comments
- 12:30 Adjourn

Three Bays & Centerville River 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

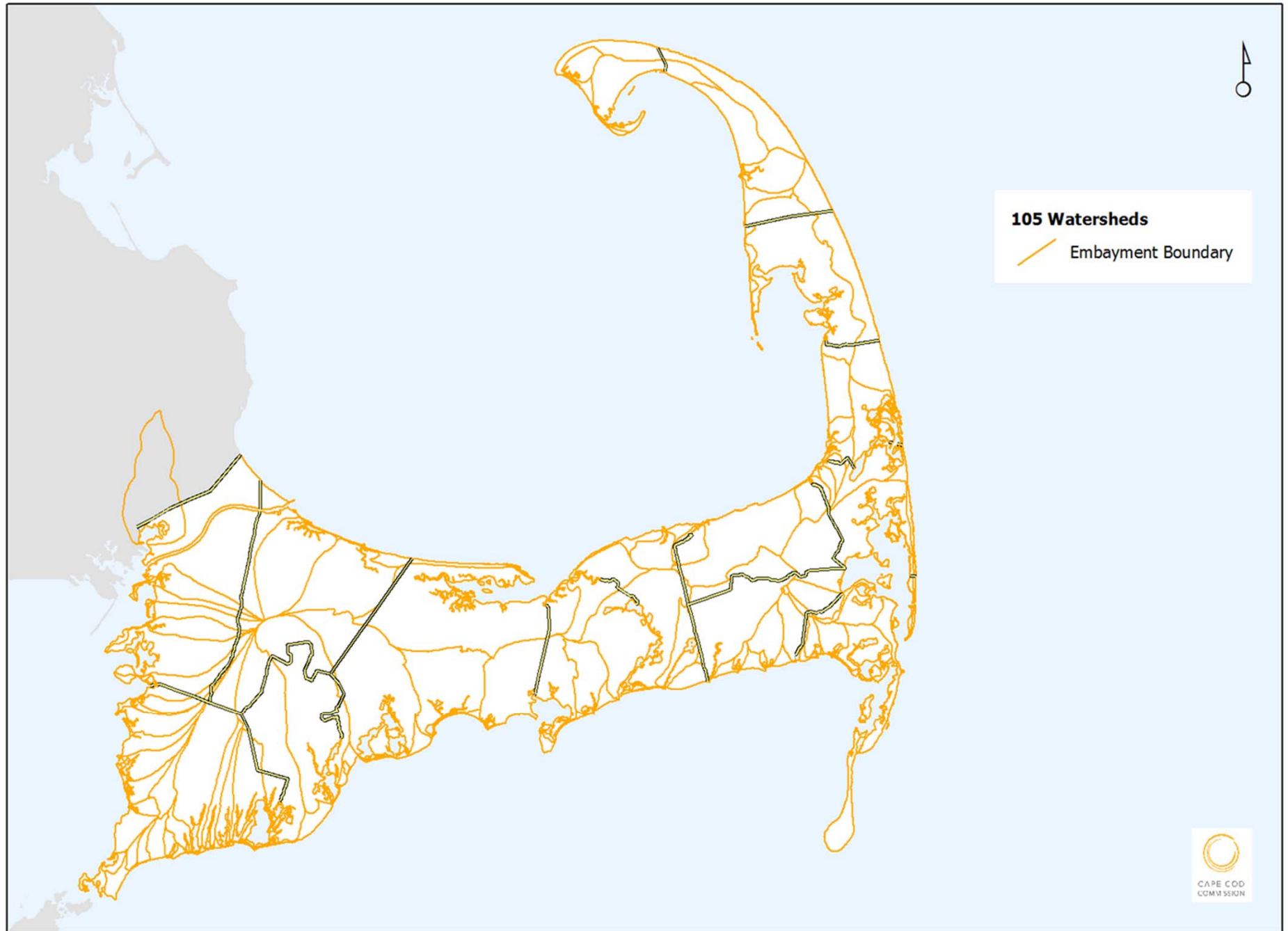
Focus on 21st Century Problems

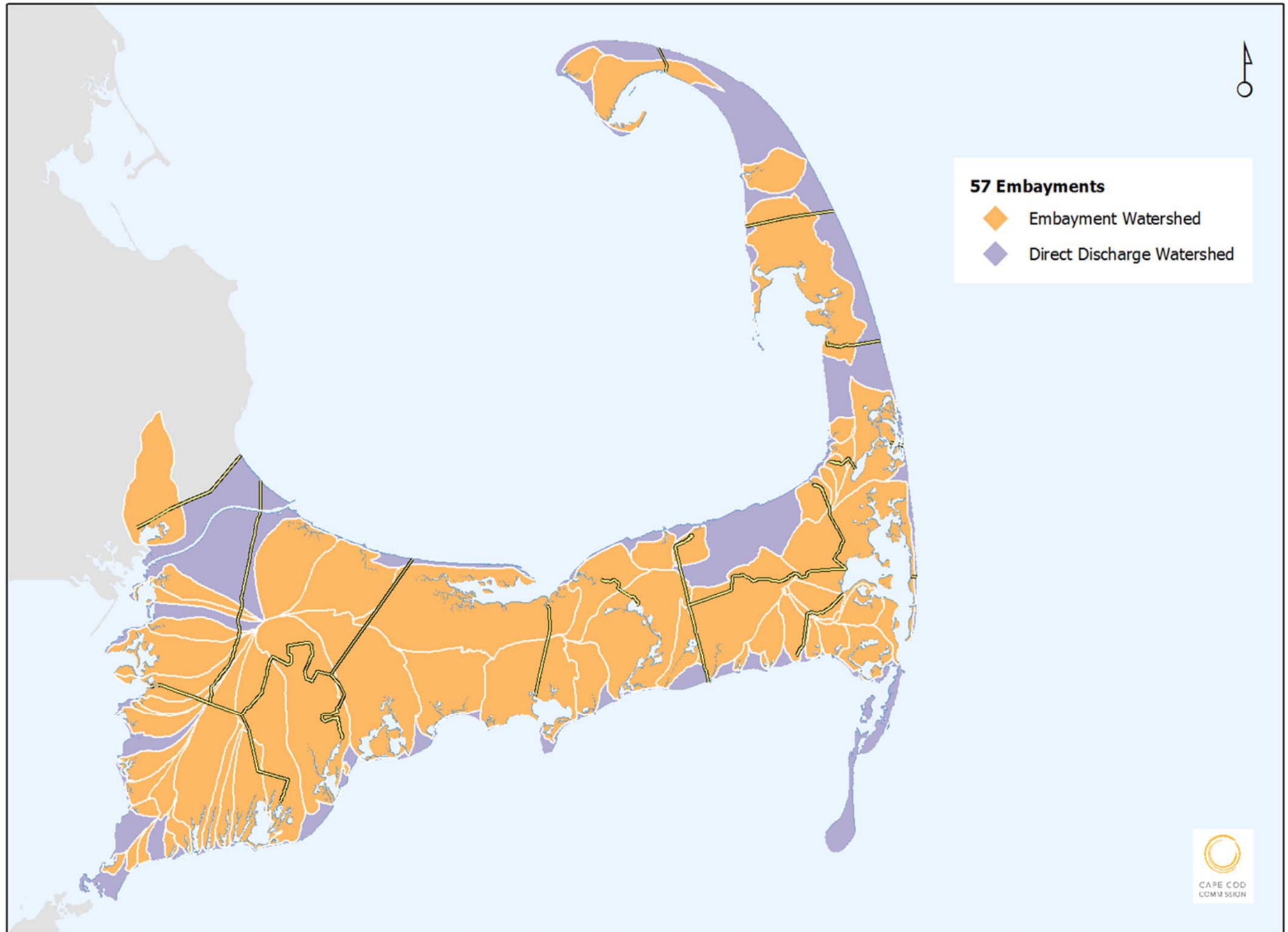


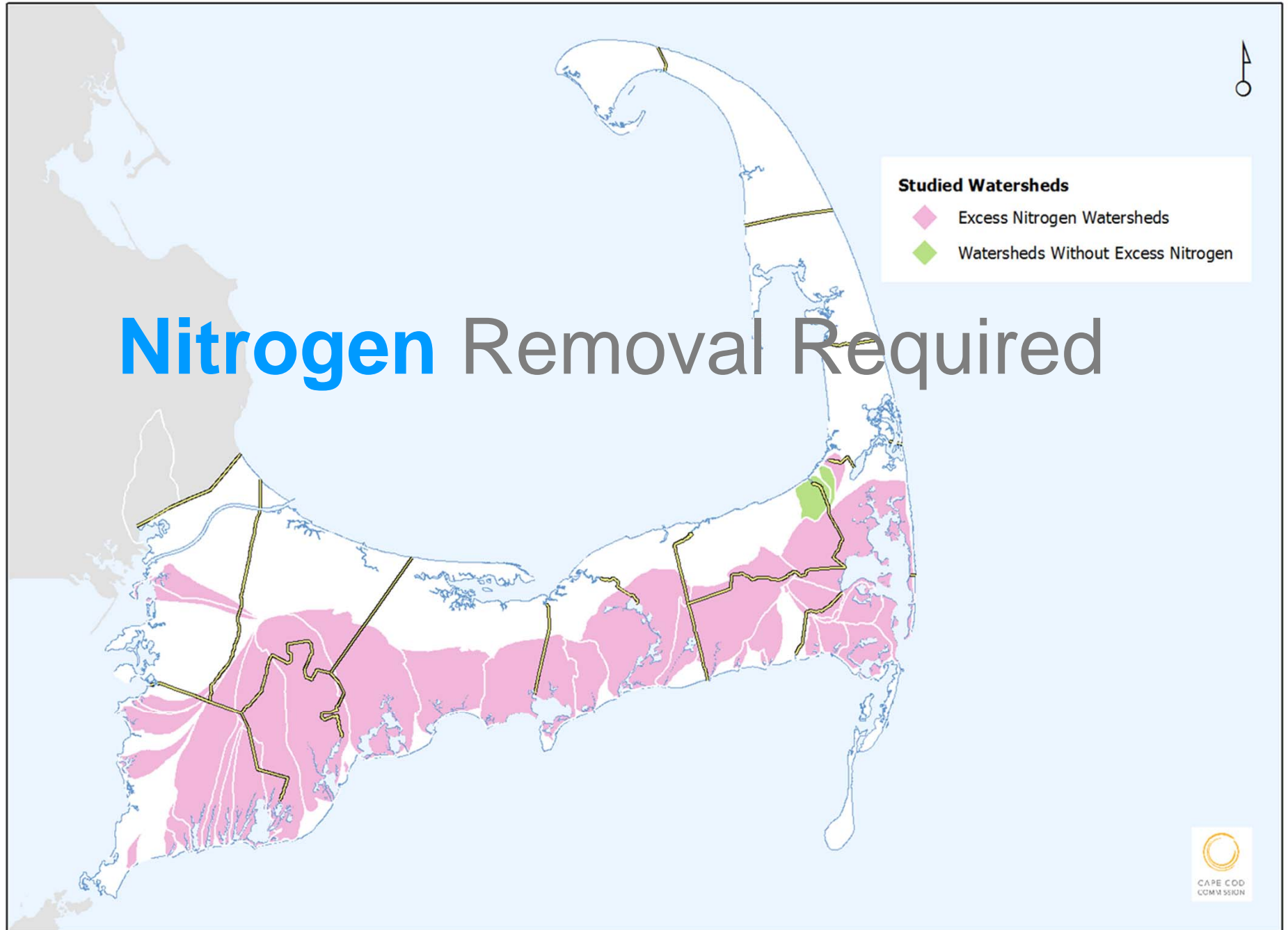
**Nitrogen:
Saline Waters**

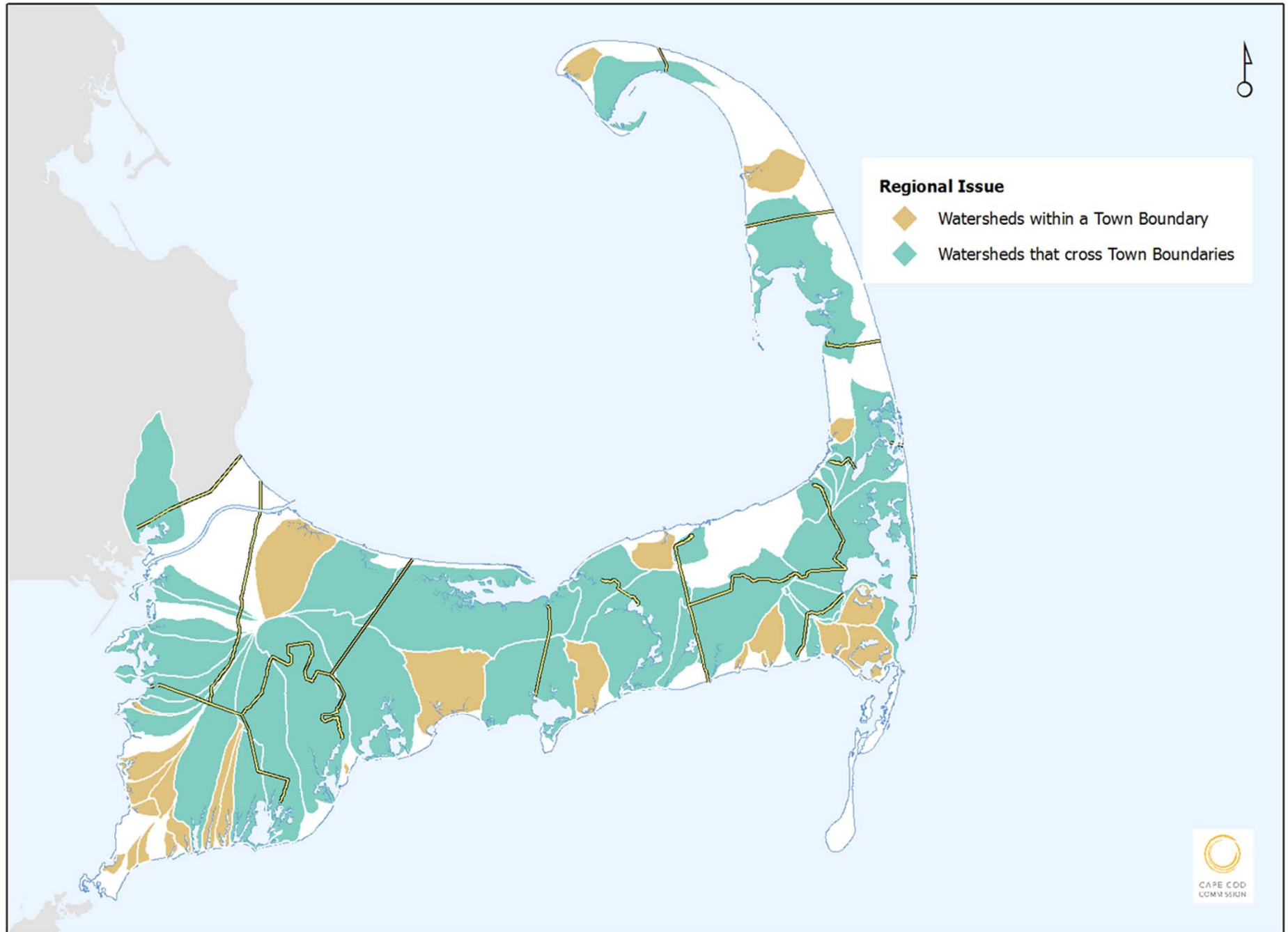
**Phosphorus:
Fresh Waters**

**Growth &
Title 5
Limitations**

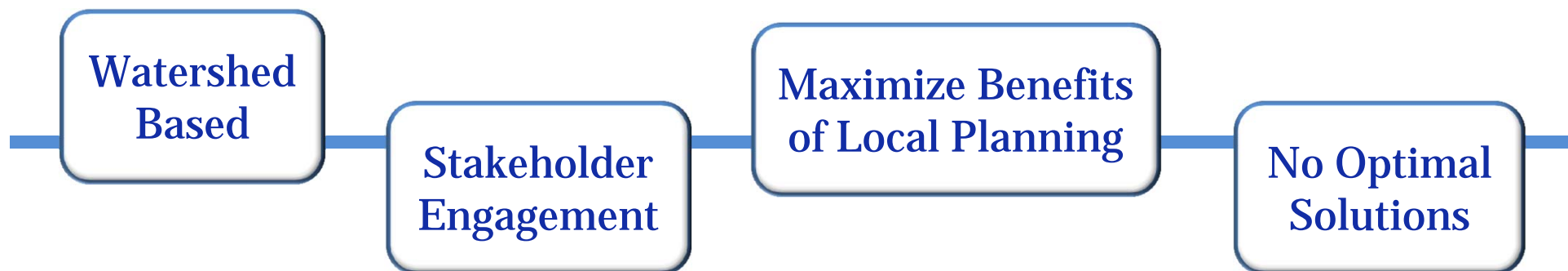






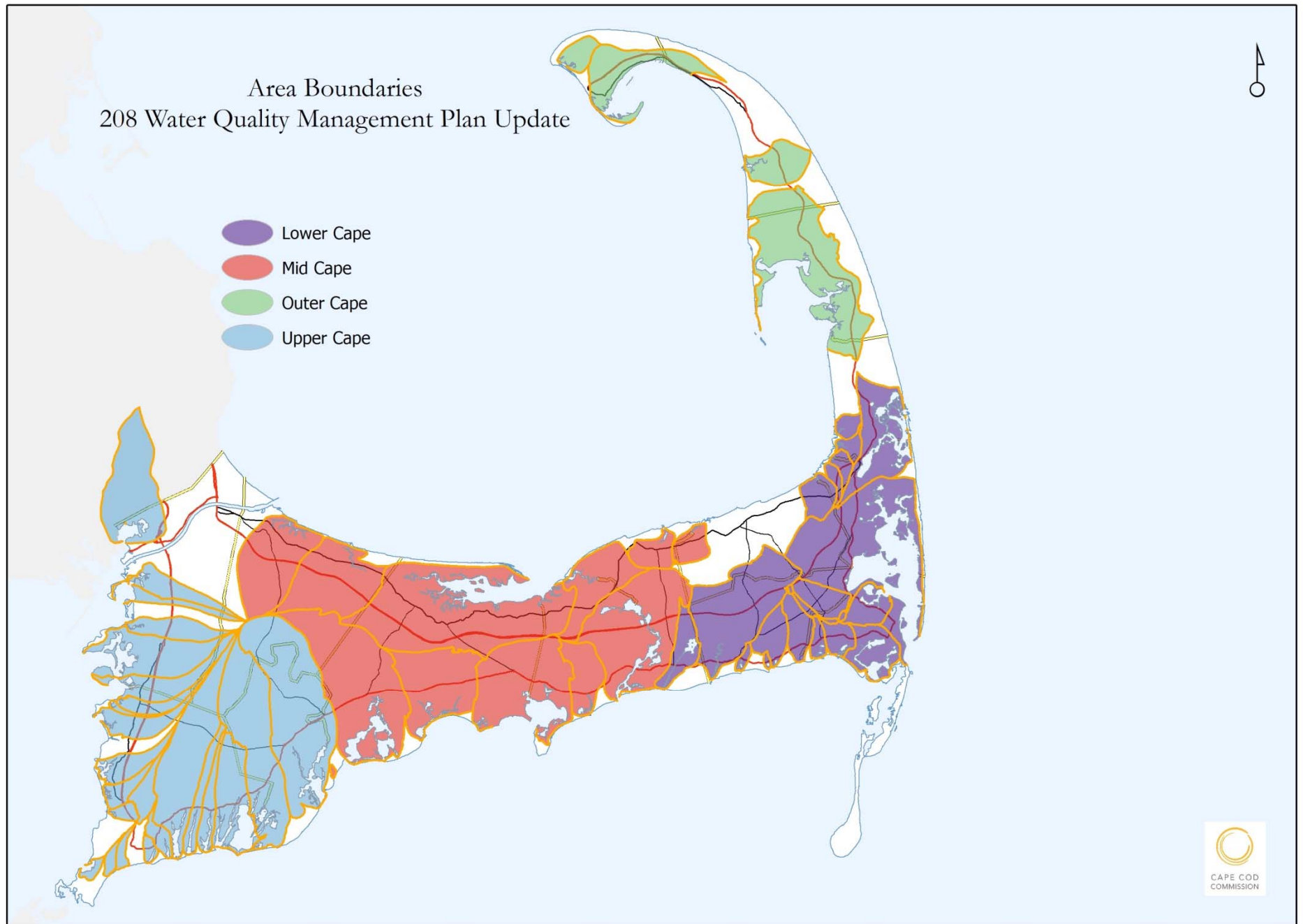


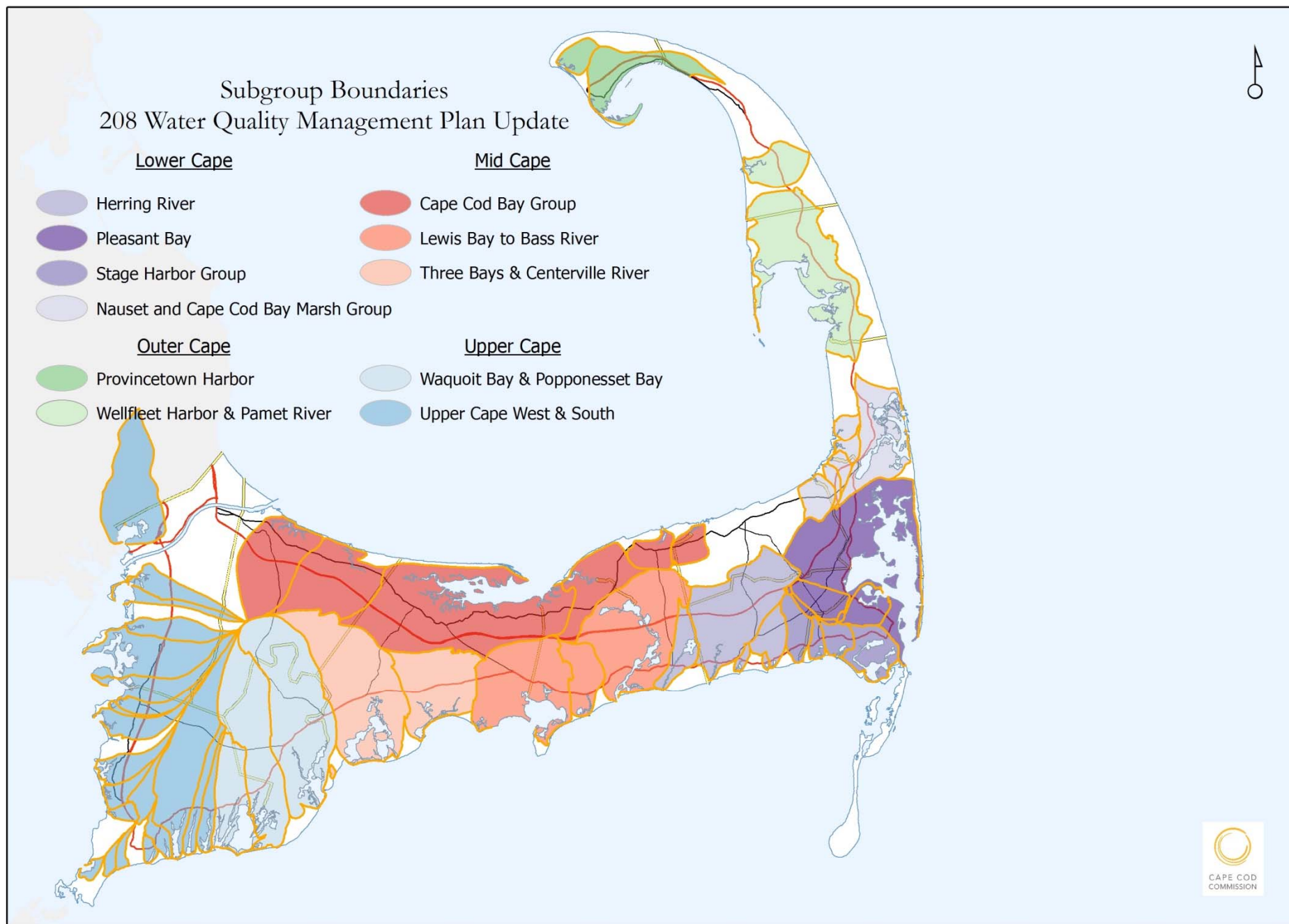
Approach to the 208 Plan Update



Goal:

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

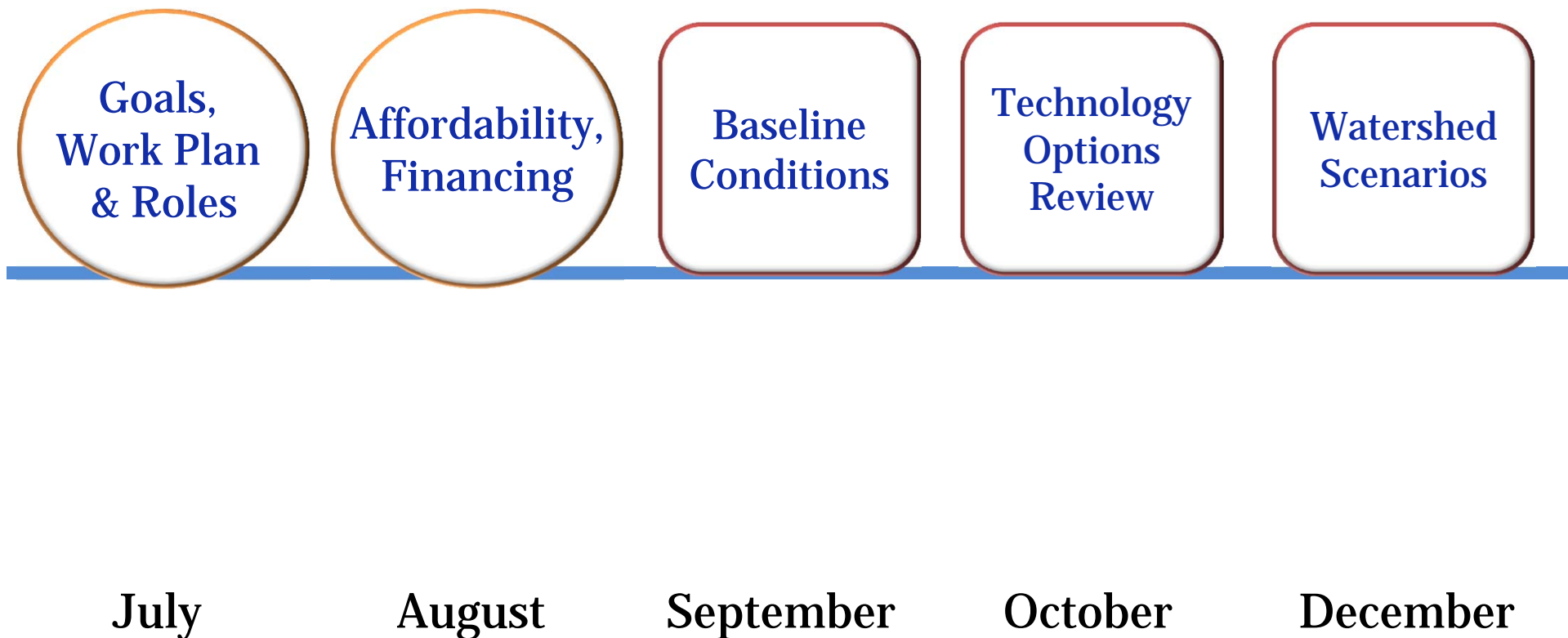




What is the stakeholder process?

