

**Cape Cod 208 Area Water Quality Planning  
Pleasant Bay Group Watershed Working Group**

**Meeting One**

**Friday, September 27, 2013**

**Orleans Town Hall, 19 School Road, Orleans, MA 02653**

**8:30 am - 12:30 pm**

- 8:30 Welcome – *Cape Cod Commission*
- 8:35 Introductions, confirm working group membership and participation –  
*Stacie Smith (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 – *Scott Horsley (area manager)*
- 9:30 Review and add to chronology of work to date – *Working Group*
- 9:45 Discussion: drawing on past work to move forward – *Stacie Smith and  
Working Group*
- 10:00 Baseline Conditions: Understanding Your Watershed and its Water Quality  
Problem – *Scott Horsley (area manager)*
- 10:45 Break
- 11:00 Discussion of Baseline Conditions – *Stacie Smith (facilitator) and Working  
Group*
- 11:30 Review/Discuss Process Protocols – *Stacie Smith (facilitator) and Working  
Group*
- 12:00 Framework for Moving Forward: Preview Meetings 2 and 3 – *Scott Horsley  
(area manager)*
- 12:10 Public Comments
- 12:30 Adjourn

# **Pleasant Bay Group**



## **Baseline Conditions & Needs Assessment**

# **What is the 208 Plan?**

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# Clean Water Act Section 208



The Commission was directed to update the 1978 Plan

The Commonwealth provided \$3 million to fund the project

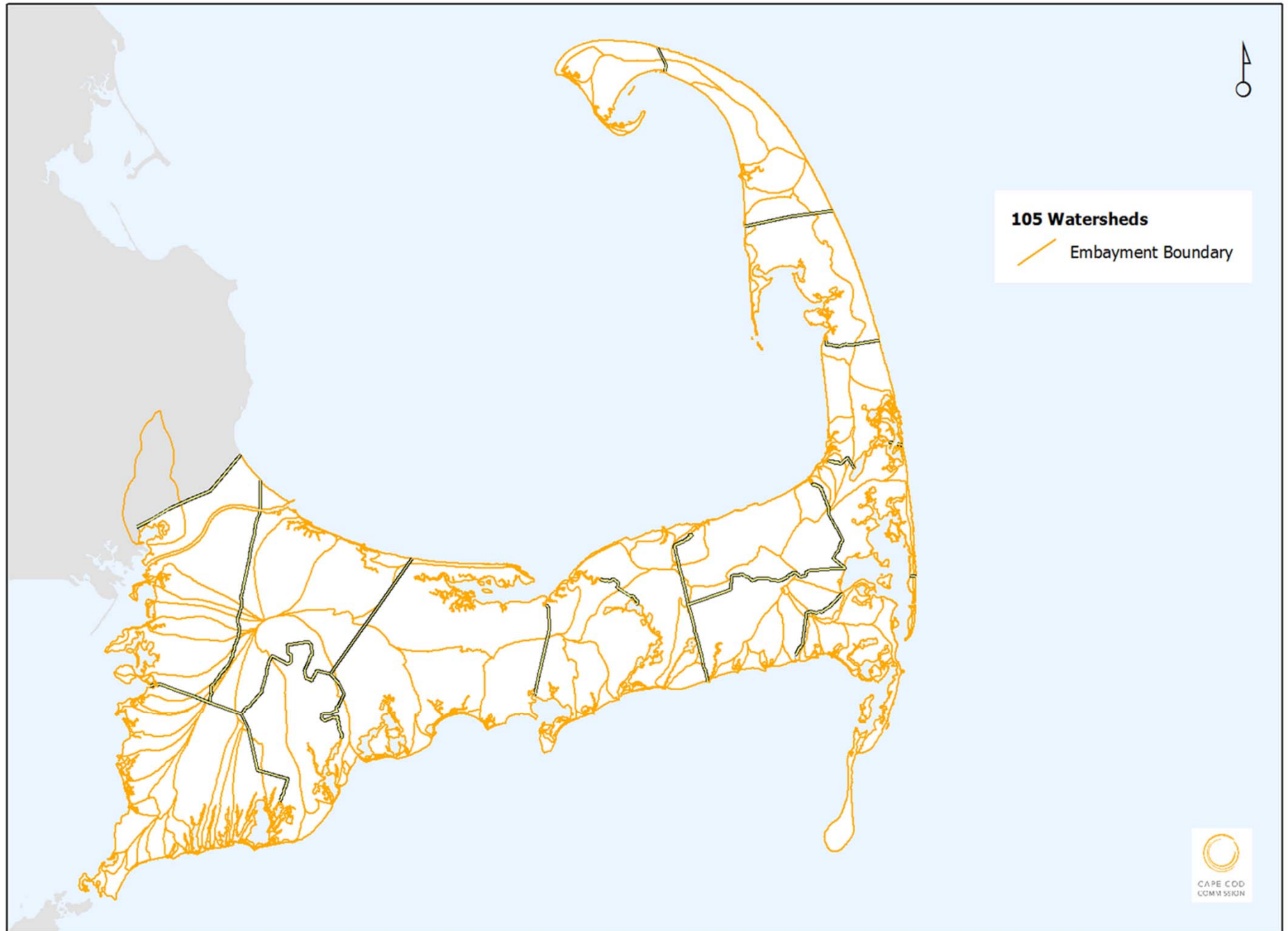
# Focus on 21<sup>st</sup> Century Problems

