



Cape Cod Bay 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

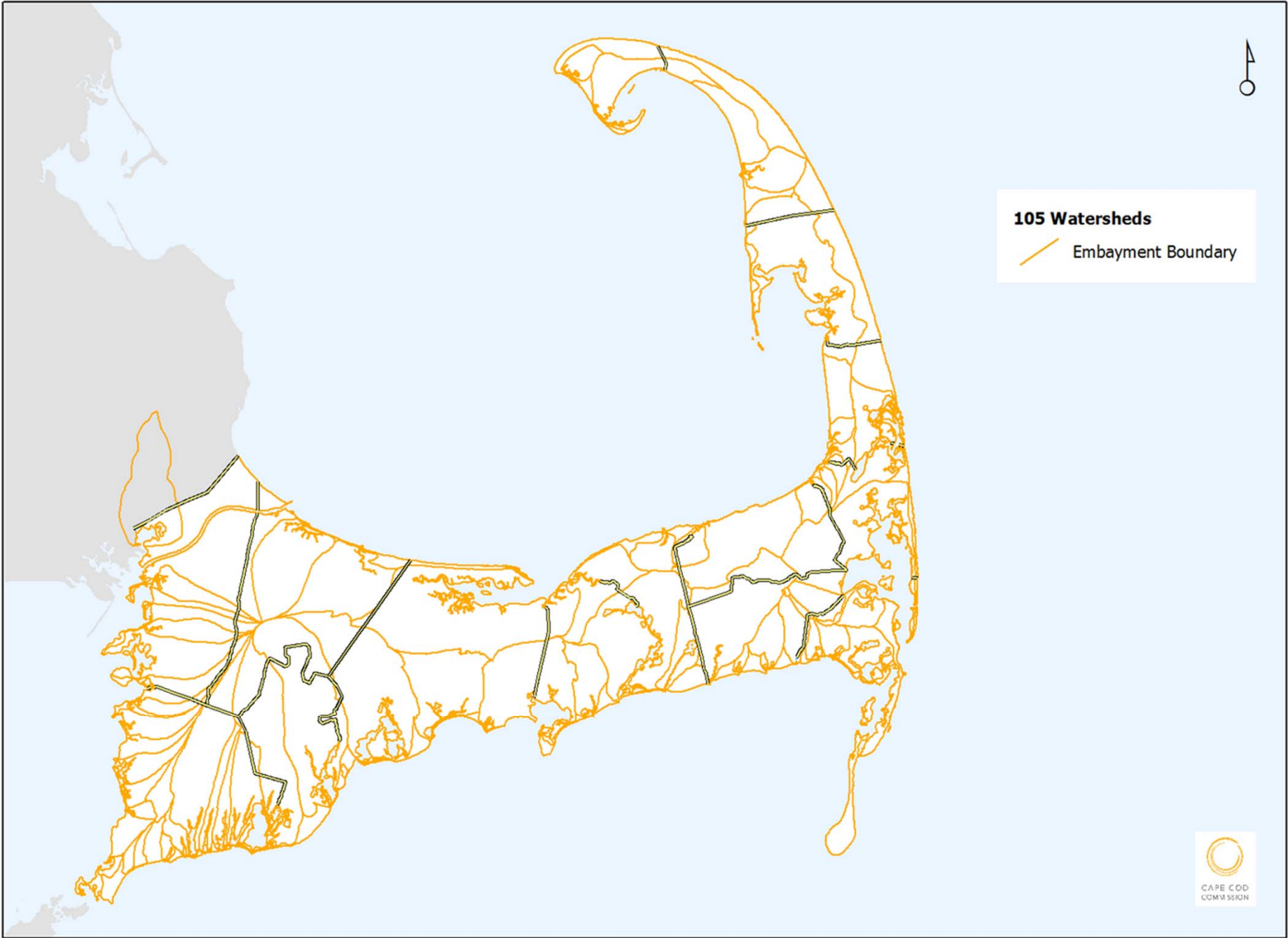
Focus on 21st Century Problems



Nitrogen:
Saline Waters

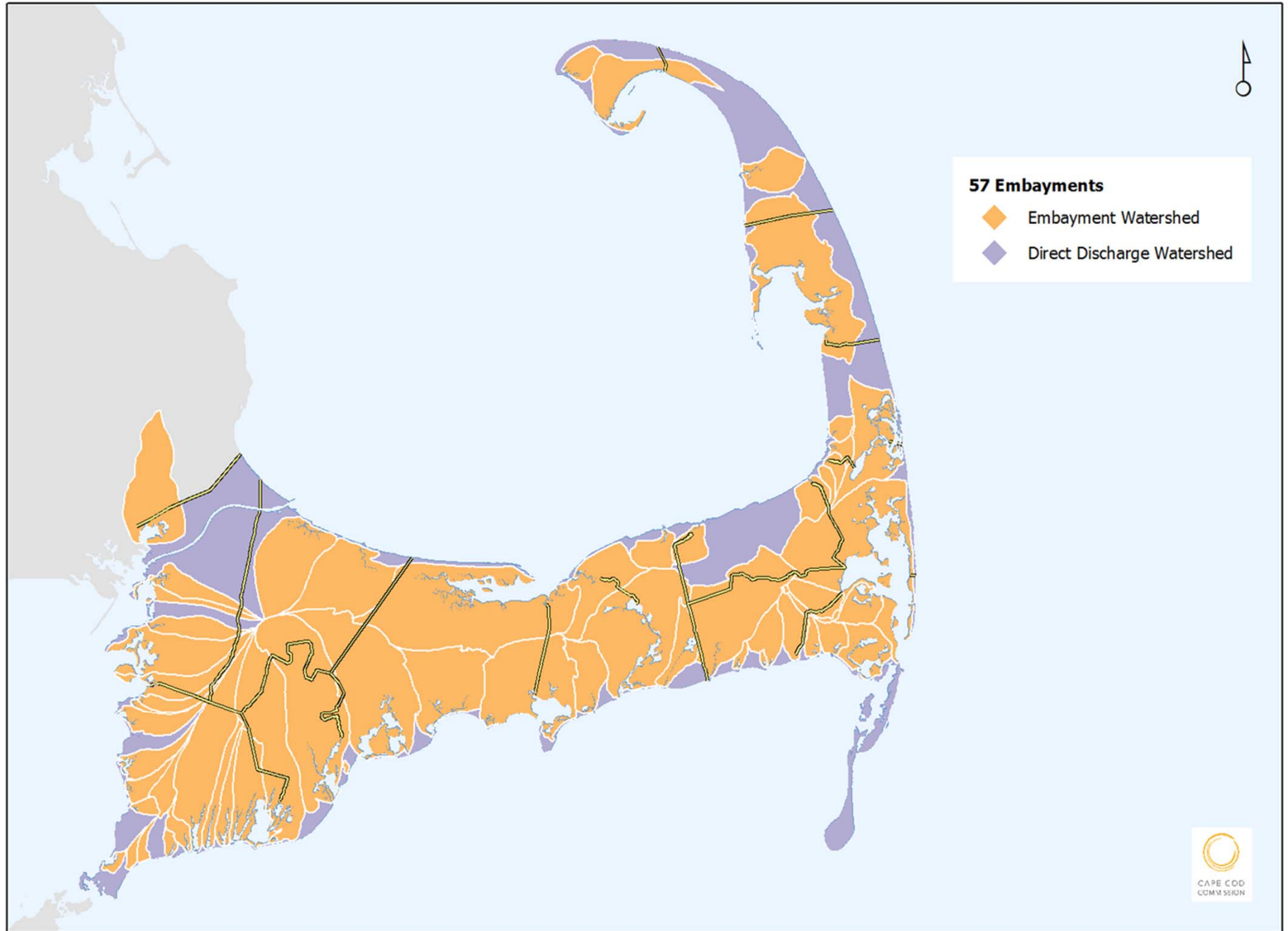
Phosphorus:
Fresh Waters

Growth &
Title 5
Limitations