Public Meetings

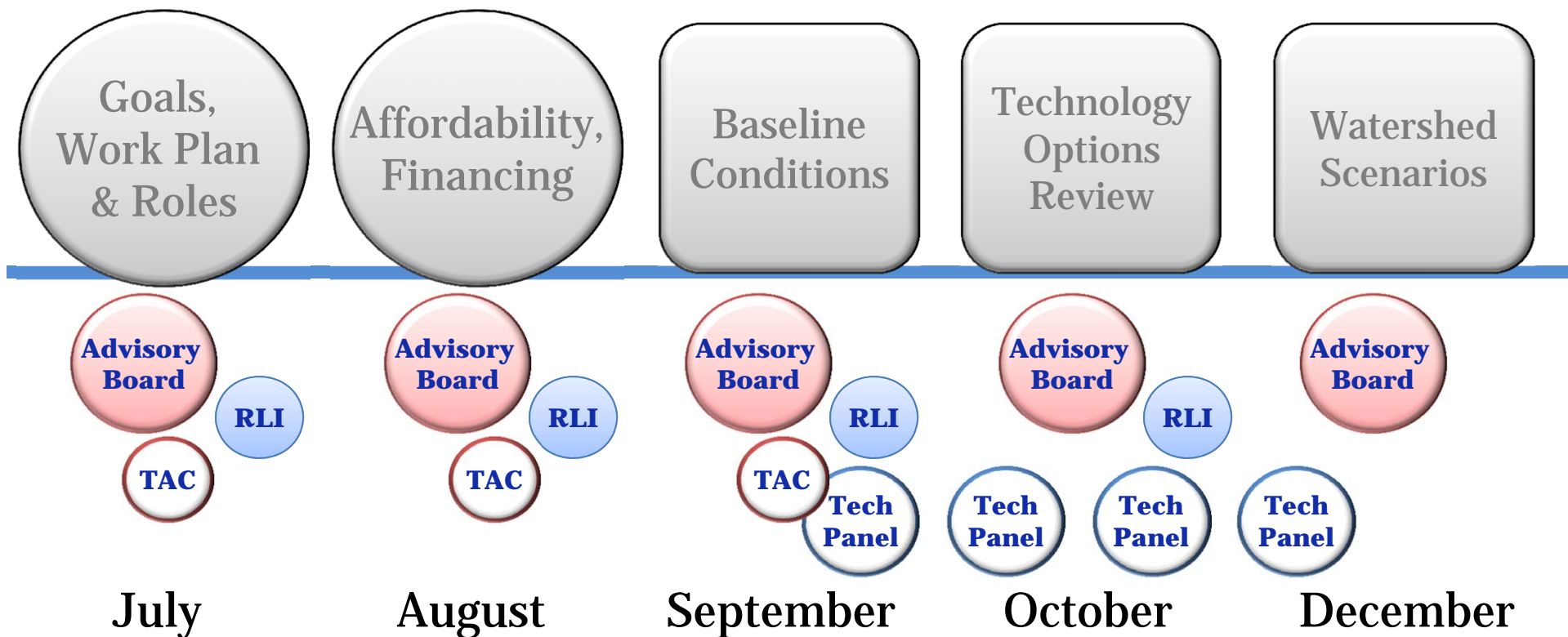
Watershed Working Groups



208 Planning Process

Public Meetings

Watershed Working Groups



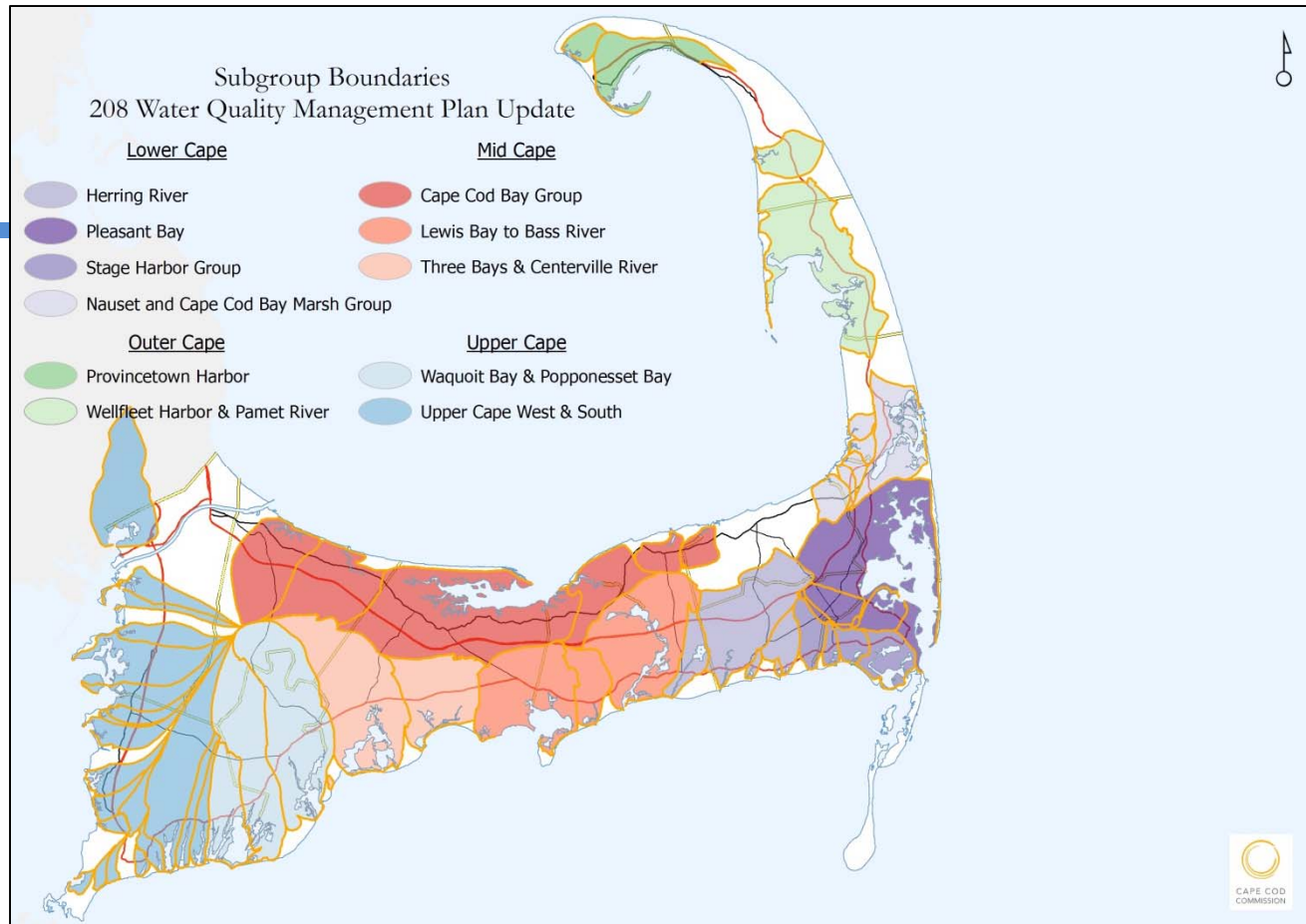
RLI Regulatory, Legal & Institutional Work Group

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



- Wastewater
- Stormwater
- Existing Water Bodies
- Regulatory

208 Planning Process

Baseline
Conditions

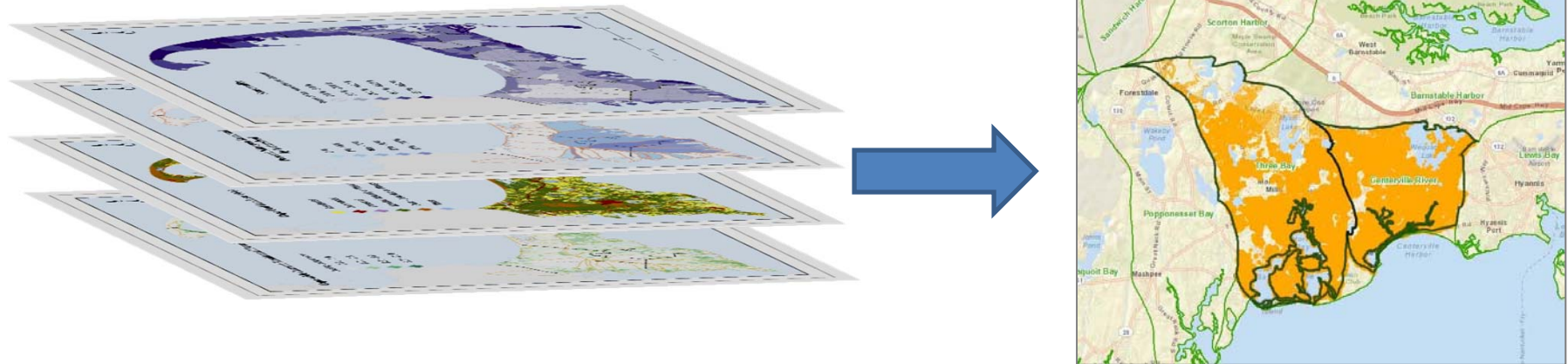
11 Working
Group Meetings:
Sept 18-27

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



Centerville River
Rushy Marsh
Three Bays

Barnstable: 1970-2013

From 1978 Section 208 Plan

- ▶ The major 208 concern for Barnstable is the protection of its public water supply wells.

- ▶ **The Planning Board appears to be interested in water supply protection as indicated by its recent zoning proposals. The coordination of town boards and the water utilities is essential to the success of this effort in Barnstable.**

- ▶ Possible consolidation of the water utilities or some formal coordinative mechanism should be seriously considered to insure efficient and effective protection of the town's water resources.

- ▶ While the town is presently constructing an expansion of the sewage treatment plant and collection system with EPA 201 funds, it has not addressed all of the wastewater management problem areas in the town. Additional 201 facilities planning must be carried out to demonstrate a sewer need exists under present EPA criteria.

- ▶ Certain problem areas are included as future phases of the sewer collection system expansion in the "Sewer Service Areas" delineated in the 208 plan and would be eligible for 201 funding assistance.

The present Hyannis treatment plant has the necessary capacity to handle all sewer service area needs in Hyannis. Should the town want to expand the collection system beyond these sewer service areas, 201 funds will not be available for these expansions or for an additional treatment plant.



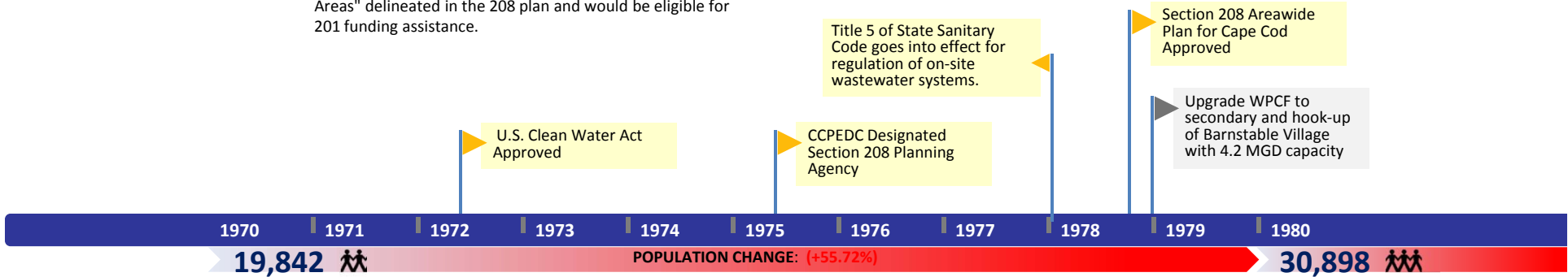
The need for collection system expansion in the Hyannis area should be carefully considered in assessing the plant's ability to accept wastewater from Yarmouth since the Hyannis treatment plant cannot be expanded beyond its present capacity.



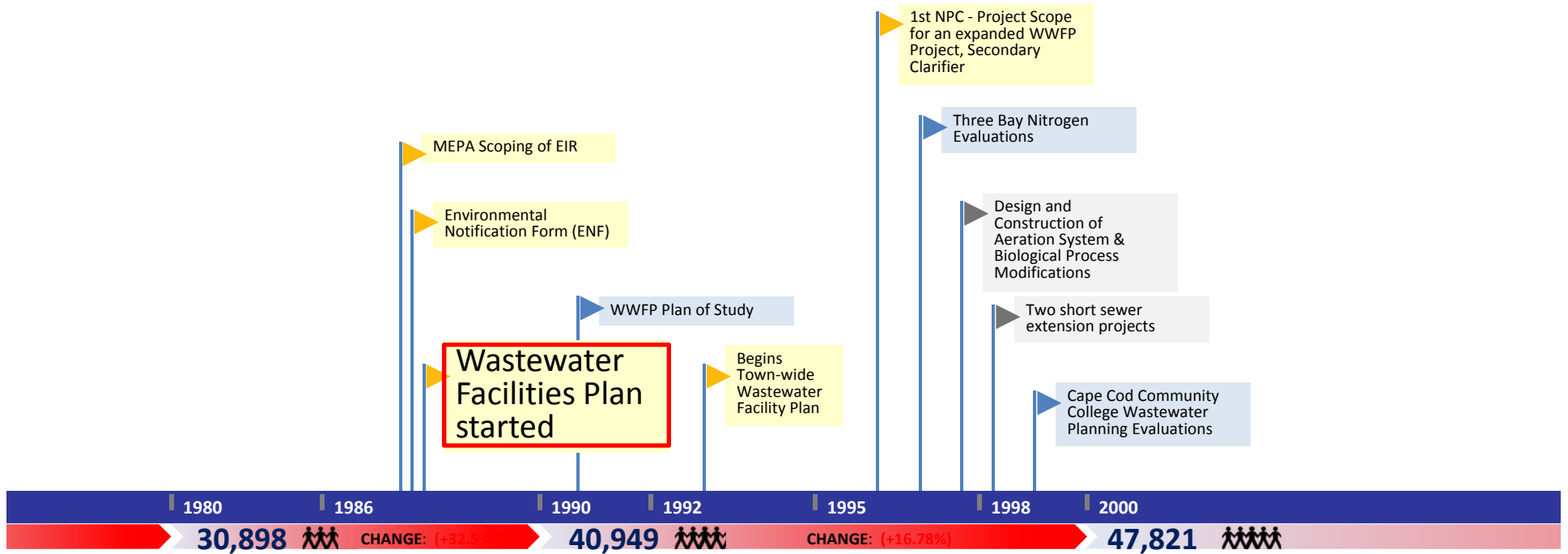
The town should consider, in the near future, entering into a 201 facilities plan to resolve the present Category 2 problem areas possibly through decentralized solutions.



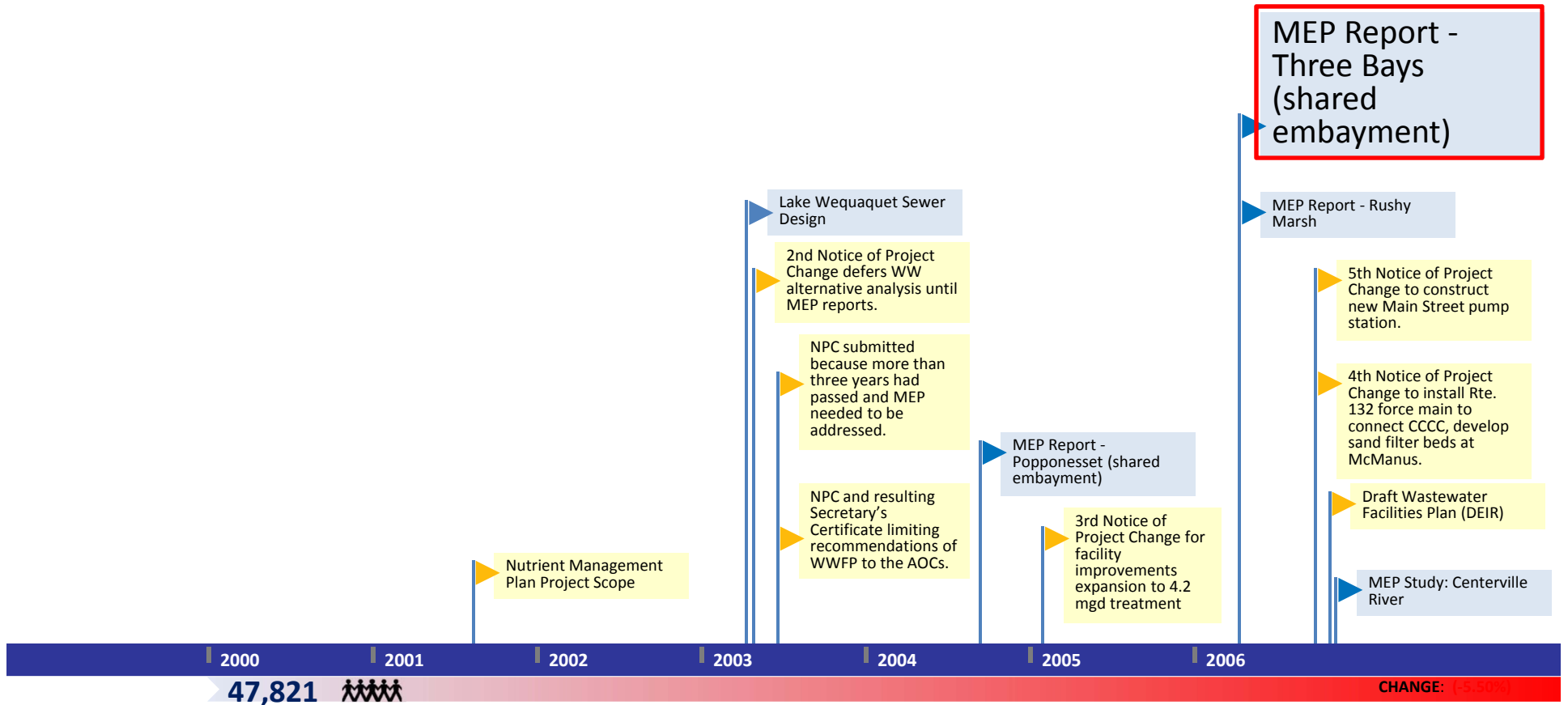
The 201 study and efforts of town board should address the coastal water quality problems of the town, particularly Lewis Bay.