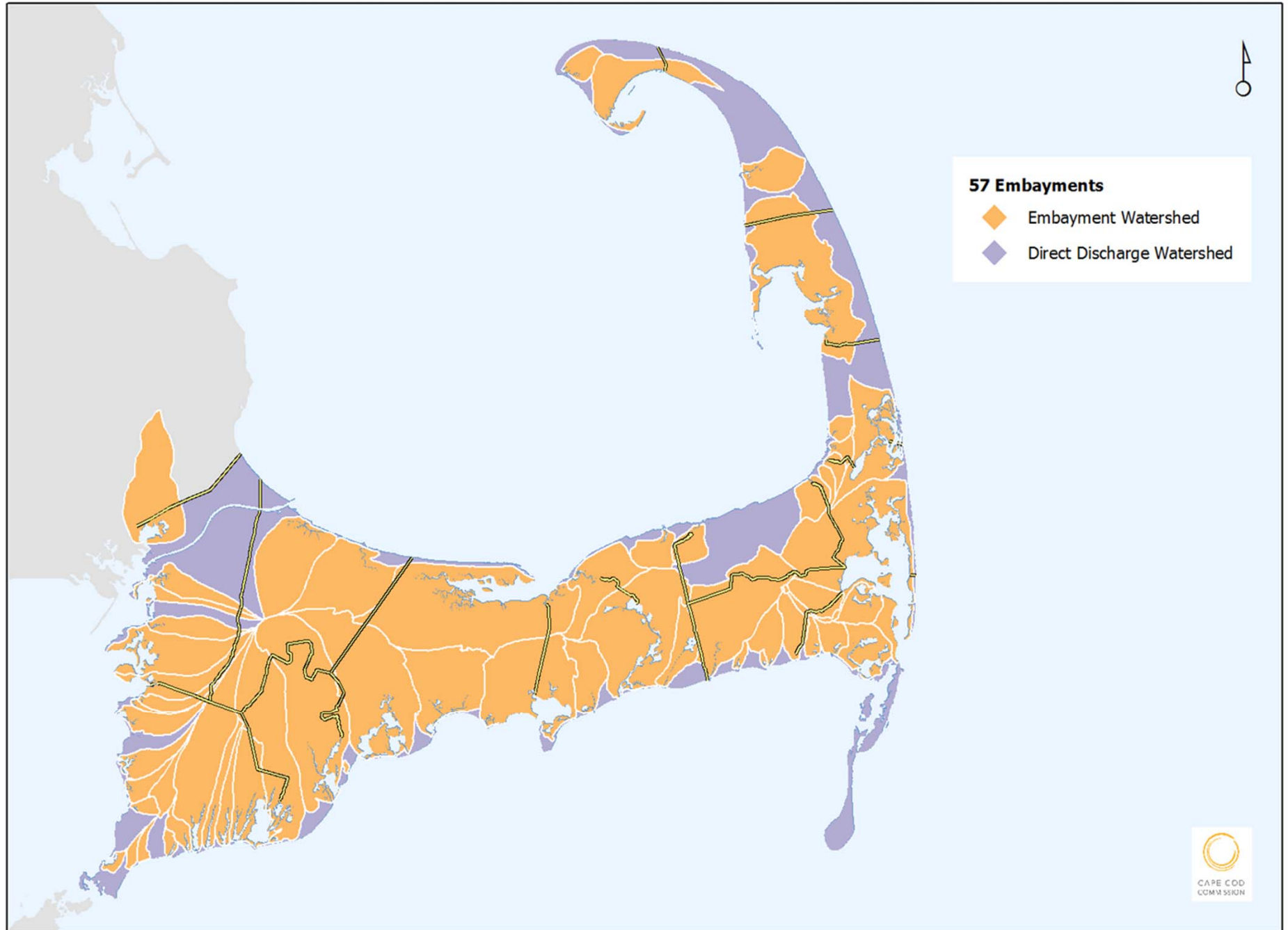


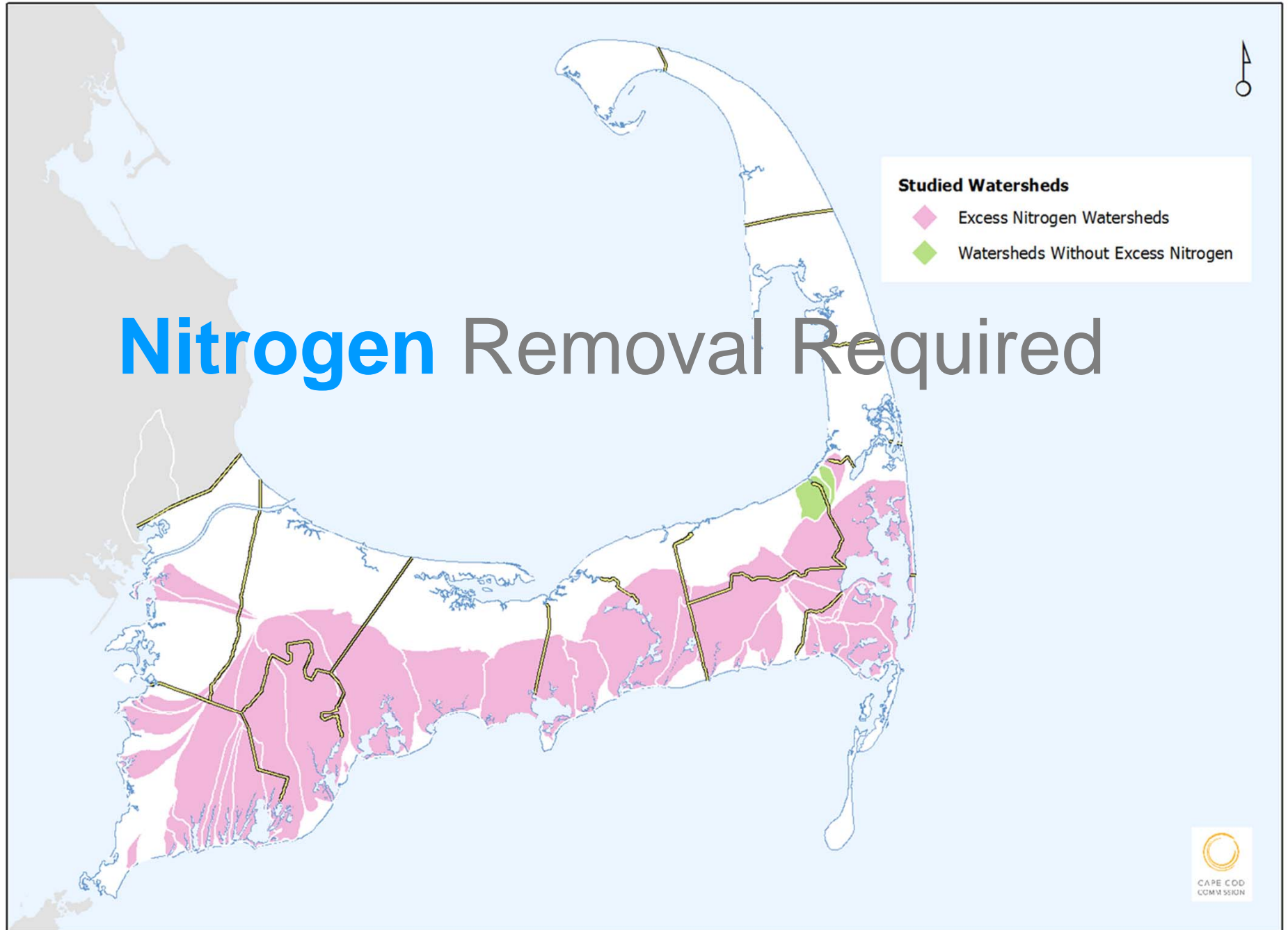
**Nitrogen:  
Saline Waters**

**Phosphorus:  
Fresh Waters**

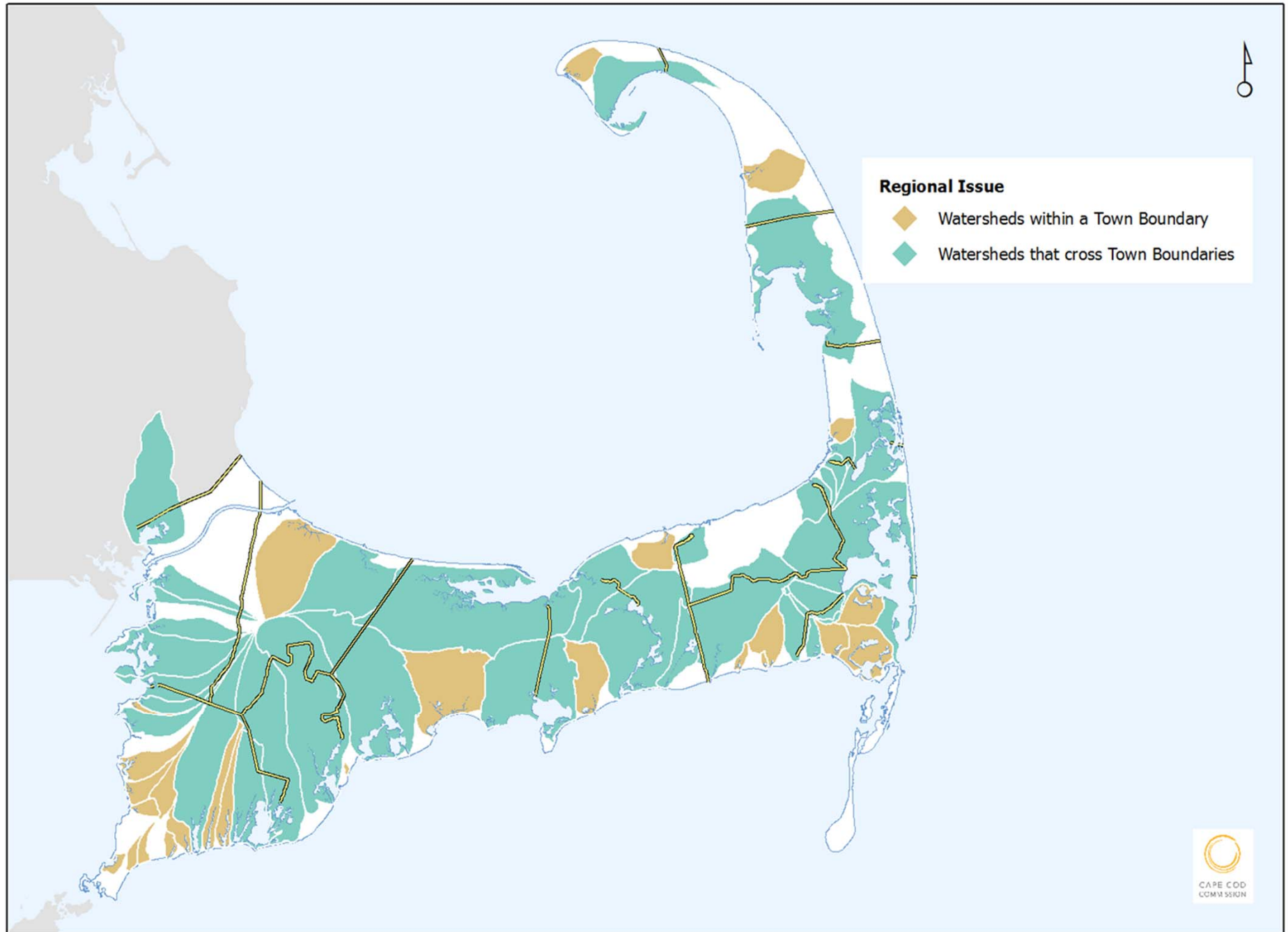
**Growth &  
Title 5  
Limitations**



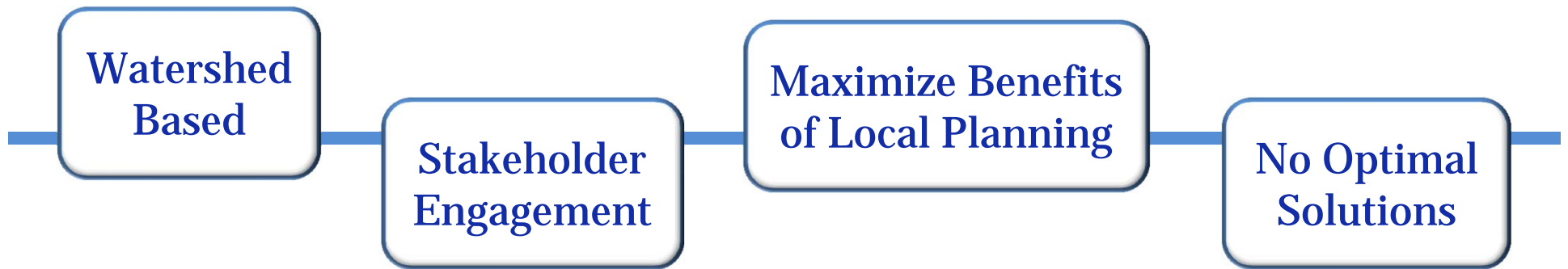






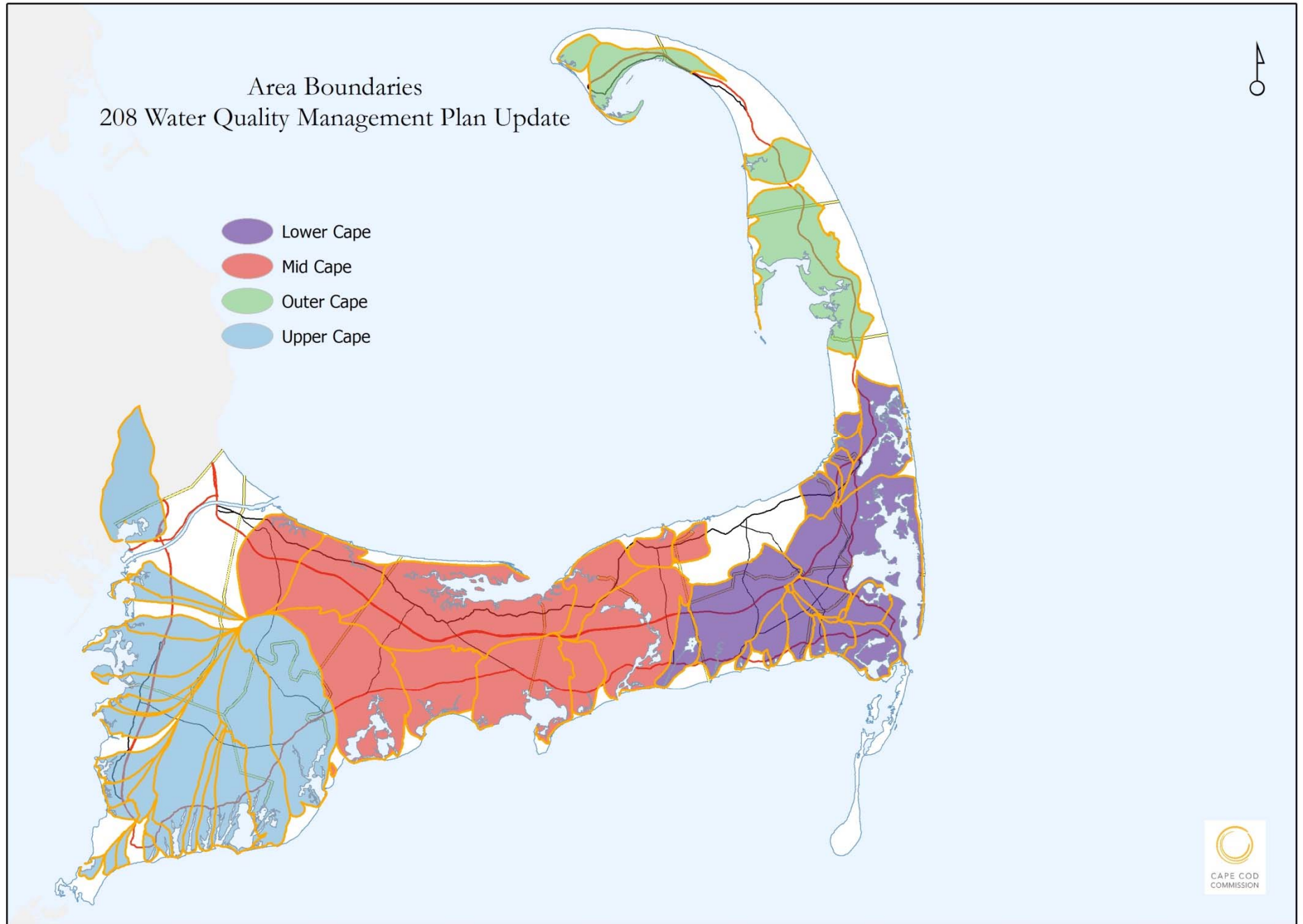


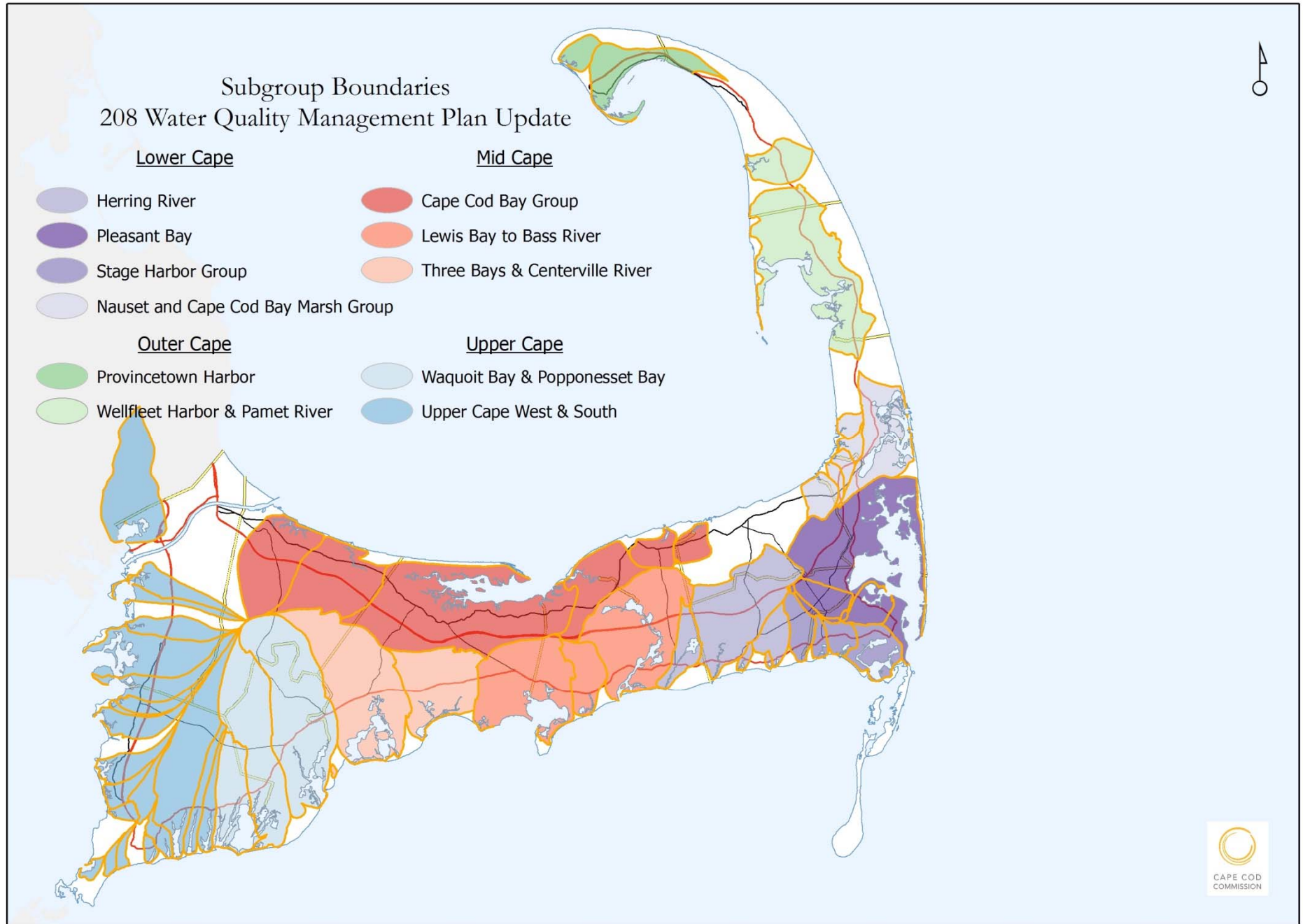
# Approach to the 208 Plan Update



## **Goal:**

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





# **What is the stakeholder process?**

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## Public Meetings

## Watershed Working Groups



July

August

September

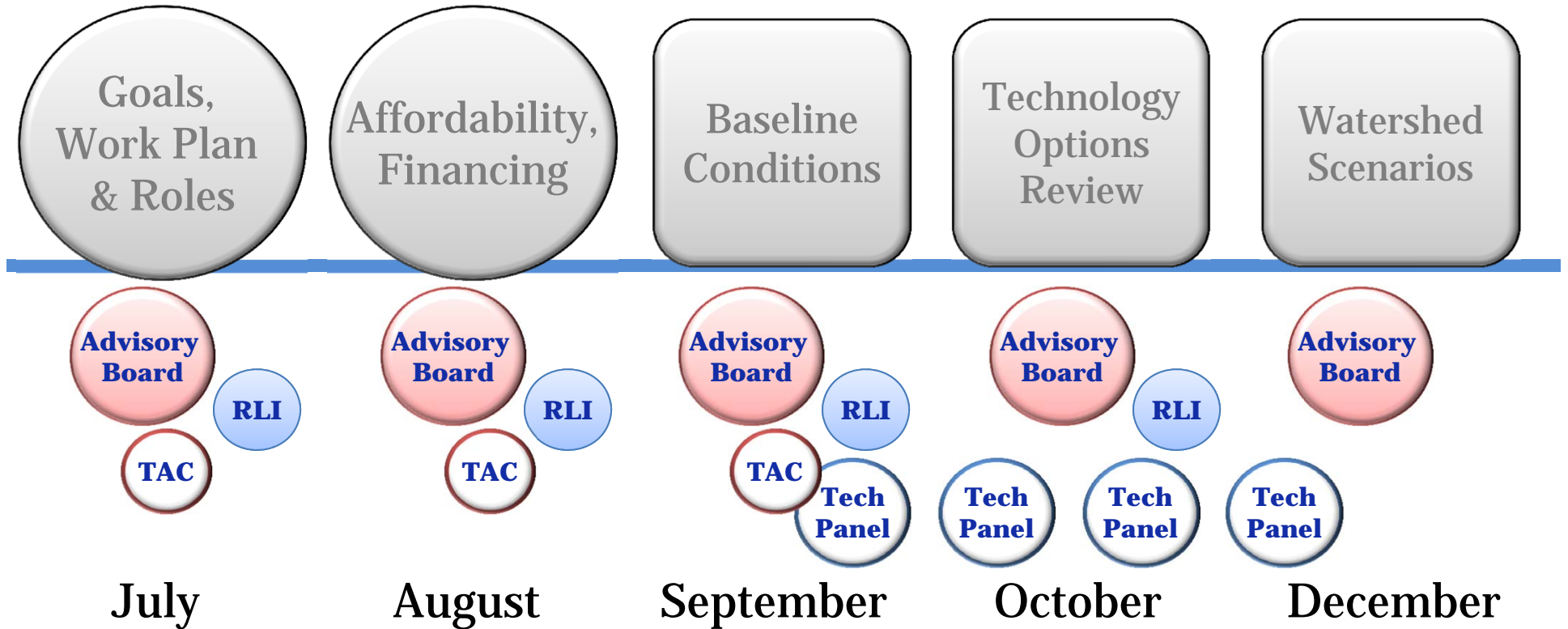
October

December

# 208 Planning Process

## Public Meetings

## Watershed Working Groups



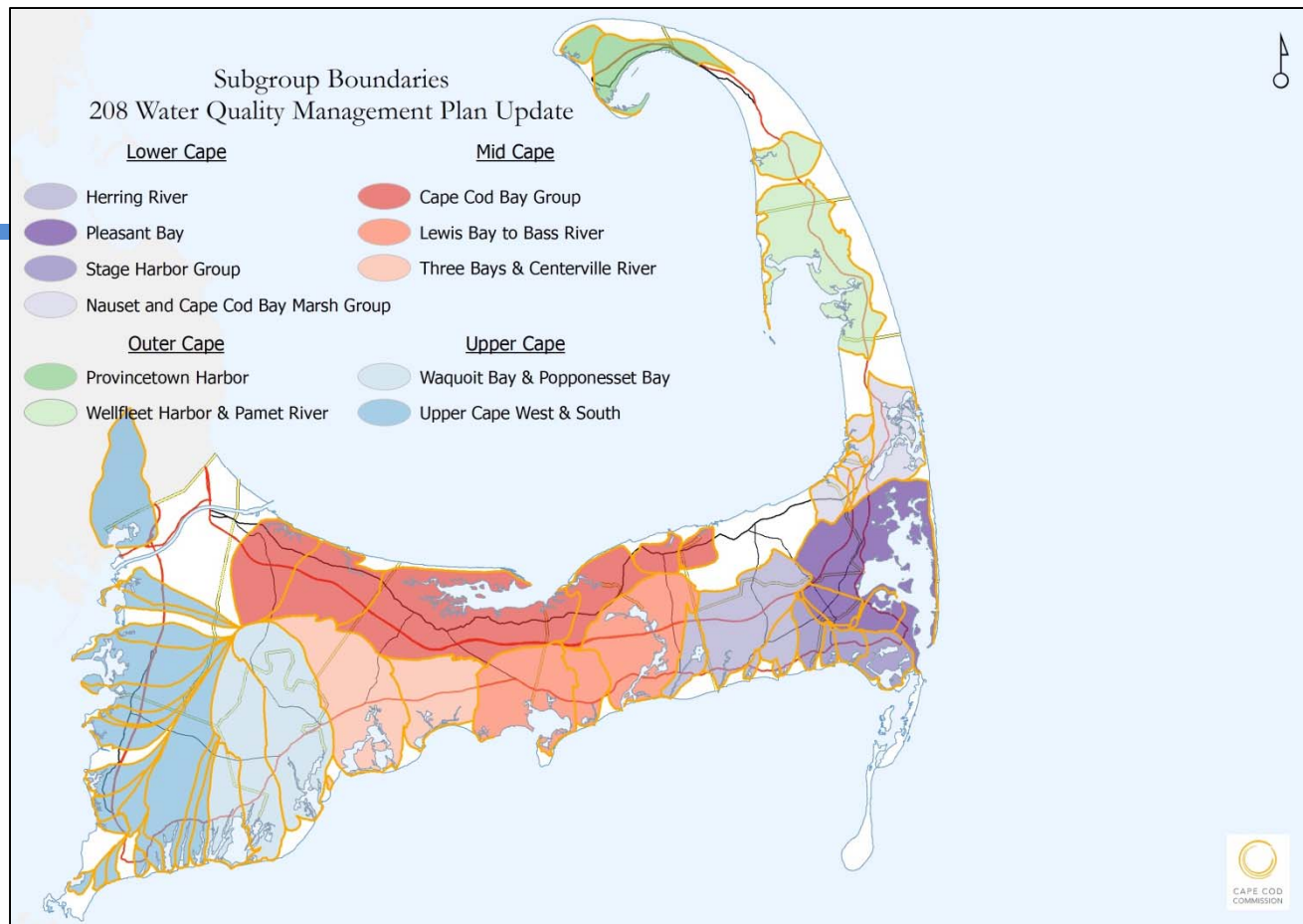
**RLI** Regulatory, Legal & Institutional Work Group

**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



- Wastewater
- Stormwater
- Existing Water Bodies
- Regulatory

# 208 Planning Process

**Baseline  
Conditions**

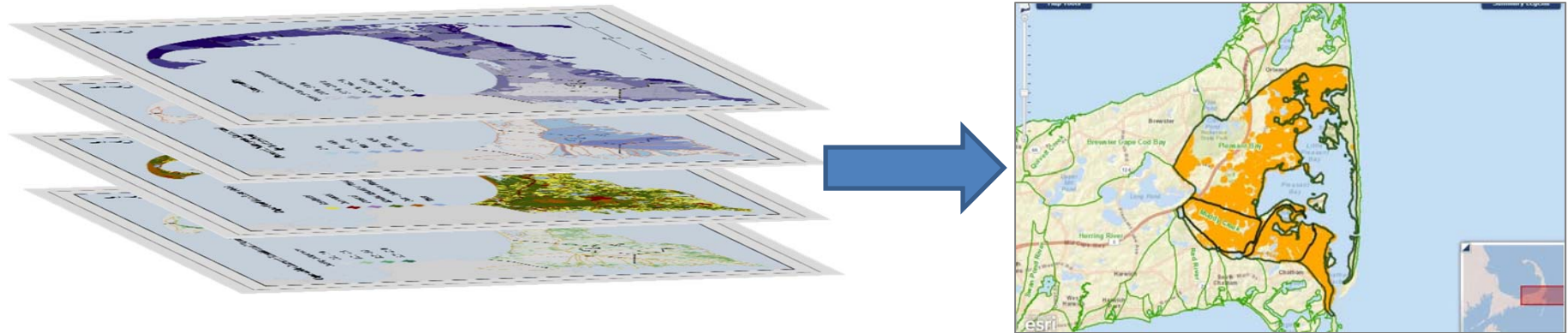
11 Working  
Group Meetings:  
Sept 18-27

**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:**

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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



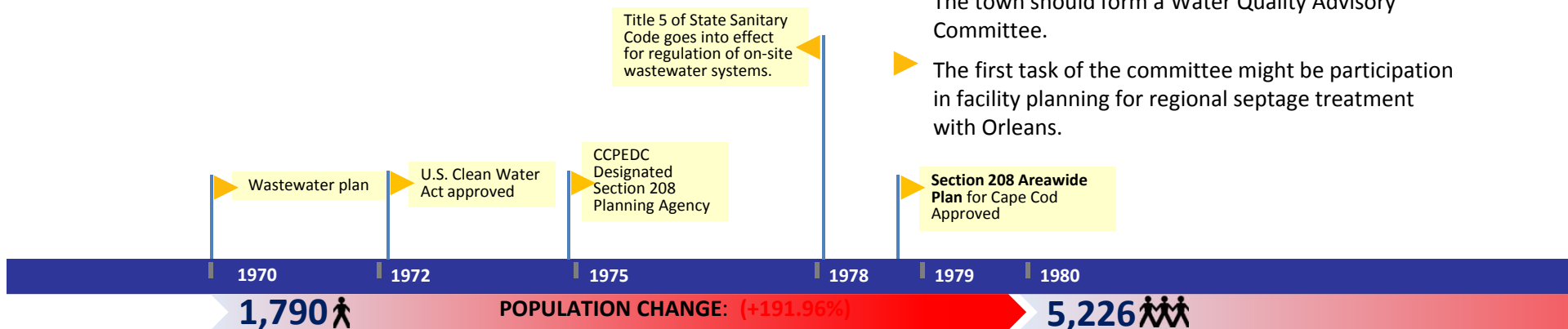
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Bassing Harbor/Ryders Cove  
Muddy Creek  
Pleasant Bay

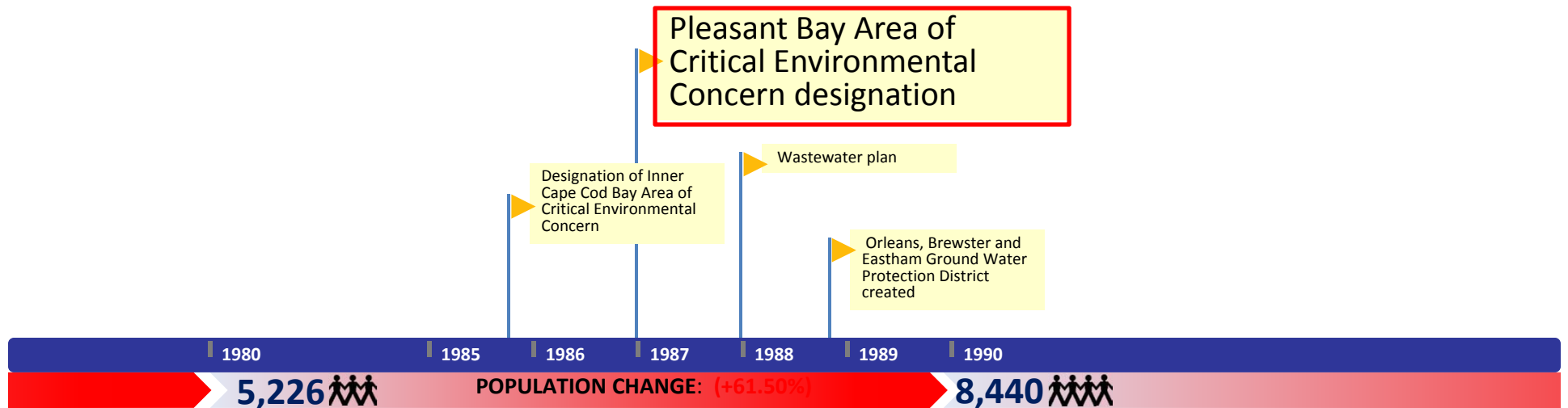
# Brewster

## From 1978 Section 208 Plan

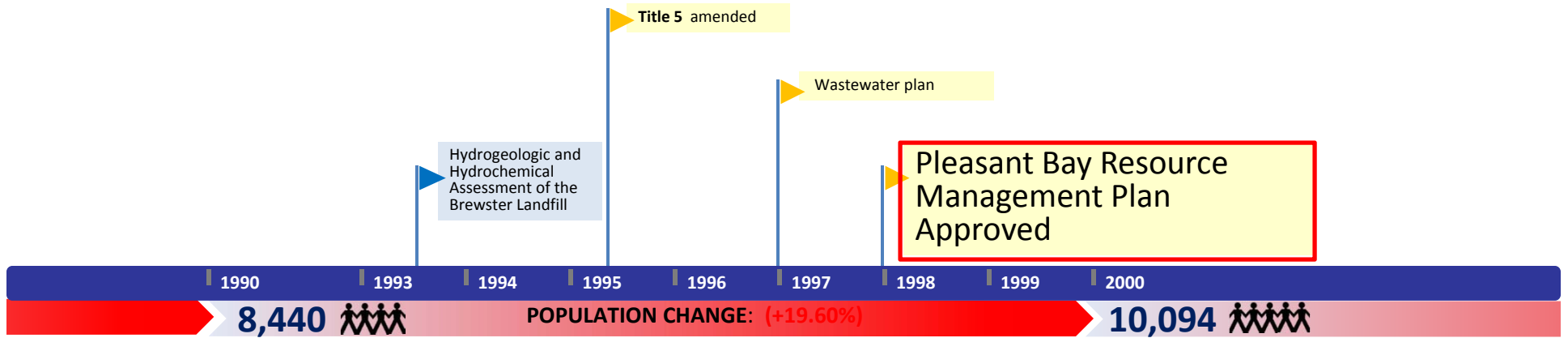
- ▶ Present and future town well sites should be protected from the non-point sources resulting from New development by creating Watershed Protection Districts.
- ▶ The town should cooperate in regional water supply planning to determine future water supply needs of neighboring towns and whether it can assist.
- ▶ WASTEWATER: It is expected that no new problem areas will develop and that present problem areas will be controlled during the planning period.
- ▶ The Orleans 201 facility plan will soon be underway and the cooperation of Brewster in the planning of a septage facility in Orleans that can meet Brewster's septage treatment needs is highly recommended.
- ▶ It is recommended that Brewster consider cooperating in a regional landfill monitoring program.
- ▶ The town should form a Water Quality Advisory Committee.
- ▶ The first task of the committee might be participation in facility planning for regional septage treatment with Orleans.