105 Watersheds
— Embayment Boundary

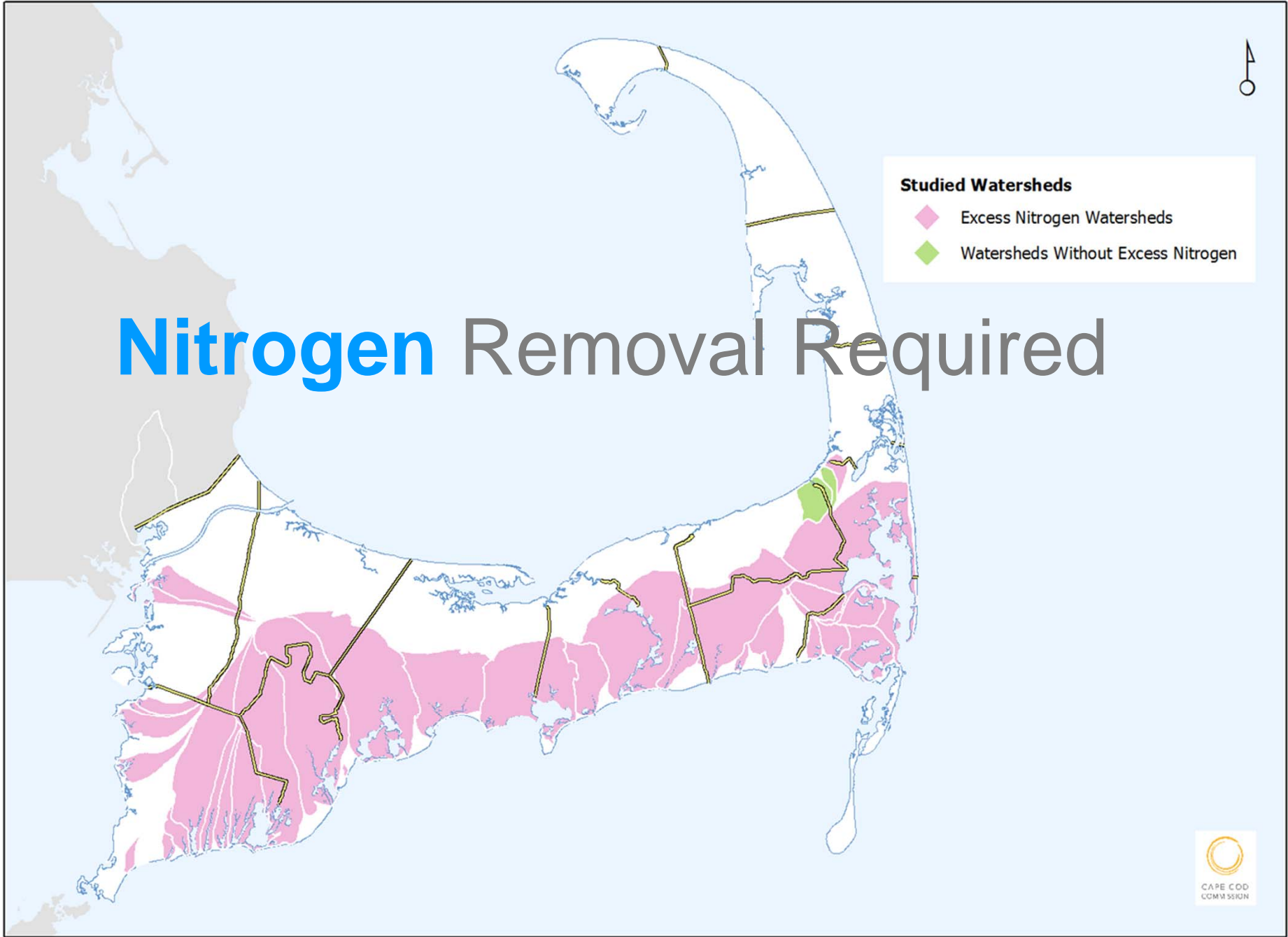


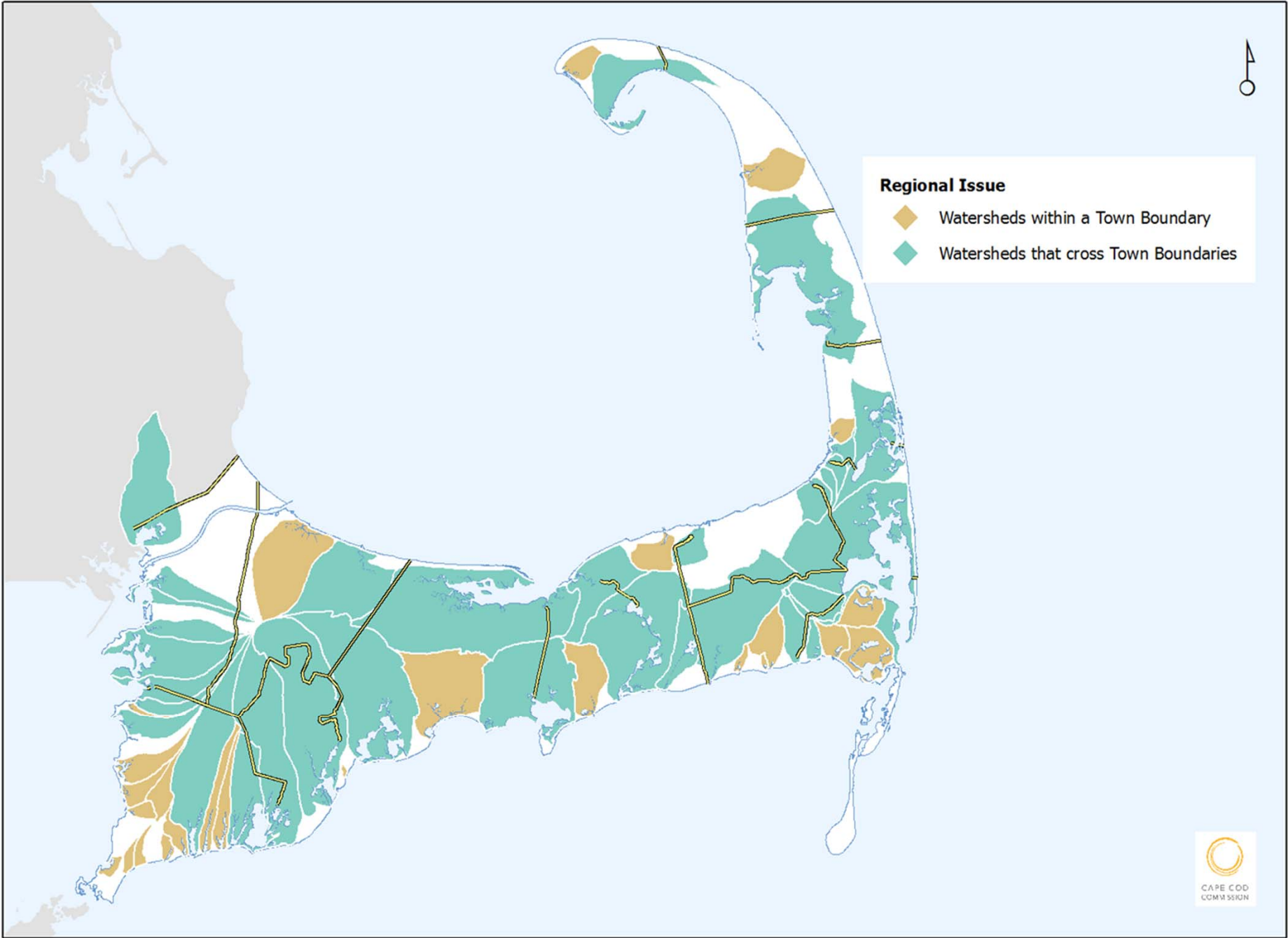


Nitrogen Removal Required

Studied Watersheds

- ◆ Excess Nitrogen Watersheds
- ◆ Watersheds Without Excess Nitrogen



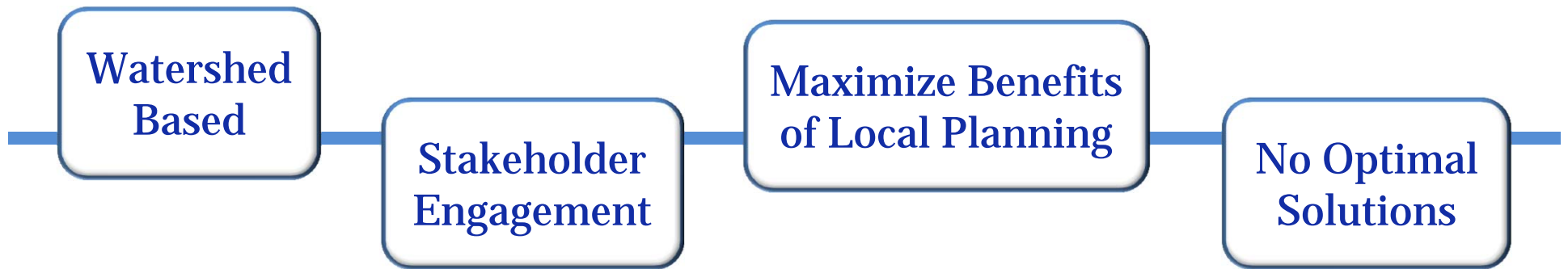