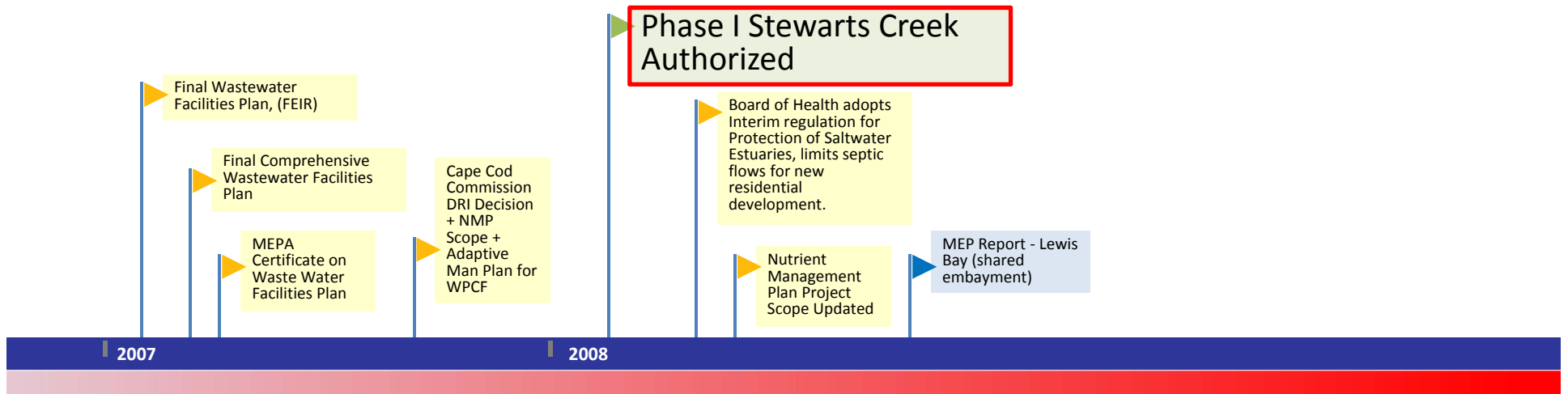
Barnstable: 1970-2013



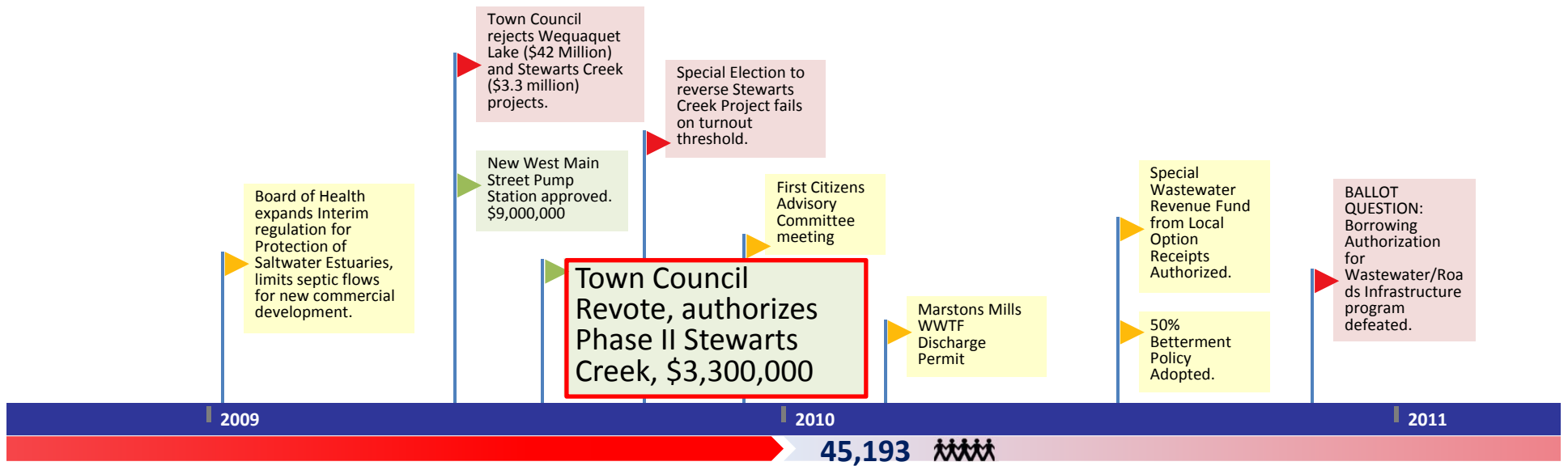
Barnstable: 1970-2013



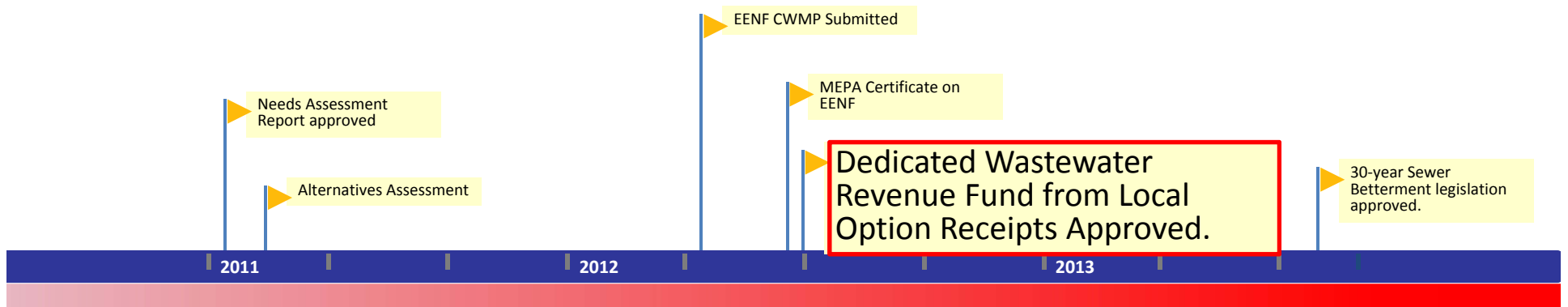
Barnstable: 1970-2013



Barnstable: 1970-2013



Barnstable: 1970-2013



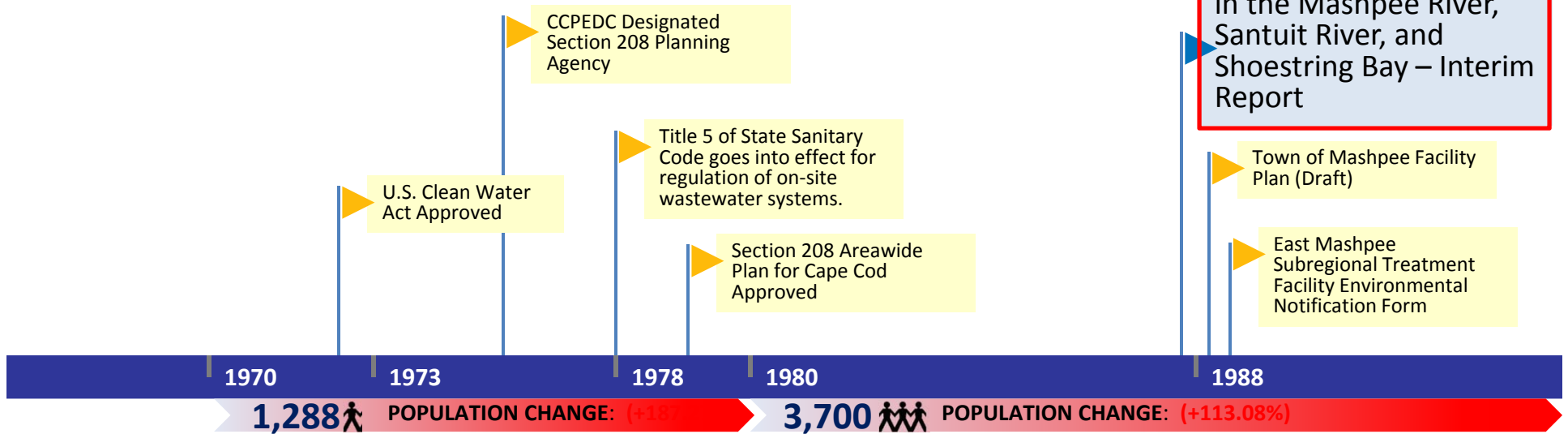
Mashpee

From 1978 Section 208 Plan

- ▶ While there does not appear to be any major wastewater management problem areas, pond water quality has been a problem of concern to the town for a number of years.
- ▶ The town should protect the future water supply development area, once defined, with a Watershed Protection District.
- ▶ Non-structural solutions, including careful management of on - site systems, water conservation and innovative options should be adequate to avoid creation of future sewer needs.
- ▶ Mashpee is not highly developed and is in an excellent position to plan development and manage subsurface disposal to avoid future problems.
- ▶ Mashpee should participate in regional septage planning with neighboring towns (Sandwich, Falmouth and Barnstable) to determine the most cost-effective means of disposing of its septic wastes.

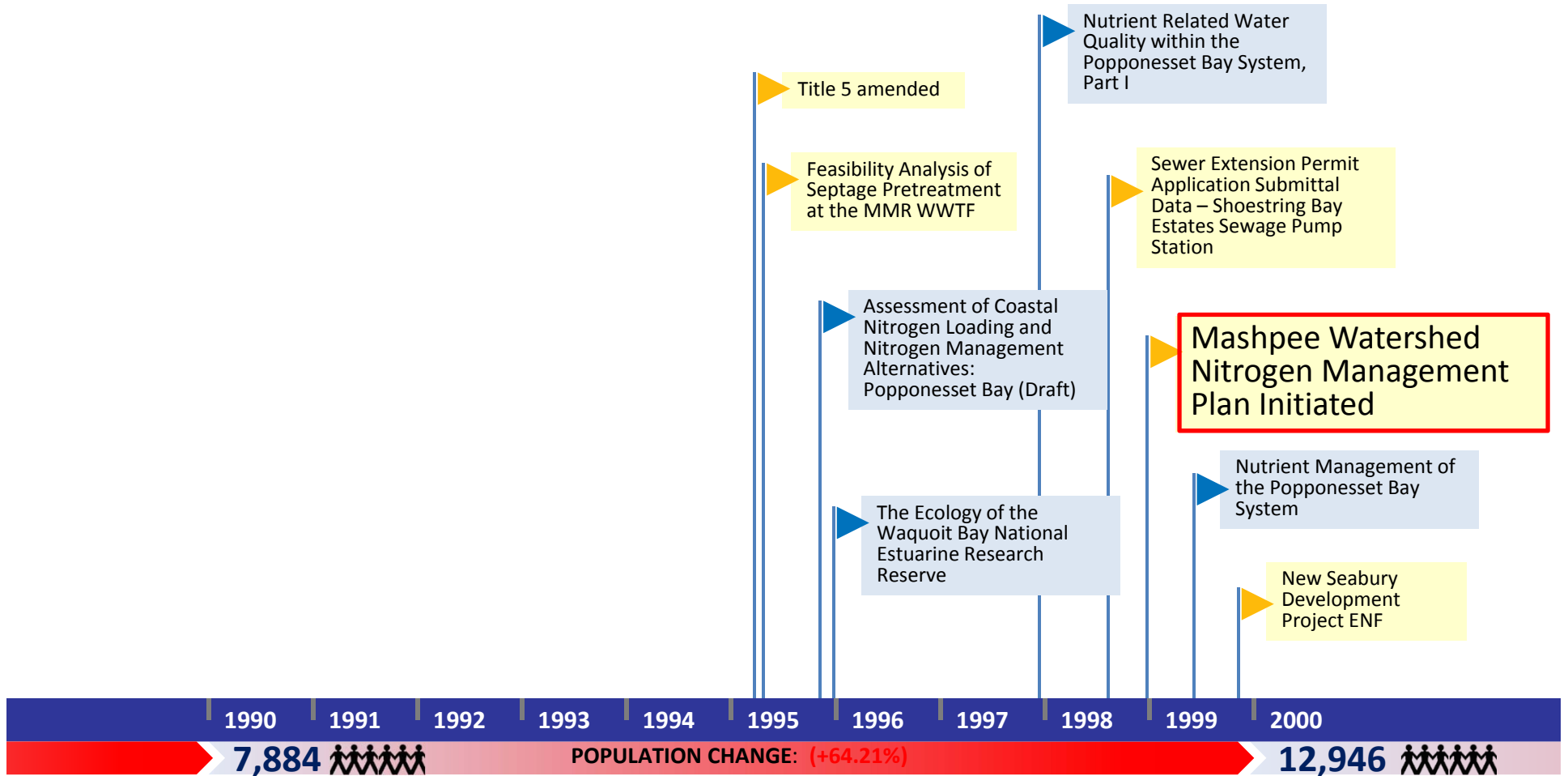
- ▶ The town has been concerned about the condition of recreational ponds that have significant development around them, particularly Johns and Ashumet Ponds.
- ▶ Extensive water quality testing has been conducted on Johns Pond, and the town is interested in implementing a Pond Management program.
- ▶ It is further suggested that the town adopt a "Great Pond Protection District" as part of its zoning by-laws to begin such a management program.
- ▶ The landfill plume may be flowing towards the Mashpee River. If private wells are found to be down gradient there may be a need for town water service to the area.

Sources of Bacterial and Nutrient Contamination in the Mashpee River, Santuit River, and Shoestring Bay – Interim Report

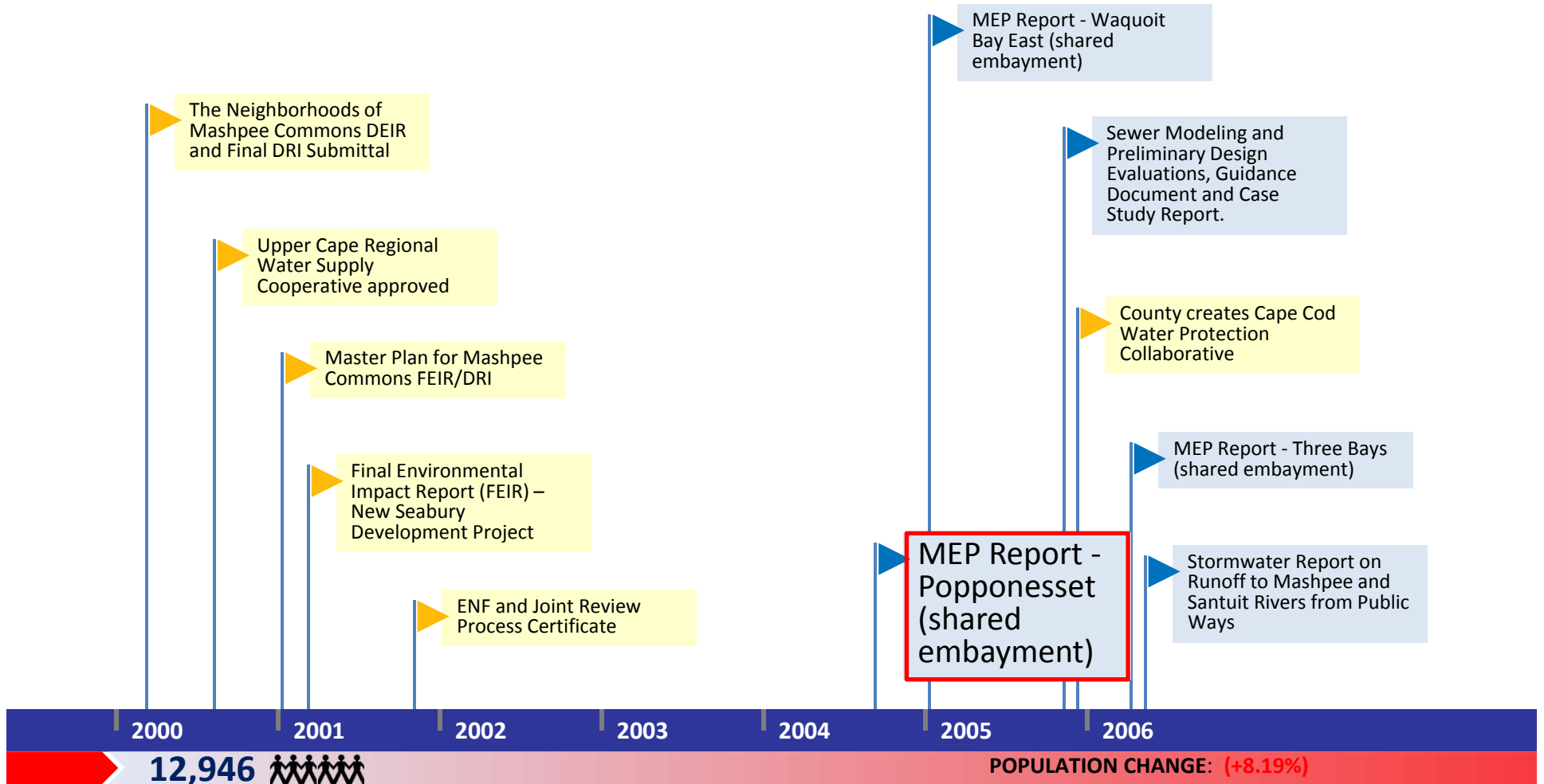


POPULATION: 7,884 (+113.08%)

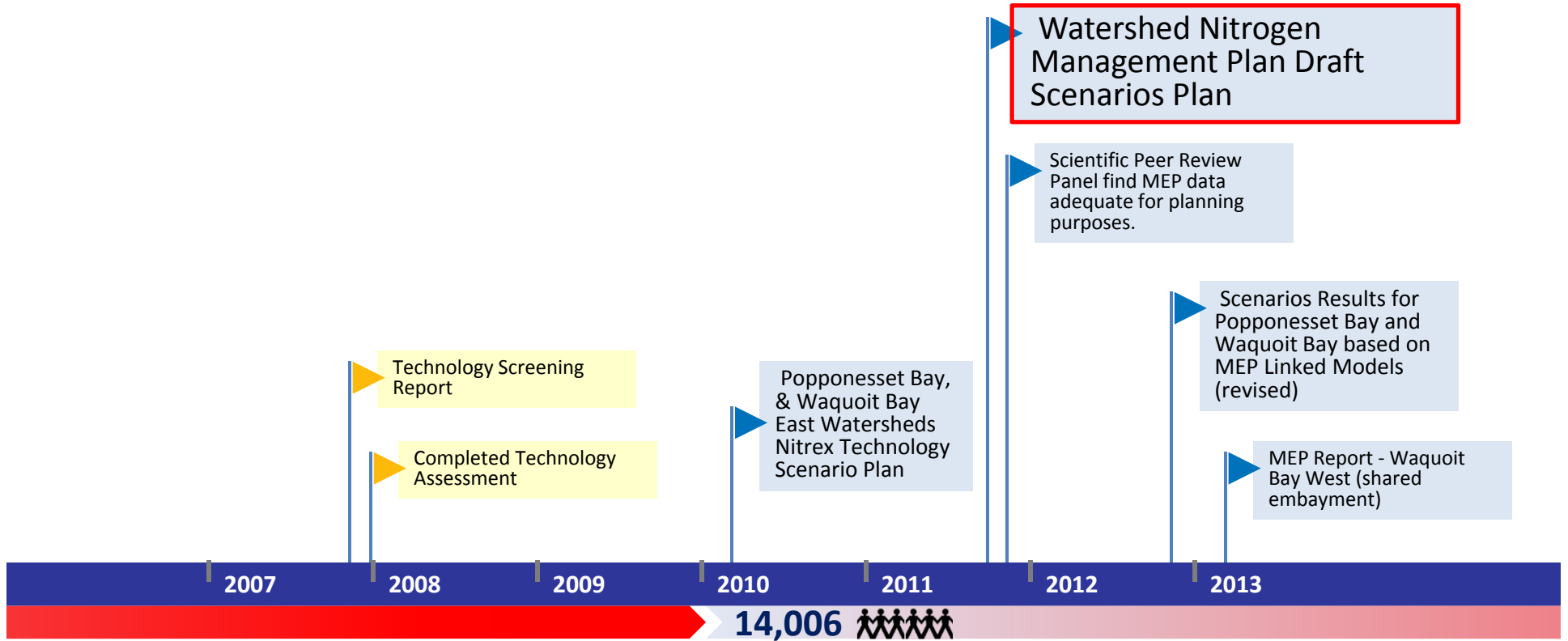
Mashpee: 1970-2013



Mashpee: 1970-2013



Mashpee: 1970-2013



Sandwich

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.

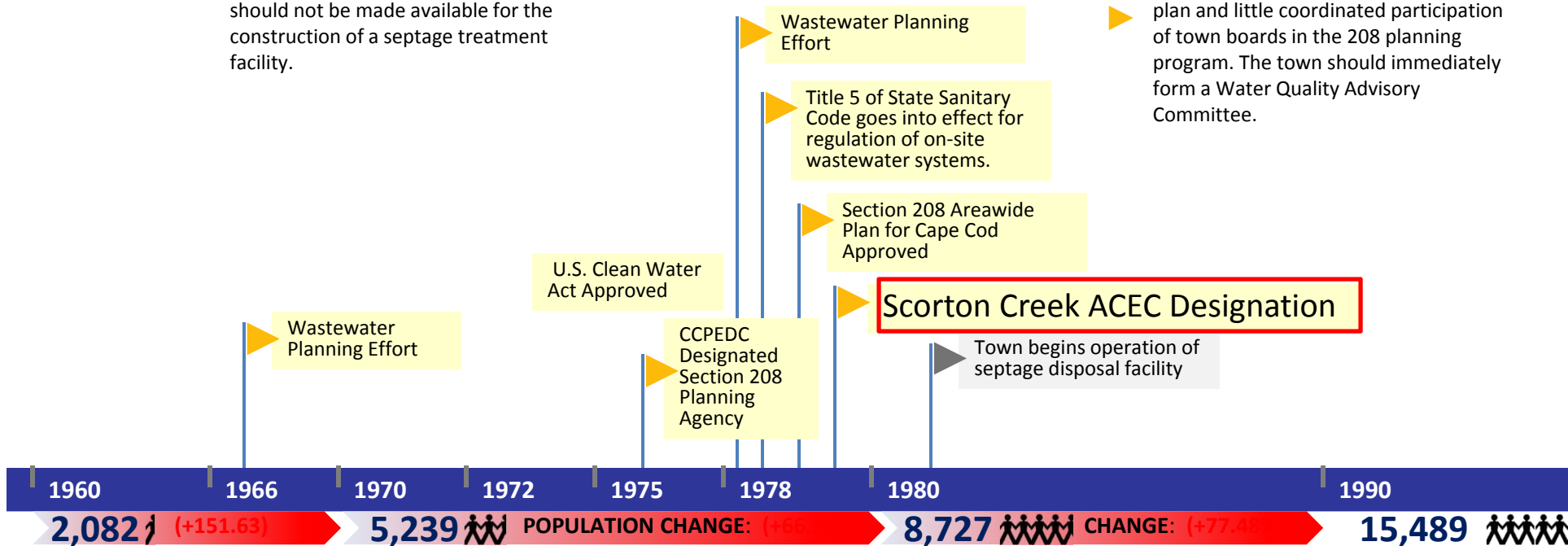
▶ The town health agent should strictly enforce Title 5 and should seek additional qualified personnel to implement the 208 recommended on-site systems management program.

▶ 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.

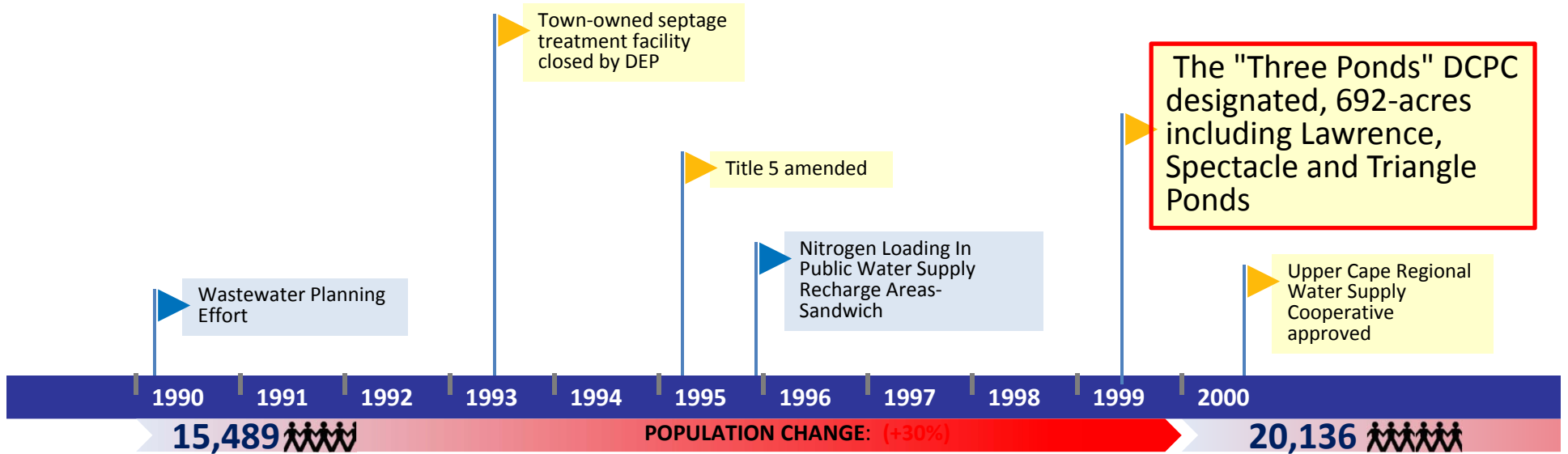
▶ The problem of the State Fish Hatchery discharging over half a million gallons of fresh water must be addressed by the Department of Fisheries and Wildlife as recommended in the "Water Conservation" section of the final plan.

▶ The town should actively participate in regional solid waste planning to develop a long-range solution to its solid waste management problems.

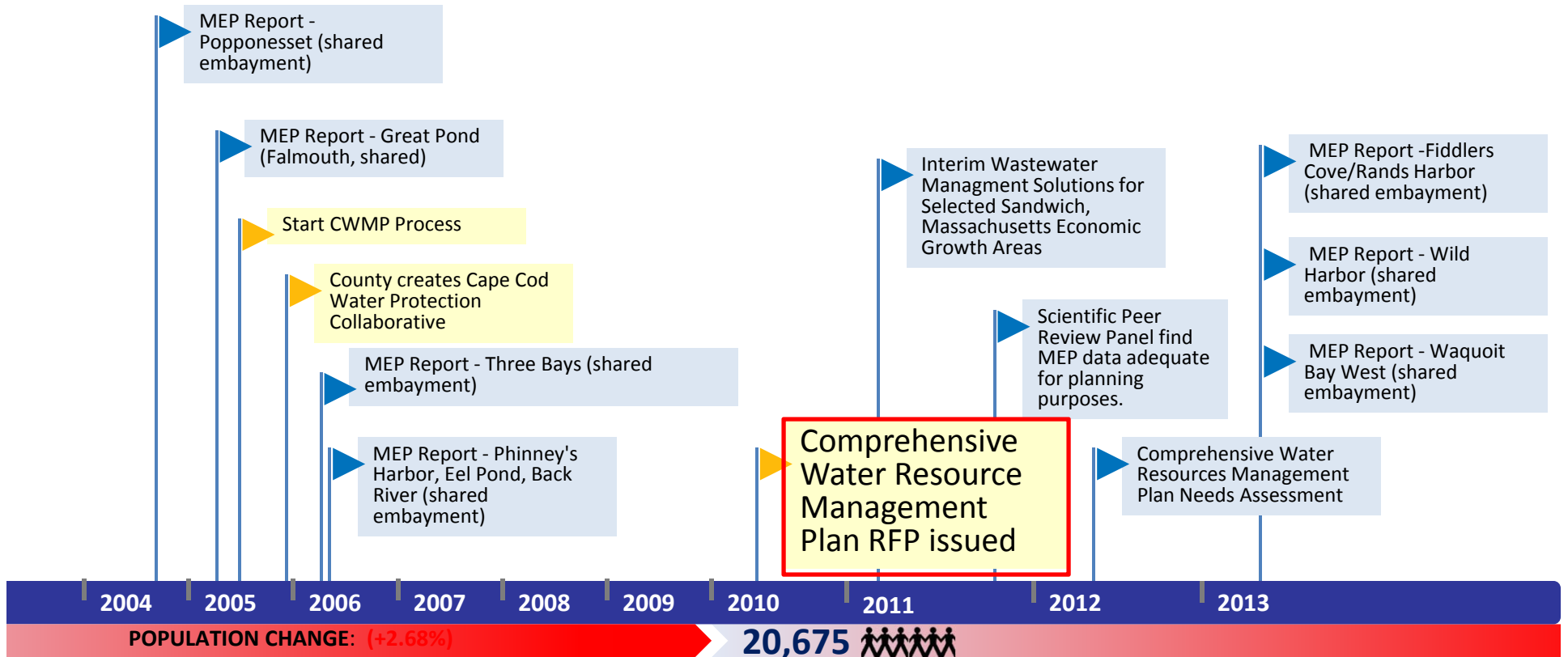
▶ There has been a serious delay in action on the town's proposed sewer facility plan and little coordinated participation of town boards in the 208 planning program. The town should immediately form a Water Quality Advisory Committee.