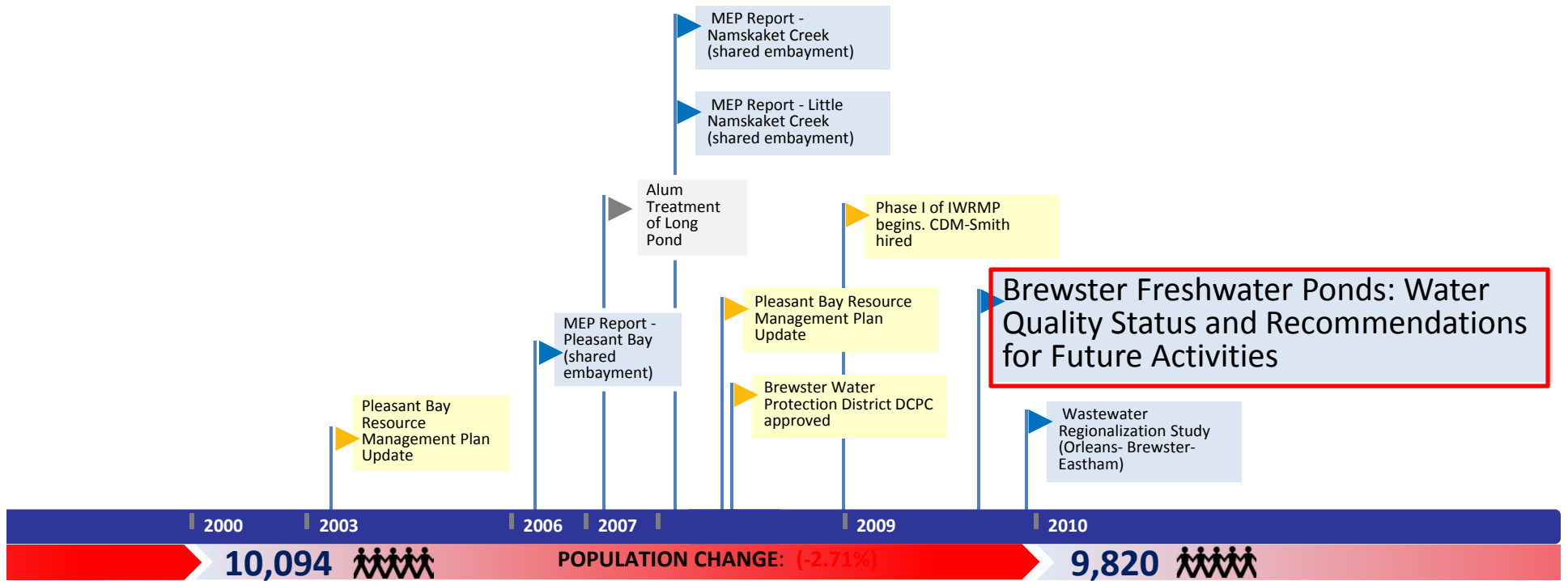
# Brewster: 1970-2013



# Brewster: 1970-2013

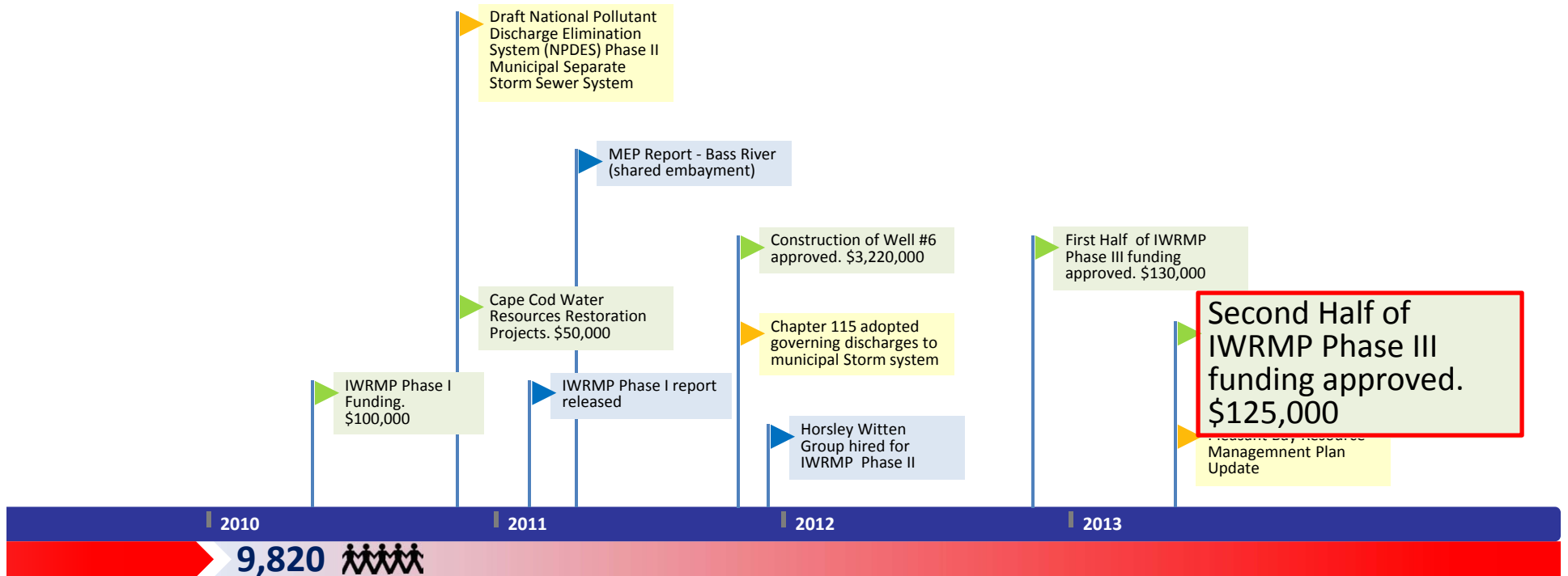


# Brewster: 1970-2013





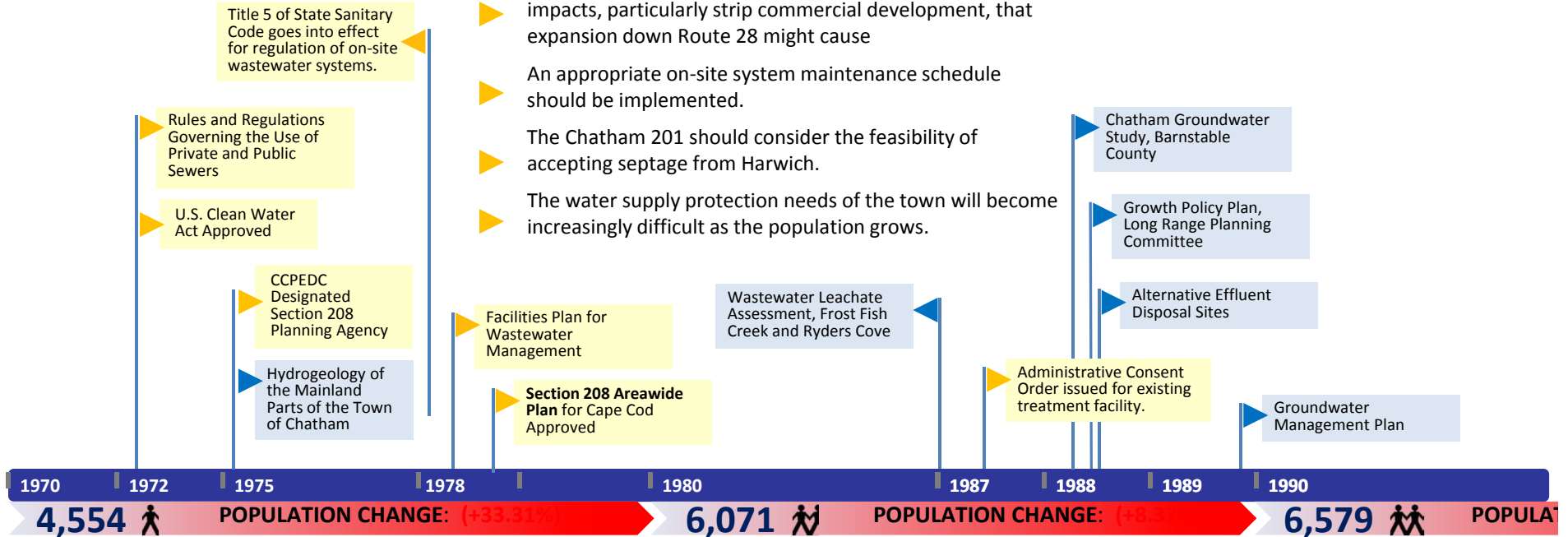
# Brewster: 1970-2013



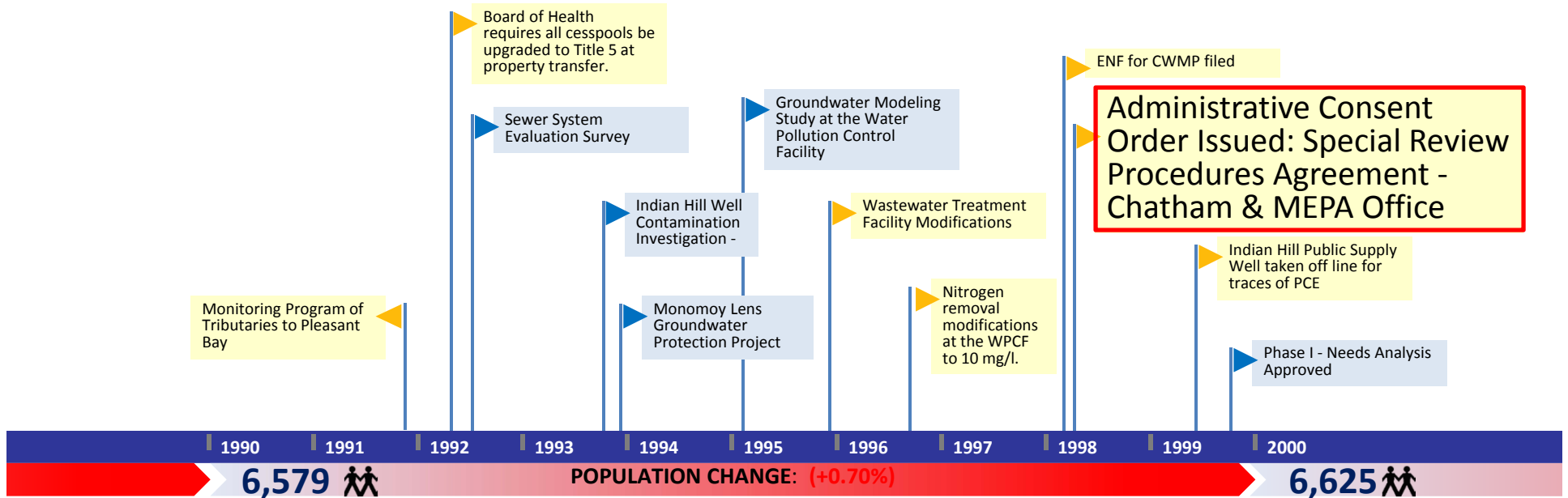
# Chatham

## From 1978 Section 208 Plan

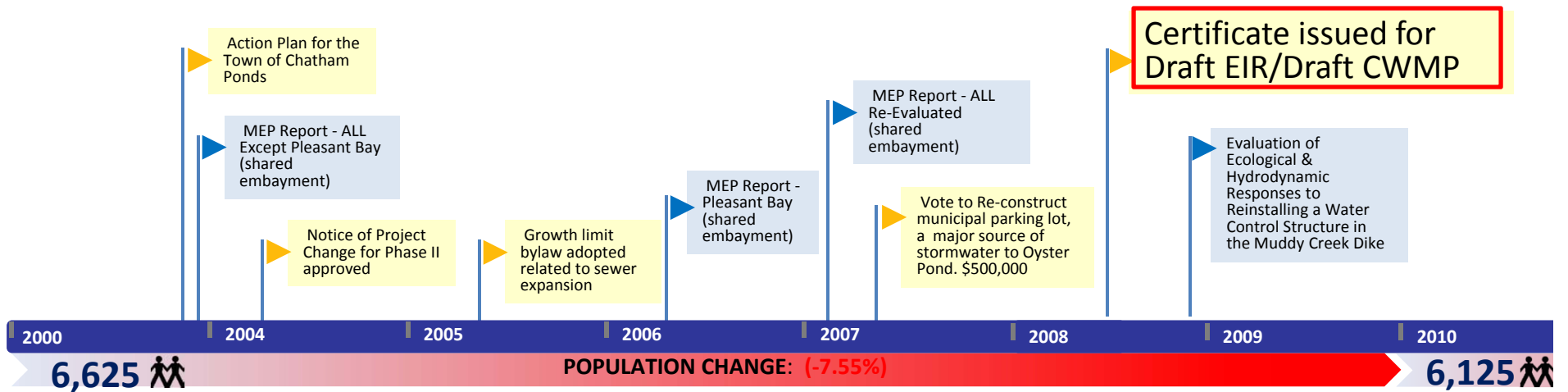
- ▶ A study is needed to examine the present capacity of the town's sewage treatment plant and the possible need to expand the present collection system.
- ▶ The 201 facility plan should be town-wide in scope and should fully evaluate all problem areas in the town including coastal water problems.
- ▶ The town should fully examine all problem areas considered for expansion in terms of present EPA criteria for determining sewer needs. Since most of the costs for such expansion are not eligible for 201 funding, the town is likely to find the cost of extensive expansion is very high.
- ▶ The 201 study should also address the secondary growth impacts, particularly strip commercial development, that expansion down Route 28 might cause
- ▶ An appropriate on-site system maintenance schedule should be implemented.
- ▶ The Chatham 201 should consider the feasibility of accepting septage from Harwich.
- ▶ The water supply protection needs of the town will become increasingly difficult as the population grows.



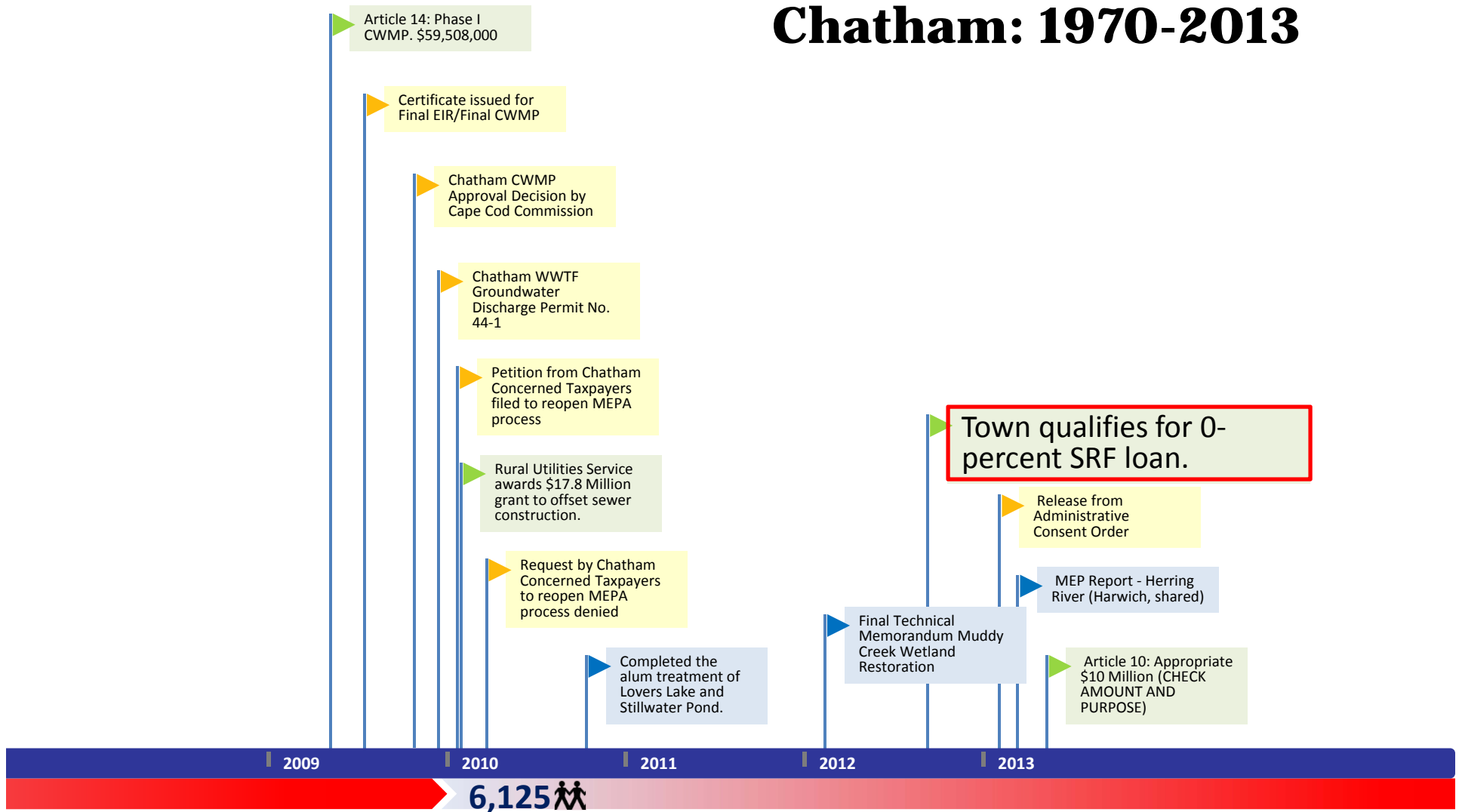
# Chatham: 1970-2013



# Chatham: 1970-2013



# Chatham: 1970-2013

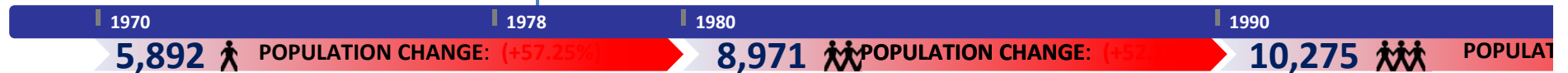


# Harwich

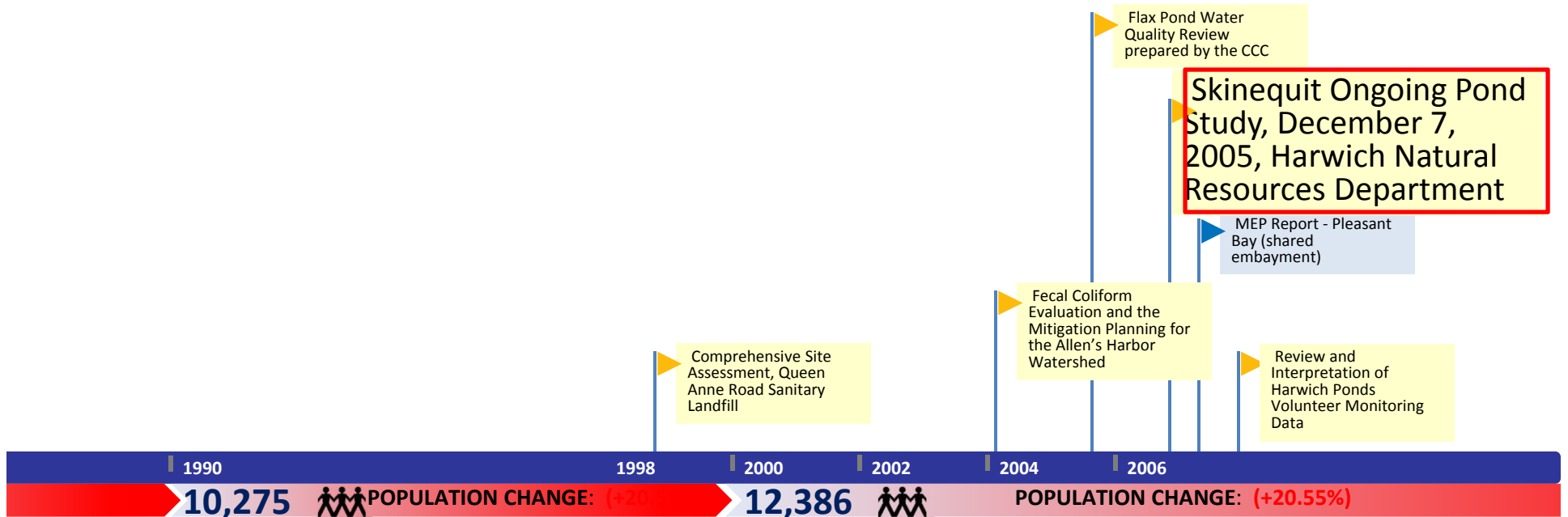
## From 1978 Section 208 Plan

- ▶ That the town recognize that the Category 2 problem areas on the south side of town need special attention.
- ▶ It is also suggested that the town consider establishing "Seasonal Residential Districts" in this area to control the conversion of seasonal dwellings to year-round occupancy.
- ▶ The 208 plan does not indicate a sewer need in Harwich. This means that the town will not be eligible for a major central collection system for twenty years.
- ▶ New wastewater management problems created by the town's failure to take recommended actions for on-site system management will not be eligible for future 201 construction funds.
- ▶ While Harwich presently has a state approved interim lagoon, the town should not view this system as a long-term solution to its septage treatment problems.
- ▶ There has been considerable concern raised over the possible development of a large subdivision and golf course upgradient of the town's wellfield.
- ▶ The town should also consider purchasing additional areas to protect the town wells.

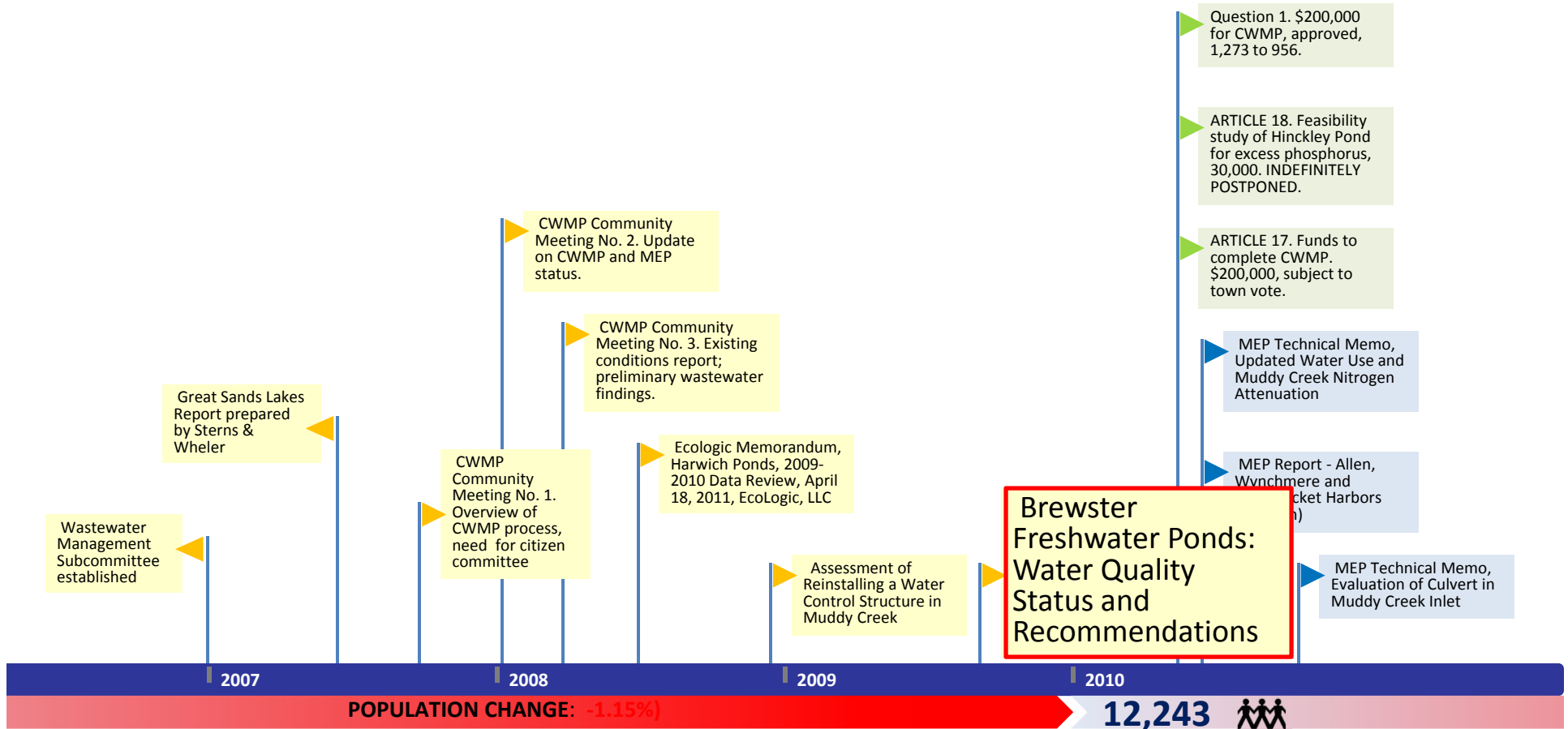
▶ Section 208 Areawide Plan for Cape Cod Approved



# Harwich: 1970-2013

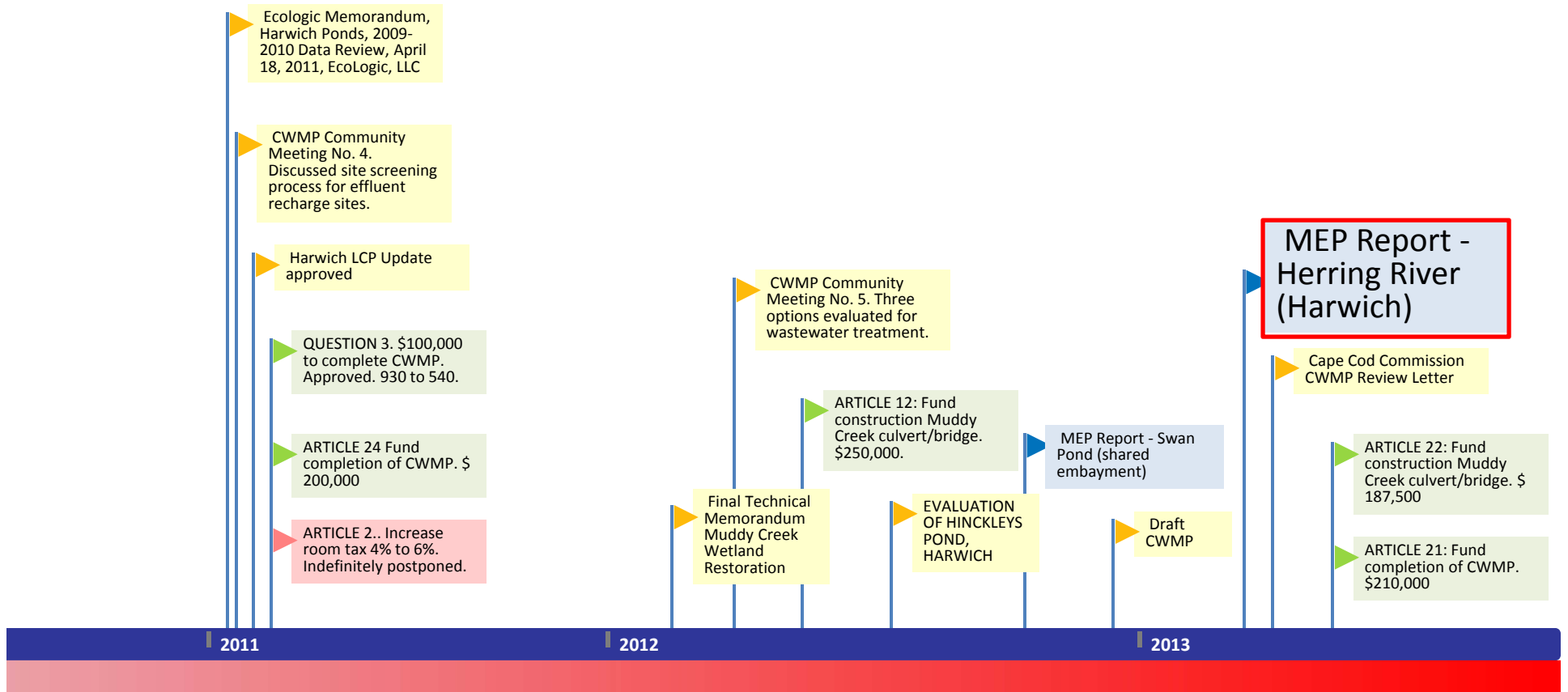


# Harwich: 1970-2013





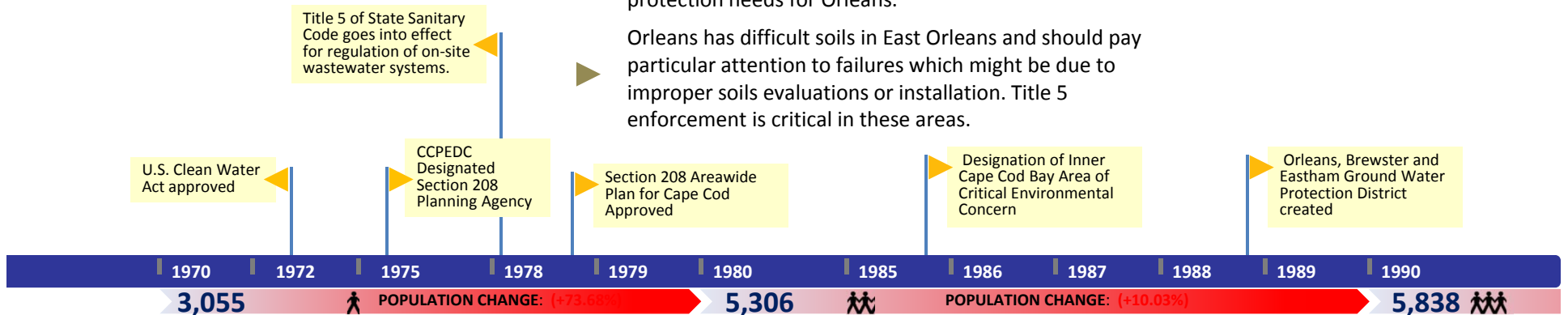
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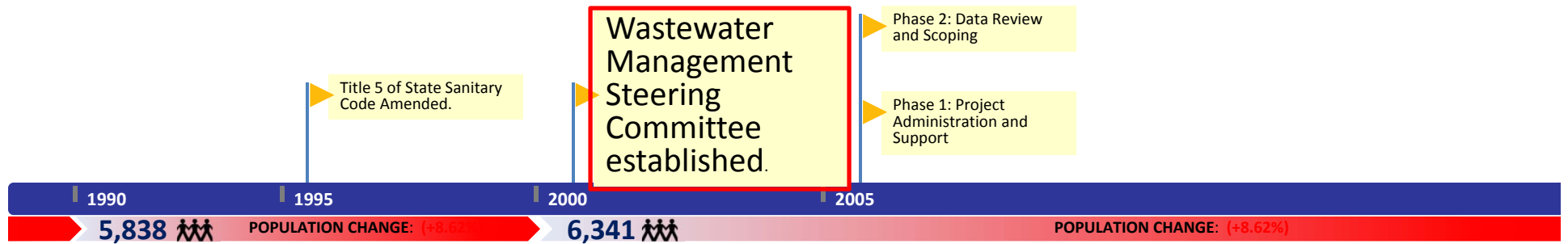
# Orleans

## From 1978 Section 208 Plan

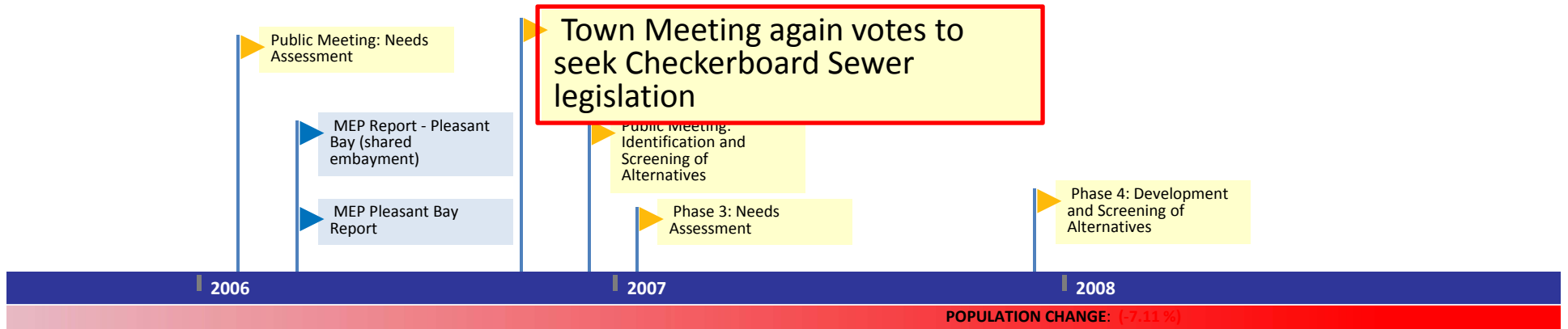
- ▶ The major problems in Orleans at present are septage management, failing systems in the town center, and protection of water quality in the municipal wells.
- ▶ Orleans is one of the first towns on the Cape to take positive action to abate the serious problems posed by septage disposal.
- ▶ A scope of work that would adequately address the problems in downtown Orleans, which may need to be sewered with a small neighborhood system was developed.
- ▶ The scope of work considered regionalized septage treatment with Eastham and Brewster.
- ▶ The actual landfill plume location has not been determined. This is critical if the site is to be used as a septage disposal site in the future.
- ▶ A coordinated land use analysis coordinated with Brewster is necessary to determine watershed protection needs for Orleans.
- ▶ Orleans has difficult soils in East Orleans and should pay particular attention to failures which might be due to improper soils evaluations or installation. Title 5 enforcement is critical in these areas.