Regional Issue

- ◆ Watersheds within a Town Boundary
- ◆ Watersheds that cross Town Boundaries



Approach to the 208 Plan Update

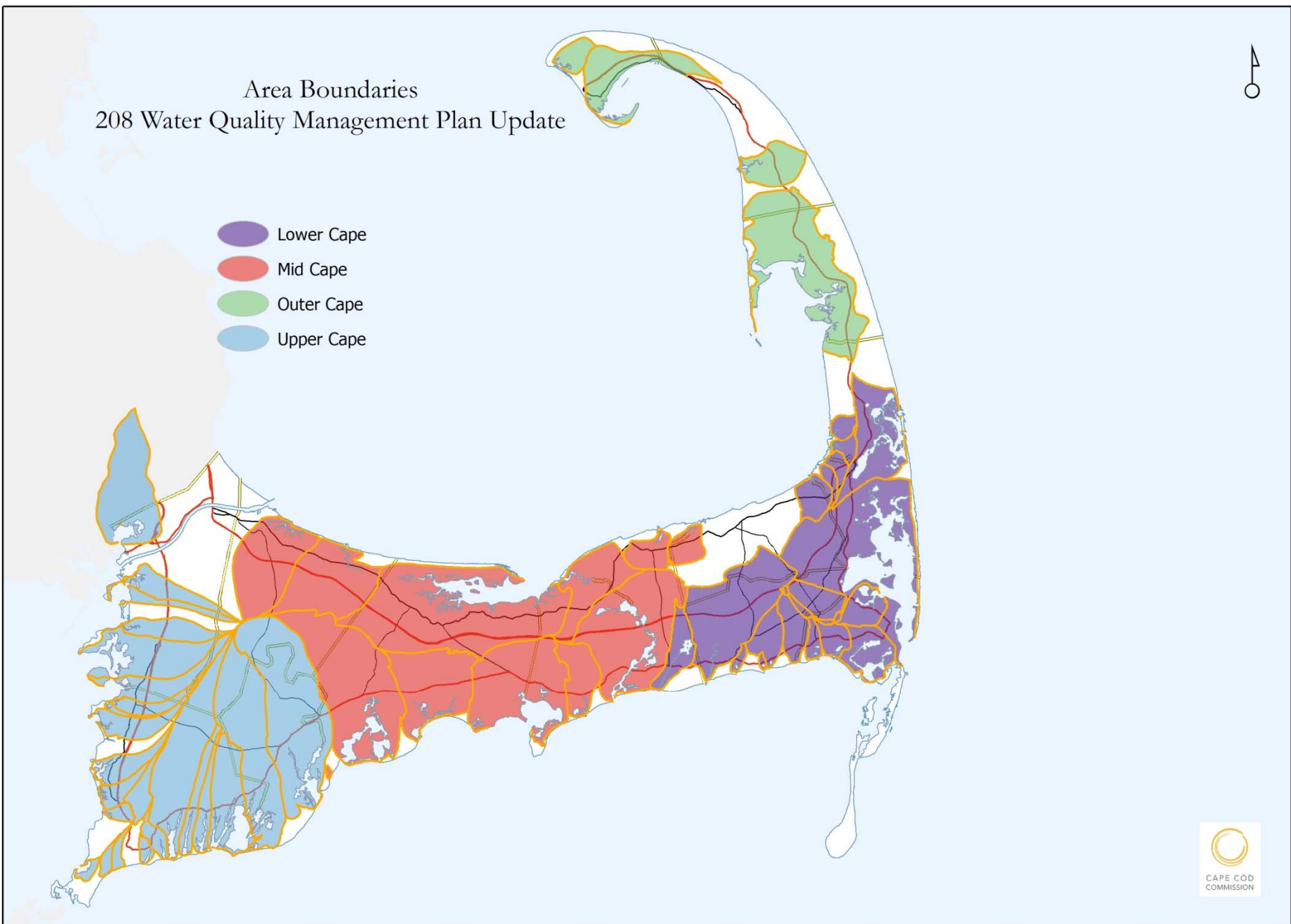


Goal:

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

Area Boundaries