Sandwich: 1960-2013



Sandwich: 1960-2013

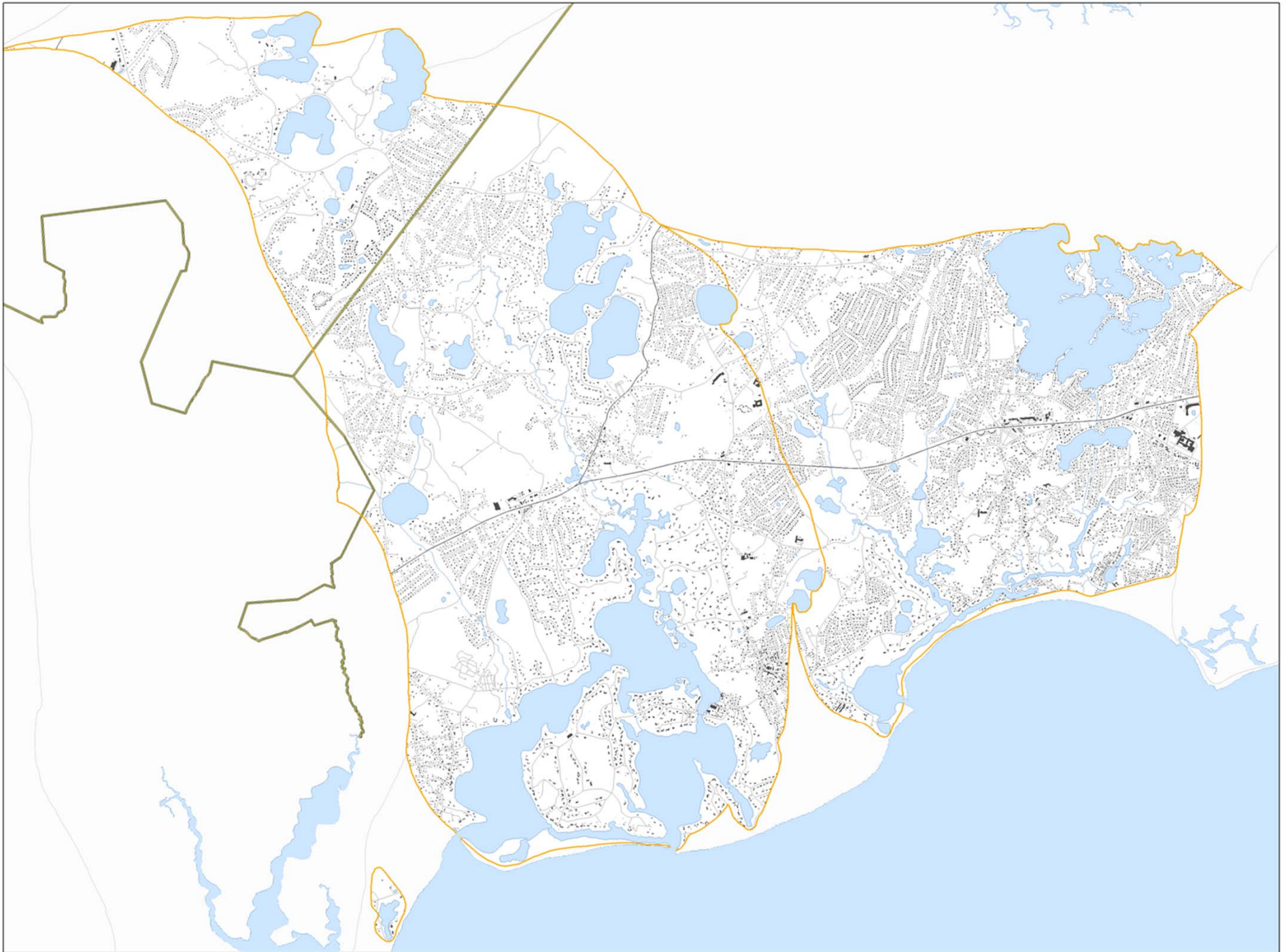


Did we miss anything?