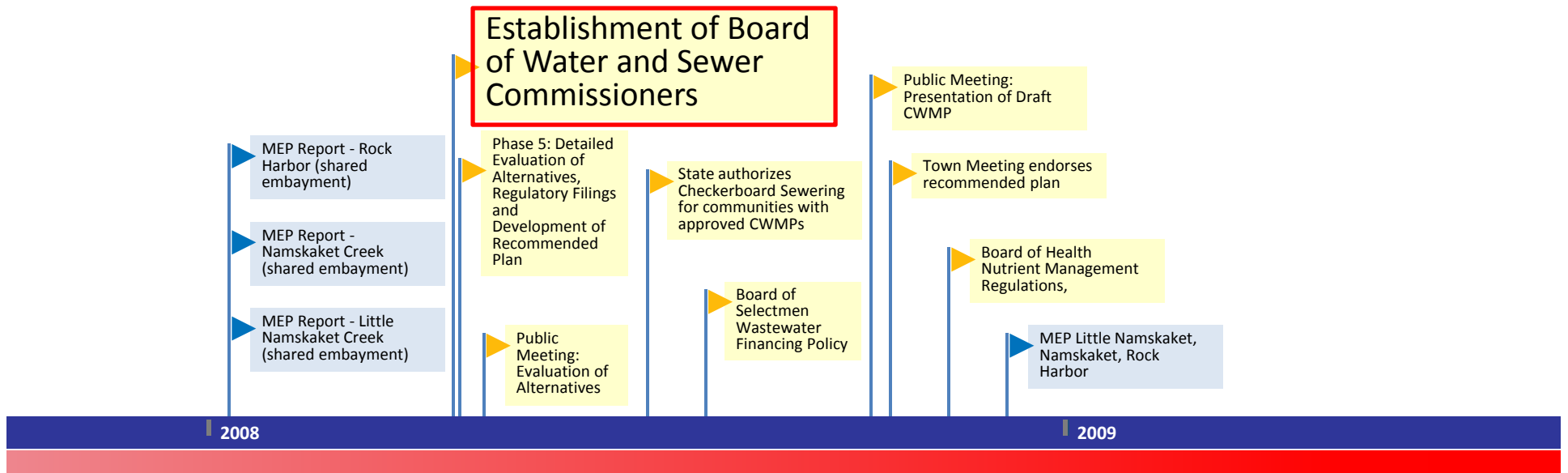
# Orleans: 1970-2013



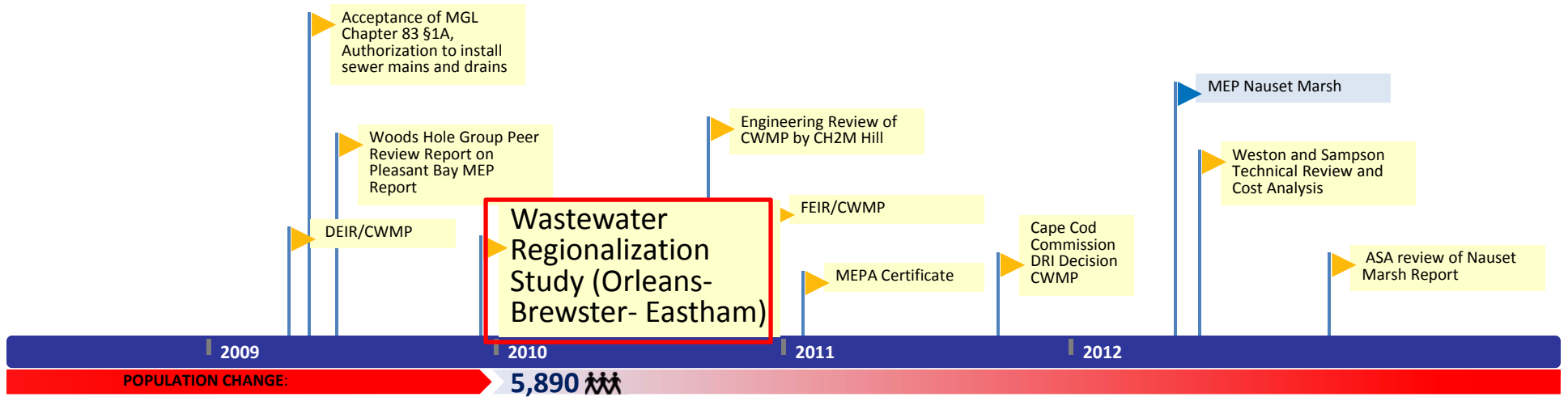
# Orleans: 1970-2013



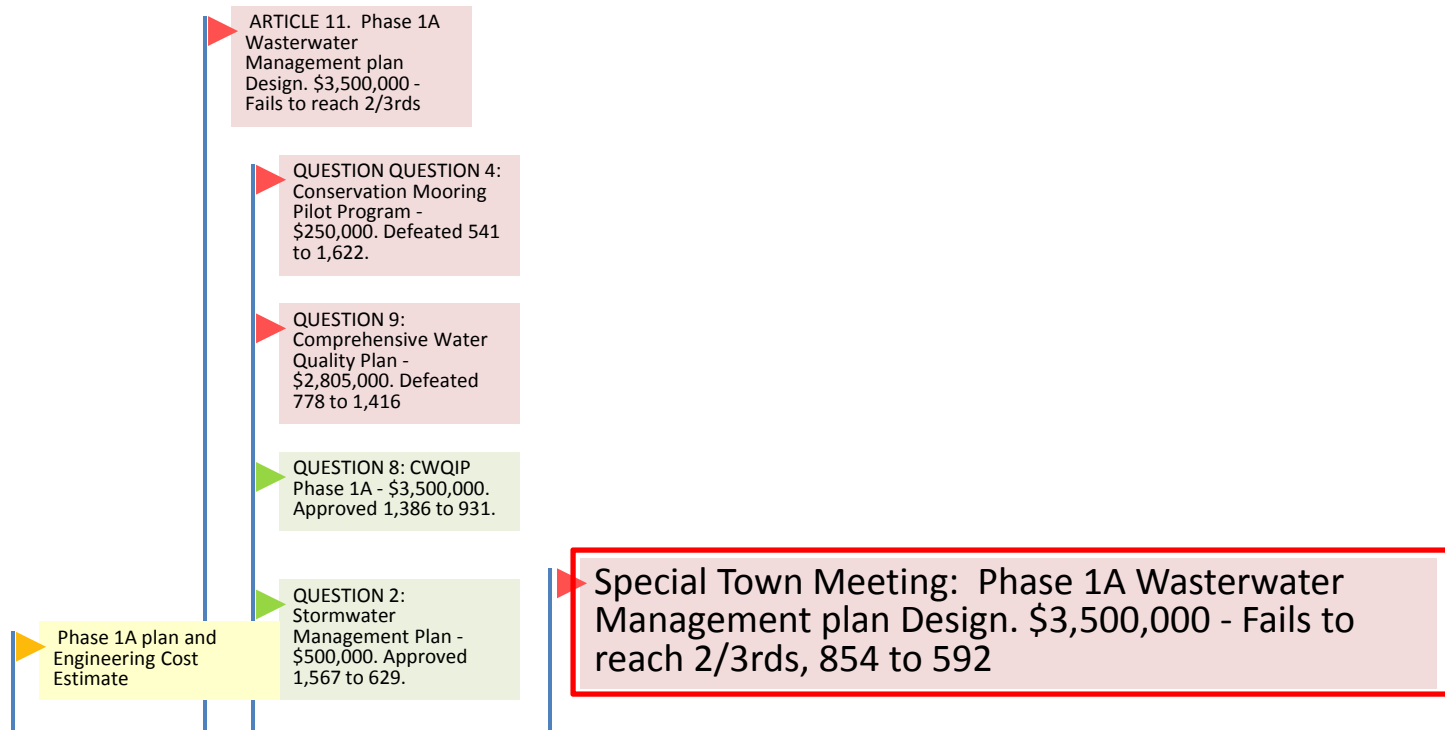
# Orleans: 1970-2013



# Orleans: 1970-2013



# Orleans: 1970-2013



# **Did we miss anything?**

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# Your Watersheds



**Bassing Harbor/Ryders Cove**  
**Muddy Creek**  
**Pleasant Bay**

"Watershed Working Group - Pleasant Bay - Workshop 1"








# Cape Cod National Seashore




# 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

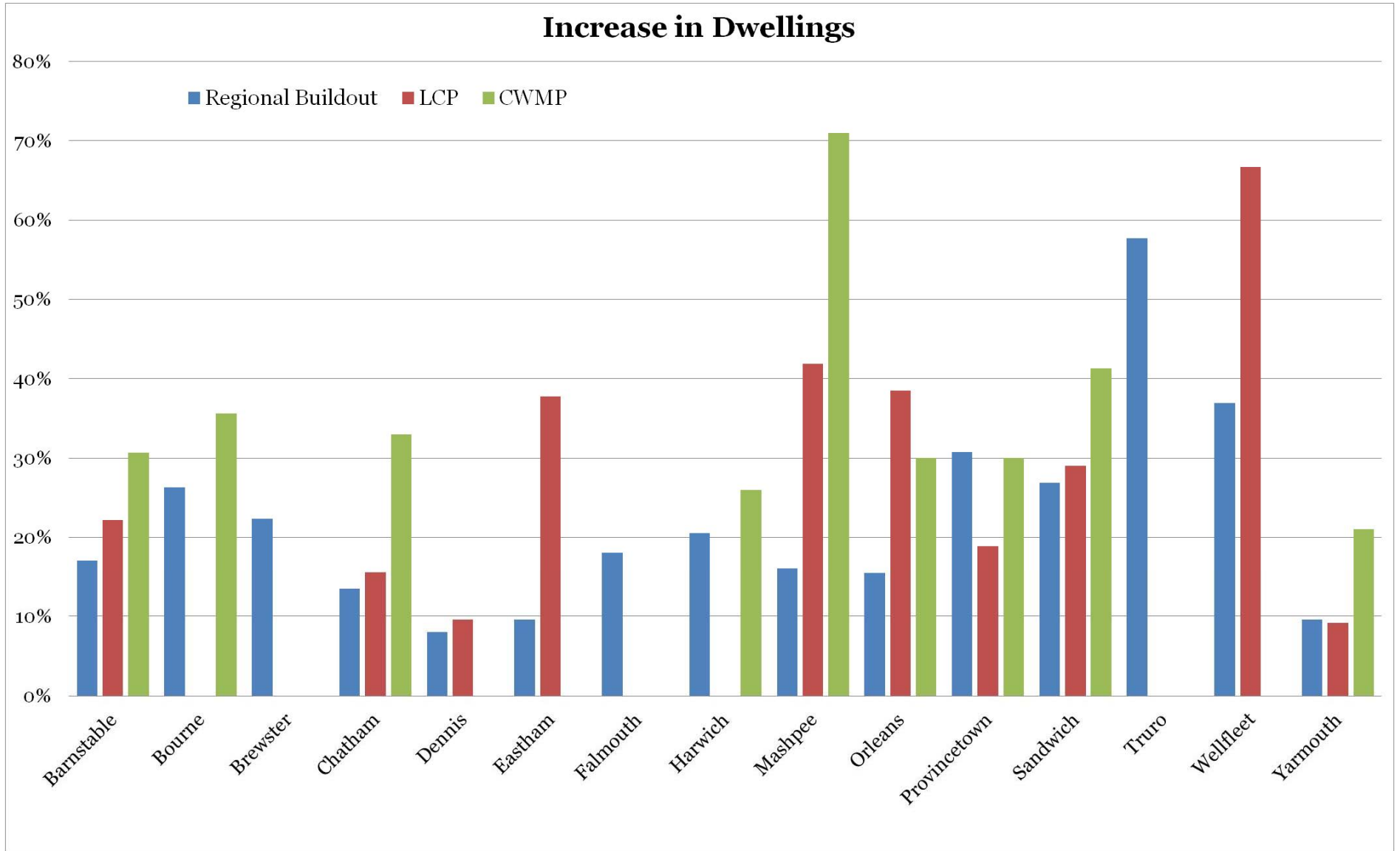
 Open - Disturbed or Managed

 Water

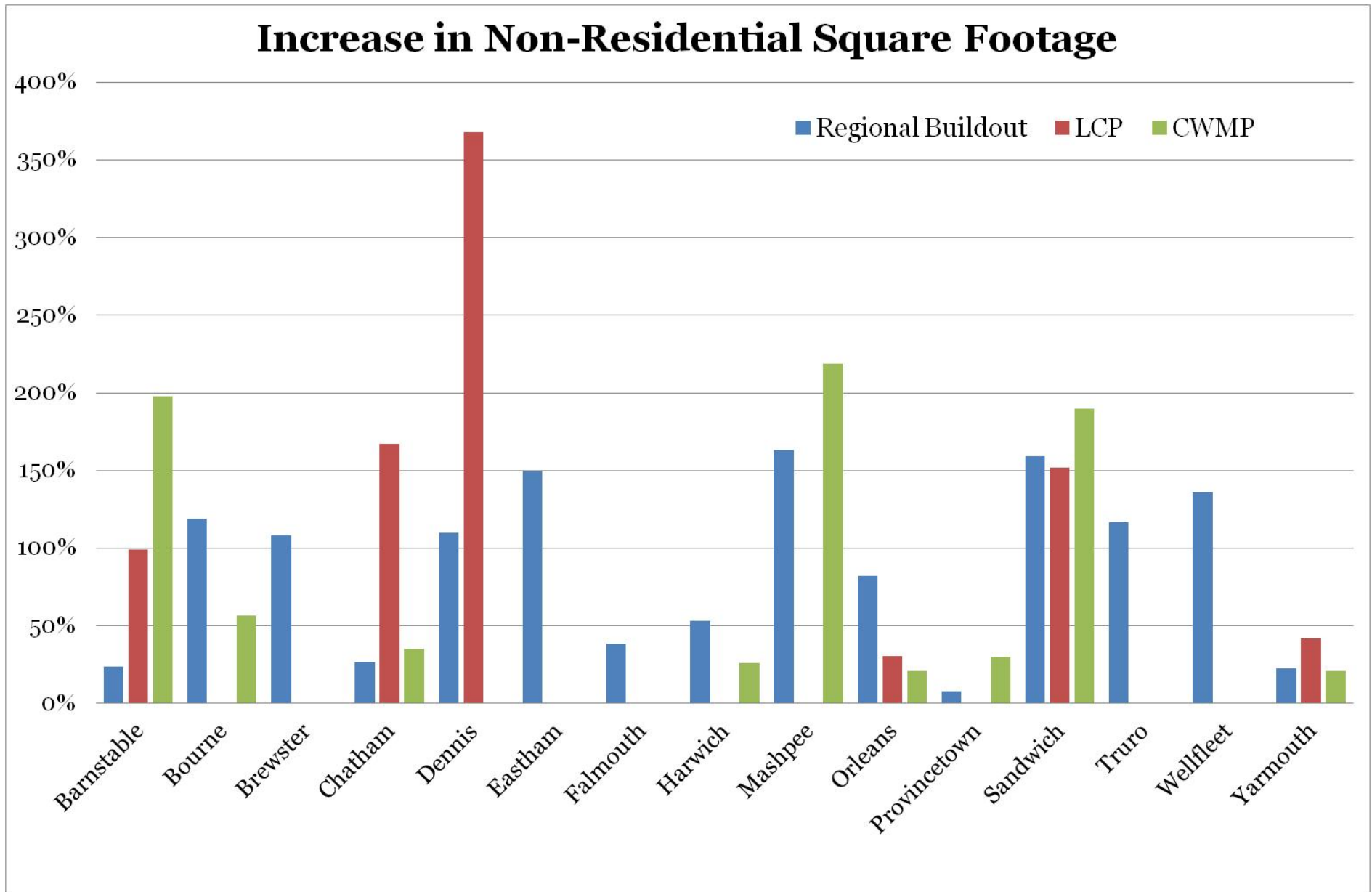
# Density

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

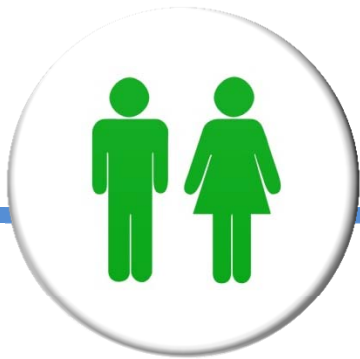
# Buildout



# Buildout

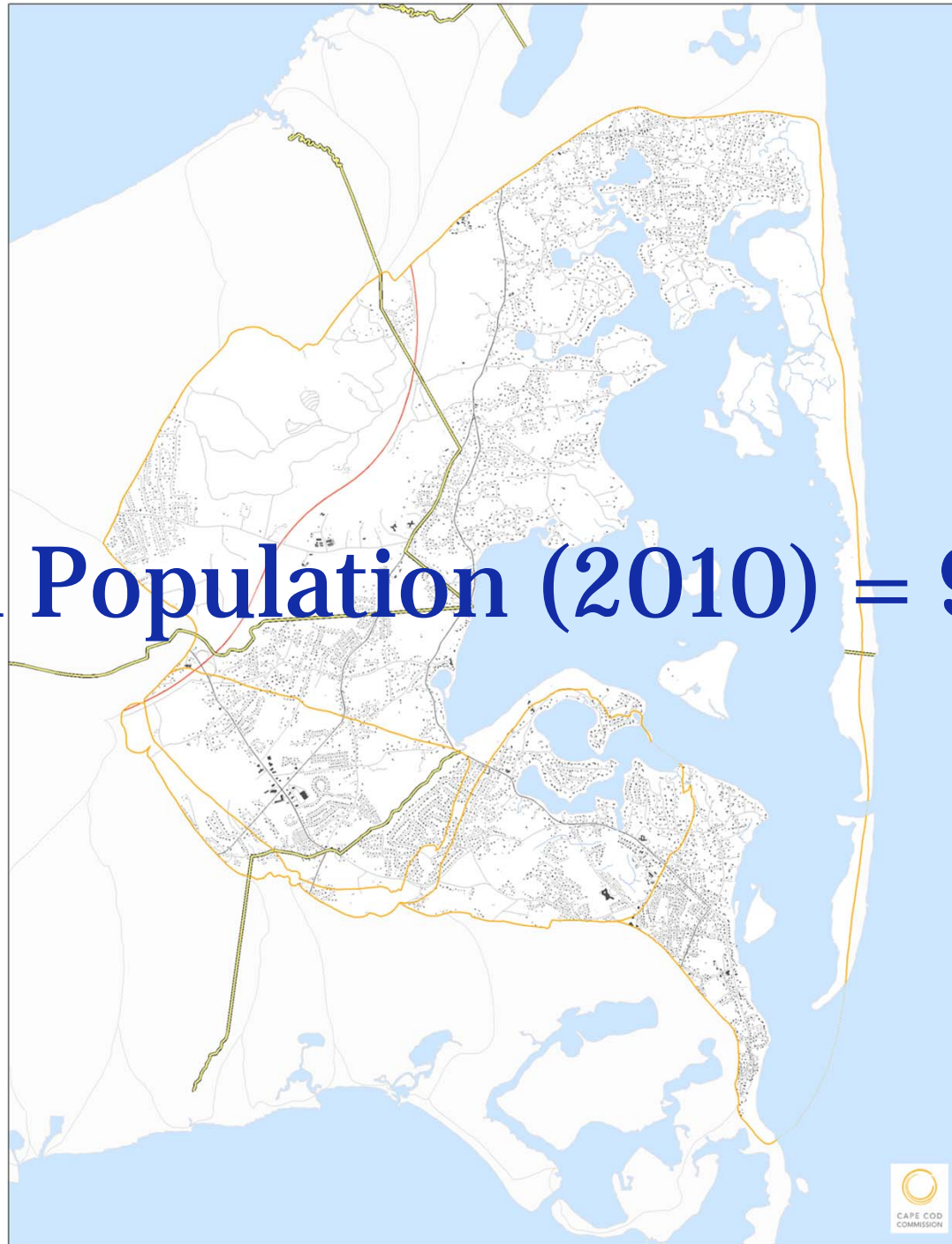


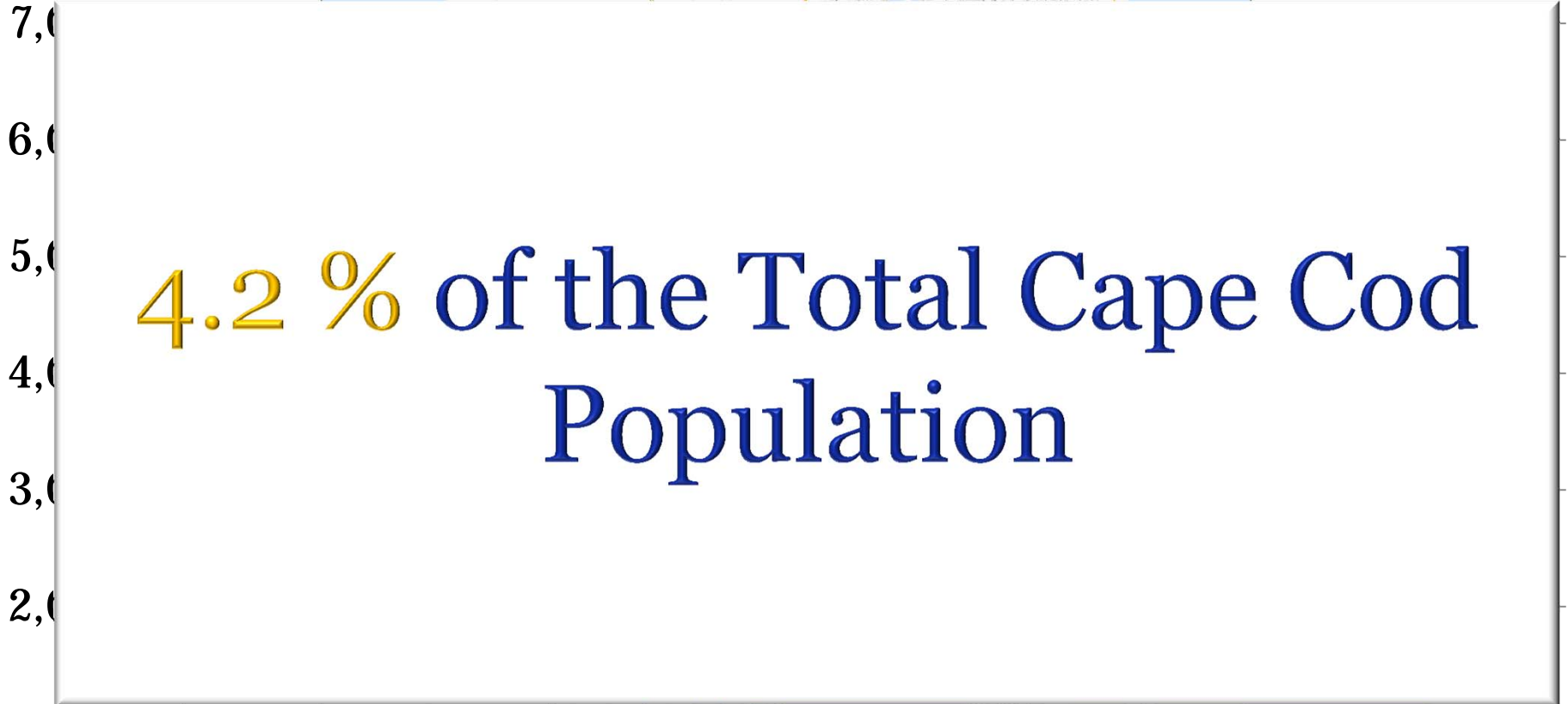
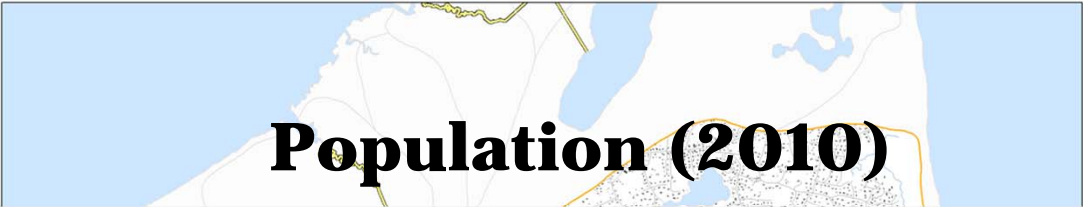
# The People