208 Water Quality Management Plan Update

- Lower Cape
- Mid Cape
- Outer Cape
- Upper Cape



Subgroup Boundaries 208 Water Quality Management Plan Update



Lower Cape

- Herring River
- Pleasant Bay
- Stage Harbor Group
- Nauset and Cape Cod Bay Marsh Group

Mid Cape

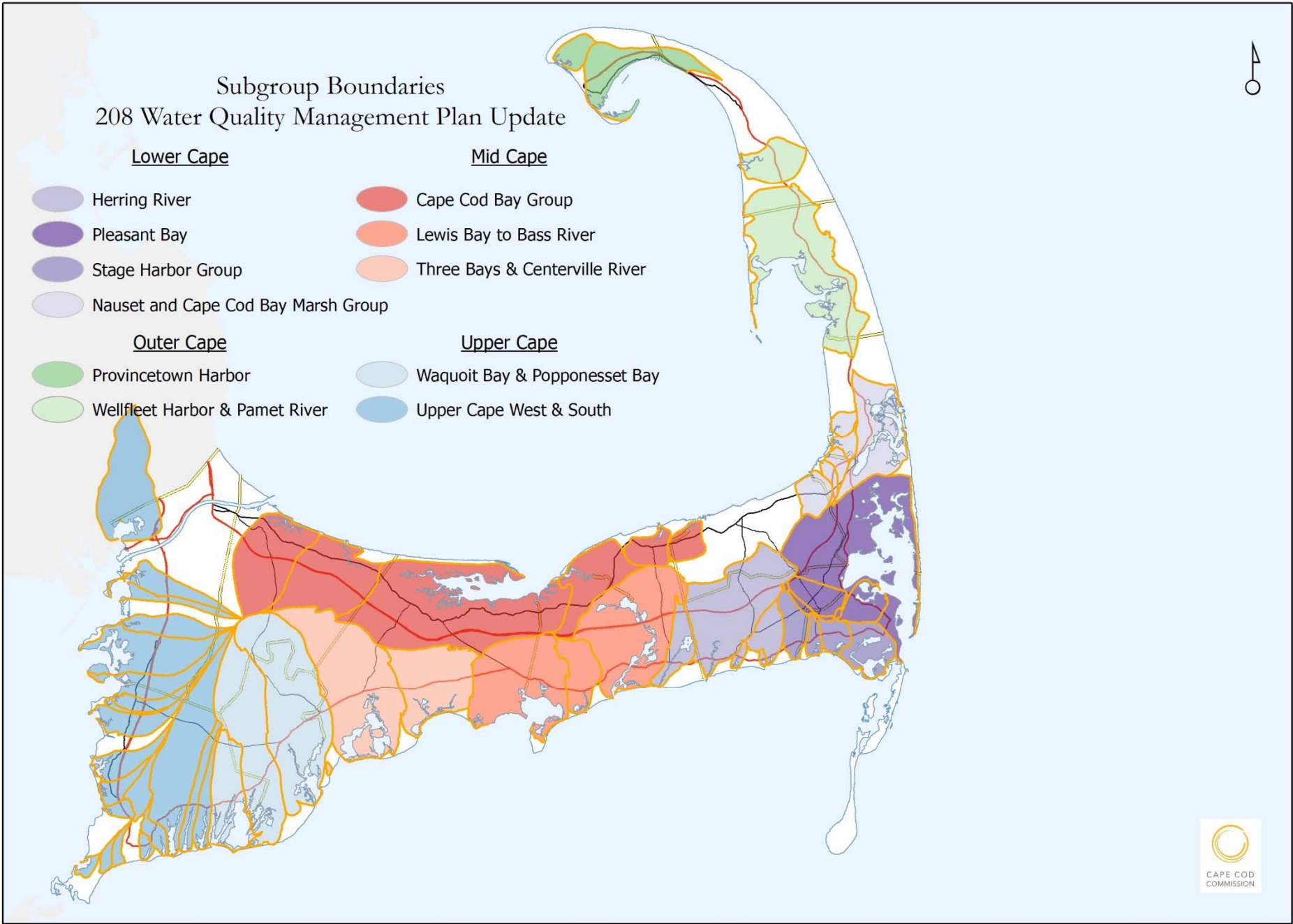
- Cape Cod Bay Group
- Lewis Bay to Bass River
- Three Bays & Centerville River

Outer Cape

- Provincetown Harbor
- Wellfleet Harbor & Pamet River

Upper Cape

- Waquoit Bay & Popponesset Bay
- Upper Cape West & South



What is the stakeholder process?