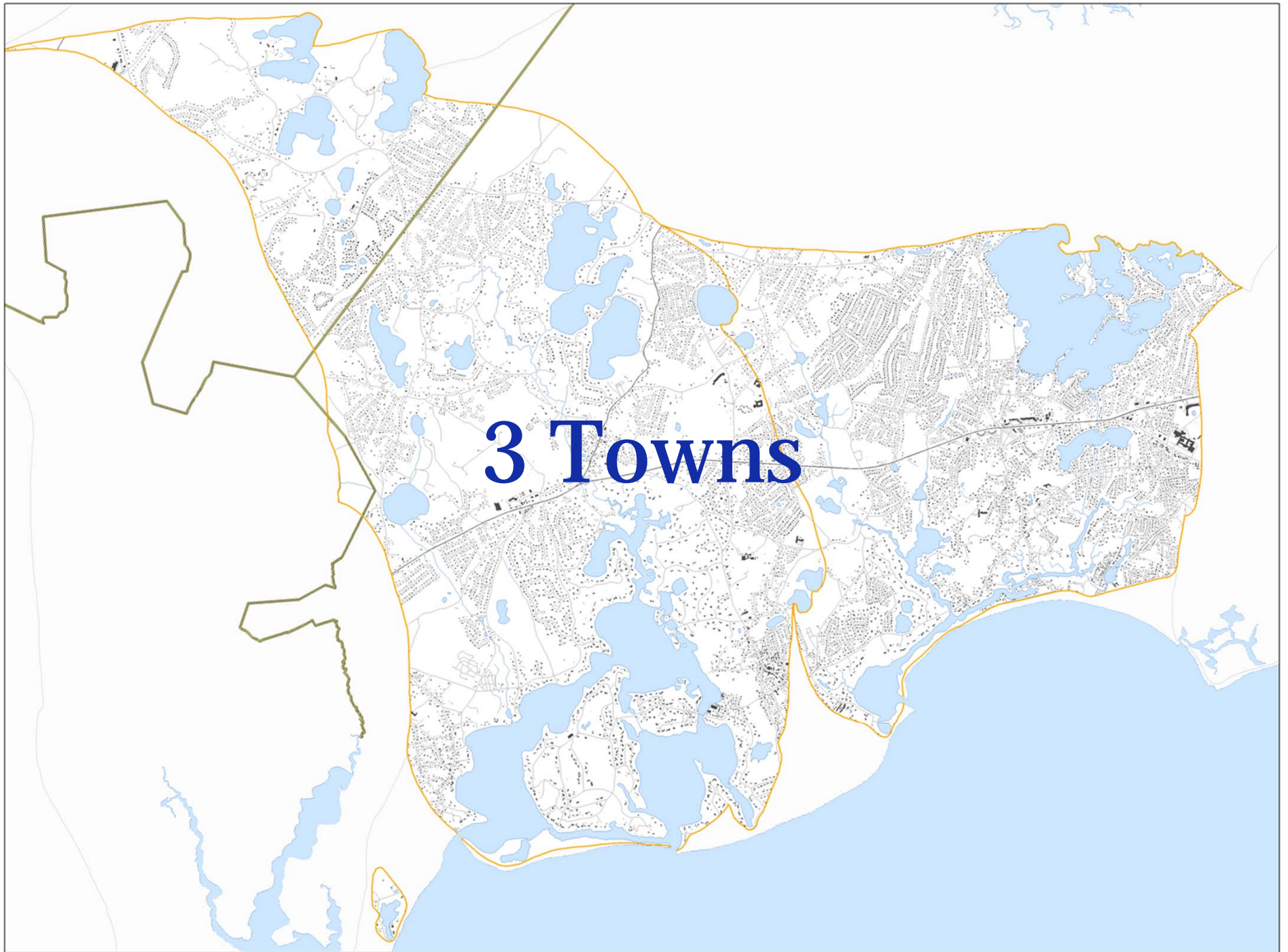
Your Watersheds



Centerville River
Rushy Marsh
Three Bays









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

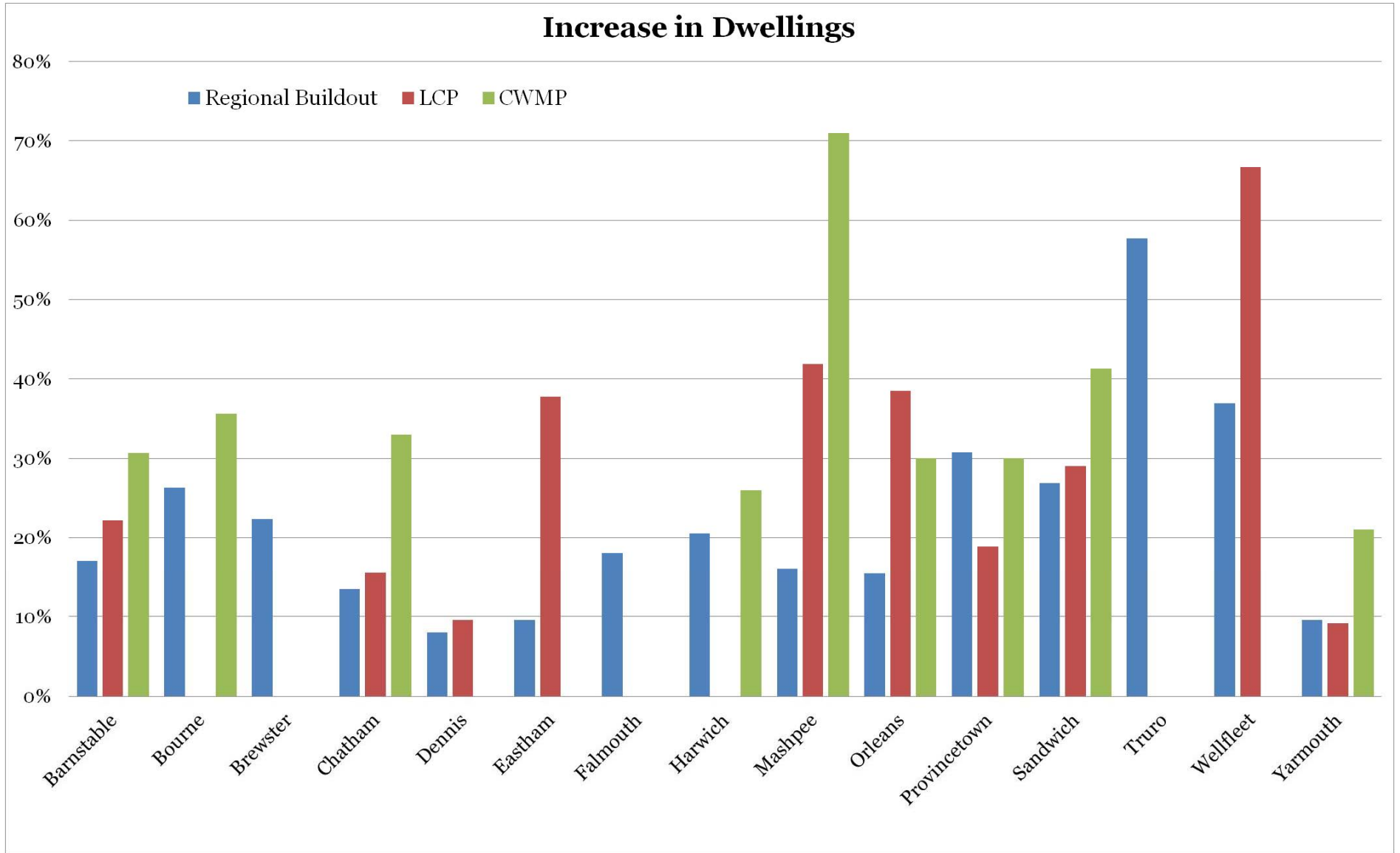
 Open - Disturbed or Managed

 Water

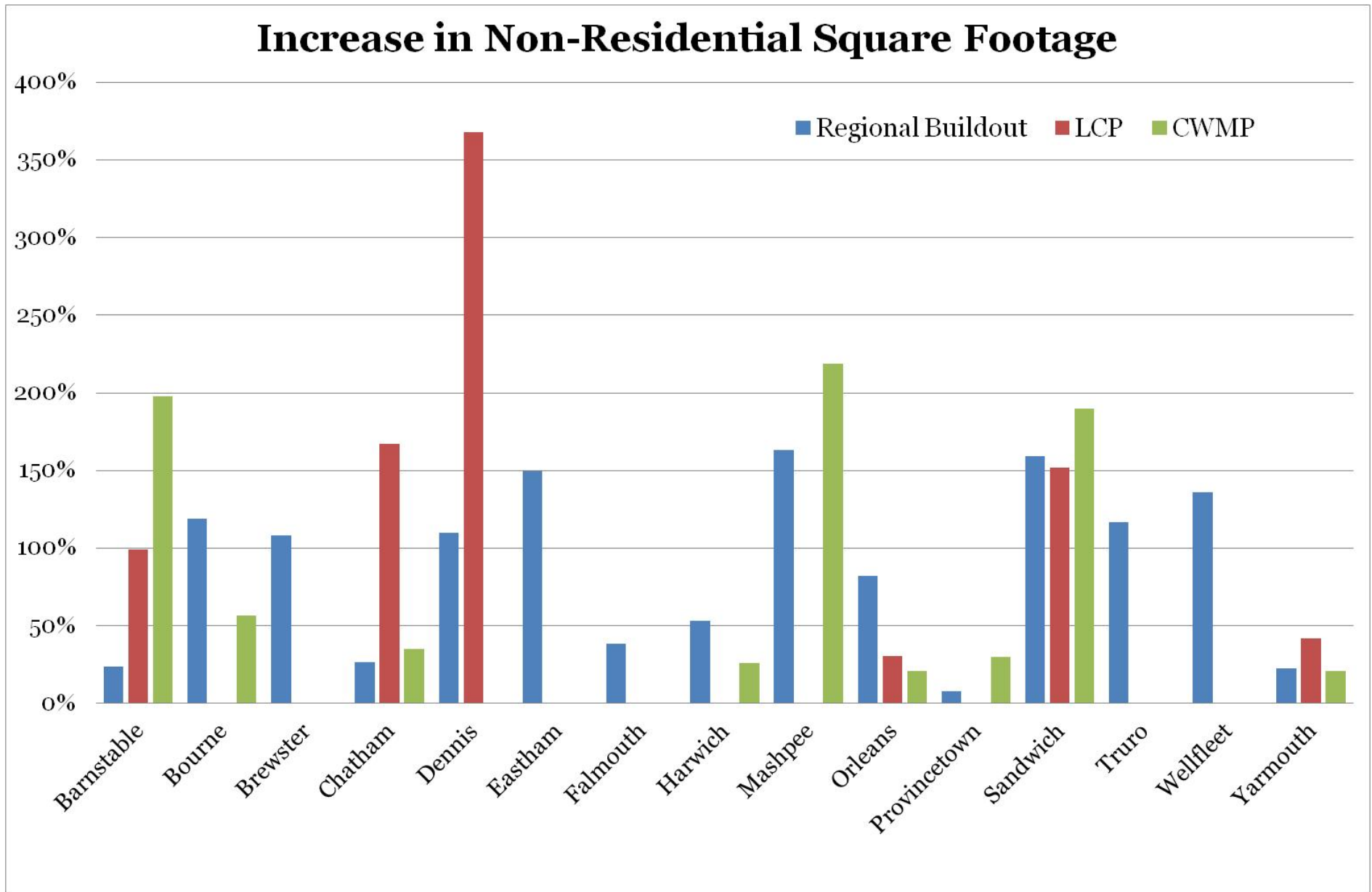
Density

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

Buildout



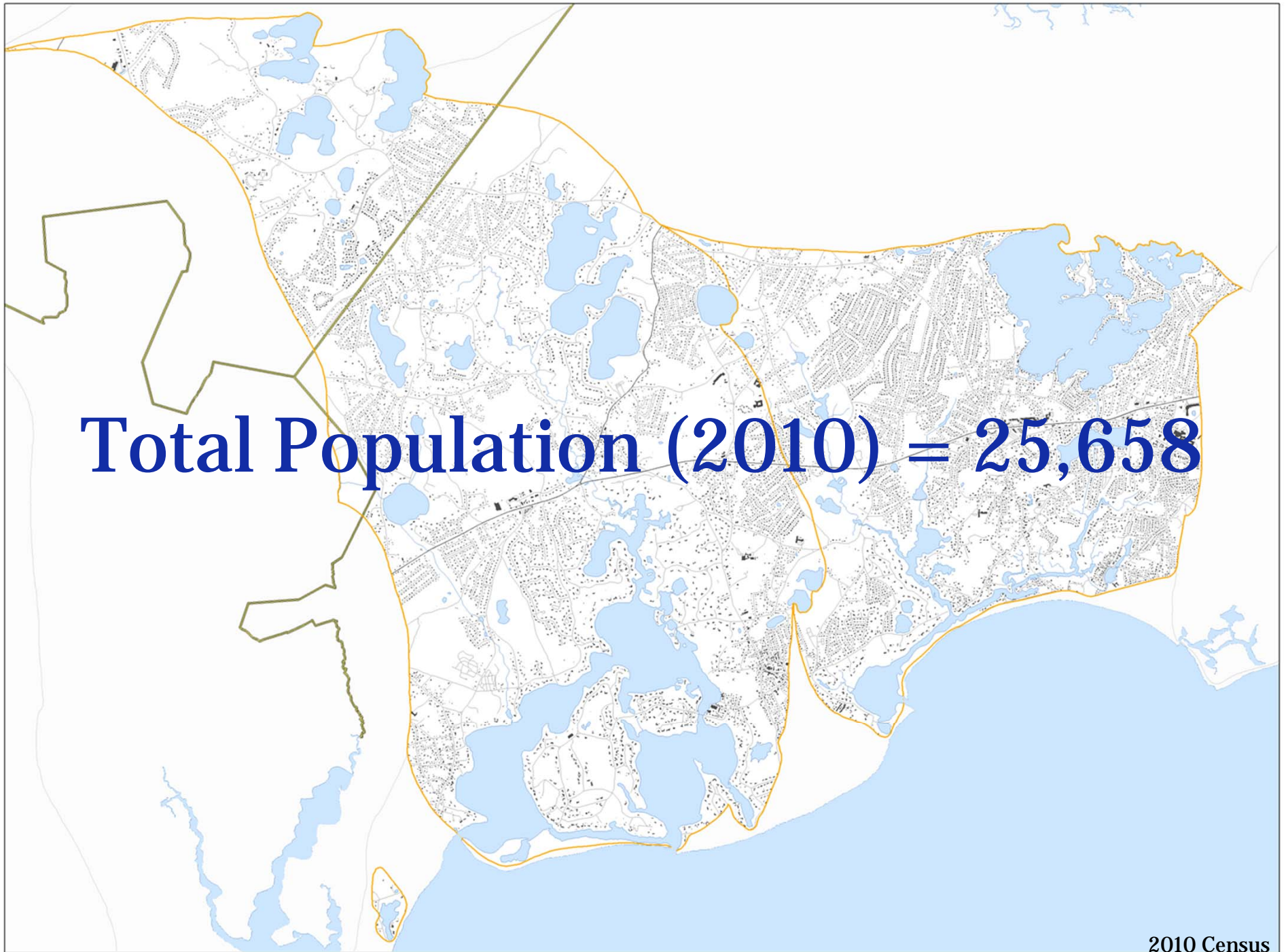
Buildout



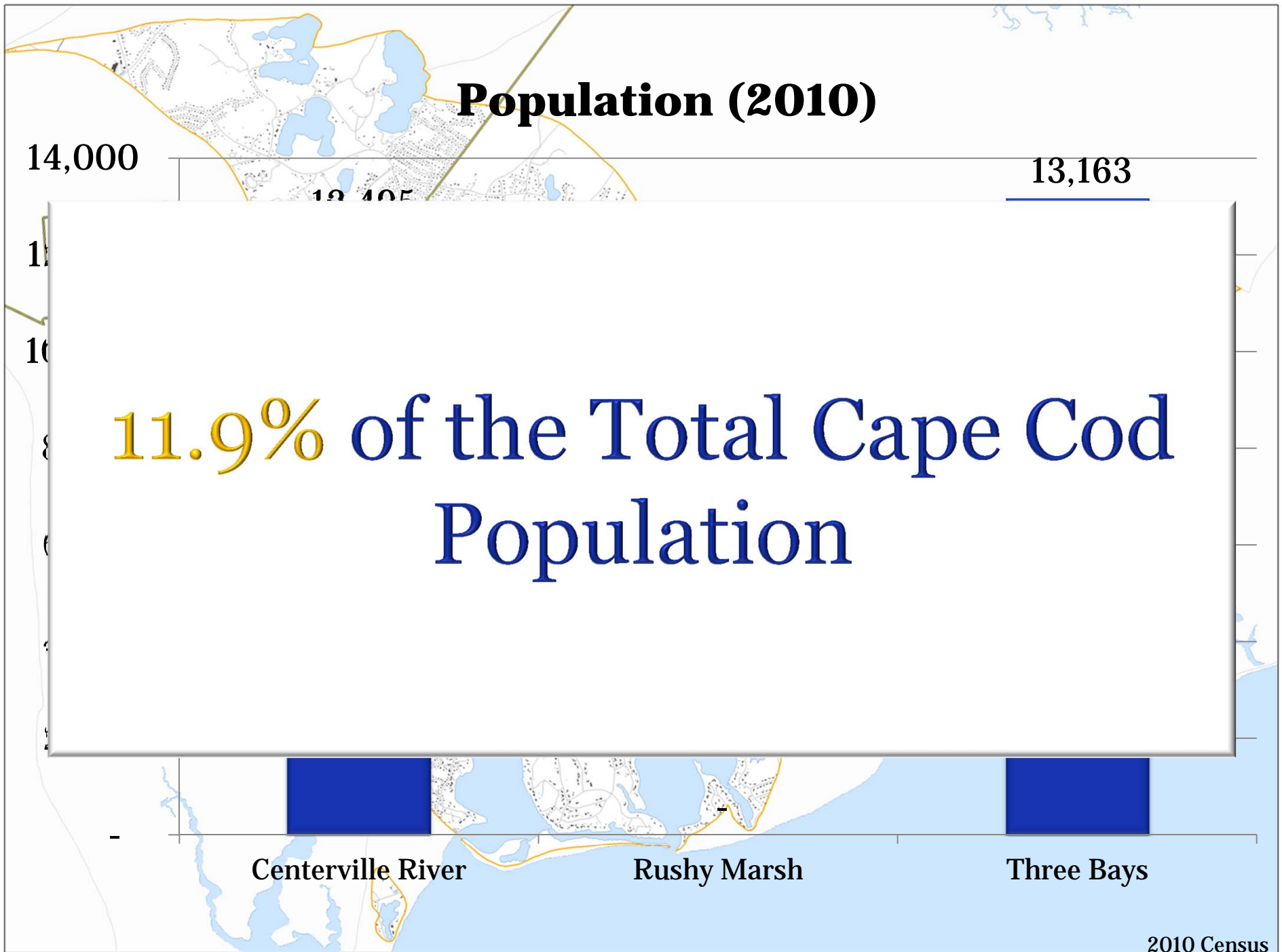
The People

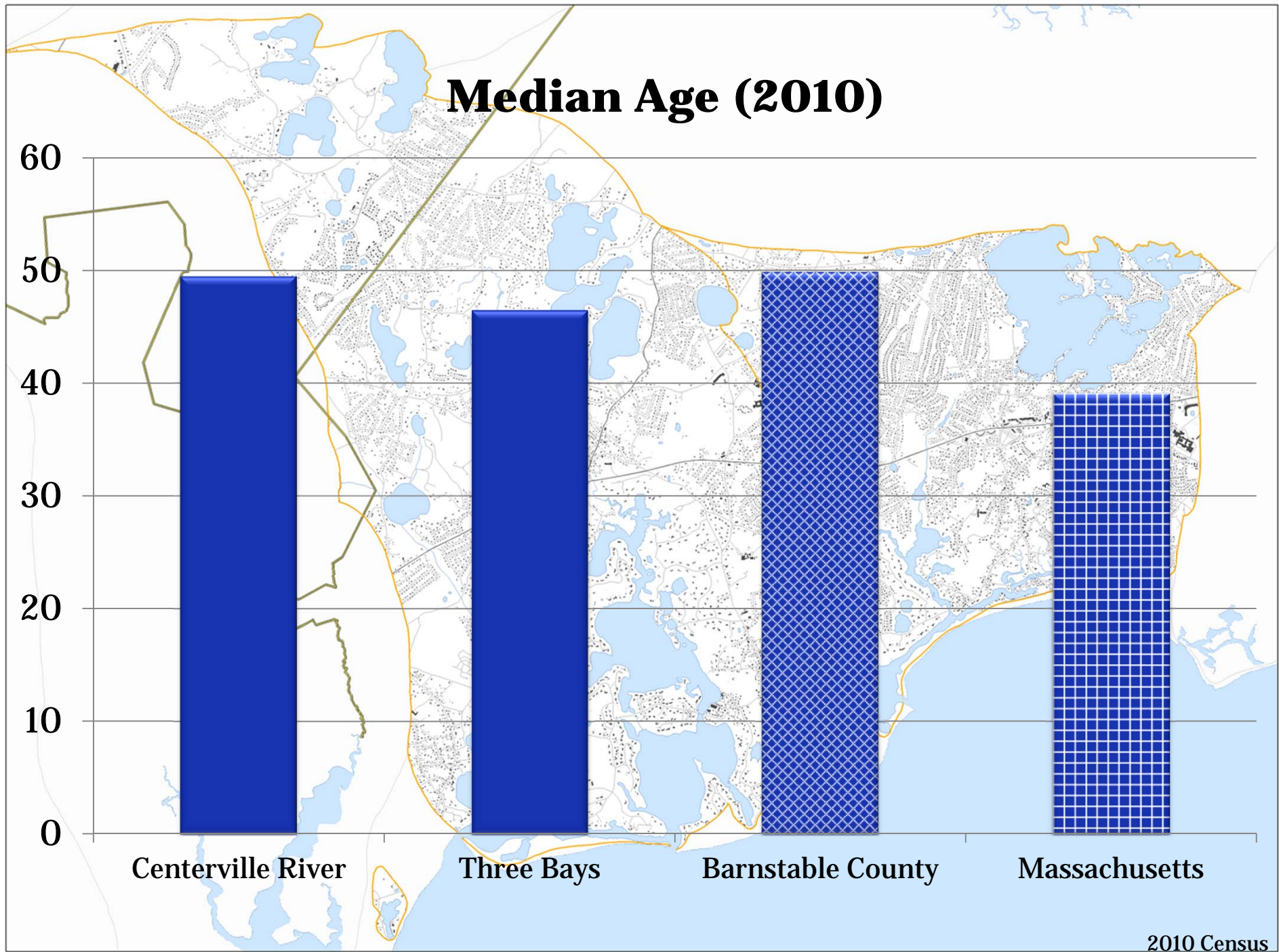


Centerville River
Rushy Marsh
Three Bays

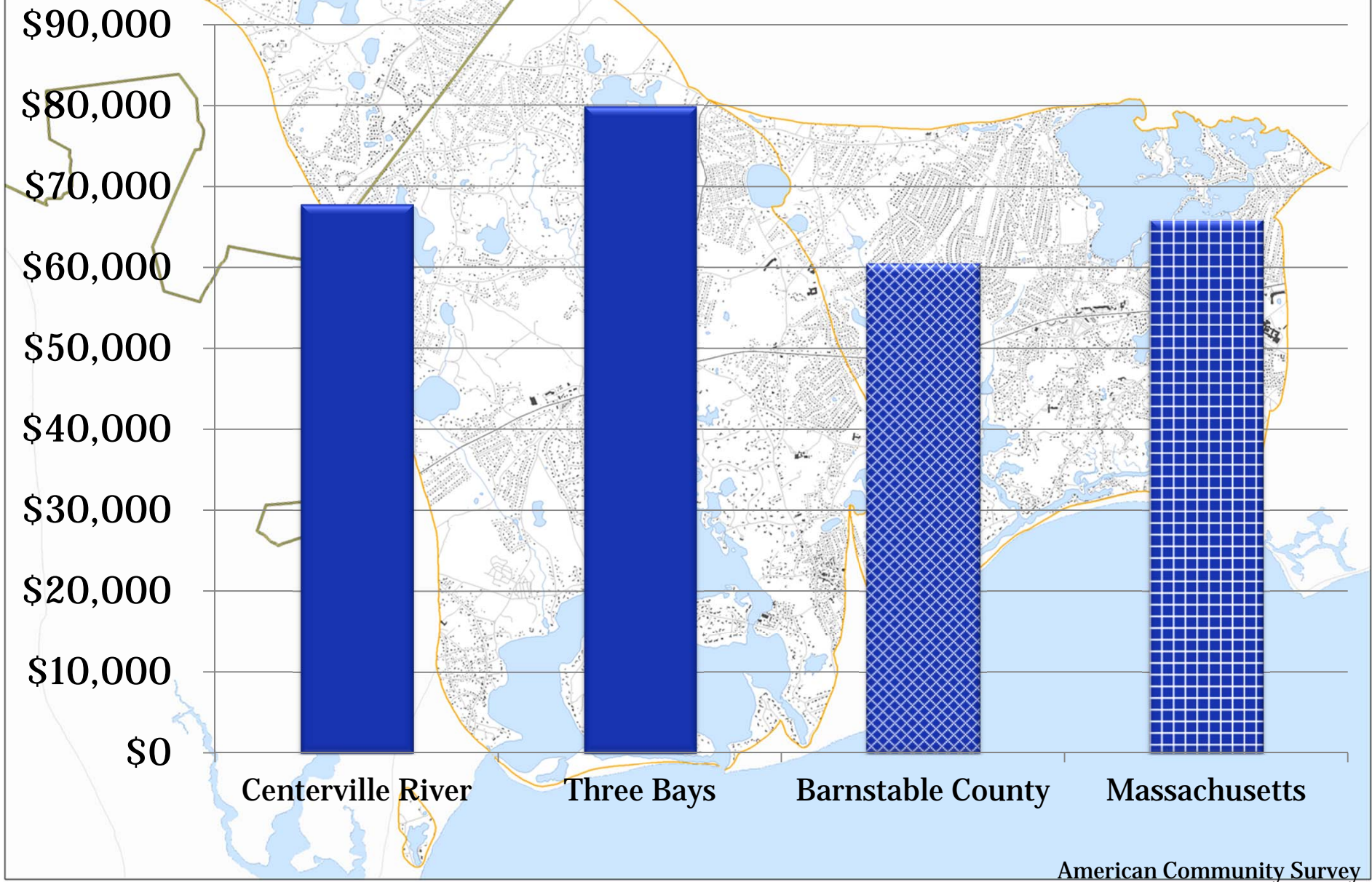


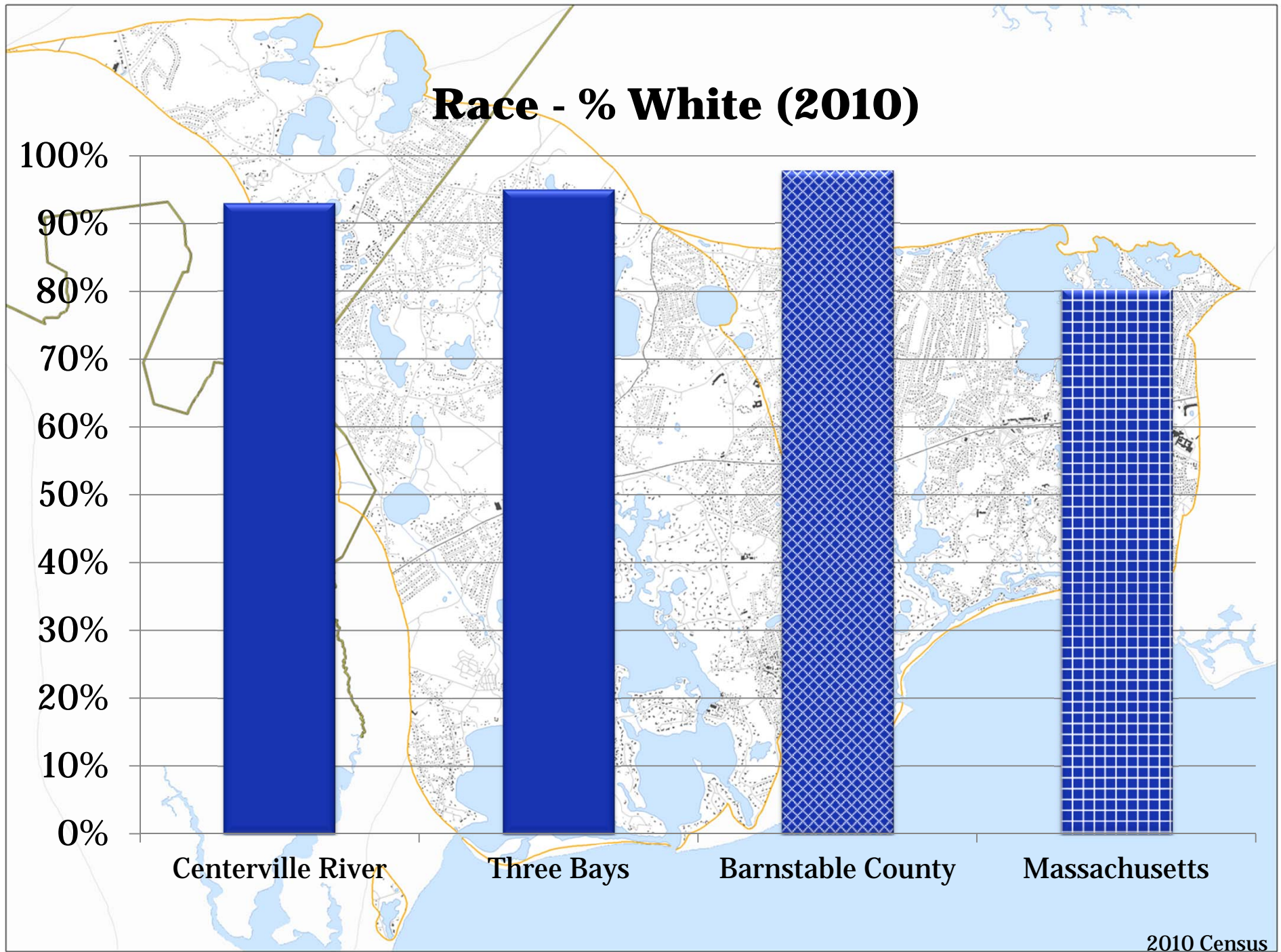
Total Population (2010) = 25,658



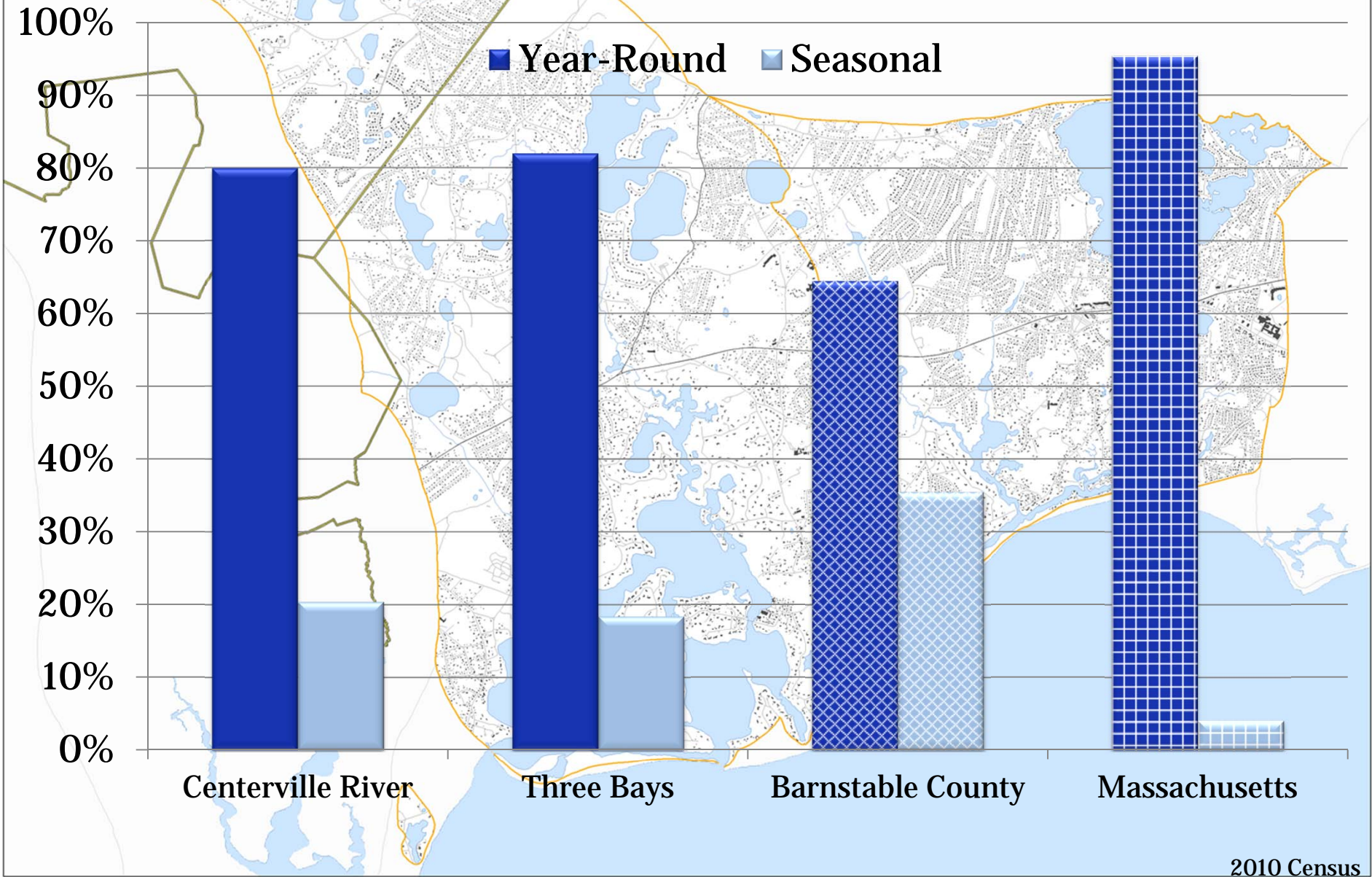


Median Income (2010)





Seasonal vs. Year Round Housing (2010)



Average Assessed Home Value (2010)

\$3,000,000

Total Assessed Value of Residential Homes =
\$6,578,290,000

\$0

Centerville
River

Rushy Marsh

Three Bays

Barnstable
County

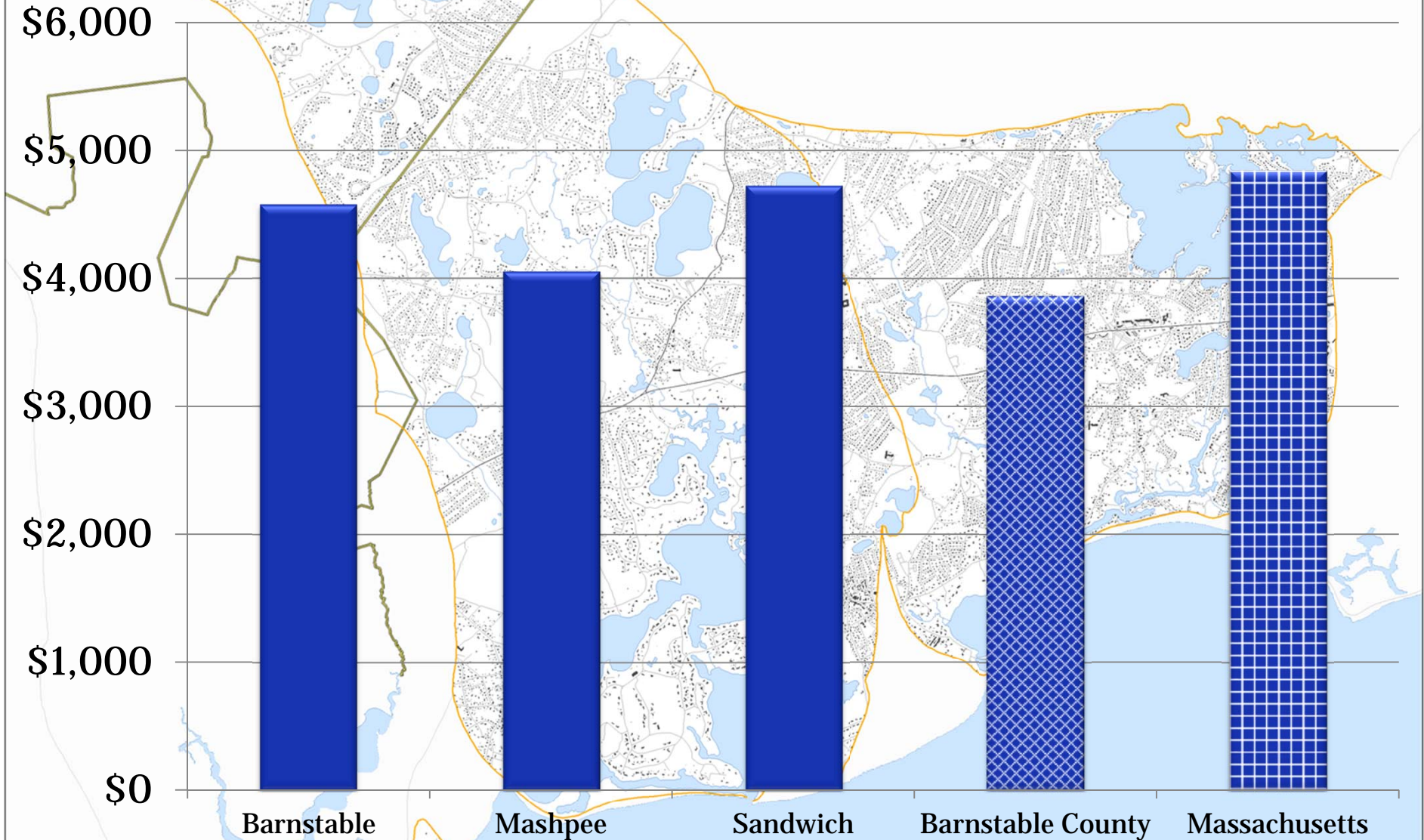
Massachusetts

Your Government & Taxes

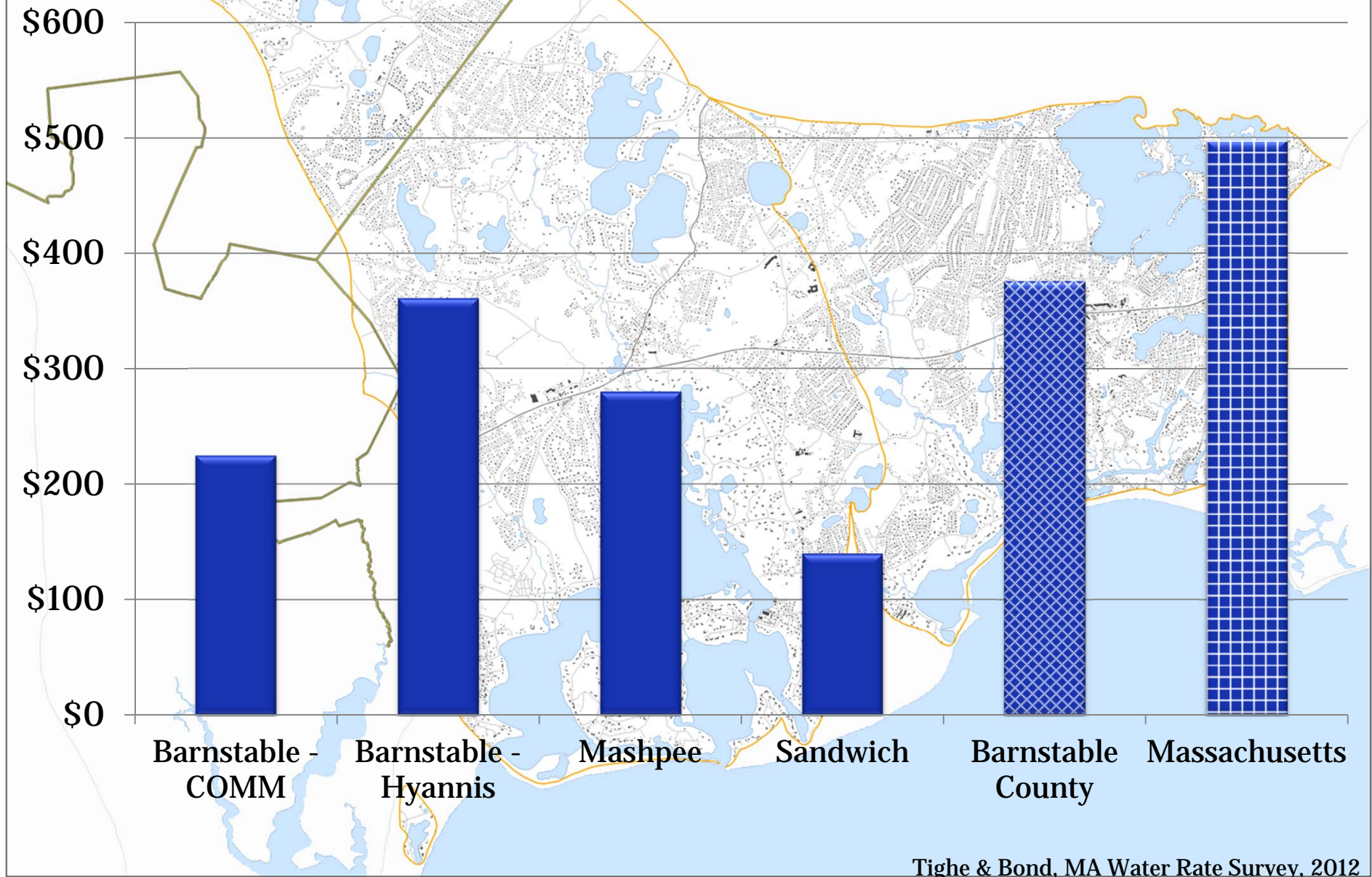


**Centerville River
Rushy Marsh
Three Bays**

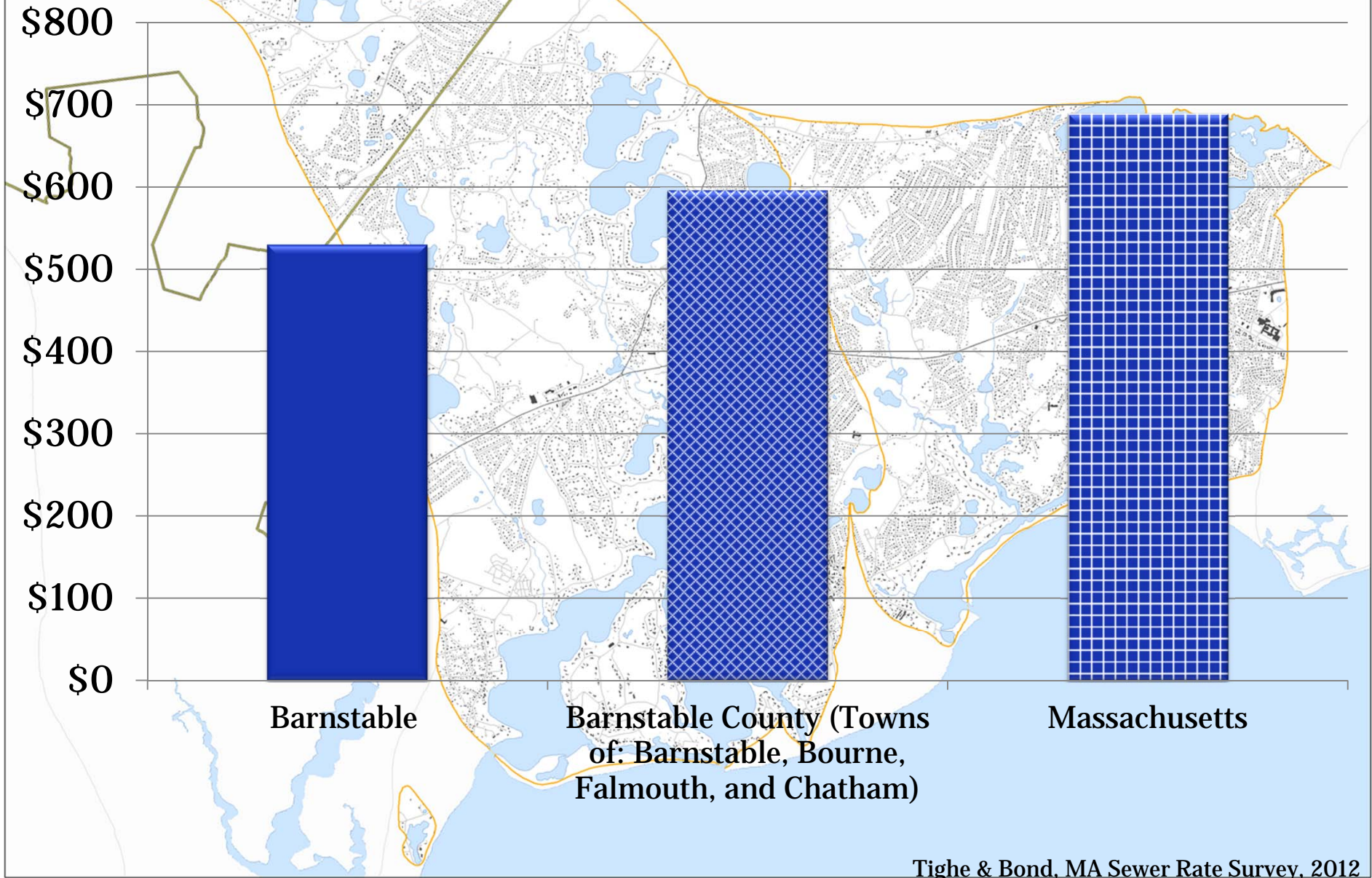
Average Single Family Property Tax Bill (2013)