Bassing Harbor/Ryders Cove  
Muddy Creek  
Pleasant Bay

**Total Population (2010) = 9,099**



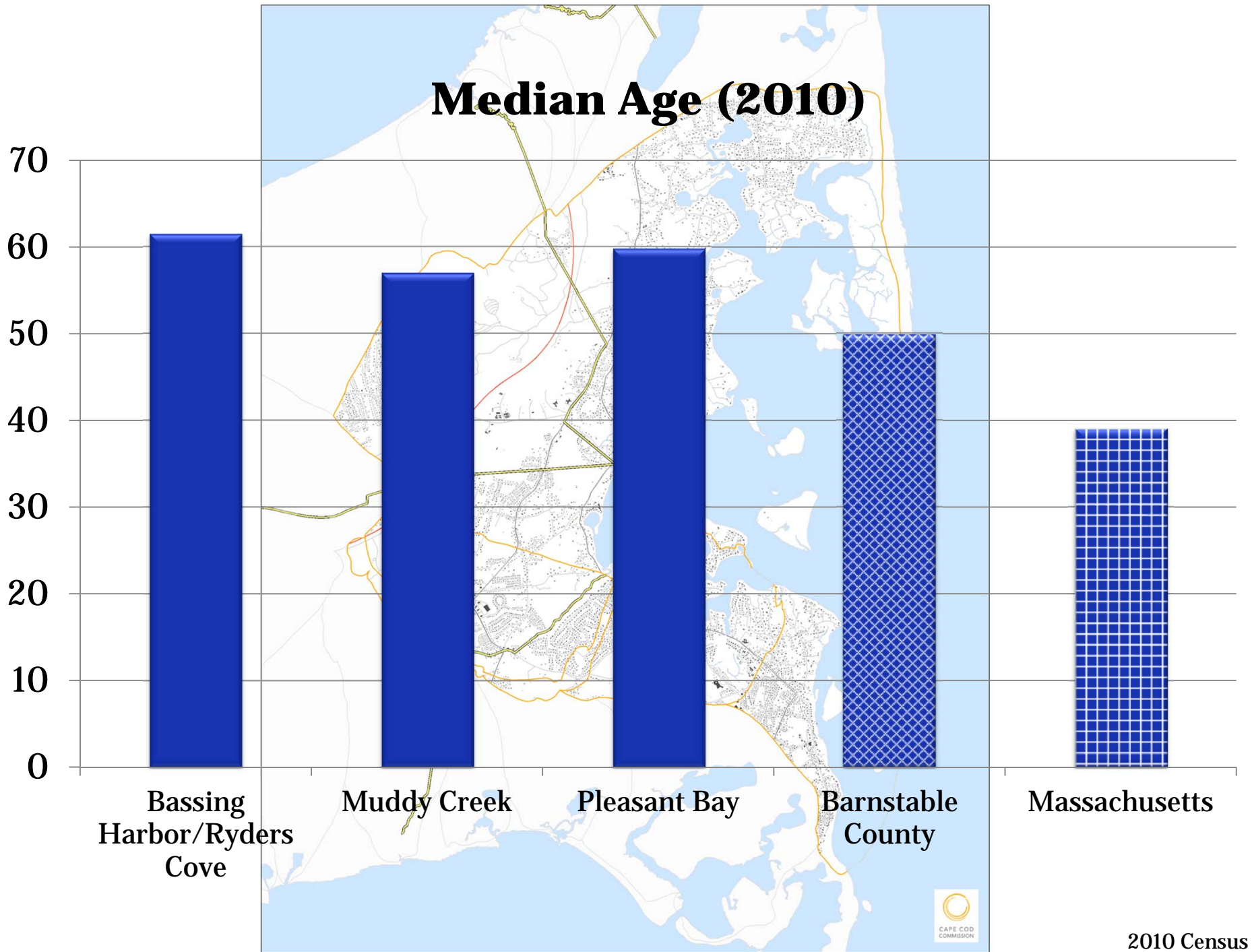


Bassing Harbor/Ryders  
Cove

Muddy Creek

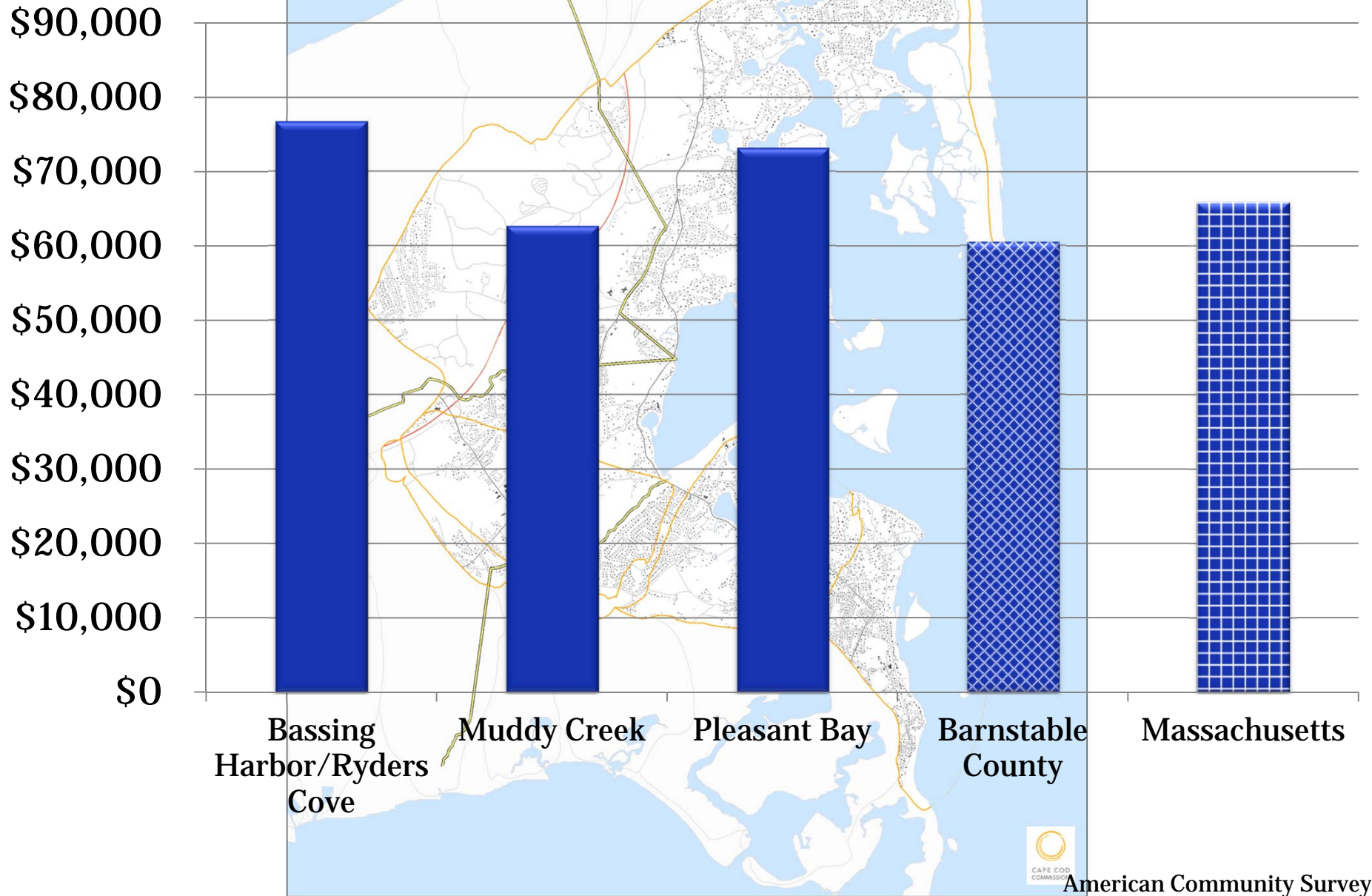
Pleasant Bay

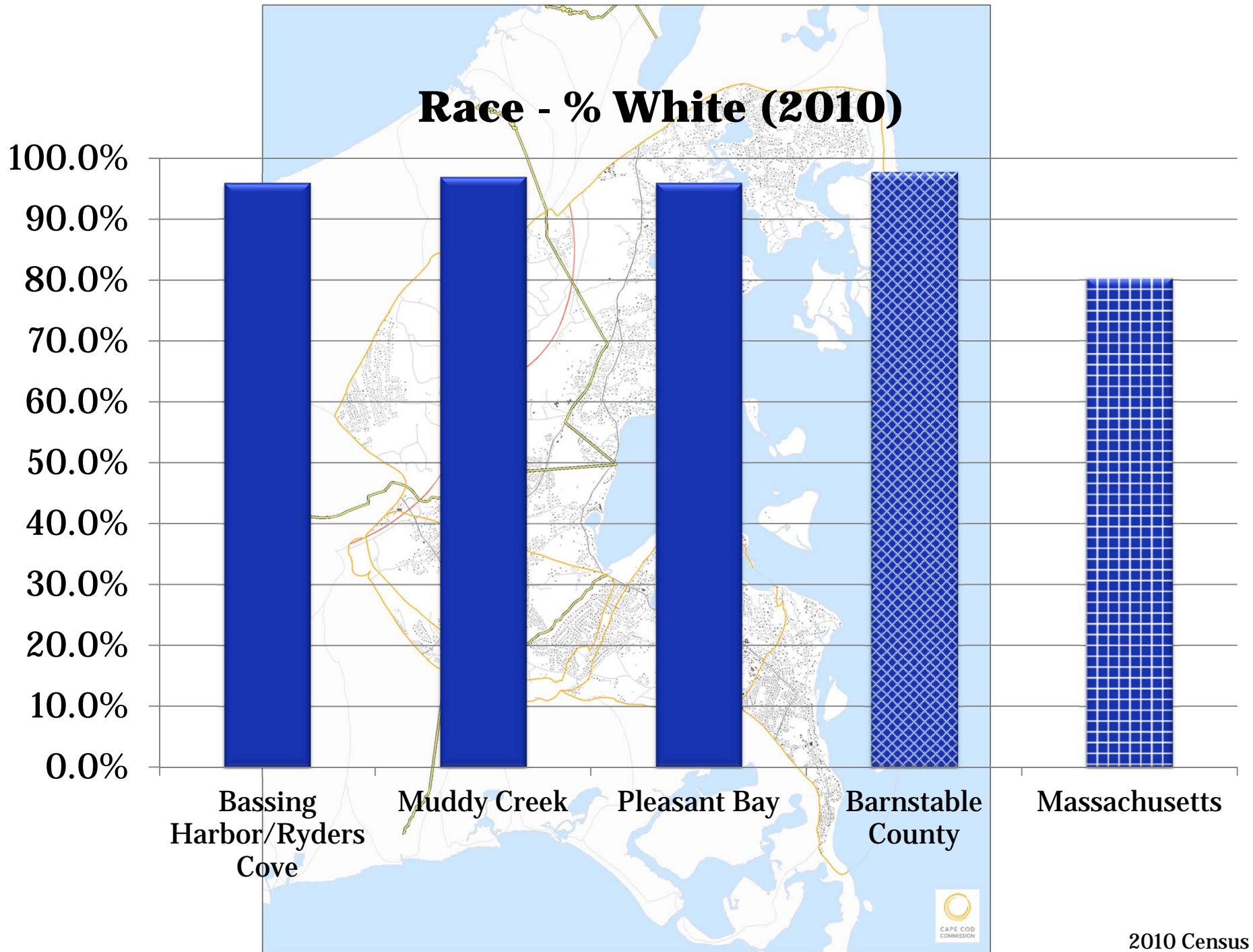




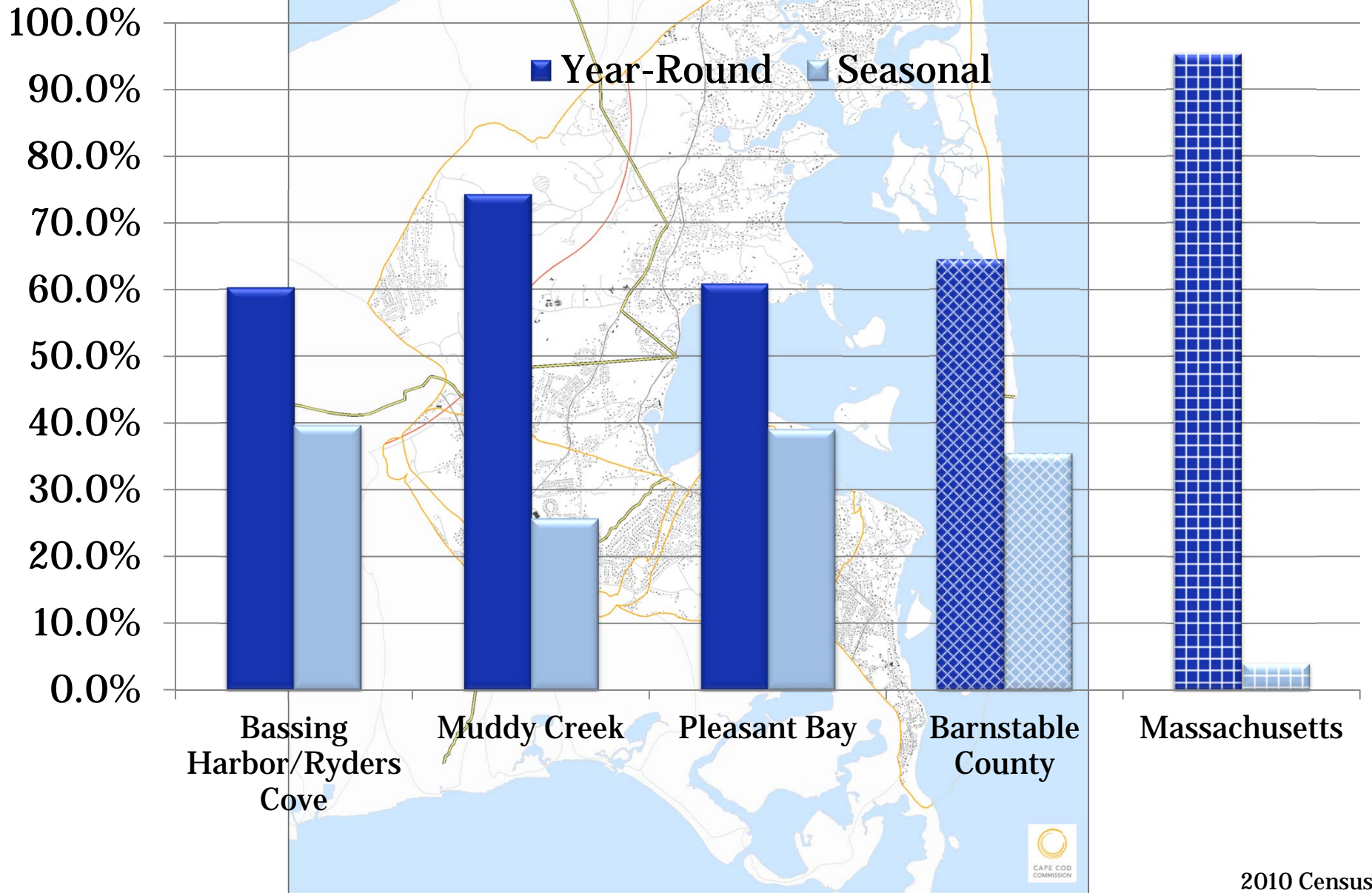


# Average Median Income (2010)





# Seasonal vs. Year Round Housing (2010)



# Average Assessed Home Value (2010)

\$1,000,000

Total Assessed Value of Residential Homes =  
**\$4,790,151,300**

\$0

Bassing Harbor/Ryders Cove

Muddy Creek

Pleasant Bay

Barnstable County

Massachusetts

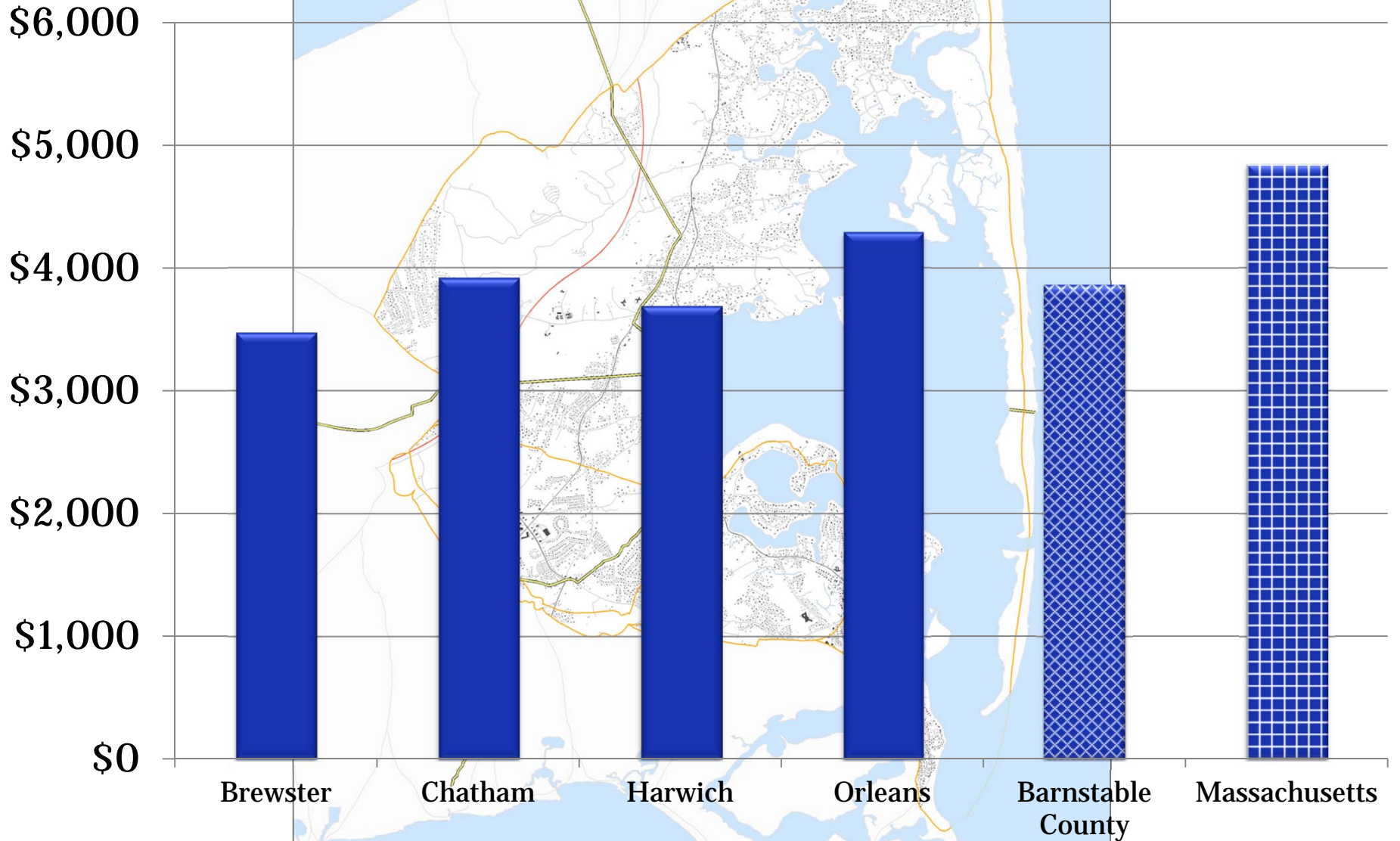


# **Your Government & Taxes**

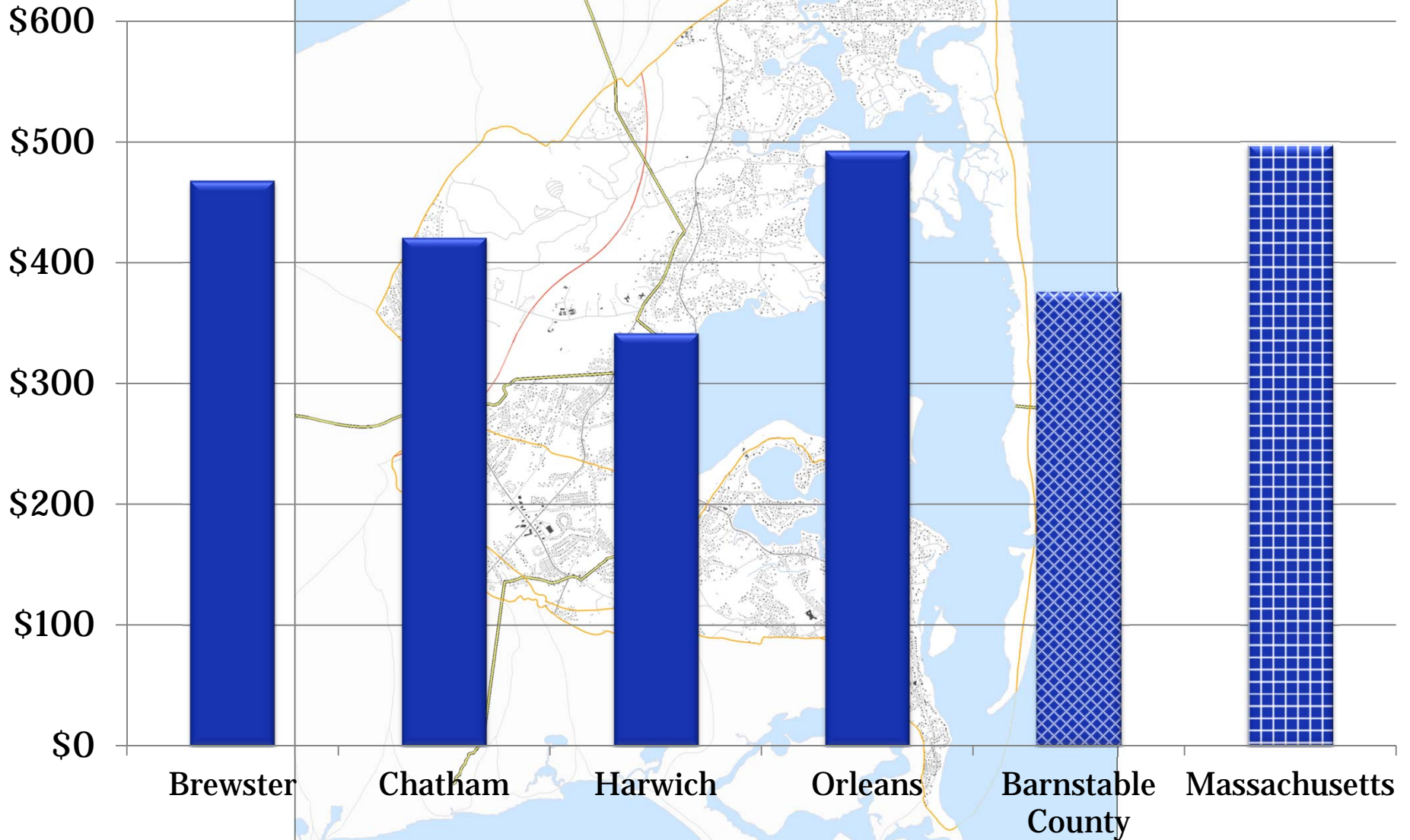


**Bassing Harbor/Ryders Cove  
Muddy Creek  
Pleasant Bay**

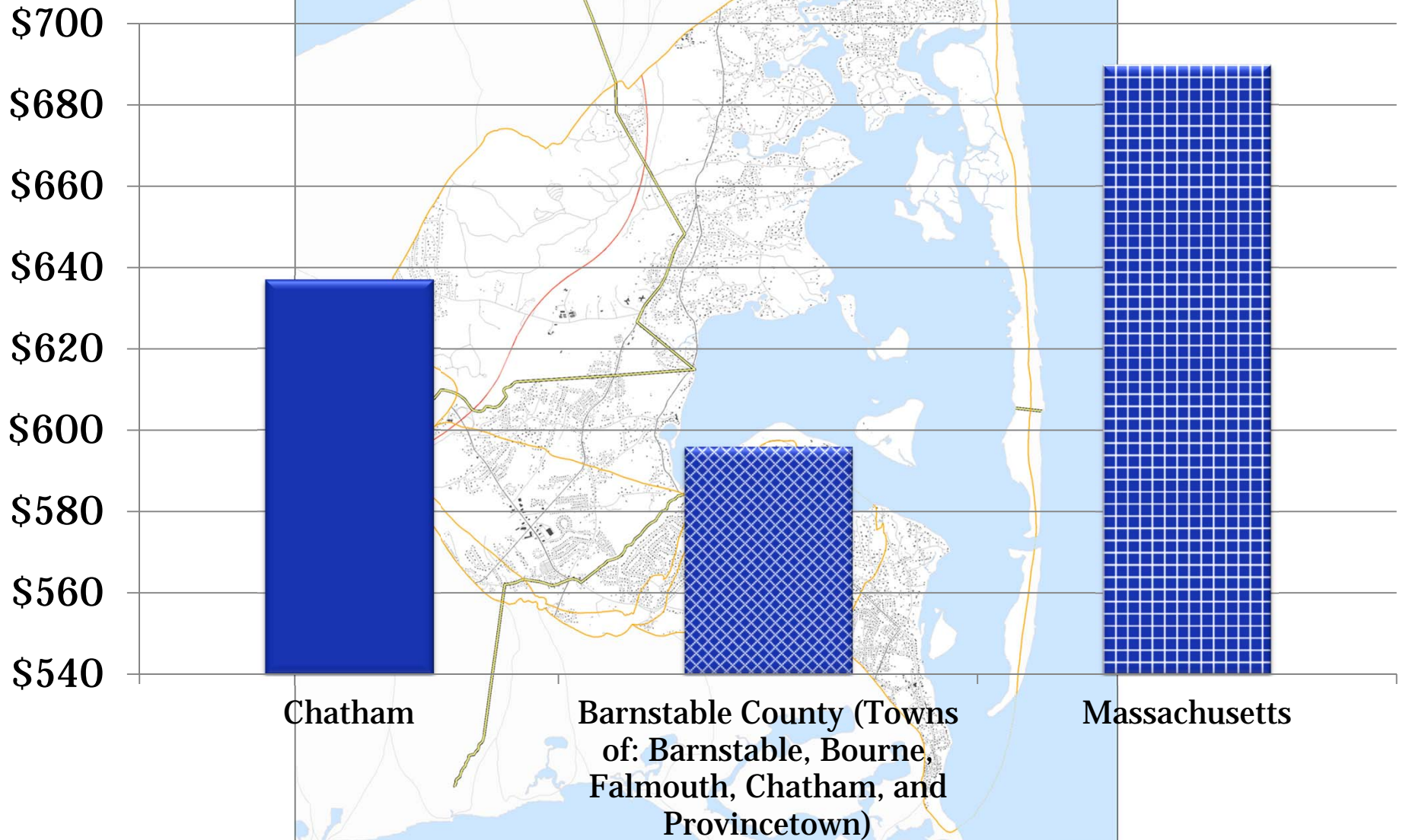
# Average Single Family Property Tax Bill (2013)