Public Meetings

Watershed Working Groups



July

August

September

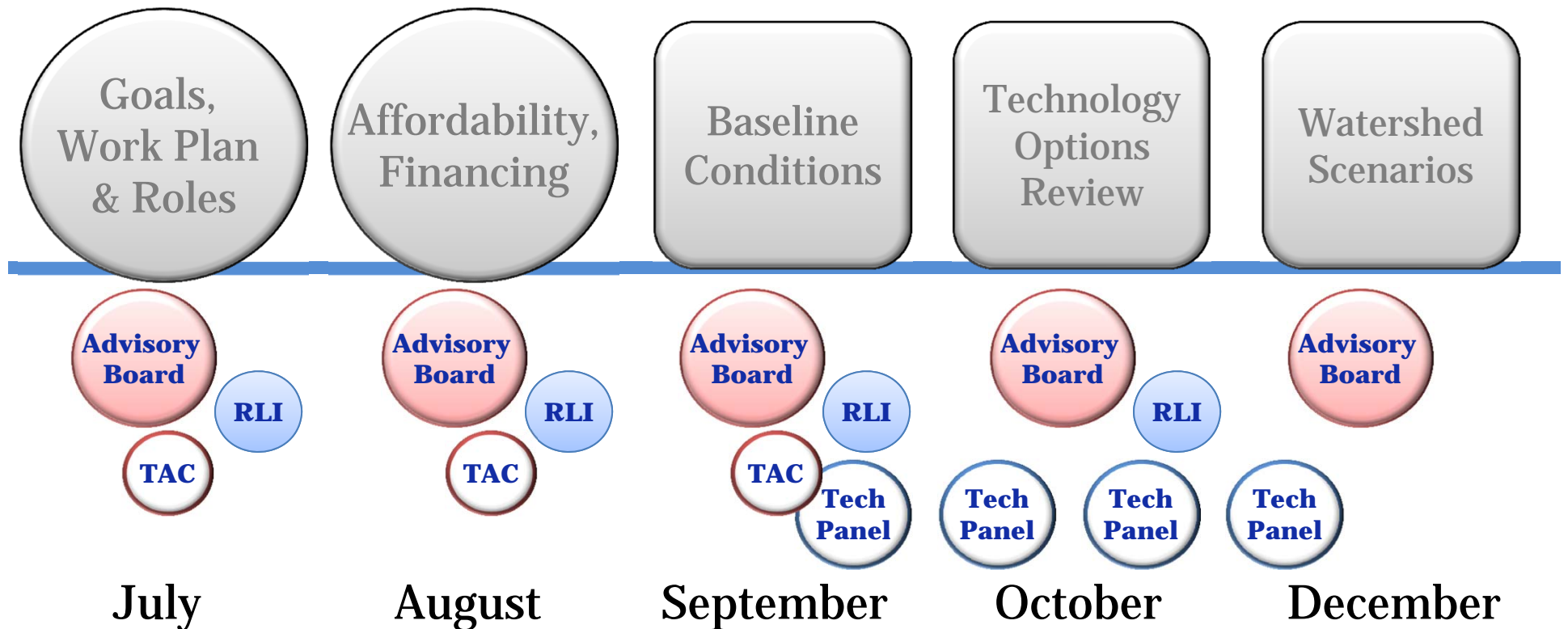
October

December

208 Planning Process

Public Meetings

Watershed Working Groups



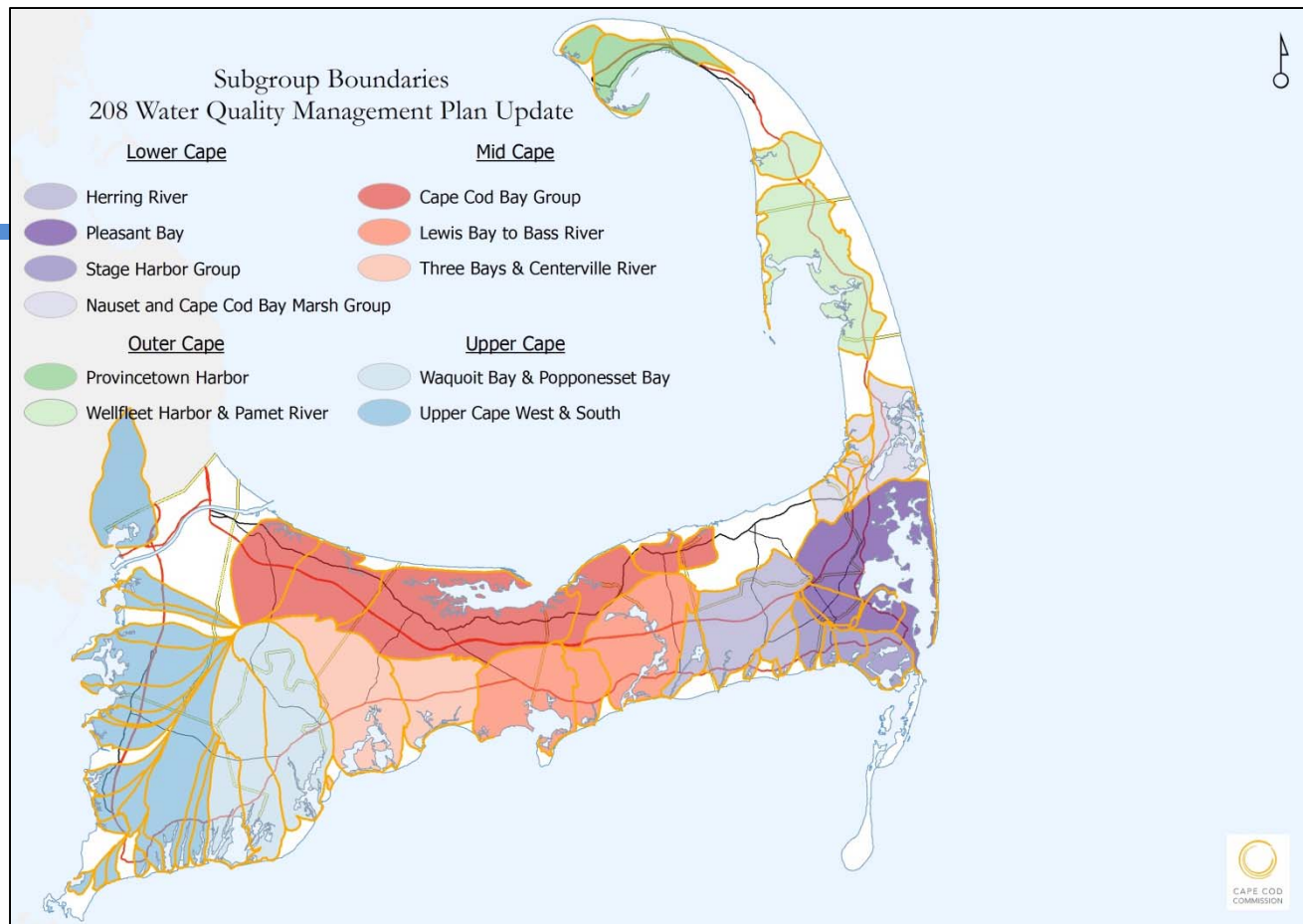
RLI Regulatory, Legal & Institutional Work Group

TAC Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working
Group Meetings:
Sept 18-27