Average Annual Water Bill (2012)



Average Annual Sewer Bill (2012)



The Problem



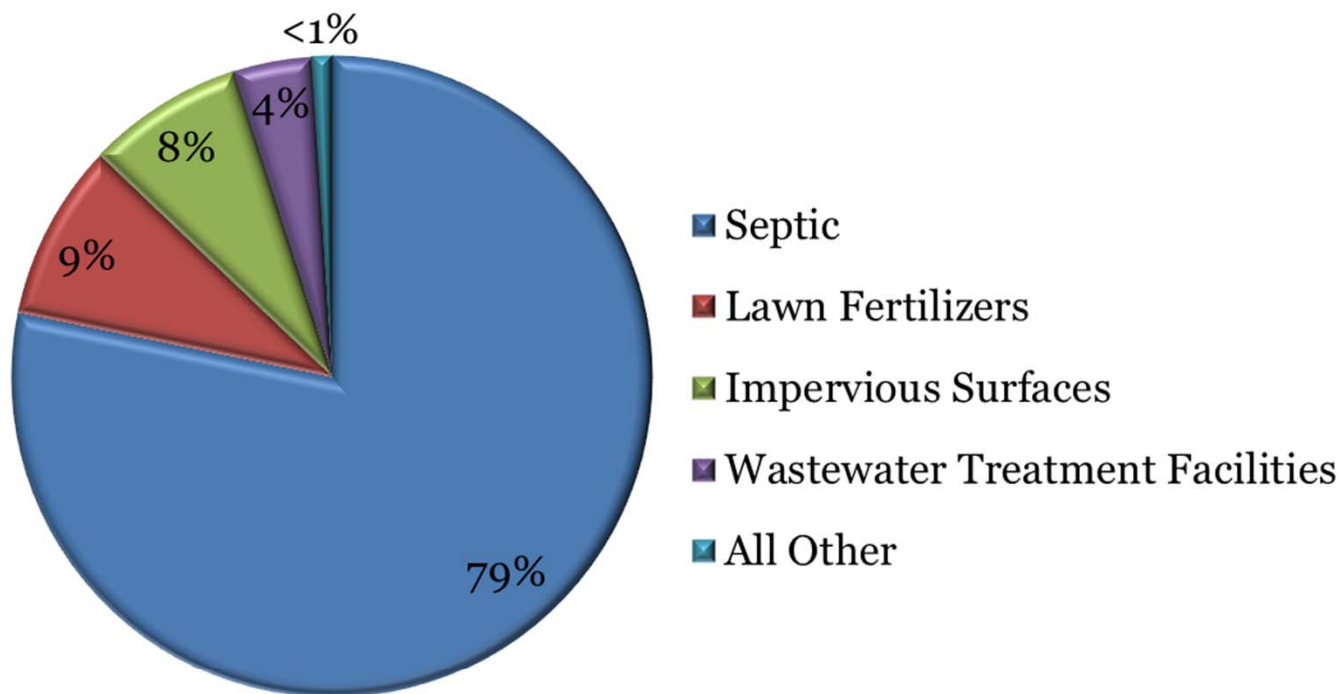
Centerville River
Rushy Marsh
Three Bays



Massachusetts Estuaries Project

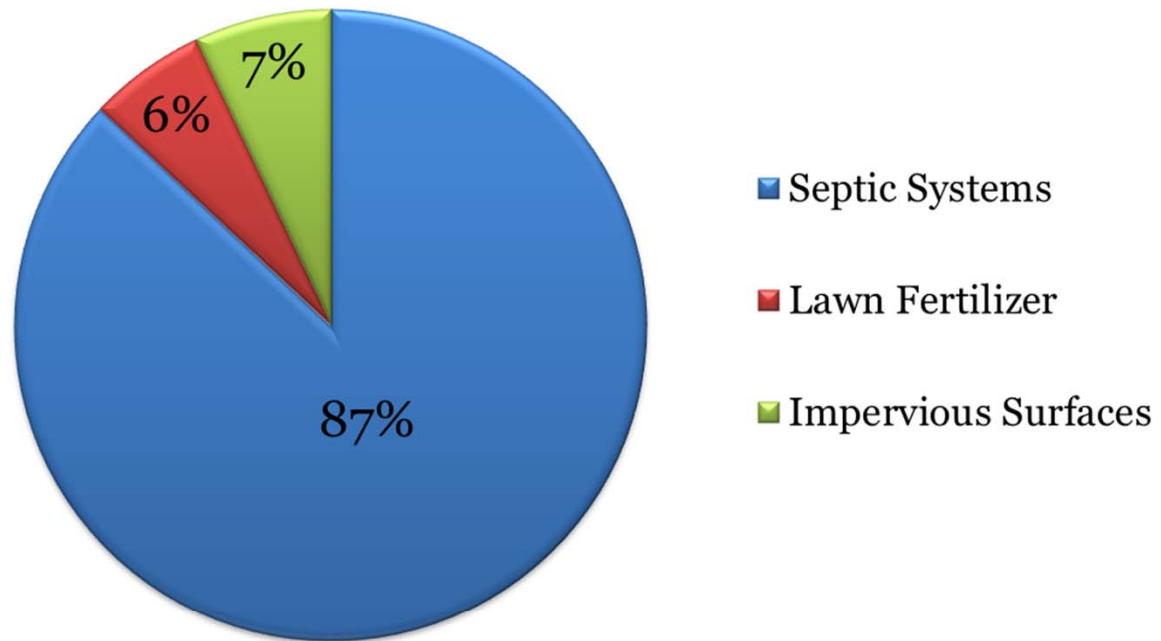
- Opportunity for towns to obtain independent analysis of nitrogen loading and its impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

Cape-Wide Controllable Nitrogen Loads



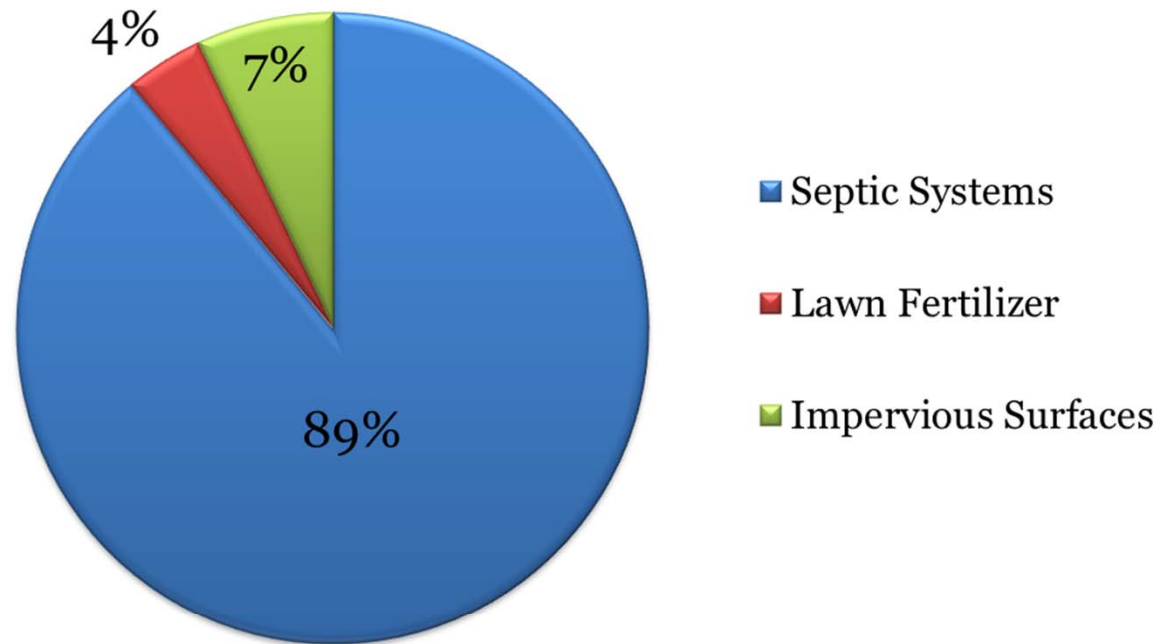
Note: Data averaged from existing Massachusetts Estuaries Project Reports

Centerville River Controllable Nitrogen Loads



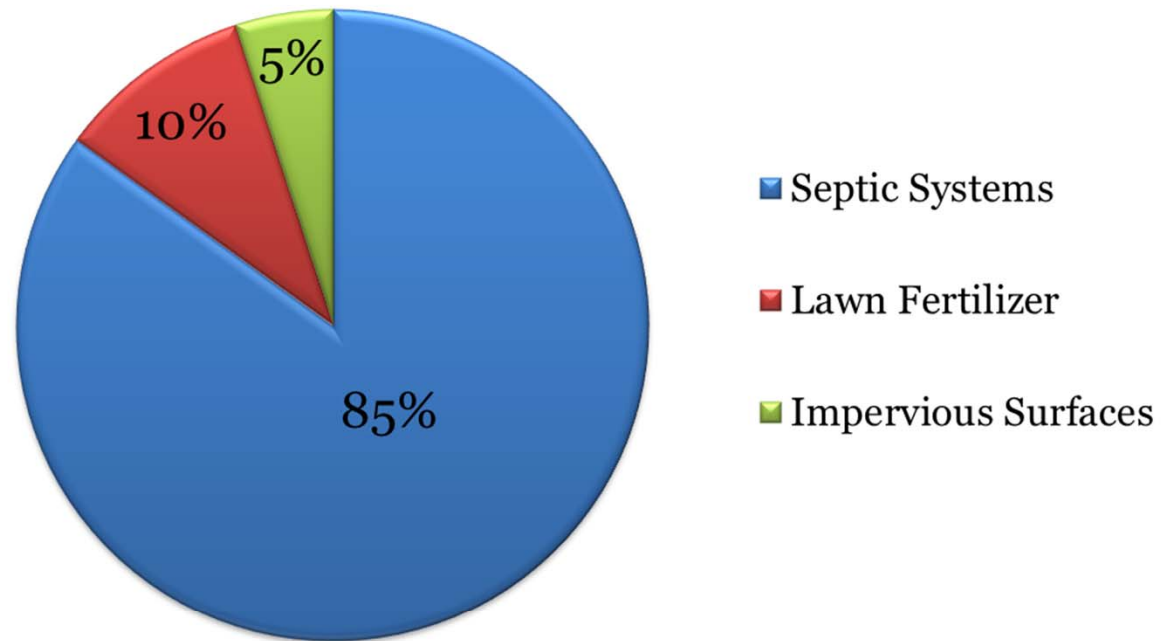
Massachusetts Estuaries Project, Nov 2006

Rushy Marsh Controllable Nitrogen Loads



Massachusetts Estuaries Project, April 2006


Three Bays Controllable Nitrogen Loads



Massachusetts Estuaries Project, April 2006


Nitrogen Problem


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway







 Roads

 Structures

 Ponds

Nitrogen

Ecological Indicators

-  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 in Public Supply Wells


-  0 - 0.5 mg/l
-  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

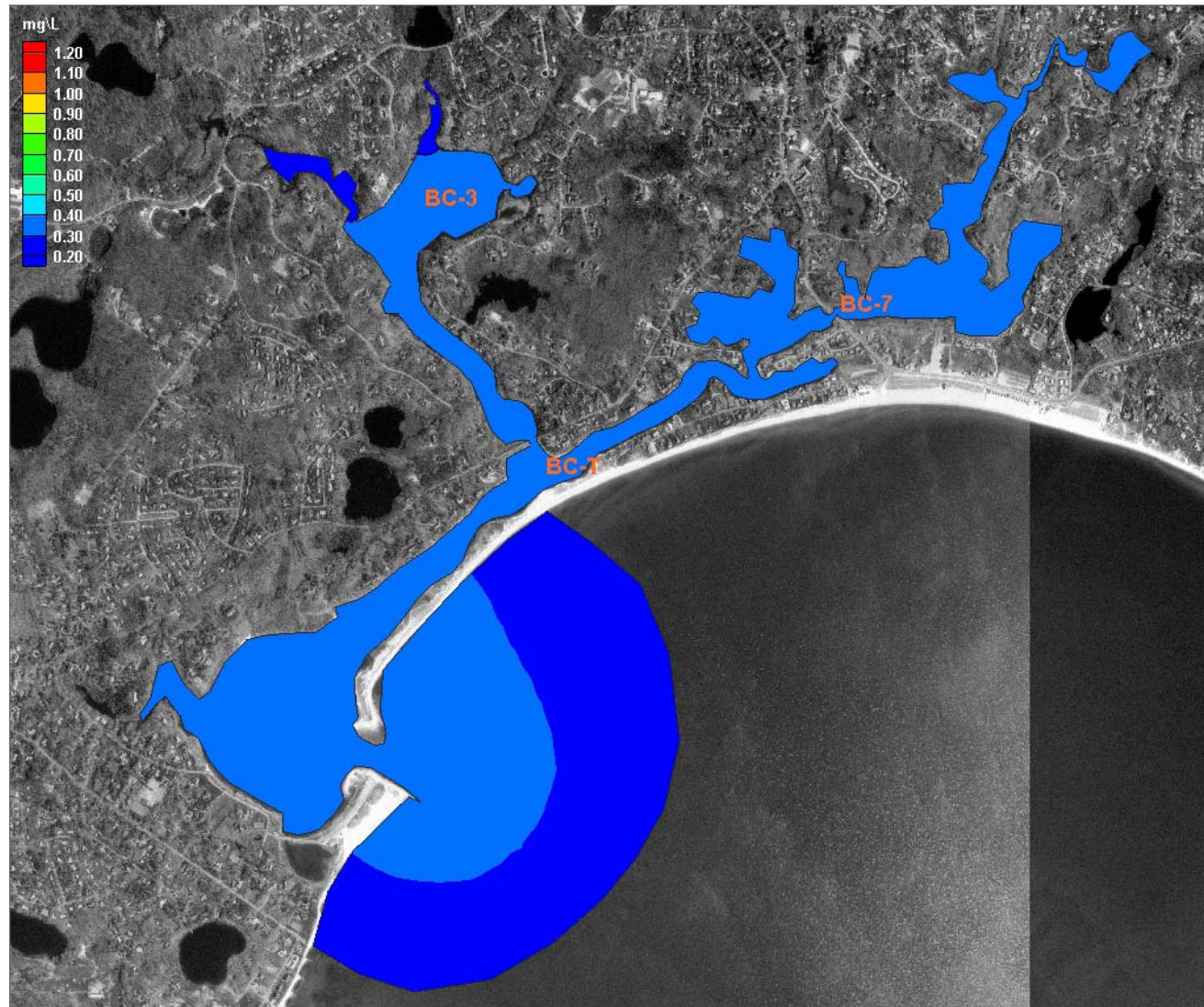
 0.1 % - 9%

 9.1 % - 38 %

 38.1 % - 62 %

 62.1 % - 86 %

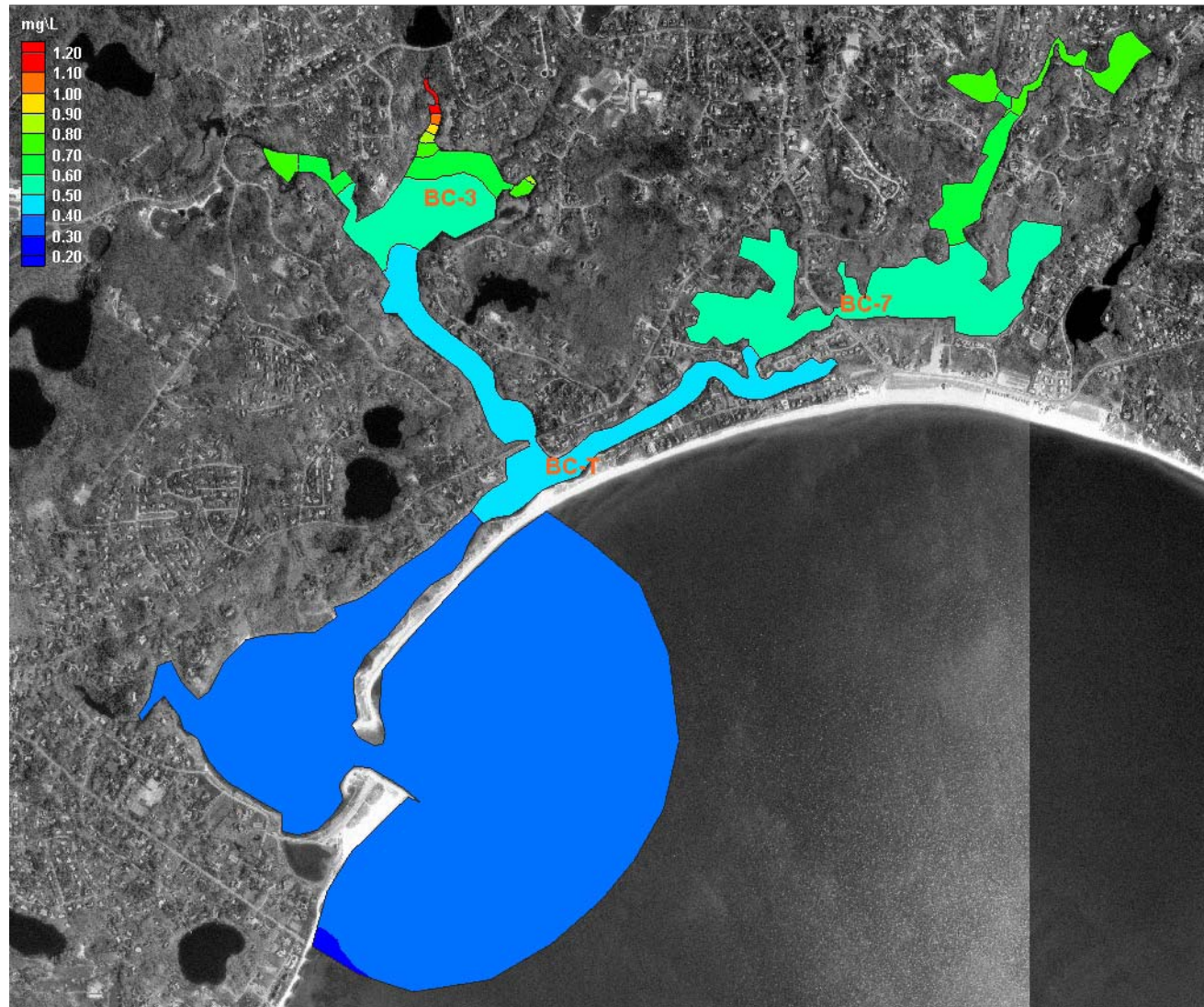
 86.1 % - 100%



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

(Source: MEP 2006)

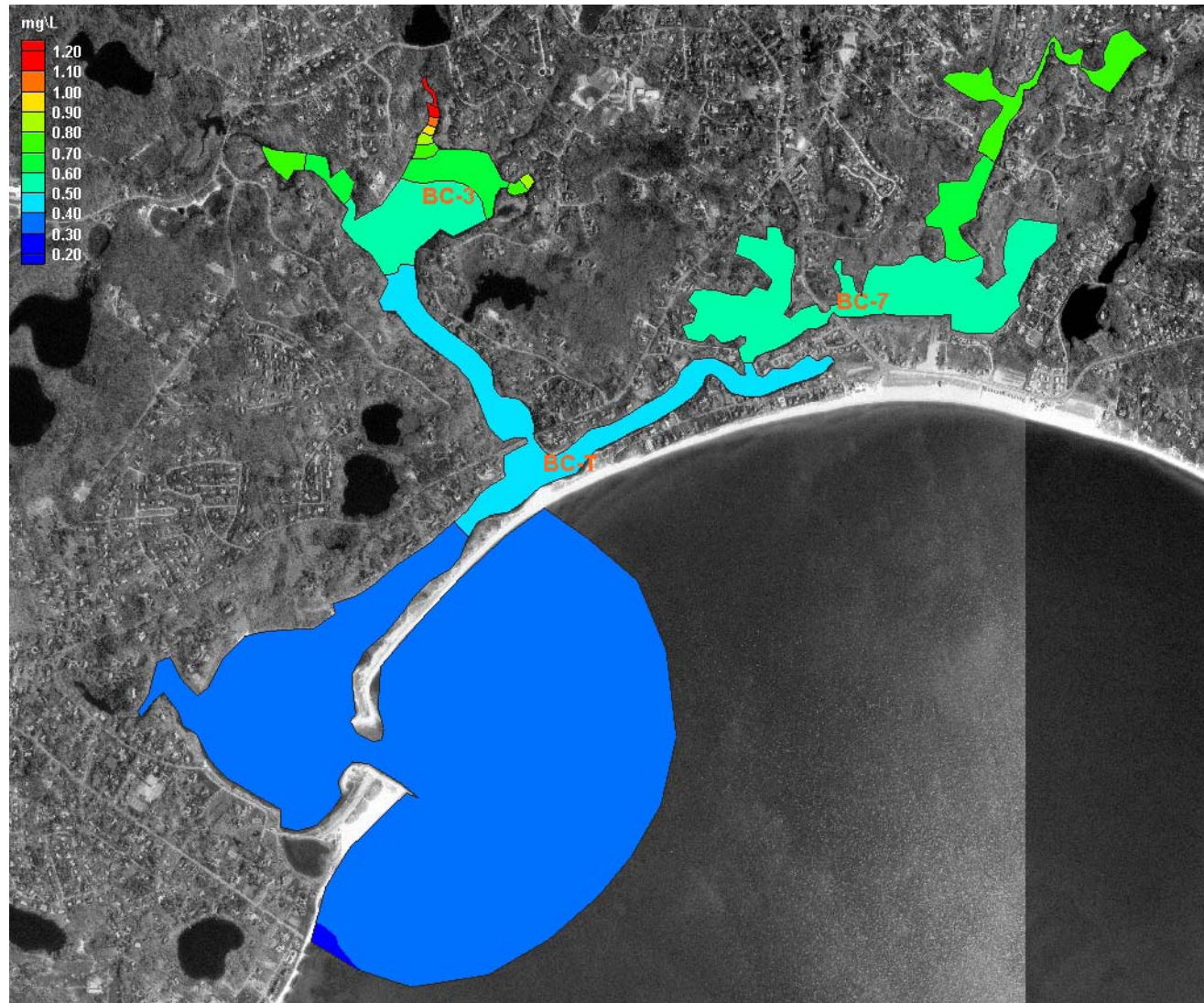
Pre-Colonial Conditions: Centerville River



Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Centerville River System. The approximate location of the sentinel threshold station for Centerville River System (BC-T) is shown.