# Average Annual Water Bill (2012)



# Average Annual Sewer Bill (2012)





# The Problem



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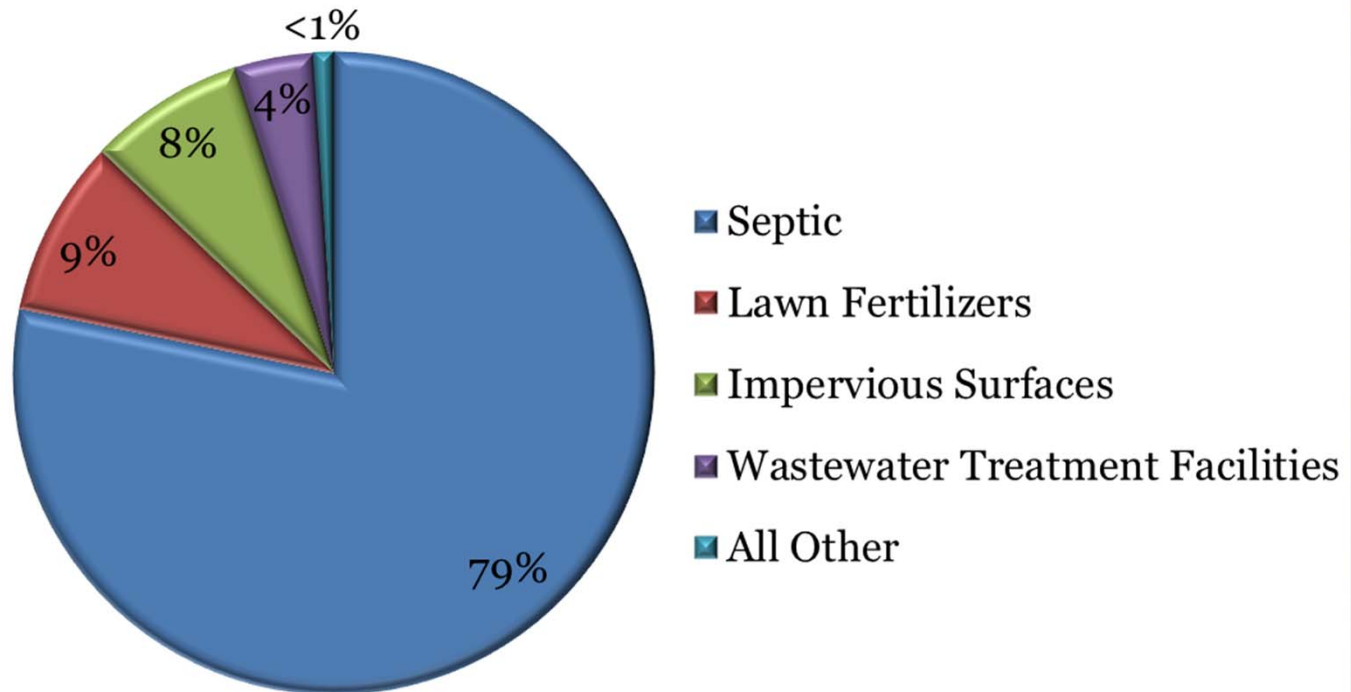
Bassing Harbor/Ryders Cove  
Muddy Creek  
Pleasant Bay



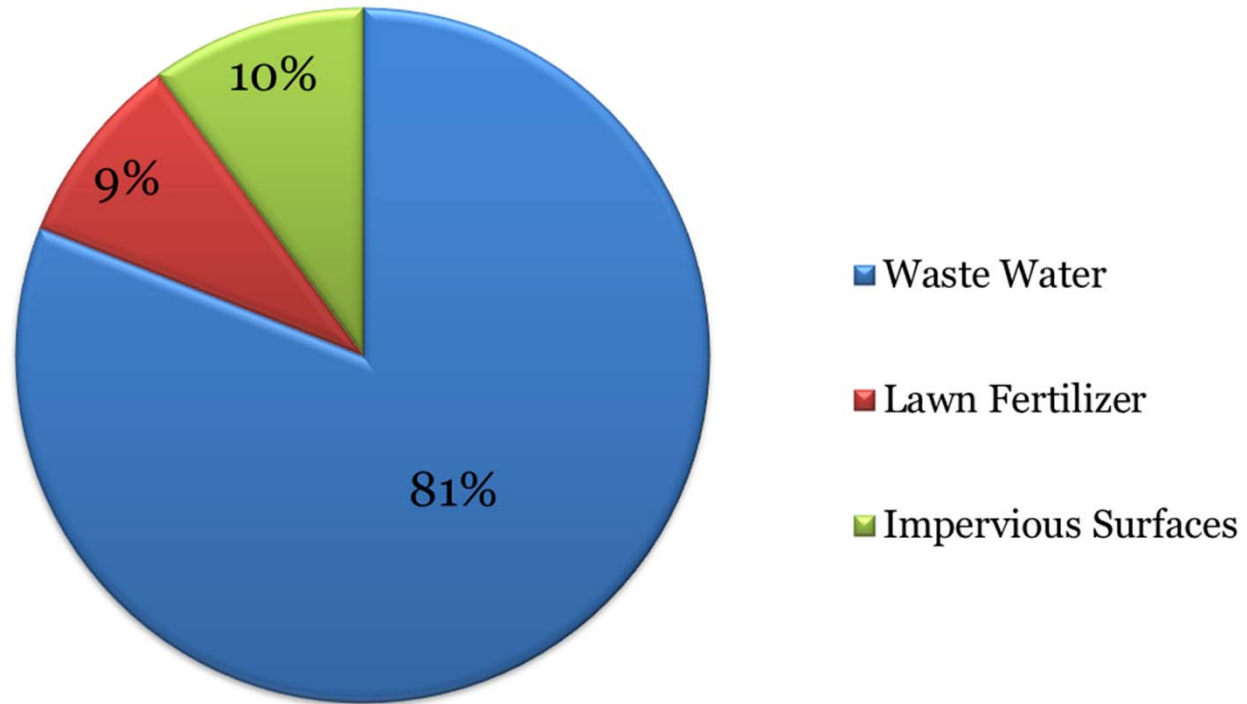
## Massachusetts Estuaries Project

- 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

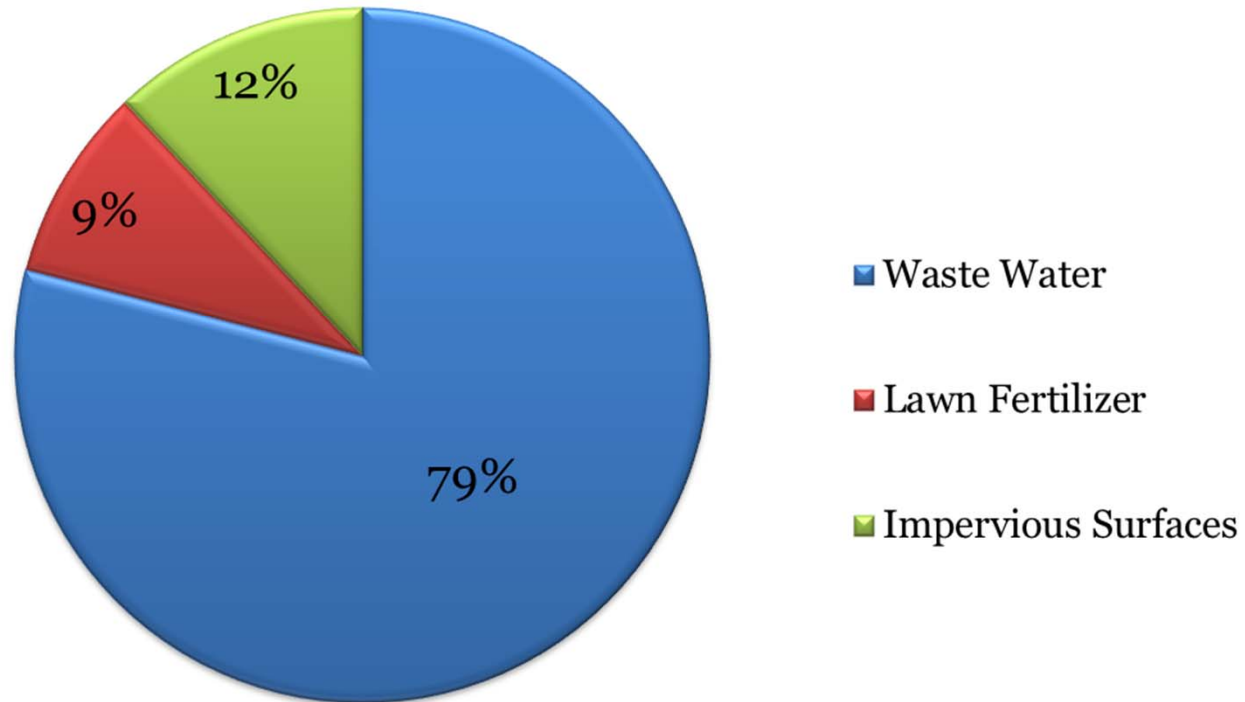


## Bassing Harbor/Ryders Cove

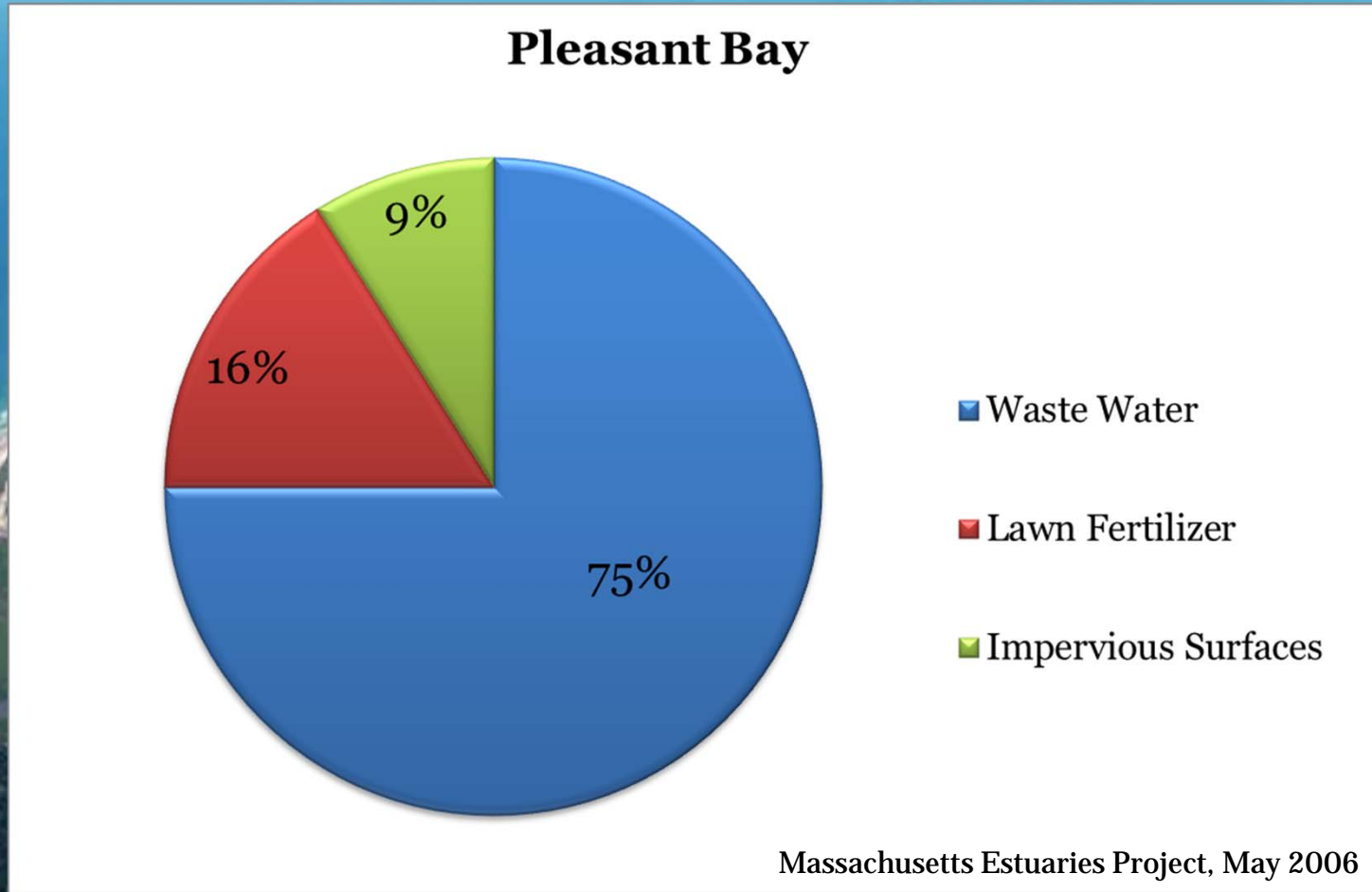


Massachusetts Estuaries Project, Dec 2003

## Muddy Creek



Massachusetts Estuaries Project, Dec 2003




# 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%

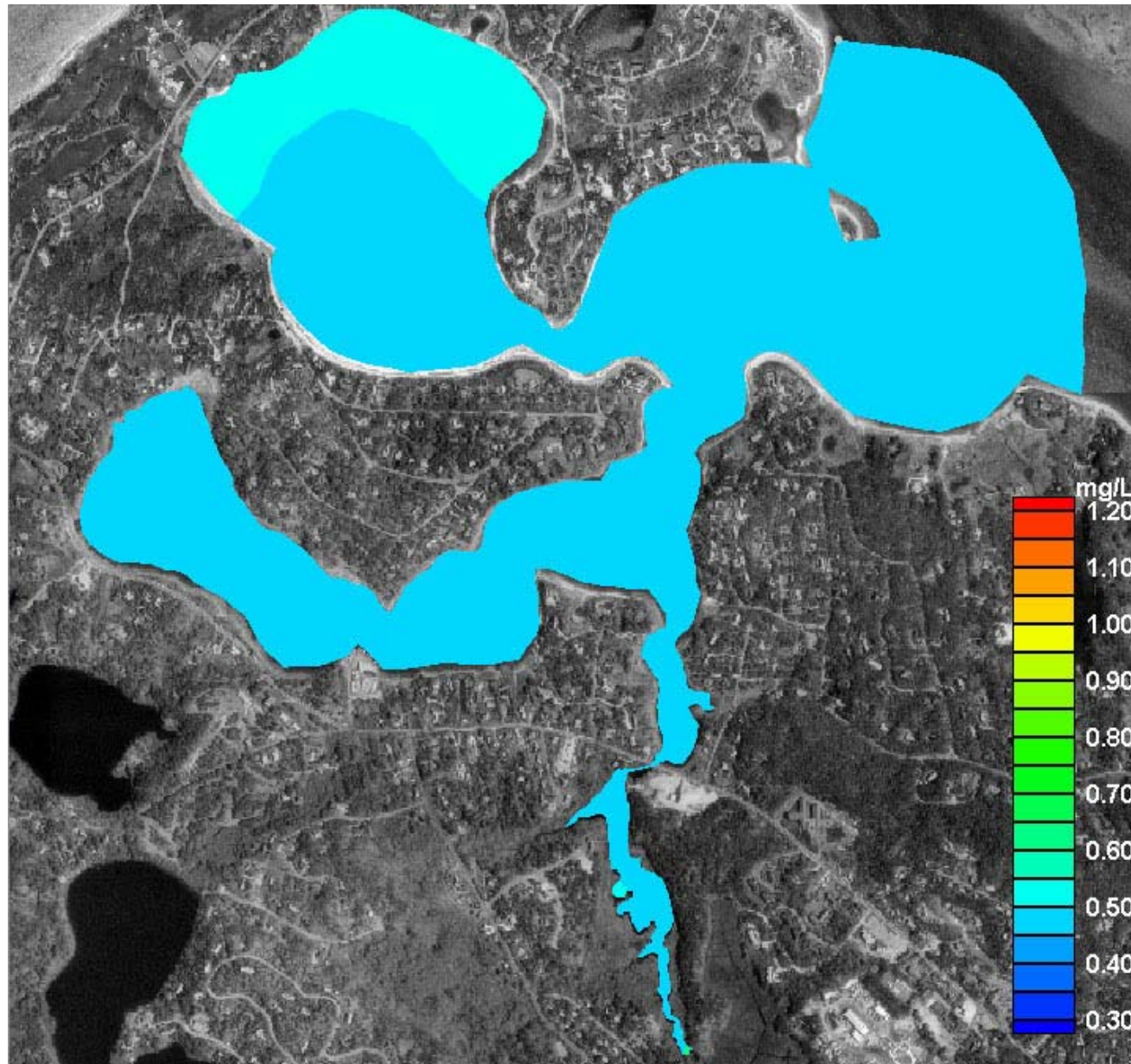
 9.1 % - 38 %

 38.1 % - 62 %

 62.1 % - 86 %

 86.1 % - 100%

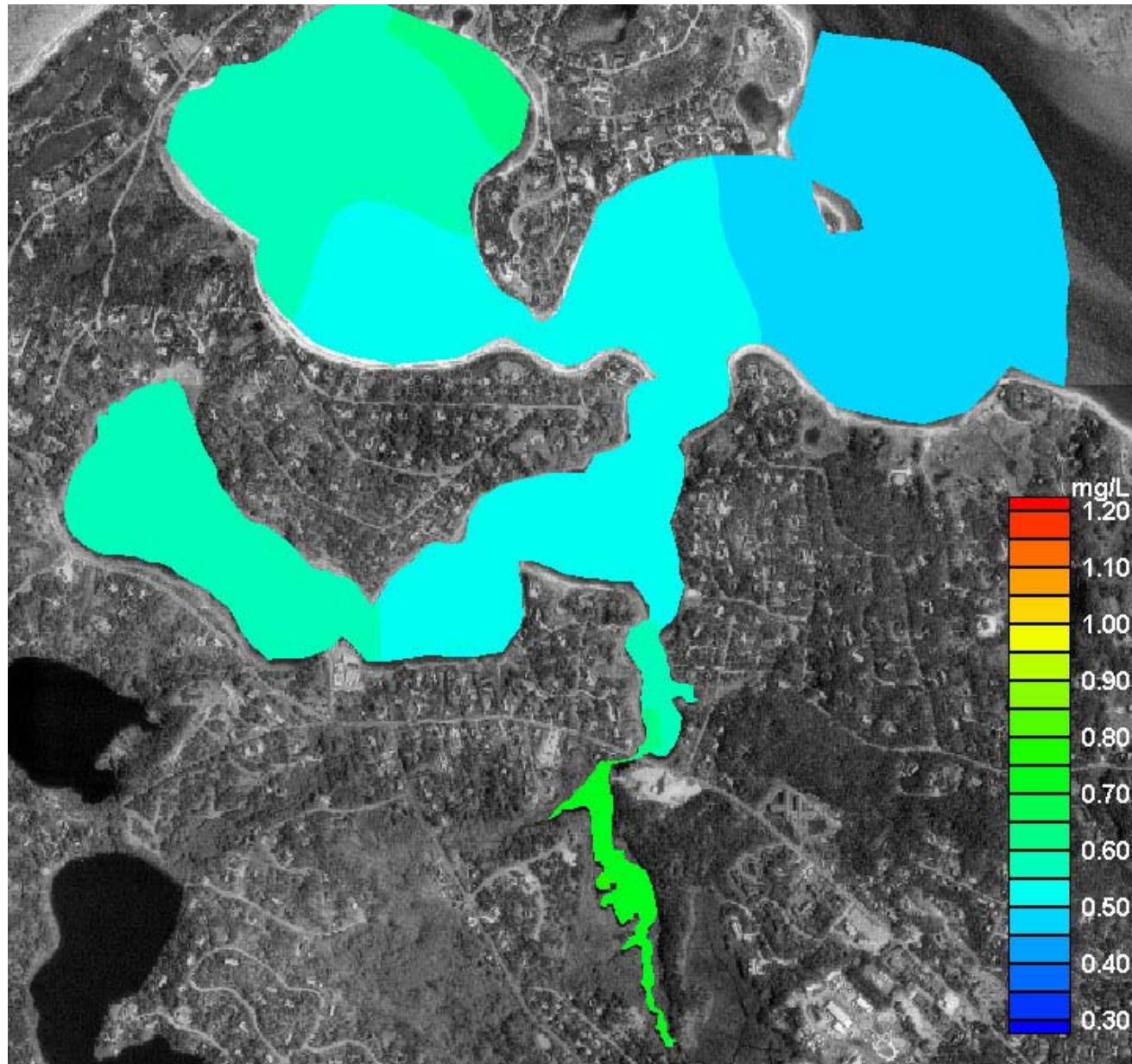




Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Bassing Harbor system, for no anthropogenic loading conditions, and present background N concentration at the entrance to Pleasant Bay (0.48 mg/L).

(Source: MEP 2003)

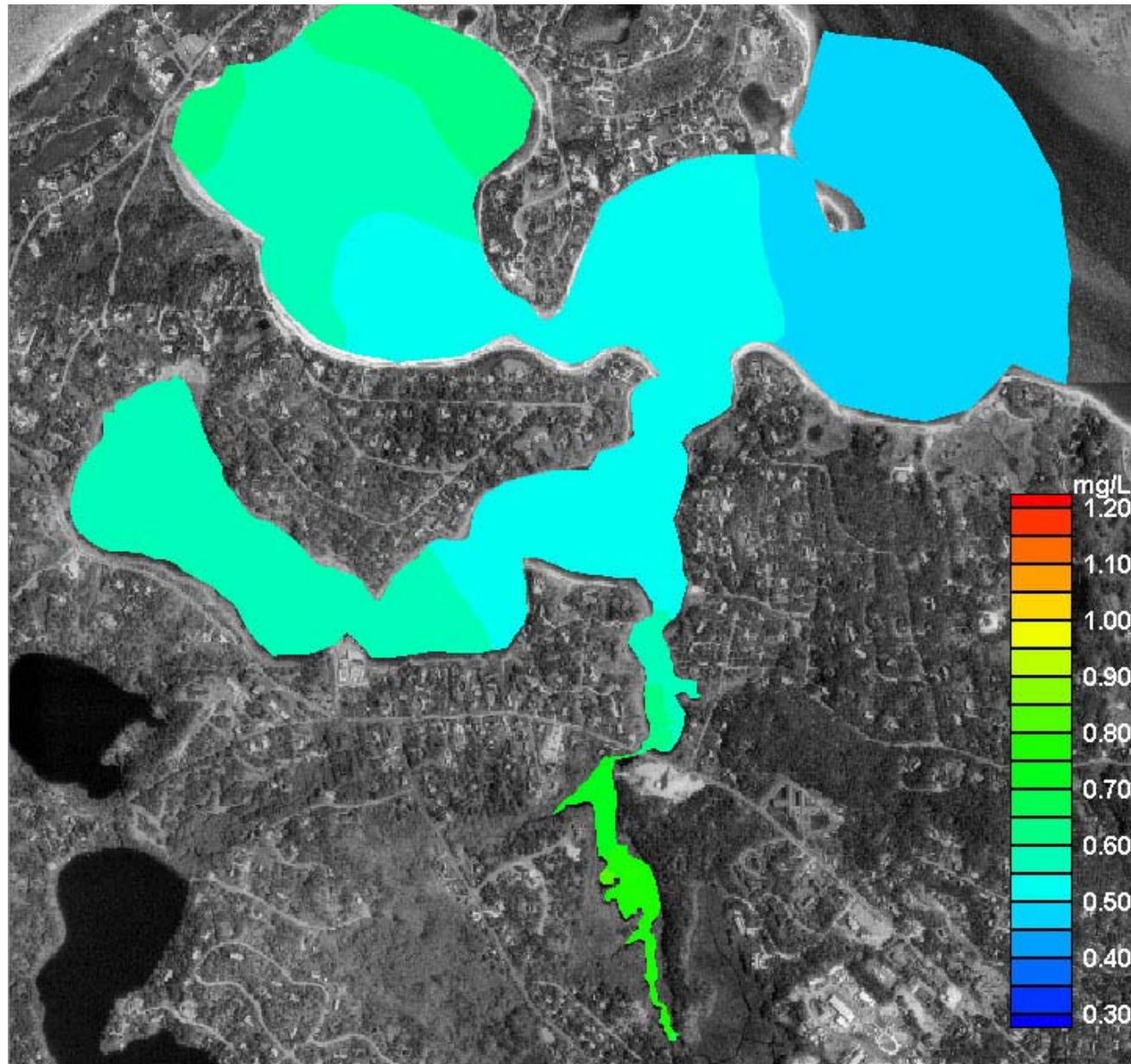
## Pre-Colonial Conditions: Bassing Harbor/Ryders Cove



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Bassing Harbor system, for present loading conditions, and present background N concentration at the entrance to Pleasant Bay (0.48 mg/L).