208 Planning Process

Baseline Conditions

11 Working Group Meetings:
Sept 18-27

Technology Options Review

11 Working Group Meetings:
Oct 21-Nov 5



- Wastewater
- Stormwater
- Existing Water Bodies
- Regulatory

208 Planning Process

Baseline
Conditions

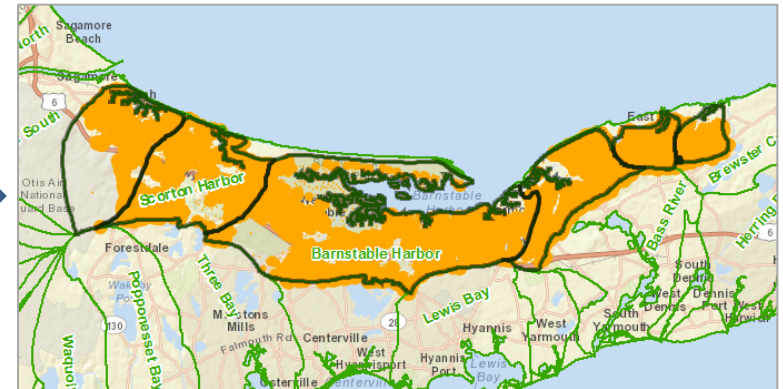
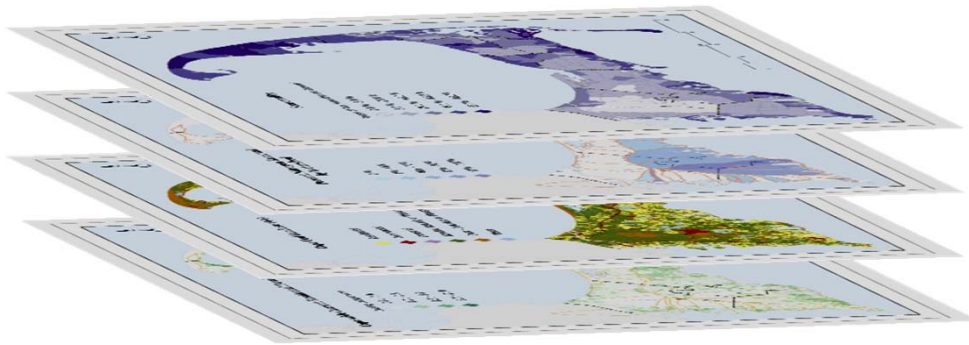
11 Working
Group Meetings:
Sept 18-27