(Source: MEP 2006)

Present Conditions: Centerville River



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

(Source: MEP 2006)

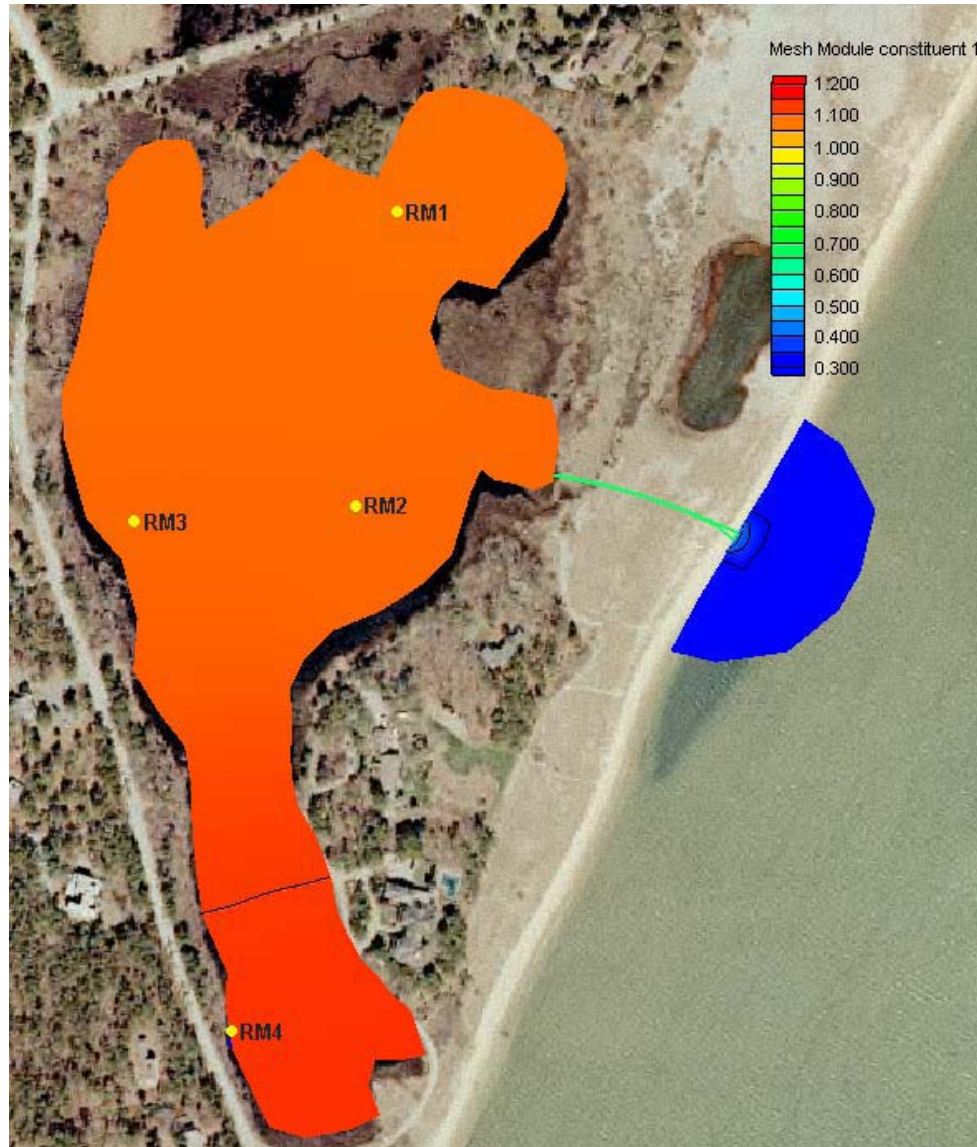
Build-out Conditions: Centerville River



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Rushy Marsh, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Rushy Marsh (RM2) is shown.

(Source: MEP 2006)

Pre-Colonial Conditions: Rushy Marsh



Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario and the bathymetry, for Rushy Marsh. The approximate location of the sentinel threshold station for Rushy Marsh (RM2) is shown.

(Source: MEP 2006)

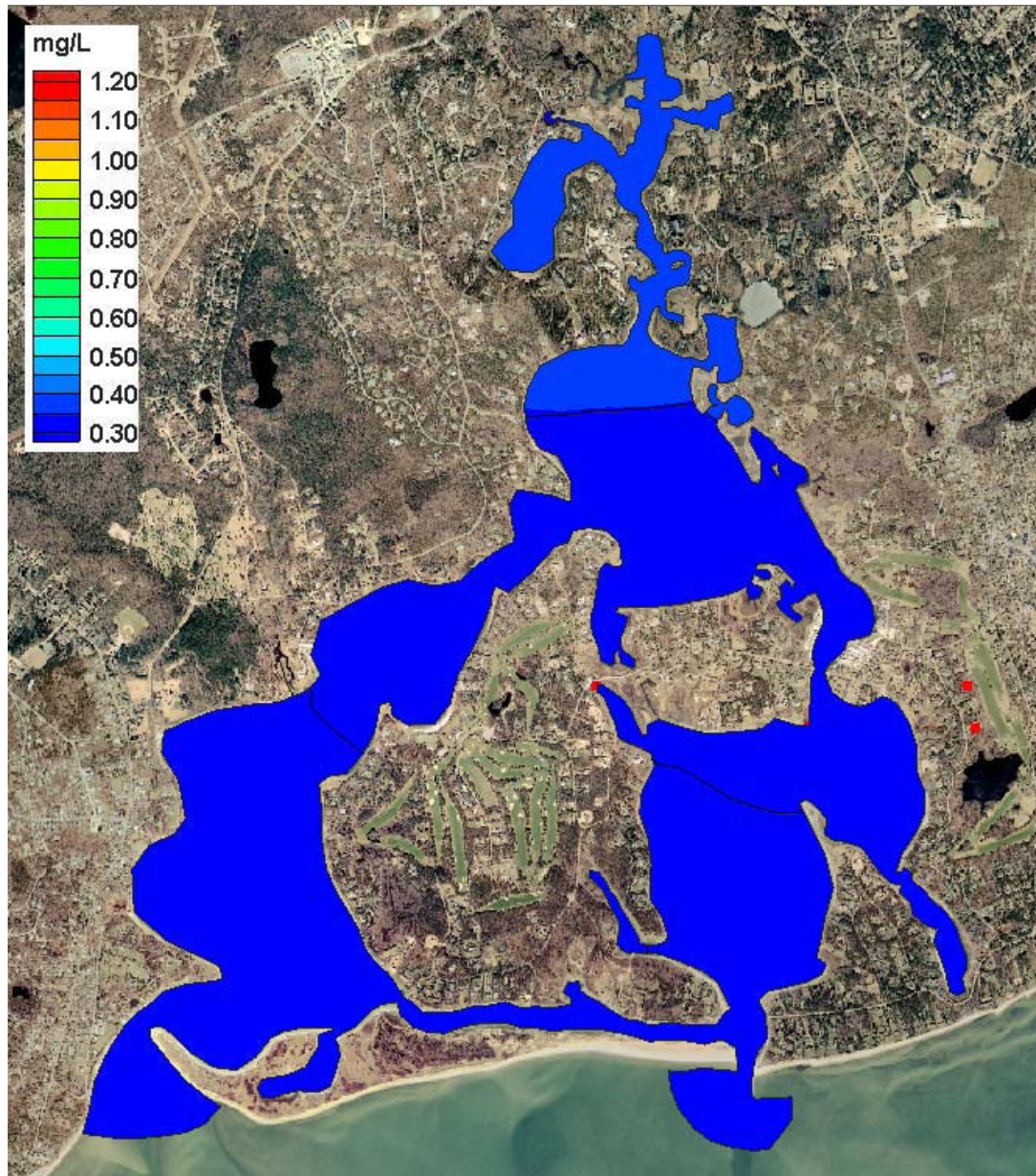
Present Conditions: Rushy Marsh



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Rushy Marsh, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Rushy Marsh (RM2) is shown.

(Source: MEP 2006)

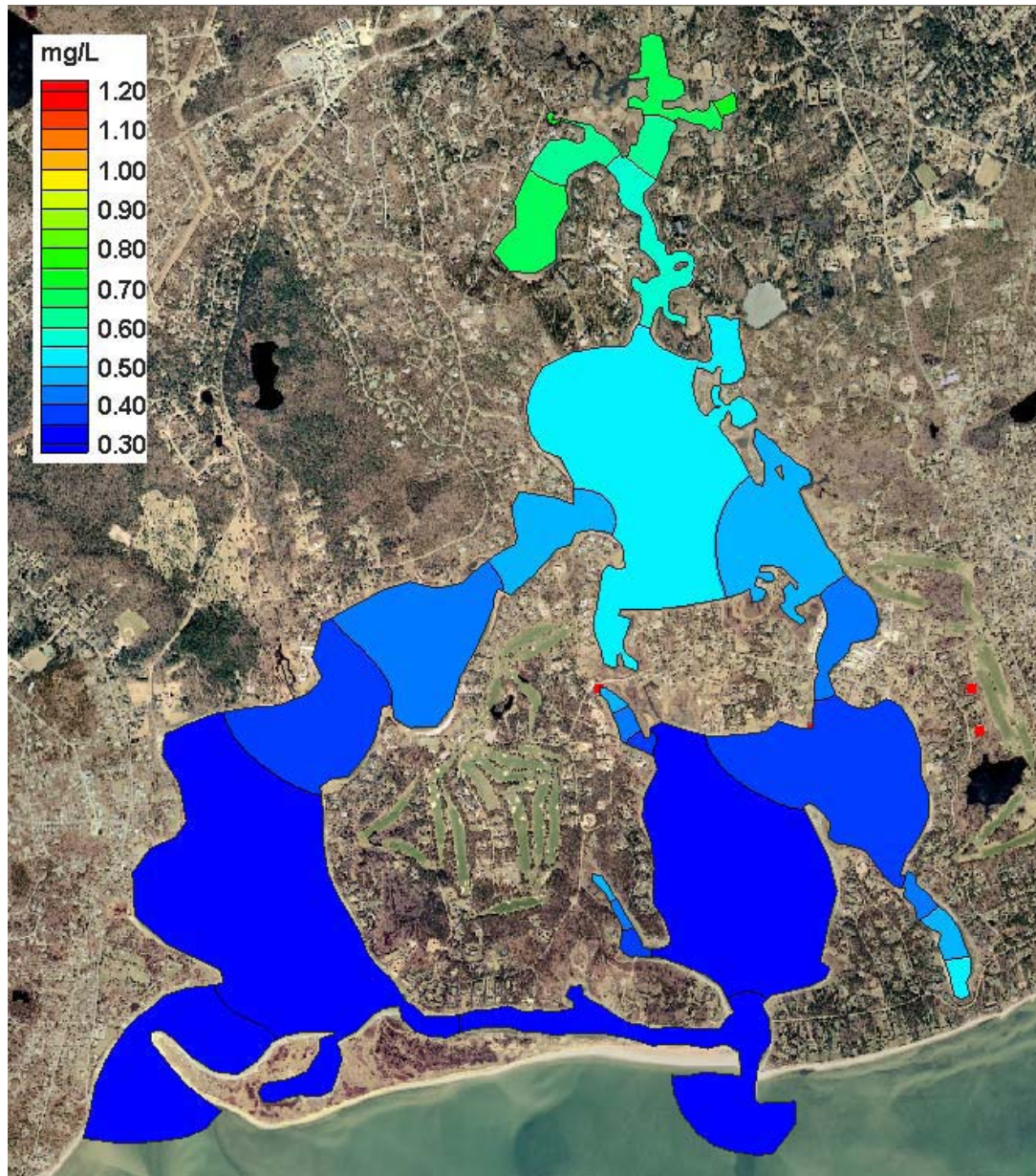
Build-out Conditions: Rushy Marsh



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

(Source: MEP 2006)

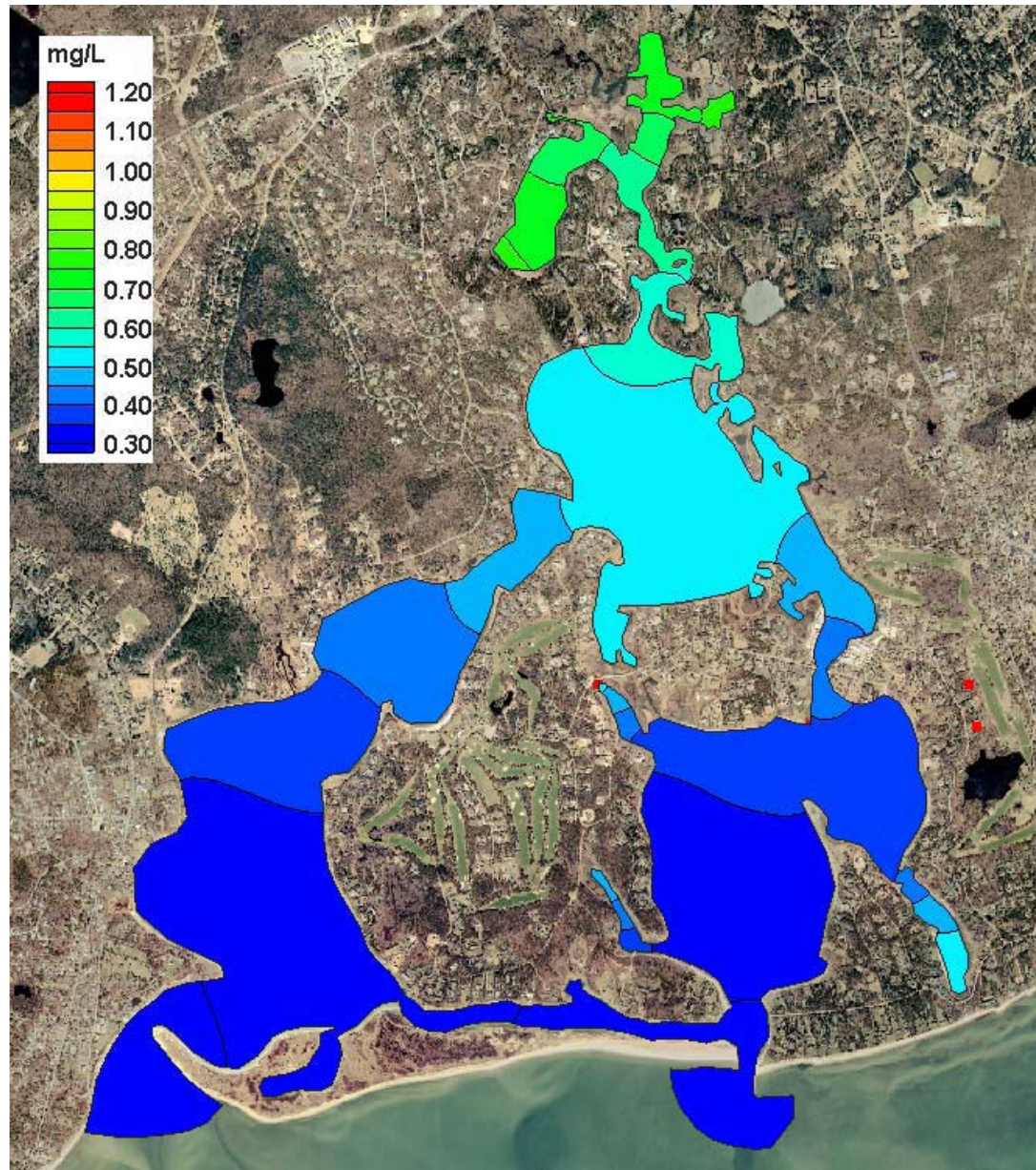
Pre-Colonial Conditions: Three Bays



Contour plot of **average total nitrogen concentrations** from results of the present conditions loading scenario, for the Three Bays system.

(Source: MEP 2006)

Present Conditions: Three Bays




Contour plot of modeled **total nitrogen concentrations (mg/L)** in the Three Bays system, for projected build-out loading conditions.

(Source: MEP 2006)

Build-out Conditions: Three Bays


Nitrogen Problem


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

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 Structures

 Ponds

Nitrogen

Ecological Indicators

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


Embayments with Removal Target


Total NLoad Percent Removal

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Subwatersheds with Removal Target


Total NLoad Percent Removal

 0.1 % - 9%

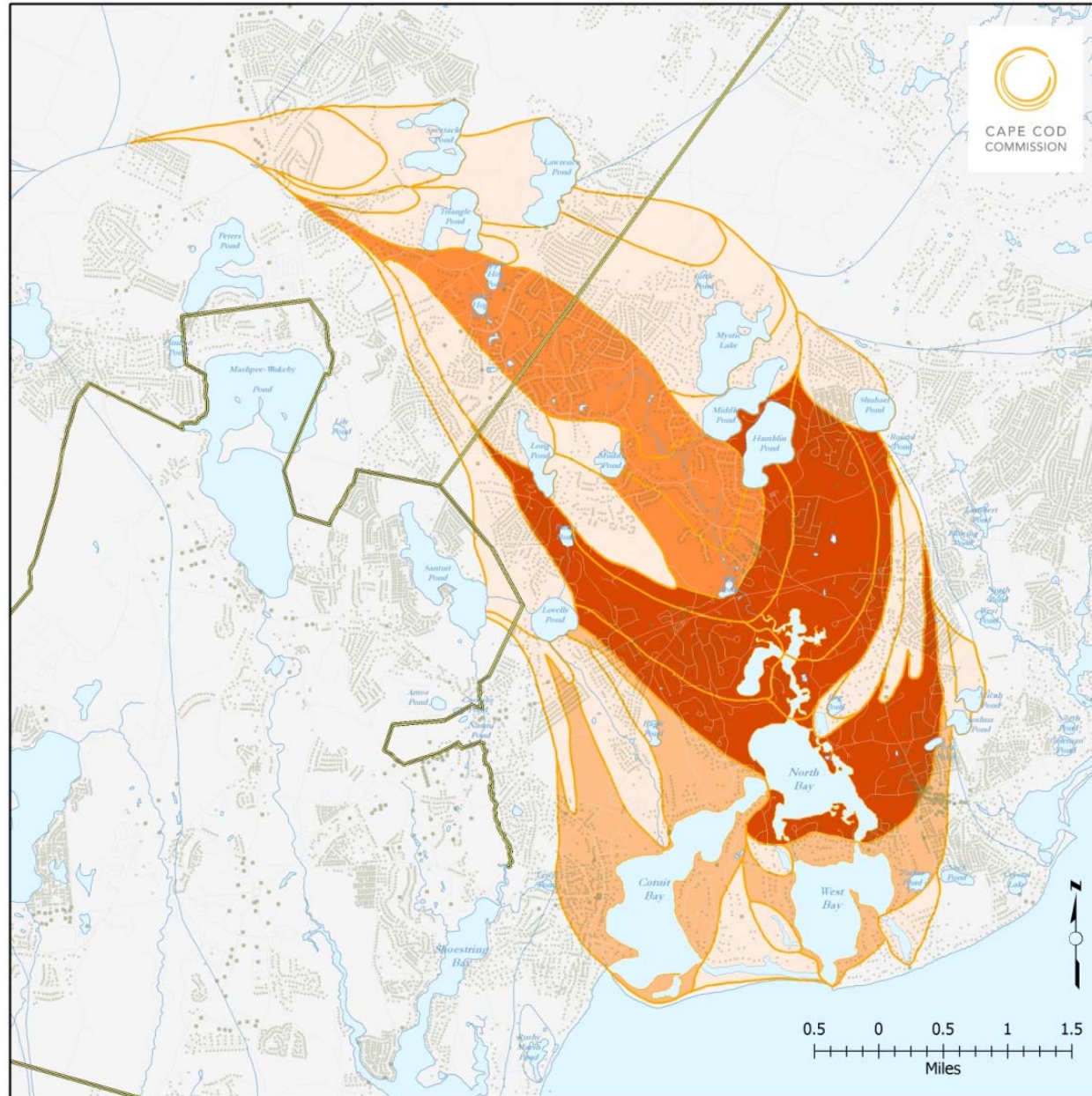
 9.1 % - 38 %

 38.1 % - 62 %

 62.1 % - 86 %

 86.1 % - 100%

Nitrogen Problem



100% Removal
25% Removal
20% Removal

Sources: MEP


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



Centerville River
Rushy Marsh
Three Bays


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

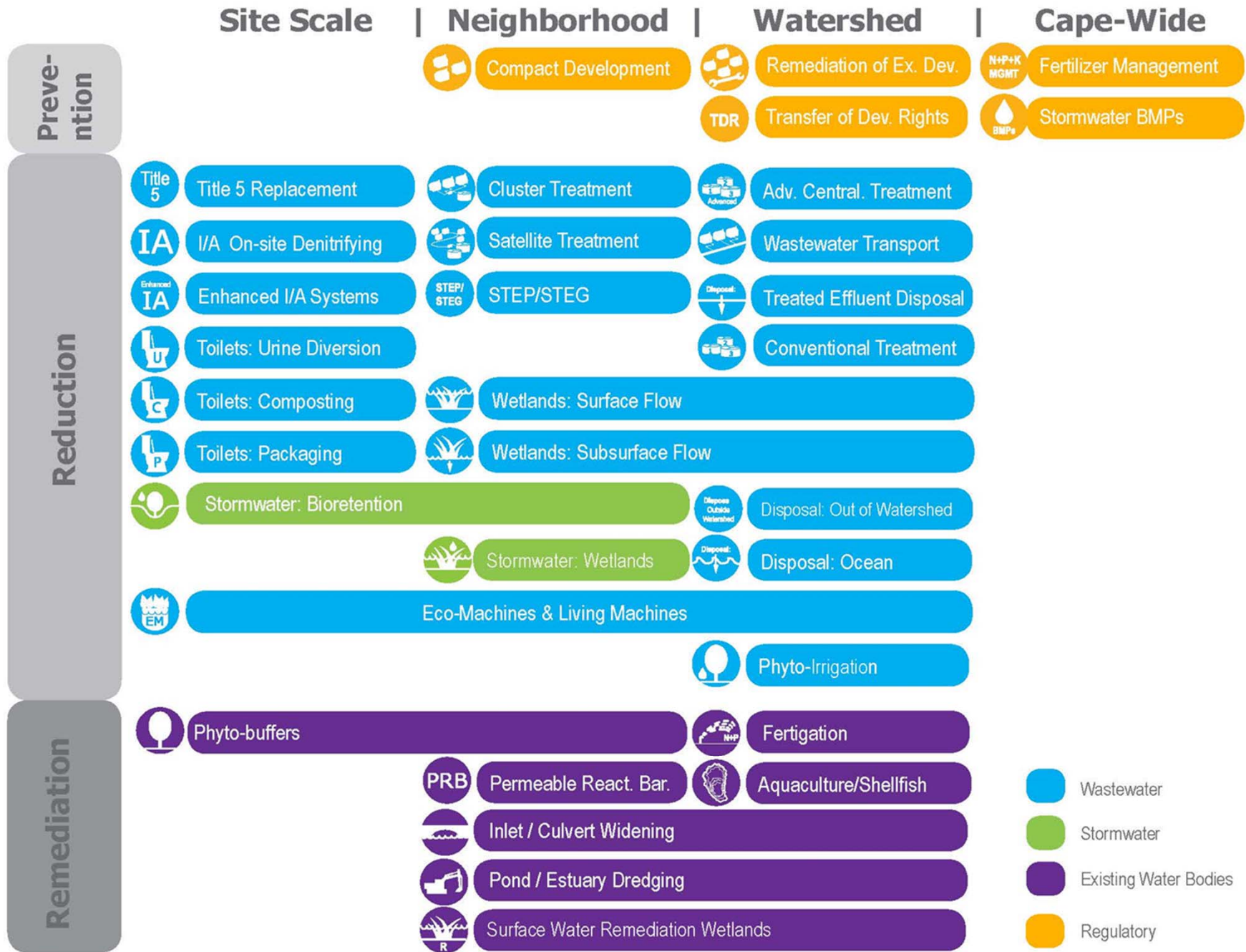
 2031 - 2040

 2041 - 2050



Framework for Addressing Solutions Moving Forward

Centerville River
Rushy Marsh
Three Bays



- 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 Centerville River
and Three Bays Group will be available on the Cape
Cod Commission website:**

<http://watersheds.capecodcommission.org/index.php/watersheds/mid-cape/three-bays-centerville-river>

Centerville River
Rushy Marsh
Three Bays

**Cape Cod 208 Area Water Quality Planning
Three Bays and Centerville River Working Group**

**Meeting One
Thursday, September 26, 2013
COMM Fire Station, Centerville, MA**

DRAFT SUMMARY NOTES

ACTION ITEMS

Cape Cod Commission

- Include on or with chronologies:
 - Town votes on wastewater-related issues that failed.
 - Shellfish bed closings and openings due to water quality.
 - Legend for acronyms.
 - Land use management decisions related to water quality.
 - Start of Coastal Mitigation Program in the 1980s.
 - Clean Lakes program
 - What has been done on golf courses on the Cape, follow up with Ed Nash about this
 - Pond water quality studies, follow up with Lindsey Counsell about this.
 - Have people include their names on their sticky note suggestions in the future to make it easier to follow up and get information.
- Think about how to incorporate indicators discussed by participants into planning and monitoring.
- Land use change data:
 - The 1951 data was based on a different scale than more recent data—is this an issue?
 - There is land use change data from 2005, although it is finer grained. Look into this and see if it should be included.
 - Get land use data from Woods Hole (Tom Stone?)
- Buildout data:
 - Getting a finer grained buildout for non-residential. The Growth Management Department can help for Barnstable.
- Demographic data:
 - Update demographic numbers for Rushy Marsh: there are 200 homes in Rushy Marsh and a farm going in, according to participants.
 - Clarify whether the family property tax bill refers to the taxes for an “average home” or whether this is the average across all tax bills.
 - Add Cotuit to annual water bill slide. It was suggested that Chris Wiseman could help with this information.
 - Concerns about seasonality—how do you plan for seasonality, since you don’t know how property will be used in the future?
- Nitrogen and environmental health data:

- Participants noted that the area on the east side of Centerville River appears “healthy” on the GIS layer but that shellfish beds are closed there. Also, information on the buildout map for this area doesn’t correlate with the GIS layer data. Look into this and address.
- Participants commented that some of the reports used for the nitrogen and environmental health data are outdated (over a decade old). They indicated that the Commission needs data that are more current. Address or at least acknowledge this.
- Clarify TMDLs and related target reductions for the Working Group and the public.
- Phosphorus data:
 - Participants raised questions about the trophic map’s accuracy. Get more information from towns and pond groups about this.
 - Perhaps add a phosphorus source pie chart like the nitrogen source pie chart.
- Woods Hole has information on PRBs that might be useful to Commission.
- Participants suggested that the Commission add “economic development” as criteria for the screening process, perhaps under project goals or target areas.
- A participant suggested adding buildout load to the “Establish targets and articulate goals” section of the screening process.
- Get proposed attenuation sites from towns.
- Public education:
 - Educate about why protect ponds, how this issue affects ponds, beaches, swimming water, etc.
 - Explain Title 5 for public and stakeholders.
 - Consider including some “story telling” about impacts on shellfish, crabs, etc as part of chronology or plan to get people to care.