(Source: MEP 2003)

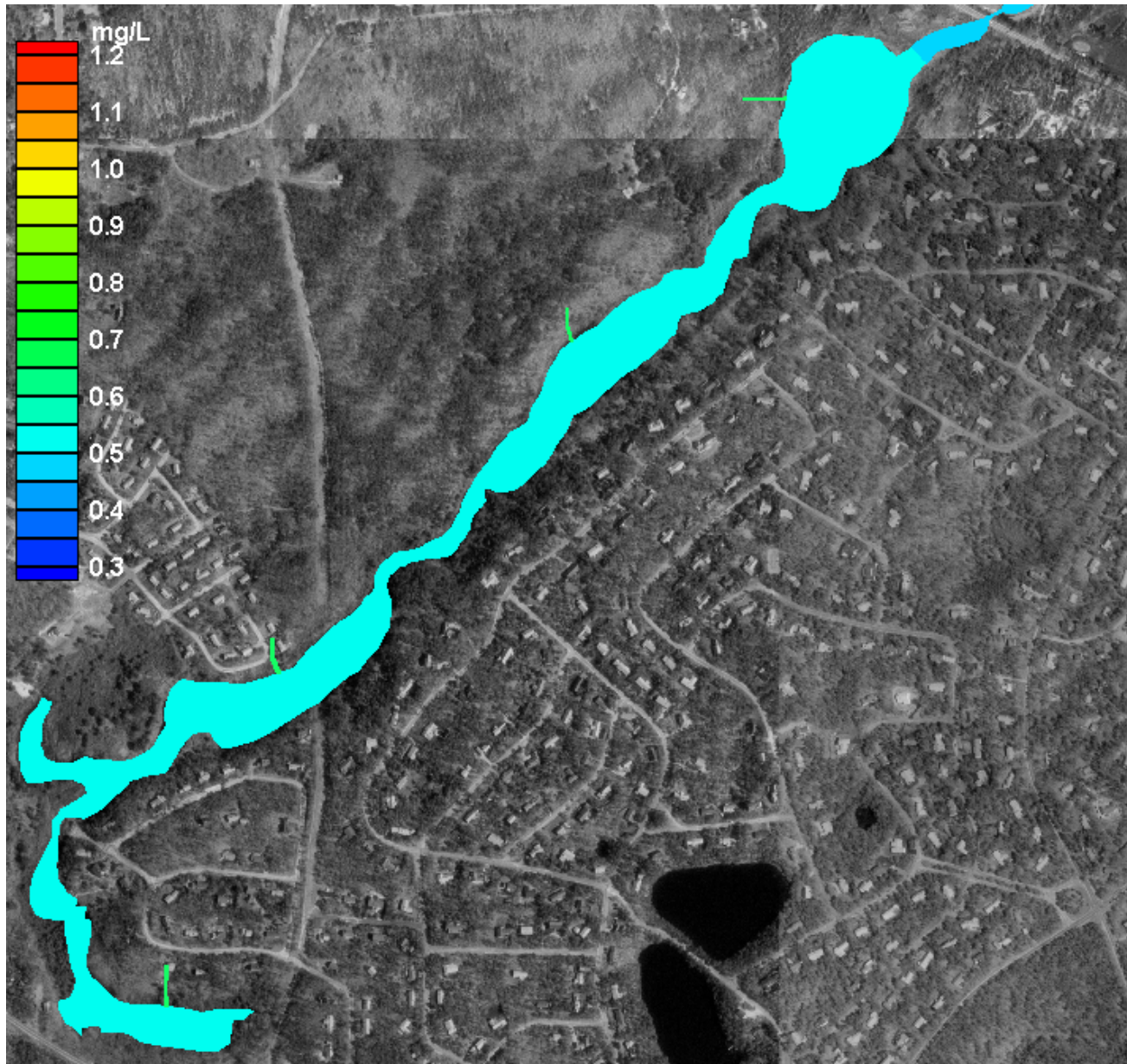
## Present Conditions: Bassing Harbor/Ryders Cove



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Bassing Harbor system, for projected build out loading conditions, and present background N concentration at the entrance to Pleasant Bay (0.48 mg/L).

(Source: MEP 2003)

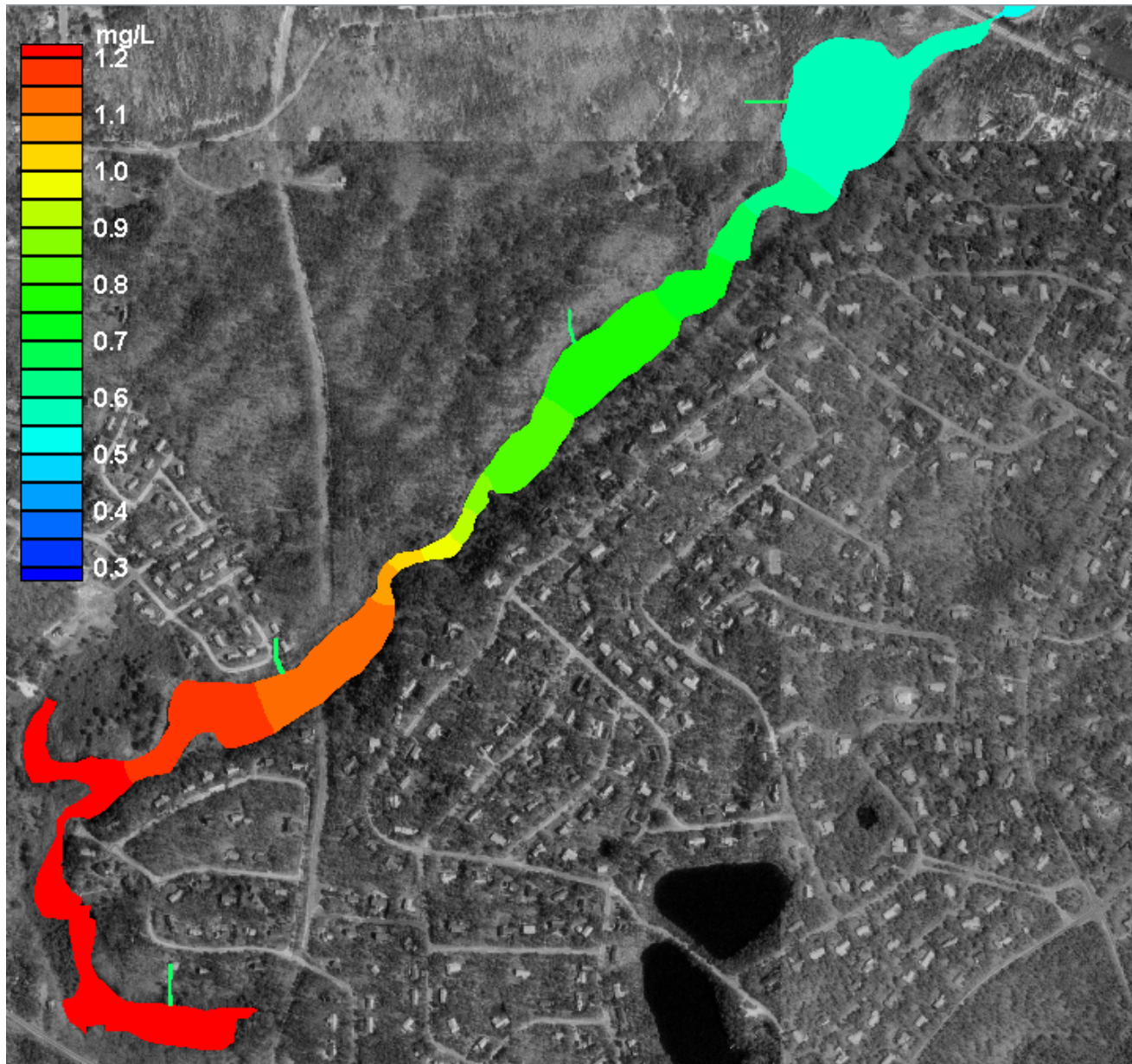
## Buildout Conditions: Bassing Harbor/Ryders Cove



Contour plot of **modeled total nitrogen concentrations** in Muddy Creek, for no anthropogenic loading conditions, and present total nitrogen concentration in Pleasant Bay (0.50 mg/L).

(Source: MEP 2003)

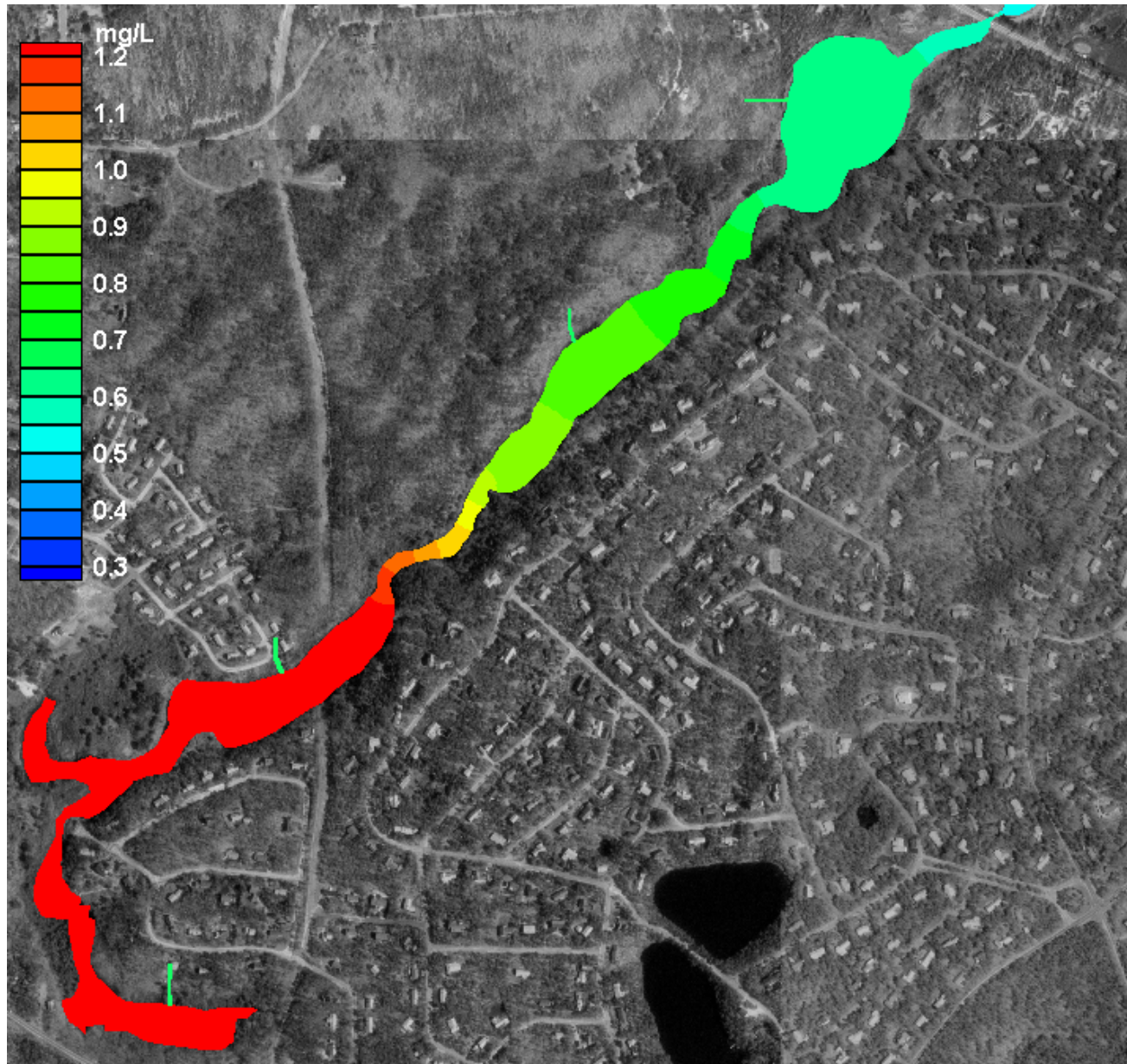
## Pre-Colonial Conditions: Muddy Creek



Contour plot of **modeled total nitrogen concentrations** in Muddy Creek, for present loading conditions, and present total nitrogen concentration in Pleasant Bay (0.50 mg/L).

(Source: MEP 2003)

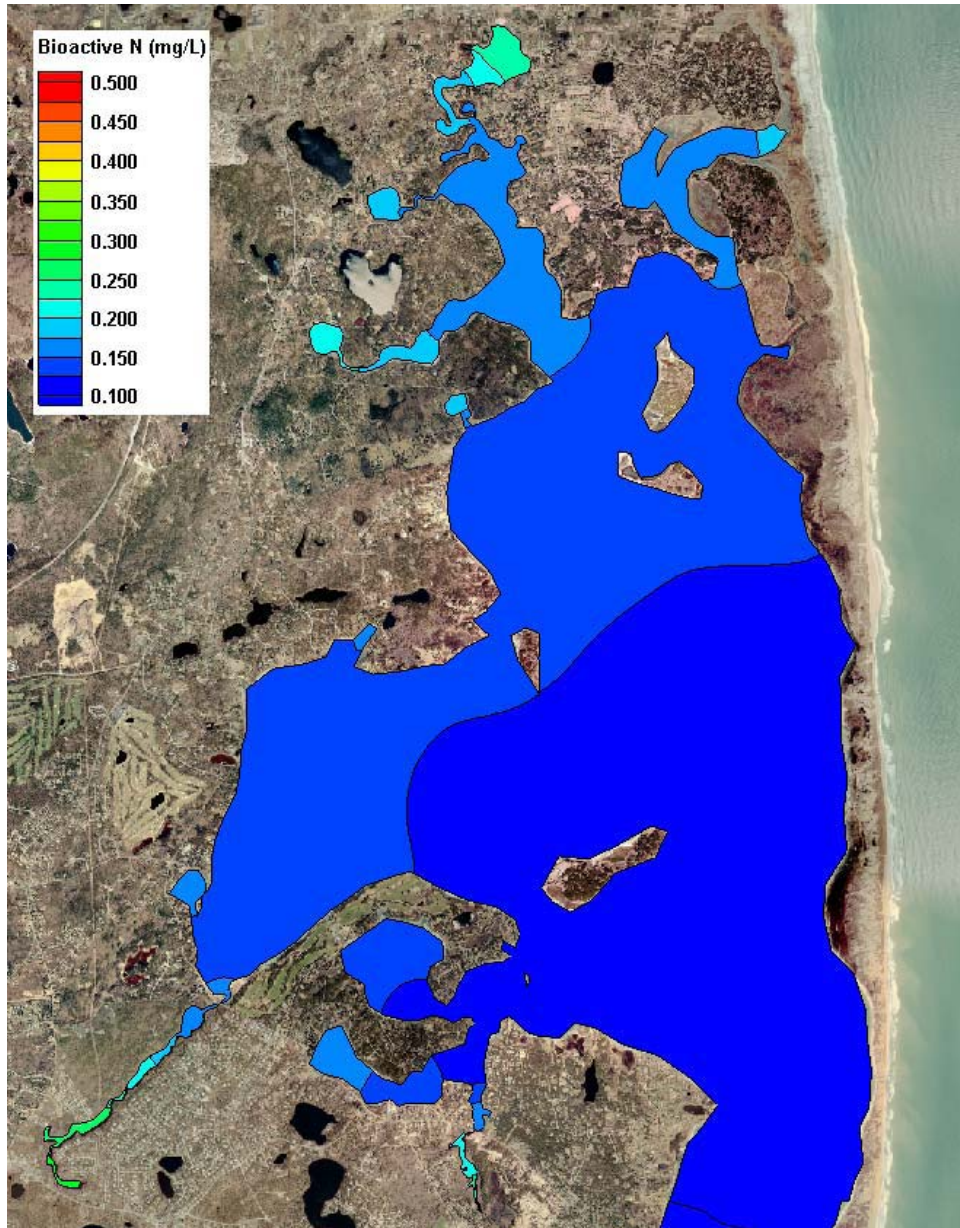
## Present Conditions: Muddy Creek



Contour plot of **modeled total nitrogen concentrations** in Muddy Creek, for projected build out loading conditions, and present total nitrogen concentration in Pleasant Bay (0.50 mg/L).

(Source: MEP 2003)

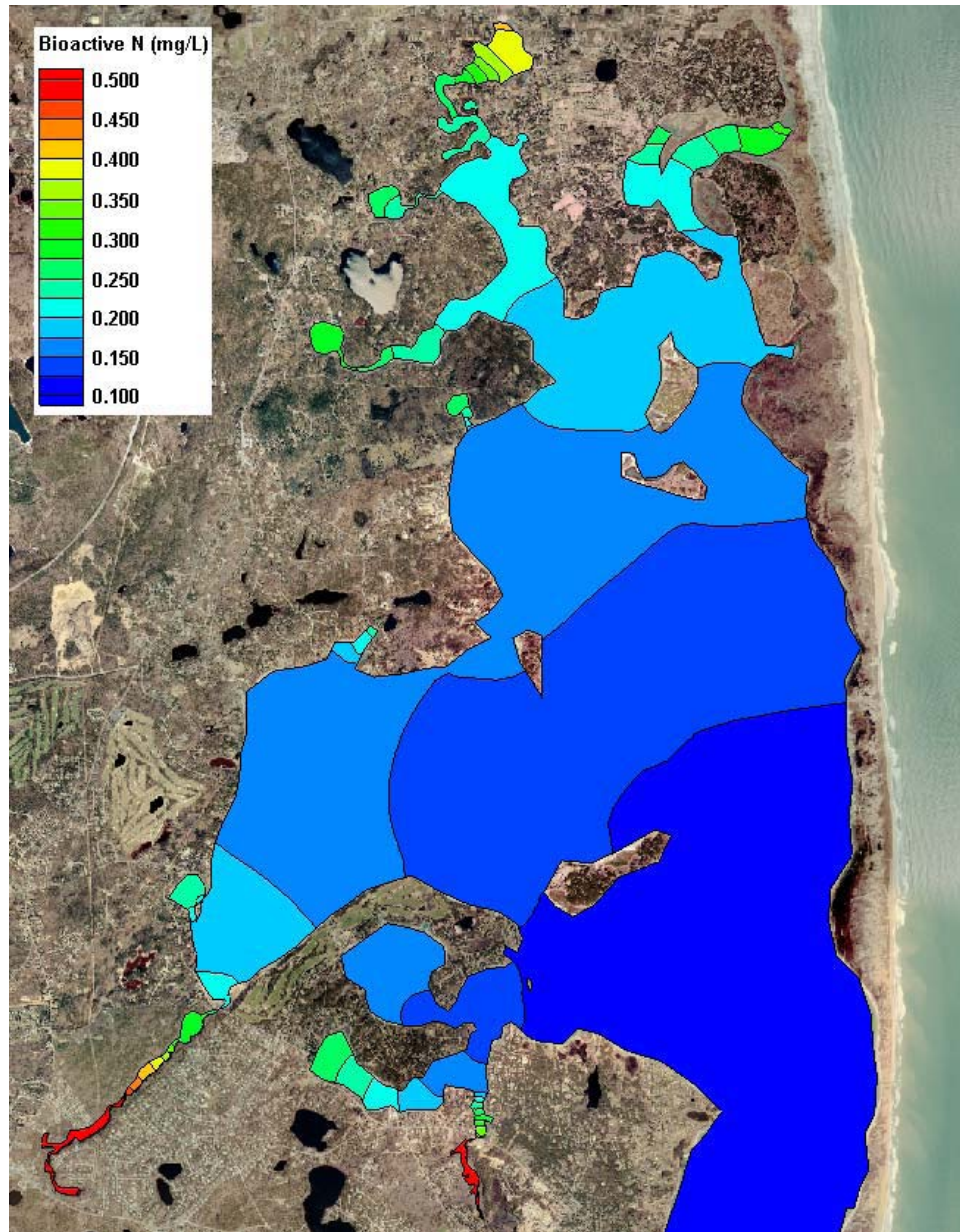
## Buildout Conditions: Muddy Creek



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

(Source: MEP 2003)

## Pre-Colonial Conditions: Pleasant Bay

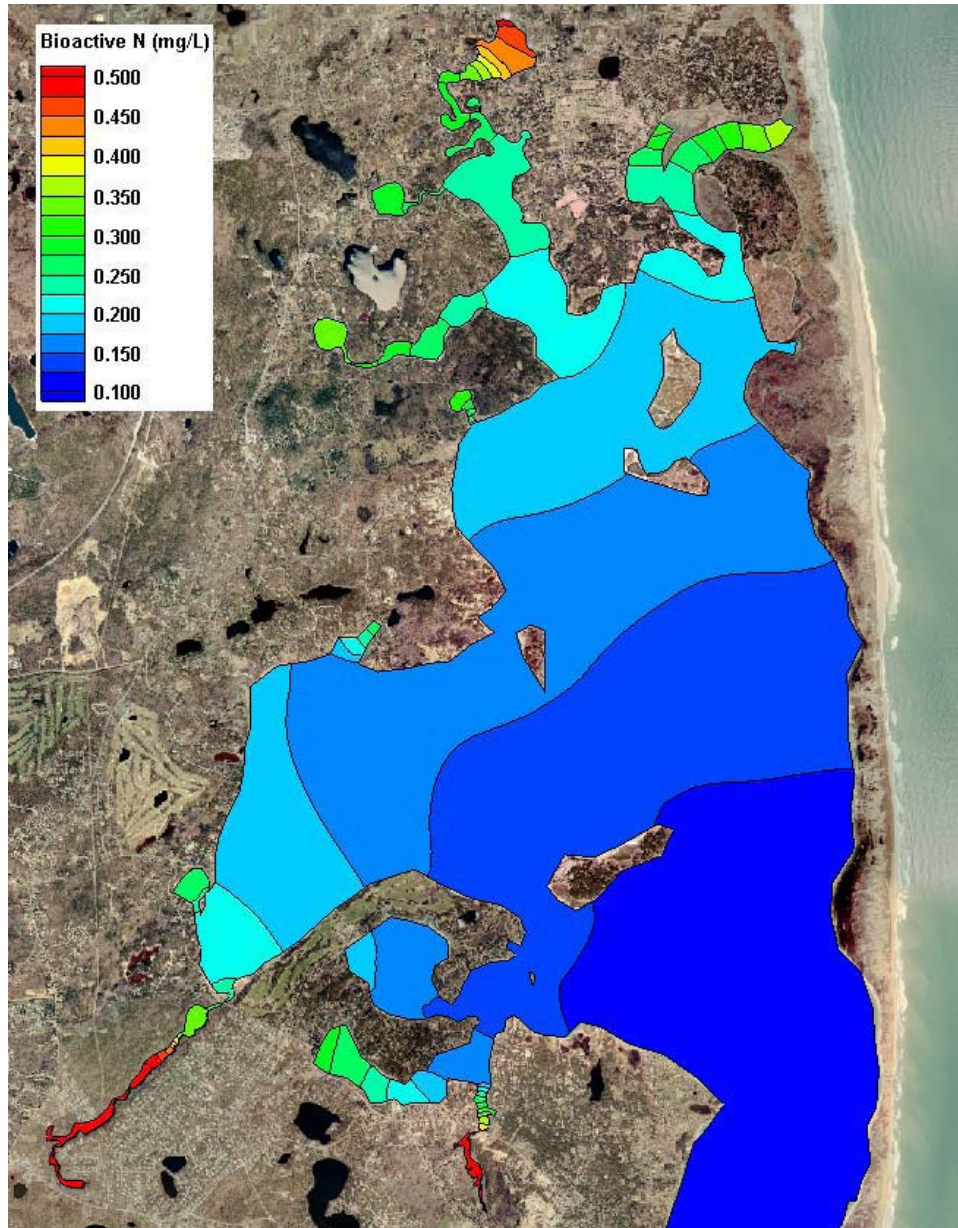


Contour plot of **average bioactive (DIN+PON) nitrogen concentrations** from results of the present conditions loading scenario, for the Pleasant Bay system.

(Source: MEP 2003)

## Present Conditions: Pleasant Bay





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

(Source: MEP 2003)

## Buildout Conditions: Pleasant Bay


# 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

-  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

-  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



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Bassing Harbor/Ryders Cove  
Muddy Creek  
Pleasant Bay


# 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

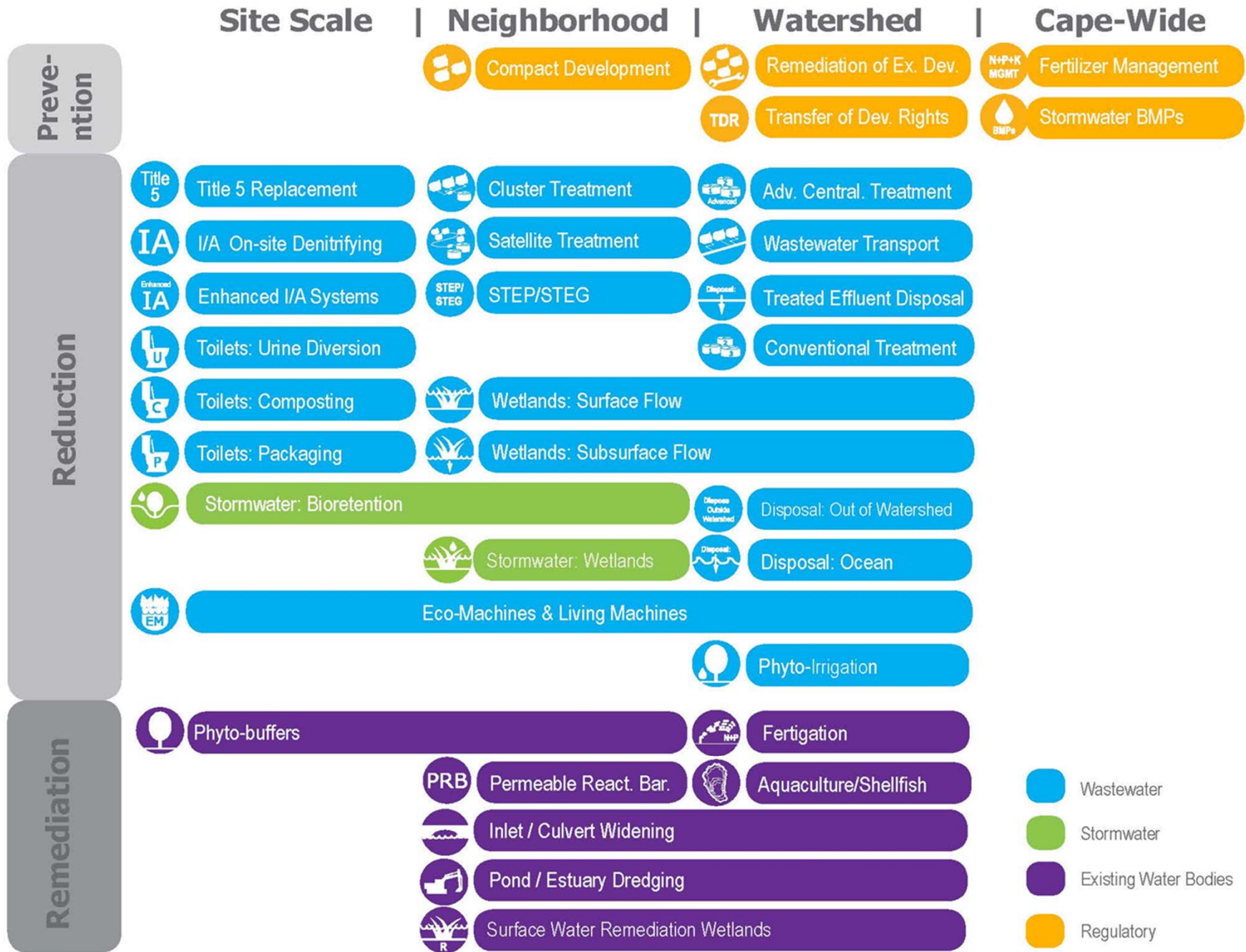




# **Framework for Addressing Solutions Moving Forward**

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**Bassing Harbor/Ryders Cove  
Muddy Creek  
Pleasant Bay**



- 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 Pleasant Bay Group will be available on the Cape Cod Commission website:**

<http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/pleasant-bay-town-cove-nauset-marsh>

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**Bassing Harbor/Ryders Cove  
Muddy Creek  
Pleasant Bay**

**Cape Cod 208 Area Water Quality Planning  
Pleasant Bay Watershed Working Group**

**Meeting One  
Friday, September 27, 2013  
Orleans Town Hall  
19 School Road, Orleans, Massachusetts 02653**

**DRAFT MEETING SUMMARY**

*This summary is a draft. Please send your comments on any errors or omissions to the working group facilitator. This summary will be corrected and finalized after the second working group meeting.*

**ACTION ITEMS**

The following action items were captured during the meeting:

Next Meeting: Thursday, October 24, 2013

8:30 am-12:30 pm

Orleans Town Hall

- Watershed Working Group Members
  - Provide the Cape Cod Commission with any additional updates to the chronologies and with data that may be helpful for the group to assess the issues.
  - Review technology fact-sheets in advance of the October 24 meeting. (Technology fact sheets will be distributed in early October)
  - Pleasant Bay Alliance to provide the working group with a summary of the water quality data they collected during the past 13 years.
- Cape Cod Commission
  - Provide to the group the links to the financial meeting video and meeting notes from the July and August meetings.
  - Obtain the data layers illustrating groundwater nitrogen levels from the towns of Eastham and Brewster
  - Verify the date of publication and of the data for the MEP reports on these watersheds
  - Prepare and distribute presentation slides in advance of the October presentation
- CBI
  - Distribute September meeting summary
  - Distribute meeting materials for October meeting: fact sheets and agendas

**WELCOME AND INTRODUCTIONS**

Ms. Patty Daley, Cape Cod Commission Deputy Director, welcomed the members of the Pleasant Bay Watershed Working Group. Appendix A contains a list of the group members who were in attendance. All meeting documents and presentations for the Pleasant Bay Watershed Working Group will be located here:

<http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/pleasant-bay>

Ms. Stacie Smith, Facilitator from the Consensus Building Institute (CBI), reviewed the agenda and described CBI's role and the member selection process.<sup>1</sup> Ms. Smith then acknowledged the wide range of perspectives on the MEP science and data. Noting that a special meeting on October 3 would be convened to specifically address these issues, she requested working group members to simply note their disagreement with the MEP science and data during the meeting and to refrain from discussing the specifics of their disagreement until the October 3 meeting.

Ms. Smith explained that the goal of the first meeting was to review and develop a shared understanding of the characteristics of each watershed, 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. She confirmed that the group was sufficiently representative of stakeholder interests, and invited a participant who felt he was not represented to sit at the table for now.

### **REVIEW OF GOALS AND PROCESS**

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 Cape Cod 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.

Many of the 105 watersheds and 57 embayments on Cape Cod overlap the boundaries of two or more municipalities, thus making the Section 208 update a regional issue and highlighting the need for inter-municipal collaboration. A watershed-based approach will be used to update the 208 Plan and working group members from the 11 watershed working groups, with input from other stakeholders and members of the public, will jointly identify solutions appropriate for their watershed. The approach strives to maximize the benefits of previous local planning efforts by building upon those efforts whenever possible. Ultimately, each watershed working group will generate a series of approaches recommended for their specific watershed, each of which may incorporate a different set of technologies, to meet water quality standards.

Patty Daley, Area Manager for the Lower and Upper Cape, will attend the stakeholder workshops and help prepare materials for subsequent workshops to ensure members have the materials necessary for the planned discussions. In Spring 2014, she will work with the Cape Cod Commission staff to draft a comprehensive Cape-wide plan that combines the specific recommendations from the Pleasant Bay Watershed Working Group with the recommendations of the other 11 watershed working groups on the Cape.<sup>2</sup>

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<sup>1</sup> CBI's role and the participant selection process are described in detail in the Draft Process Protocols located at the link mentioned on page 1 of this summary.

<sup>2</sup> The area manager information was not explained in the meeting but is added here for general understanding.

Ms. Perry reviewed the timeline of the 208 Plan Update. In July, public meetings were held across the Cape to present the 208 Plan Update goals, work plan, and participant roles in July. Public meetings were also held in August to present information on the affordability and financing of the updated comprehensive 208 Plan. Since few people attended the August meetings, the Cape Cod Commission will present this information to interested groups upon request.<sup>3</sup> As previously noted, the September working group meetings are focused on baseline conditions. During the next working group meetings in October, stakeholders will review and discuss the technological options to address the issues in their watershed. Stakeholders will develop watershed scenarios drawing on discussions from the September and October meetings during the final meeting in December.

In addition to the aforementioned stakeholder engagement meetings, an advisory board; a Regulatory, Legal, and Institutional (RLI) working group; a Technical Advisory Committee (TAC), and; a Technology Panel will provide guidance to the 208 Plan Update process. The advisory board consists of former local officials, individuals with experience advancing regional plans, and representatives of the environmental community. Representatives from the MassDEP, the EPA, the Cape Cod Commission, the Army Corp of Engineers, and other state and federal partners comprise the RLI. Local, regional, national, and international experts on water quality management technologies comprise the Technology Panel. The TAC, which is a committee of the Cape Cod Water Protection Collaborative, will provide a local, municipal perspective on the technologies under consideration. She then explained that the 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."

Working group members offered the following comments and questions after the review of the goals and the process. *Responses from the Cape Cod Commission and the facilitator are italicized.*

- A group member asked why some sub-watersheds were called out individually in the Pleasant Bay working group, since all are really part of Pleasant Bay? *Ms. Daley responded that they were singled out individually because this is how they were presented in the MEP report, but offered to look into this further.*
- A group member commented on the slide stating that nitrogen removal is required. He stated that identifying nitrogen as the problem without first investigating the other potential causes of the watershed problems is risky because it could lead to investing significant financial resources in nitrogen reduction only to find out the investments do not solve the problem. *Ms. Smith responded that the premise of the 208 Planning process, as dictated by the MassDEP, was to build on the MEP conclusions and focus on nutrient removal.*
- A group member asked where in the 208 Plan Update process social, economic, and environmental considerations would be made, and that it would be too late in the process if these considerations were made after selected measures were sent to the engineers for design. *Ms. Daley said the Commission is working with the EPA now on a triple bottom line model that will look at these issues. She estimated that the model should produce preliminary results by the end of December, but the full analysis will not be completed by the end of the*

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<sup>3</sup> Contact Erin Perry ([eperry@capecodcommission.org](mailto:eperry@capecodcommission.org)) if you would like to schedule an Affordability and Financing presentation.

year. The group member said he is concerned the information that comes to the working group from that model will be highly filtered and will not have sufficient details to understand how to evaluate the information.

- Another group member stated he anticipated the Commission would present an overarching plan and was concerned this had not happened. He also expressed concern about the lack of a management plan for non-point source runoff in the town of Orleans.
- A group member commented that this meeting distracted from Orleans ongoing water quality efforts and expressed concern that Orleans will not be able to finish anything if they must participate in another planning process. She said another concern is that the 208 Plan Update process will give communities another reason for not acting now. *Ms. Daley replied that the idea is to take local plans and roll them into a conceptual regional watershed plan, while elevating collaboration between towns. The Commission does not intend to hold towns back in their ongoing efforts. Ms. Smith asked working group members to keep in mind the potential opportunities this process could bring, especially those opportunities that can only be achieved through inter-municipal collaboration.*
- Another person said she commends the Commission for creating a plan based on watersheds, and said the towns have a responsibility to move forward on their own in parallel with the 208 Plan Update.
- A participant said one of the most important questions is whether or not this process will help acquire funding. He said he mentioned this process while on Beacon Hill and that people responded positively to the idea.
- A member asked if transcripts of the July and August meetings are available. *Ms. Perry responded that the financial meeting is available in video and meeting minutes will be available soon.*

#### **LOCAL PROGRESS TO DATE**

On four separate chronologies, Ms. Daley highlighted past actions that had been taken in Harwich, Chatham, Orleans, and Brewster that would either protect or inhibit water quality in the watersheds of the Pleasant Bay Working Group.<sup>4</sup> Working group members and the public then reviewed the chronologies and, using sticky notes, added missing events or corrected the information to help create a more accurate view of past actions. The Cape Cod Commission will update the chronologies with the information provided by working group members. During discussion after the activity, group member reflected on lessons learned from reviewing the chronologies. Member identified the following lessons learned:

- One member commented that it appears the studies are redundant and little has changed in terms of the recommendations. The member said it was time to move beyond investigation to implementation.
- Several members commented that Pleasant Bay is a great example of the efficiencies gained through inter-municipal coordination, despite the challenges. The towns save money and time when working together and increased communication and coordination fostered cooperative agreements. Another person mentioned that cooperation will help to identify the critical focal points for work, while reducing the tax burden any one town must impose on its residents.

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<sup>4</sup> Detailed chronologies are available in the Pleasant Bay Baseline Data Presentation located at the link on page 1 of this summary, along with updated versions of these chronologies based on working group input.



- One member said that in addition to the cooperation, the need for flexibility in contexts with evolving political, technological, and regulatory conditions.
- A member reminded the group that Pleasant Bay is one of the largest and most complicated coastal water systems on the Cape. He stressed the importance of clearly defining how to measure success and identifying the parameters that could be used to measure it and the adaptive management measures that could be implemented to ensure success in the long term.
- Another member suggested that land use planning and policy can be used as a tool to influence water quality goals.
- Another commenter said it seems that more broad guidelines and standards should be followed and asked what the county, state, and federal agencies might want from the towns to make sure the cohesive plan creates the desired effect.

## **BASELINE CONDITIONS**

Ms. Daley and Mr. Jay Detjens, Cape Cod Commission GIS Analyst, presented GIS data layers, demographic data, and water quality data both Cape-wide and specific to the watersheds in the Pleasant Bay Watershed Working Group. Working group members and members of the public are encouraged to view the layers on the Cape Cod Commission website.<sup>5</sup> 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. However, Ms. Smith reiterated the request that working group members simply note their disagreement with the MEP science and data and refrain from discussing the specifics of their disagreement until the October 3 meeting.

### *GIS Data Layers*

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. OpenSpace data is displayed in three levels of land protection: land protected in perpetuity, limited protection, and no protection. The Pleasant Bay study area contains a large Area of Critical Environmental Concern. Land use Vision Map data delineates economic centers; industrial and service trade areas, village boundaries,

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<sup>5</sup> Data used for modeling and analysis will be available through the link on page 1 of this summary.

resource protection areas, other designations, and undesignated lands. Brewster and Orleans have Land use Vision Maps. No Growth Incentive Zones are present in the study area.

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 2005 data layer is also available, but was not displayed since the collection methodology was different than the 1951, 1971, and 1999 data.

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' existing zoning regulations and normalizing that data by applying state designated zoning categories. Ms. Daley emphasized that buildout scenarios are an art, not a science, and that there are many ways to conduct a buildout analysis. She illustrated this point by showing a slide that depicted differences between the Regional buildout, the Comprehensive Waste Management Plan (CWMP) buildout, and the Local Comprehensive Planning buildout for towns across the Cape. She explained that each of these buildouts use different assumptions, different time spans, different geographies, and could not be compared to each other. The Cape Cod Commission's regional approach to the buildout analysis enables comparison of potential buildout across the entire Cape, but loses some detail on the local level. Ms. Daley noted that density is a critical component to the 208 Update Plan, illustrated by the prediction that a hypothetical 30% growth would increase capital costs by 40% (based on an analysis of traditional sewerage costs).

Pleasant Bay Watershed Working Group members had the following comments and questions about the GIS data layers. *Responses from the Cape Cod Commission and the Consensus Building Institute are italicized.*

- Regarding the density and buildout layers, one member commented it would be helpful to differentiate between lands that are potentially buildable and lands that are protected by NGOs or others. *Mr. Detjens said the Commission has some of this data from the office of the assessor, but not the protected lands data.*
- Another member suggested that if you build it – meaning infrastructure – people will come. *Ms. Daley replied that Title 5 results in some development limitations, and that Towns need to grow to remain economically healthy. She said that Towns will need to think about their current zoning and whether they want to refine zoning regulations to prevent growth if there is new development that will be enabled by wastewater infrastructure.*
- A member suggested adding the Brewster buildout to the Commission's data layers.
- A participant noted the nitrogen loadings for buildout in the MEP report implies a great population increase in Orleans; but, there is no infrastructure planned to drive that increase. The participant said the basis of the TMDL illuminates a need to return to real world conditions.

#### *People 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. Data includes population estimates, median age, average income, race, average home value, total home value, average annual water bill, average annual sewer bill, seasonal vs. year round housing, and average annual single-family property tax bill. After reviewing this data, the group members had the following comments and questions.

- Regarding the seasonal and year round population estimates, a participant requested information on the change in these numbers over the past 10 years. *Ms. Daley said they could obtain this information and noted that population is not correlated to the number of dwellings. She noted the potential inaccuracies of the census data since some people may call their home on Cape Cod their year round home, but in reality they are living elsewhere for the majority of the year. If towns have better data on seasonal and year round populations, please provide it to the Commission.*
- A member mentioned a demographer who observed five or six towns on the Cape where the number of residential buildings exceeds the number of residents, which is a rare occurrence.
- Another member asked if the working group would have access to water use data to measure population fluctuations. *Ms. Daley said the Commission has water use data from the water purveyors.*
- A member asked if the cost of the average annual sewer bills would exceed the average cost in Massachusetts if the towns were to install grey infrastructure like in Boston. *Referring to the slide illustrating the annual sewer bills in Barnstable, Falmouth and Chatham, Ms. Daley said the price would not necessarily be higher since the aforementioned cities have lower than average sewer bills.*

## **THE PROBLEM**

Ms. Daley explained that eutrophication from nitrogen loading in coastal estuaries and phosphorous loading in ponds and lakes is the primary problem to be addressed with the 208 Plan. In many areas of the Cape, the Massachusetts Estuary Project (MEP) provides three years of nutrient loading data, water quality monitoring data, and hydrodynamic information to link water quality data to nitrogen loads.

Ms. Daley next reviewed the Cape-wide MEP data, 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. Ms. Daley then reviewed the MEP data for Bassing Harbor/Ryders Cove, Muddy Creek, and Pleasant Bay. Wastewater, lawn fertilizers, and impervious surfaces were identified as the main contributors of controllable nitrogen in the MEP study of these watersheds.

Ms. Daley proceeded to present a series of maps and diagrams illustrating contour plots of modeled past, current, and anticipated future nitrogen concentrations in Bassing Harbor/Ryders Cove, Muddy Creek, and Pleasant Bay sub-watersheds, which showed increasing concentrations and growing percentages of the watersheds showing unhealthy nitrogen concentrations.

She then showed maps of eelgrass distribution, from 1951, 1995, and 2001, noting that eelgrass is an indicator species for water health.

Ponds and lake data is available from the Pond and Lake Stewardship Project (PALS). PALS provides a snapshot of the physical water quality parameters of 200 inland water bodies and connects this data to trophic status. The term 'priority' used on the GIS layer description slide does not imply a measure of importance; rather, the ponds data included to in the layer represent ponds that have been sampled and where the trophic status has been concluded.

To identify areas where Title 5 compliance issues might be concentrated, the Cape Cod Commission mapped the approximate locations of the Title 5 loan applications. Mr. Detjens clarified that this layer does not tell us anything definitive: loan applications do not signify failure, and systems that were updated without acquiring loans will not be on the layer. The Potential Title 5 Compliance Issues layer attempts to identify geographic areas that could be more likely to exhibit compliance issues according to a set of criteria, including: 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. The Commission recently contracted a consultant to collect Title 5 failure and variance information from local health agents. Once the information is compiled, it will be incorporated into the analysis.

Working group members had the following questions and comments about the presentation of the problem:

- One member said the towns have collected water quality data, but they were told the data is not sufficient to run the MEP models.
- A participant noted that it would be great if the 208 Plan Update would address the impact of the Midwest on the Cape's nitrogen loading. *Ms. Daley agreed that it should.*
- A member suggested retitling the slides currently titled as 'Present Conditions of total modeled nitrogen concentrations' since this data is not current. *Ms. Smith further clarified that the date on the slides indicated the date of the published report rather than the date of data collection.*
- A member suggested verifying the MEP publication date, which he thought was 2006 instead of 2003.
- A member noted that new regulations to control fertilizer could be a helpful part of the solution.
- A participant noted a disparity in the data. He pointed out that in Nickerson State Park there are no houses yet it seems the map indicates some level of density. He stated that nitrogen could not be reduced from areas where there is no source of nitrogen. *Mr. Detjens clarified that the layer denotes sub-watershed areas that have modeled a nitrogen removal rate to achieve the TMDL. So, the layer shows the entire sub-watershed, not a specific area where reduction measures should be implemented. Ms. Daley also noted that Nickerson State Park is an area with significant capacity to assimilate nitrogen.*
- One member expressed concern about the impact of nitrogen runoff from Route 6, which bisects wetlands near Orleans.
- A participant commented that the 1951 eelgrass data was taken from Department of Transportation photos with very poor resolution and that no ground-truthing of the images occurred. The participant also noted that nitrogen level data from 1987 in the MEP report are higher, and not listed here.

- A group member asked if there is a data layer for nitrogen concentrations in groundwater, and said Eastham and Brewster both have nitrogen concentration data for groundwater. *A representative of the Commission said groundwater nitrogen concentrations are usually reflected in public water supply information, which the Commission has obtained.*
- Another member asked if data for contamination plumes from dry cleaners or landfills could be incorporated. *Yes, said a representative of the Commission.*
- Regarding the Title 5 Compliance layer, a member pointed out that the discharge points on the map are the permit holder addresses and not necessarily the permitted discharge points.
- A member said he did not think the MEP reports took into account that fact that the wastewater treatment plants treat water to 5 milligrams of nitrogen or less, thereby removing a lot of nitrogen from the system.
- Adding to the previous comment, a member reminded the group that the current systems were installed with the intent to expand them in the future to allow greater treatment capacity.

### **EXISTING AND PROPOSED SOLUTIONS**

Ms. Daley and Mr. Detjens next presented the existing and proposed infrastructure data layers. 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 sewer shed phasing, if applicable. They requested group members provide additional information on planned stormwater upgrades to existing infrastructure. Group members made the following comments.

- A group member said the town of Orleans will have a comprehensive list of existing stormwater infrastructure in the coming months.
- A group member requested revision to a data point on the lower east side of the proposed infrastructure map in Pleasant Bay. He said this is actually a natural break, not a managed inlet.

### **WORKING GROUP FEEDBACK**

Based on the information they saw today, Ms. Smith then asked group members to list the priority actions, priority areas, or issues of greatest concern. Group members made the following suggestions:

- A member suggested stormwater runoff as a priority issue. He said Orleans is currently inventorying their stormwater structures and prioritizing remediation sites, and there is some funding available for actual construction.
- Another member said an area of focus should be cost reduction through inter-municipal collaboration.
- A member proposed a priority action of contacting the Department of Transportation to learn what they have done at sites to reduce runoff, identify what they plan to do to minimize runoff, and identify their high priority areas. *Ms. Daley said the Commission could bring the DOT into the conversation through the RLI group.*
- A member suggested that educating the professionals in the Department of Public Works regarding stormwater management should be a focal point. He said DPW professionals know how to address bacterial contamination, but the methodology to address nitrogen remediation is completely different and will require the DPW to change their actions.

- One member suggested the value of a statement about the critical water quality issues, and where there is agreement and disagreement.
- A member proposed consideration of contaminants of emerging concern when selecting treatment methodologies.
- Another participant mentioned the need for a robust monitoring protocol to evaluate progress from baseline data points.
- A participant suggested the Pleasant Bay Alliance could share the water quality data they collected over the past 13 years to help set a baseline understanding of the current conditions. From this baseline, the member suggested framing research questions and monitoring programs that will help the communities evaluate success in 5, 10, 15, or 20 years. The participant noted, however, the need to identify and measure other factors of success in addition to nutrient loads to get at water quality parameters. Eel grass and benthic monitoring were suggested metrics. In response to this statement, another member suggested consideration of National Marine Fisheries data on shellfish landings as a potential metric. Another discussant commented that wildlife production is dramatically lower than it was 30 years ago.
- A member announced that the Orleans Board of Selectmen are currently discussing the development of a water monitoring protocol. In particular, they are identifying the sites where water quality data must be collected. The town will vote on the protocol in 2014.
- A member said housing density should not be the focus. Instead, population should be the focus. The member added that he does not anticipate population growth by 30% in the town of Orleans.

#### **NEXT STEPS**

Ms. Daley presented the technologies matrix and described the upcoming meetings. The technologies matrix organizes a mixture of remediation, reduction and prevention techniques that can be deployed at the site level, neighborhood level, watershed level, or Cape wide. In response to a question about number of alternatives, she noted that it was meant to be comprehensive, but that not all technologies would be seen as appropriate in all the Watershed Working Groups. 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.

Ms. Daley explained that workshop three would center around an alternatives screening method. The Commission is taking a two-pronged approach to the examination of alternatives, including looking at more traditional methods, but also looking at all greener, alternative options to sewerage and how these might fit into the overall solution.

The 7-part process was 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

### **OPERATING PROTOCOLS**

Ms. Smith briefly reviewed the draft protocols and requested the group members suggest changes to the groundrules within one week. 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. Smith also reiterated that CBI works on behalf of all the participants at the table and that CBI will try to balance their needs for the process as fairly and transparently as possible. She noted that high level meeting summaries will be produced for each meeting and that working group members will have a chance to suggest corrections and edits to the summary before they are finalized.

### **PUBLIC COMMENTS**

The facilitator opened the floor for public comments. The following statements were made:

- One person commented that a big hurdle will be finding agreement on how much nitrogen to reduce.
- Another commenter expressed concern about the 208 Plan Update timeline and the amount of work to be completed. The commenter was worried the working group would not be able to focus on the core issues and help position the towns to move forward after the plan is updated.
- Another person suggested the working group pick one problem and start working on it instead of trying to discuss everything that is connected. *Ms. Smith responded that these meetings are a chance for the Commission to get broad input on the development of the plan, so the focus cannot be too narrow.*
- For future meetings, a commenter requested the presentation slides be sent in advance of the meeting.
- Ed Nash, Golf Superintendents Association of Cape Cod, noted that he is working with golf course grounds maintenance crews in each watershed to identify how they are applying fertilizers. The goal of his outreach is to help address water quality issues on the Cape. He said he will also continue working with the Barnstable County Extension office to reduce homeowner fertilizer use, too.

**Appendix A  
Attendance**

<b>NAME</b>	<b>AFFILIATION</b>
David Bennett	Brewster Chamber of Commerce
Ben Buck	Orleans Resident
Linda Cebula	Harwich Selectman
Christine Cox	Chatham Resident
Brooke Davis	Student/Arey's Pond Boat Yard
Robert Duncanson	Town of Chatham, Director of Health and Environment
David Dunford	Orleans Selectman
Jeff Eagles	Wastewater Validation Committee
Mark Fiegel	OCPRD
Kevin Galligan	Orleans Resident
Catherine Hertz	Orleans Resident
Sue Leven	Brewster Town Planner
Jim McCauly	Orleans Resident
Sims McGrath Jr	Orleans Selectman, Former Wastewater Mgmt. Steering Committee
Fran Meaney	Chatham Resident, Chatham Concerned Taxpayers
Dan Milz	University of Illinois, Inst. of Envir. Science and Policy
Ed Nash	Golf Course Supt. Assoc.
Carole Ridley	Pleasant Bay Alliance
Russell Schell	Brewster Resident
Len Short	Cape Cod Commission Member, Orleans Board