For Working Group Members

- Share information about existing infrastructure with the Commission.
- Share information about planned and projected infrastructure with the Commission.
- Further review and check the baseline conditions data and let the Commission know about any important changes or concerns.

WELCOME AND INTRODUCTIONS

The Cape Cod Commission (the Commission) opened the meeting with a welcome. The facilitator, Ms. Carri Hulet from the Consensus Building Institute, introduced herself. All of the representatives around the table and the public attendees introduced themselves and explained their interest in the issue (see Attendee List in Appendix A).

REVIEW OF GOALS AND PROCESS

The stated goal of the 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. Hulet explained that by the end of the meeting, she and the Commission hoped that all participants had contributed any additional questions or concerns they had.

Ms. Erin Perry, Special Projects Coordinator for the Cape Cod Commission, presented an overview of the Clean Water Act Section 208 and described the process and goals of the proposed update to the 1978 Section 208 Area-Wide Water Quality Management Plan. In January 2013, the Massachusetts Department of Environmental Protection (MassDEP) directed the Commission to update the 1978 Section 208 Area-Wide Water Quality Management Plan (208 Plan Update). The goal of the three-year 208 Plan Update process is to help communities collaborate and coordinate their water quality management activities to achieve compliance with Section 208 water quality standards. The 208 Plan Update will focus on reducing nitrogen in saline waters, phosphorus concentrations in fresh waters, and address challenges posed by future growth and Title 5 limitations. The Commonwealth has provided \$3 million to fund this process, which will involve a 3-year planning effort. The intent is to produce a plan in the first year in order to help secure federal and state funds to support the effort going forward.

Ms. Perry noted that there are 105 watersheds on Cape Cod and 57 embayments. She said that the Massachusetts Estuaries Project (MEP) has found that almost all of the embayments that it has studies on the Cape require nitrogen removal. She explained that, in light of the fact that these watersheds and embayments cross town lines, this a regional issue. The Commission, she said, is really looking to assist in the coordination and build this effort around watersheds rather than municipal boundaries

Ms. Perry explained that the goal of the 208 Update Process is to generate a series of approaches in each watershed that will meet water quality standards. The process is watershed-based, includes a focus on both stakeholder engagement and technical work, seeks to maximize the benefits of local planning, and favors allowing local stakeholders to decide which of a range of options to pursue instead of mandating a single "optimal" solution. Ms. Perry noted that the 208 Update Planning Process is occurring simultaneously in 11 subgroups across the Cape, with the Three Bays and Centerville River Working Group being one of these 11.

Ms. Perry noted that the Commission is willing to attend group and organization meetings to present on this process. She said one key goal was to spread the word as widely as possible.

Ms. Perry then reviewed the timeline of the 208 Plan Update process. Public meetings were held in July and August, and the Watershed Working Groups will meet three times: once in September (the current meeting), once in October, and once in early December. The September (current) meetings are focused on discussing baseline conditions; the October meetings will focus on technology options; and the December meetings will focus on reviewing different scenarios for the local watersheds covered by each Working Group. The efforts of each Working Group will be supported by:

- An Advisory Board of six people who provide ongoing feedback to the CCC;
- A Regulatory, Legal and Institutional Work Group, which provides legal and regulatory input;
- A Technical Advisory Committee of the Cape Cod Water Protection Collaborative, which will provide input on the potential technologies;
- Technology Panel of experts throughout the country who will be giving high-level review of possible technologies.

Ms. Perry explained the difference between the Technology Panel and the Technical Advisory Committee, saying the goal of the Technology Panel is to evaluate possible technological approaches for wastewater issues from more of an academic perspective; the Technical Advisory Committee, in contrast, is looking at this from more of a municipal perspective. Information about the advisory boards and panels supporting the 208 planning process is available online.

LOCAL PROGRESS TO DATE

Mr. Scott Horsley, the Area Director for the Commission, provided an overview of efforts made across the Cape and in the municipalities of Barnstable, Falmouth, Mashpee, and Sandwich to address water pollutants.

The study group members and observers were then encouraged to review printed chronologies of what the towns of Barnstable, Falmouth, Mashpee, and Sandwich have done to protect the watersheds in the area over the last couple decades. These chronologies, Mr. Horsley explained, have already gone through preliminary review by the involved municipalities. Commission staff asked all attendees to make additions or corrections to the chronologies through use of sticky notes; they asked participants to think about what has been done, what plans have been made, what facilities have been built, and things that were voted on but didn't move forward, among other related activities. Participants were given approximately 15 minutes to make their suggestions on the chronologies.

Ms. Hulet then went around to each of the printed chronologies for each town and asked people to explain the information on the sticky notes they had posted.

Discussion about the Sandwich Chronology

- One participant asked whether votes that didn't go through should be included on the timeline. Ms. Hulet asked the Working Group what they thought about this
 - People generally responded that they think this is important for a number of reasons, including that it provides evidence that the towns have tried to deal with water quality problems previously.

- One participant said that in the last 2-3 years, Sandwich had reopened previously closed shellfish fisheries and that this should be included on the timeline, since it is a major accomplishment.

Discussion about the Mashpee Chronology

- One participant said that around 1980, blue claw crabs had been plentiful; in the 2000s, they are no longer available. He feels that they are an indicator species.
- Another participant said that eelgrass is also disappearing and that this is also an indicator species. Commission staff explained that eelgrass is being considered as part of their study, as would be explained later in the meeting.
- Ms. Hulet and Mr. Horsley explained that these comments are very important, but that the chronologies are not the place to capture these changes.

Discussion about the Barnstable Chronology

- One participant suggested that the Commission provide a legend for all acronyms on the chronologies and powerpoints.
- A participant suggested that the Commission include land management decisions, particularly those tied directly to water quality issues, on the chronologies
- Participants said that in the late 1980s, the Coastal Mitigation program was started, which meant that money was put into addressing outfalls and water quality up the creeks. This should be added.
- In 1985, the Massachusetts Department of Transportation denied Barnstable a permit to repave Route 28 due to runoff concerns. This should be added, one participant said.
- One participant said that an important milestone was the start of Clean Lakes funding from the state in the late 1980s, this funding helped start projects like the Red Lily Pond project.
 - One participant asked whether the Clean Lakes program still has money. Another participant answered no.
- A participant suggested that in 1989, there was a Cape Cod groundwater study conducted, which looked at fertilizer runoff from the four oldest golf courses on Cape Cod. He said this was one of the first studies of this sort done. This should be added, he said.
 - Participants said that it might be worth including information about what has been done on golf courses on the Cape and that Ed Nash would be a good person to follow up with about this.
- One participant said that homes were discharging effluent into Red Lily Pond in the 1980s, so they put in a home cluster system in 1988. He thinks this home cluster system is something that can be scaled and used in other sorts of communities and that it seems to be working well.
 - Ms. Hulet reminded the group that these kinds of technological options will be the focus of next meeting.
- One participant said that the closing of shellfish beds in 1986 triggered a state testing process. The Massachusetts Division of Marine Fisheries began testing more places for coliform bacteria and ended up shutting down approximately 30,000 acres of shellfish beds around the Cape. They now do these "sanitary surveys" on a regular basis. This is an issue that touches all of the towns.
 - Dale Saad knows more about this.
- One participant asked for clarification on what exactly the group is trying to capture on these chronologies.

- Ms. Horsley responded that the Commission is trying to capture whatever the Working Group thinks needs to be on the chronologies.
- In response to Mr. Horsley's response, another participant said that things like the closing of shellfish and the loss of blue claw crabs is what people tend to be most interested in and concerned about. They tend not to think about the policies and plans. He suggested that the Commission might want to include some sort of sidebars to go along with the policy and plan chronologies that draw out these significant changes and impacts.
 - Other participants agreed and said they think there needs to be some sort of an overlay of the environmental indicators and impacts.
 - Mr. Horsley responded that this is challenging to track and that it is hard to tie policies directly to environmental effects due to the lag time between interventions and impacts on the problem.
- One participant noted that there is not very much good data on stormwater or water quality that can be directly tied to policies and plans, and that there is no funding to do this.
 - Mr. Horsley responded that this is one of many reasons that whatever management plans come out of the 208 Plan Update process have to be adaptive and have money build in for monitoring.
 - One participant added to this that if this planning process is going to lead to a political process, one of the best things the Cape can do is document that certain things work or have achieved positive effects. He said that we need indicators of success to help with this.
- Ms. Hulet asked the Working Group what kinds of indicators it thinks would be useful in tracking progress on water quality issues. The group responded with the following suggested indicators:
 - The closing and opening of shellfish beds and beaches
 - Water clarity
 - Invasive plant species
 - Blue Claw Crabs
 - Herring
 - Eel grass
 - Scallops
 - Brook trout
 - Amphibians (for freshwater monitoring)
 - Shoreline flora
 - Mussels
- Responding to earlier points about the need to include information about impacts such as shellfish bed closings on the chronology to make it salient for people, one participant said that they think the plan needs to include some "storytelling." He thinks it is important to remind people of how things used to be and get them dreaming about what it could get back to.
 - Ms. Hulet said this is an important lesson. People don't necessarily connect to timelines; they connect to stories. The Commission might want to think about whether and how to build this into the chronologies and the plan.
- One participant suggested that the Commission include the 2006 Cape Cod total maximum daily load (TMDL) regulation on the chronologies.
- Another participant thought it might be helpful to include pond water quality studies on the chronologies.
 - Lindsey Counsell can provide information on exact dates and what studies were done.

- One participant suggested that people should include their names on their suggestions in the future so that the Commission can follow up with them if more information is needed.

Ms. Hulet wrapped up the discussion of the chronologies by telling participants that the Commission will include the points made on the sticky notes and during the discussion into the chronology.

BASELINE CONDITIONS

Mr. Horsley and Mr. Shawn Goulet, Cape Cod Commission GIS Analyst, presented GIS data layers, demographic data, and water quality data both Cape-wide and specific to the Three Bays and Centerville River region. To ensure the accuracy of the data that will be analyzed for the 208 Plan Update, working group members were asked to identify anything they believed was missing from the data and to voice any differences of opinion they had with the Commissions' analysis or approach. The Commission also encouraged Working Group members and members of the public to view the GIS layers on the Cape Cod Commission website.¹

Land Features Data:

The Cape Cod Commission presented the following GIS data layers:

Natural Features – The natural features data layer shows the locations of cranberry bogs, wetlands, Natural Heritage and Endangered Species Program (NHESP) Certified Vernal Pools Water Table Contours; Sea, Lake, and Overland Surges from Hurricanes (SLOSH) Update 2013, and preliminary FEMA Flood Insurance Rate Map (FIRM) Zones 2013.

Managed Surfaces – The managed surfaces data layer includes managed ground surfaces (impervious and disturbed surfaces), residential managed lawns, and municipal managed natural surfaces. The residential managed lawns layer includes only private land surfaces where fertilizer application might occur. The municipal managed natural surfaces layer includes only public lands likely to receive fertilizer applications.

Regulatory Layer – The regulatory layer illustrates Areas of Critical Environmental Concern, MassDEP Approved Wellhead Protection Areas, and Growth Incentive Zones. Open Space data is displayed in three levels of land protection: land protected in perpetuity, limited protection, and no protection. Land Use Vision Map data delineates economic centers; industrial and service trade areas, village boundaries, resource protection areas, other designations, and undesignated lands.

Land Use Change Layer – The land use changes layer is based on McConnell land use data from 1951, 1971, and 1999. These layers illustrate the locations of the following land uses: residential; commercial; industrial; wooded, natural and wetlands; water, and; open disturbed or managed. A 1995 data layer is also available, but was not displayed since the collection methodology was different than the 1951, 1971, and 1999 data.

- One participant pointed out that the 1951 data was based on a different scale than more recent data.

¹ Data used for modeling and analysis is available here: [LINK]

- Another participant asked whether the Commission has more recent data than the 1999 data. She said that there should be data from 2005 and that it is finer grained, but should be comparable. The Commission will get this data and add it.

Density and Buildout Layers – The density layer shows the current per acre density of existing dwelling units in quarter square mile grids. The regional buildout layer shows the maximum potential buildout over a 20-25 year time horizon using the towns zoning regulations and normalizing that data by applying state designated zoning layers. Mr. Horsley emphasized that buildout scenarios are an art, not a science, and that there are many ways to conduct a buildout analysis. He illustrated this point by showing a slide that depicted differences between the Regional Buildout, the Comprehensive Wastewater Management Plan buildout, and the Local Comprehensive Planning Buildout for communities across the Cape. He explained that the Cape Cod Commission's approach to the buildout analysis enables comparison of potential buildout across the entire Cape, but eliminates some detail on the local level.

- Mr. Horsley noted that density is a critical component to the 208 Update Plan since the cost of wastewater collection is highly related to density. Greater density tends to be much more affordable to sewer. The Commission's Cape-wide estimate is that 30% growth will increase capital costs by 40%, assuming traditional sewerage.
- One participant said that Barnstable is doing some work that will probably bring down their buildout projections. She said that they would really like more granulated information that provides more data on different types of "non residential uses." The Commission will look into this and try to help provide this data.
- One participant added that he feels growth management isn't being given enough attention and that "we need people to really focus on this."

Demographic Data

The Section 208 Update will also consider demographic changes that could influence the selection of technologies to improve water quality. The Cape Cod Commission presented the demographic data, most of which was derived from the 2010 Census. Approximately 25,658 people, or 11.9% of Cape Cod's total population, live in the Three Bays and Centerville River watershed. Those living in the Centerville River area are 49 years of age on average and the average median income is a little less than \$70,000. Over 90% of Centerville River's population is white, and about 80% of the area's residents are year round. Those living in the Three Bays area are an average of 46 years old with an average median income of about \$80,000. Over 90% of the population in this area is white and over 80% is year round. The total assessed value for the study area is about \$6.5 billion. The average single-family property tax bill (2013) is approximately \$4,500 in Barnstable, \$4,700 in Sandwich, and \$4,100 in Mashpee, all of which are lower than the average in the Commonwealth. The annual water bill ranges from \$130 in Sandwich to \$360 in Barnstable-Hyannis; average water bills throughout the watershed are less than the Massachusetts average of \$500.

- One participant commented that the Commission needs to update its numbers for Rushy Marsh: there are 200 homes in Rushy Marsh and a farm going in
- Another participant commented that the towns have no control over whether a residence is seasonal or not, and that this can change from year to year. This makes it hard to plan for water and wastewater.

- One participant asked for clarification about whether the family property tax bill refers to the taxes for an "average home" or whether this is the average across all tax bills. People generally thought this was the average across all tax bills, but this needs to be confirmed by the Commission.
- The Commission needs to get information on Cotuit water. It was suggested that they talk to Chris Wiseman to get this information.

The Problem

Mr. Horsley explained that eutrophication from nitrogen loading in coastal estuaries and phosphorous loading in ponds and lakes is the primary problem to solve. He explained that the Massachusetts Estuaries Program (MEP) provides water quality, nutrient loading, and hydrodynamic information. With the MEP reports, he said, the Cape will be better able to tailor its efforts for each watershed .

Nitrogen – Mr. Horsley next reviewed the Cape-wide MEP data for nitrogen loads, which shows that septic systems account for 79% of the controllable nitrogen loads, 9% results from lawn fertilizers, and 8% from impervious surfaces. Four percent of the controllable nitrogen is the result of wastewater treatment facility effluent and natural sources comprise the remaining one percent. He then reviewed the MEP data for Centerville River, Rushy Marsh, and Three Bays. Mr. Goulet explained the GIS layers provided by the Commission on environmental health related to nitrogen. Commission staff explained that eelgrass and organisms are used as a main indicator of environmental health.

- Participants noted that the area on the east side of Centerville River study area appears "healthy" on the GIS layer but that shellfish beds are closed there. Also, information on the buildout map for this area doesn't correlate with the GIS layer data. The Commission is going to look into this.
- Participants commented that some of the reports used for the nitrogen and environmental health data are outdated (over a decade old). They indicated that the Commission needs data that are more current. This is something for the Commission to think about and address or at least acknowledge.
- Participants expressed some confusion about TMDLs and related percentage reductions. They indicated that this is complicated and not understandable to the average public, saying that even this technically oriented Working Group was having trouble getting these concepts. Mr. Horsley agreed and said that the Commission is working to develop ways of making this more understandable, such as an "accounting" system.

Eelgrass Extent – Mr. Horsley reviewed data from the Massachusetts Department of Environmental Protection on eelgrass extent. Mr. Goulet said that the Commission is looking to bolster these layers and this is a place the towns can help. Mr. Horsley explained that science strongly shows that nitrogen loading has a negative effect on eelgrass, so it is an important indicator species.

- One participant said the Three Bays Conservation Group did a survey recently and found no eelgrass in the area

Phosphorus Problem – Mr. Horsley reviewed the data on phosphorus, explaining that phosphorus impacts freshwater systems. Mr. Scott Michaud, a hydrologist from the Cape Cod Commission, explained that most of the information that is available for phosphorus loads in freshwater systems on the Cape comes from communities that are interested in the issue and have been collecting data.

- Participants raised questions about the trophic map accuracy. The Commission is going to look at this.
 - One participant said that Mystic Lake was treated with alum in 2010 and that it is better than it was but maybe not much better.
- Mr. Horsley said that the Working Group probably needs to think about lake and pond protection as part of the Plan Update.
 - In response to this, a participant commented that people need to better understand the connection between pollutants and their drinking and swimming water
- One participant noted that there are different travel times between nitrogen and phosphorus. Phosphorus moves more quickly than nitrogen, he said.
- Another participant asked how the pie chart of sources for phosphorus differs from the pie chart of sources for nitrogen. This might be something the Commission wants to add.

Potential Title 5 Compliance Issues – Mr. Horsley reviewed GIS layers showing various types of Title 5 compliance issues, including groundwater discharge points, locations of loans issued by the County for Title 5 repairs, and areas with potential Title 5 compliance issues. The Potential Title 5 Compliance Issues layer attempts to identify geographic areas more likely to exhibit compliance issues due to the small size of the land parcels, shallow depth to groundwater at the parcel locations, soils, the quantity of water used on the parcel, and presence of loan applications. This layer is based on the assumption that all parcels are on Title 5 systems.

- One participant commented that the Commission needs to clarify Title 5 for all stakeholders and the public to make sure people understand what this is.
- Another participant also mentioned that they need to consider sea level rise and how this might affect things.

Existing and Proposed Solutions

Mr. Horsely and Mr. Goulet presented data layers on existing and proposed infrastructure. The existing infrastructure layer includes attribute data for existing conditions, enhanced attenuation sites, and public supply wells. The proposed infrastructure layer will illustrate the locations of natural attenuation sites and CWMP sewershed phasing, if applicable

- Mr. Goulet explained that the Commission would like to enhance the existing infrastructure data and is hoping to get more information from the towns about this.
- A participant commented that there are a lot more projects planned than are currently included on the proposed infrastructure maps. The towns can provide this information.

Mr. Horsley closed the Baseline Conditions review by saying the Working Group will have some homework in between meetings. One thing the Commission would like Working Group members to do is to further review and check this data, which will be available online². He said the goal isn't to be perfect but to make sure that they don't miss something really important.

NEXT STEPS

Mr. Horsley presented the technologies matrix and described the upcoming meetings. The technologies matrix organizes a mixture of remediation, reduction and prevention techniques that

² <http://watersheds.capecodcommission.org/index.php/watersheds/mid-cape/three-bays-centerville-river>

can be deployed at the site level, neighborhood level, watershed level, or Cape wide. In the coming weeks, the Cape Cod Commission will distribute 1-2 page fact sheets about each technology. During the October meeting, group members will be expected to be prepared to discuss the merits of the technologies and begin to assess which technologies would be most appropriate to address the issues in their watershed.

- One participant said that Woods Hole did some work on permeable reactive barriers (PRBs) and that the Commission may want to get this information.
- Mr. Horsley said that one of the kinds of options people may want to think about is building PRBs, monitoring the benefit of these, and building sewers if and when necessary. PRBs will have a close to immediate effect, whereas sewerage won't have an effect on water quality for some time due to the travel time of nitrogen.

Mr. Horsley then reiterated that the goal of the group is to develop at least two plans with different sets of remedial options that would achieve water quality targets. He then described the alternatives screening process the group will apply over the next two meetings to achieve the aforementioned goal. The process is as follows:

- 1) Establish targets and articulate project goals.
 - 2) Identify priority geographic areas
 - 3) Determine which management activities should definitely be implemented. These might be the easiest and least costly management activities that should be undertaken regardless of other management actions.
 - 4) Assess alternative options to implement at the watershed or embayment scale
 - 5) Assess options to implement at the site-level
 - 6) Examine priority collection/high density areas
 - 7) Consider traditional sewerage or other grey infrastructure management options
- One participant commented that there are other reasons that towns may want to consider wastewater management in addition to Title 5 and environmental issues: he thinks it might be important for their economic development.
 - Mr. Horsley replied that this brings up the role that private development may play in the wastewater management puzzle.
 - Participants suggested that the Commission add "economic development" to the screening process, perhaps under project goals or target areas.
 - Another participant said that when the group gets to alternative on-site options, it would be wise to look at public spaces where it is relatively easy to implement these processes and have a larger effect, for example in schools.
 - One participant reiterated that the group needs to be mindful of managing growth throughout this process
 - A participant suggested adding buildout load to the "Establish targets and articulate goals" section of the screening process.

OPERATING PROTOCOLS

Ms. Hulet briefly reviewed the draft protocols and requested the group members suggest changes to the groundrules. She reiterated the primary role of the group members is to provide guidance on the

development of solutions to address the water quality issues specific to their watershed. Ms. Hulet explained expectations for Working Group members, including: stakeholder representatives will act as contacts for interested members of the public; and they will come prepared, do reading in advance, and participate fully in meetings. The Commission, she explained, committed to providing meeting summaries and making presentations and other information available online.

Ms. Hulet then reviewed the action items that came out of the discussion and closed the meeting by reminding everyone that the next Working Group meeting is on October 29 from 8:30-12:30pm at the same location. She then opened the floor for comments and questions.

- One participant said that there is a recent move to more farming on Cape Cod, that this could be a nitrogen problem, and that the Working Group should think about this as it plans and tries to educate others.

DRAFT

**Appendix A
Attendance**

Name	Affiliation
<i>Representatives</i>	
Rob Steen	Barnstable Public Works
JoAnne Miller Buntich	Barnstable Growth Management
Ed Nash	Golf Course Manager
Mark Robinson	Director of Compact of Cape Cod Conservation Trusts
Beth Ferranti	Citizen
Darren Meyer	Sandwich Health Department
Jaci Barton	Barnstable Land Trust
Lindsey Counsell	Three Bays Conservation Group
Fred Chirigotis	Barnstable Town Councilor
Mary Barry	Resident of Barnstable
Tom Klein	Citizen
Steve Brown	Representing Red Lily Pond Project, Inc.
Holly Hobart	Indian Ponds Association
<i>Public Attendees</i>	
Monica Mejia	Tufts University
Thomas Colombo	Hyannis Sport
Dale Saad	Barnstable Department of Public Works
Kevin Young	GCSACC (Golf Course Superintendents Association of Cape Cod)
Mike Pajolik	GCSACC (Golf Course Superintendents Association of Cape Cod)
<i>Staff</i>	
Scott Horsley	Area Manager, Cape Cod Commission
Erin Perry	Special Projects Coordinator, Cape Cod Commission
Shawn Goulet	GIS Analyst, Cape Cod Commission
Scott Michaud	Hydrologist, Cape Cod Commission
Anne McGuire	Community Relations Specialist, Cape Cod Commission
Carri Hulet	Consensus Building Institute
Danya Rumore	Consensus Building Institute
Thomas Parece	AECOM, Engineering firm working on plan
Mark Owen	AECOM, Engineering firm working on plan