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:

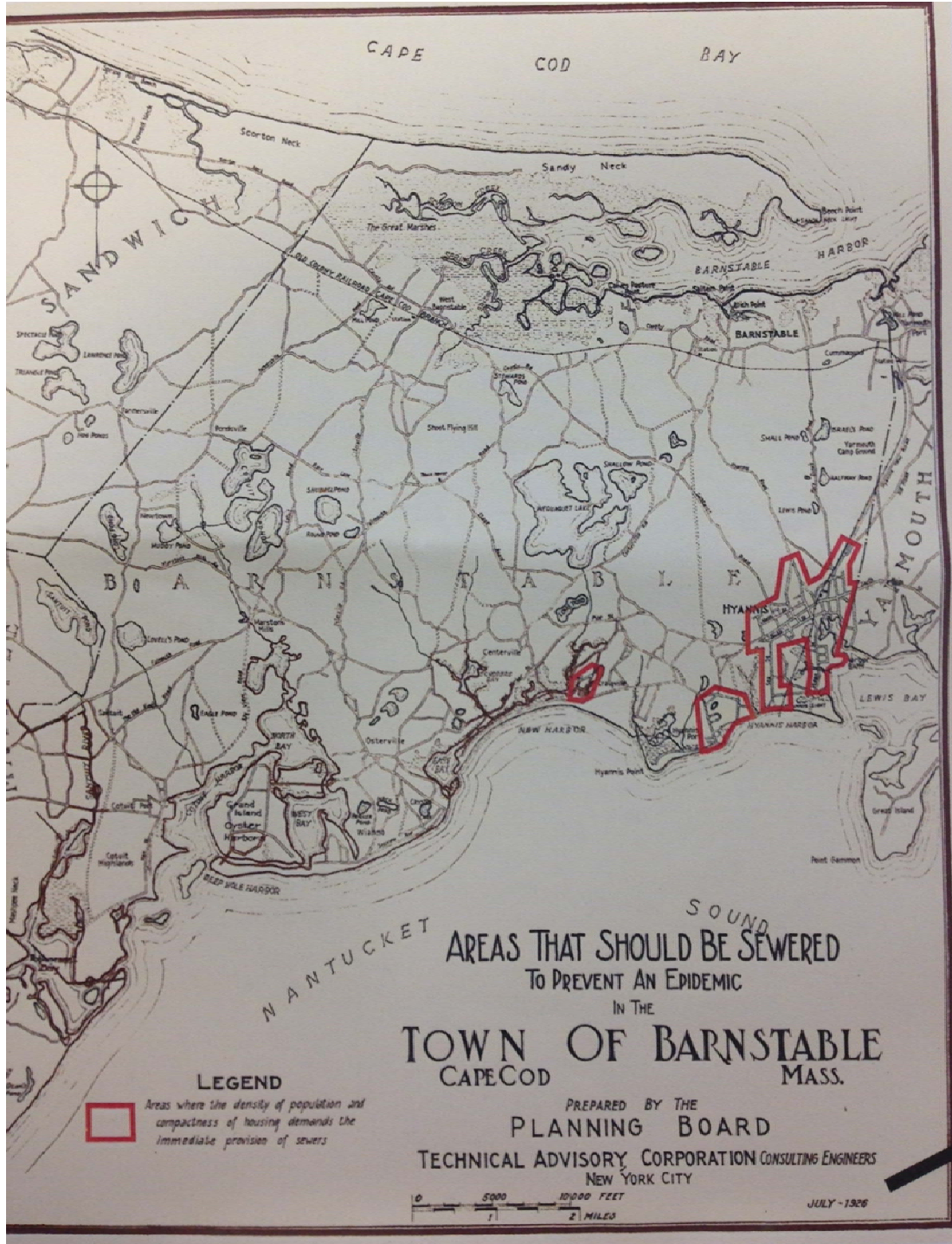
To review and develop shared understanding of the characteristics of these watersheds, the work done to date, existing data and information available, and how to apply all of this to planning for water quality improvements for these watersheds moving forward.

208 Planning Process

Local Progress to Date



**Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek**



CAPE COD BAY

SANDWICH

BARNSTABLE HARBOR

BARNSTABLE

WYOMOUTH

AREAS THAT SHOULD BE SEWERED
TO PREVENT AN EPIDEMIC
IN THE
TOWN OF BARNSTABLE
CAPE COD MASS.

LEGEND
 Areas where the density of population and compactness of housing demands the immediate provision of sewers

PREPARED BY THE
PLANNING BOARD
 TECHNICAL ADVISORY CORPORATION CONSULTING ENGINEERS
 NEW YORK CITY

0 5000 10000 FEET
 1 2 MILES

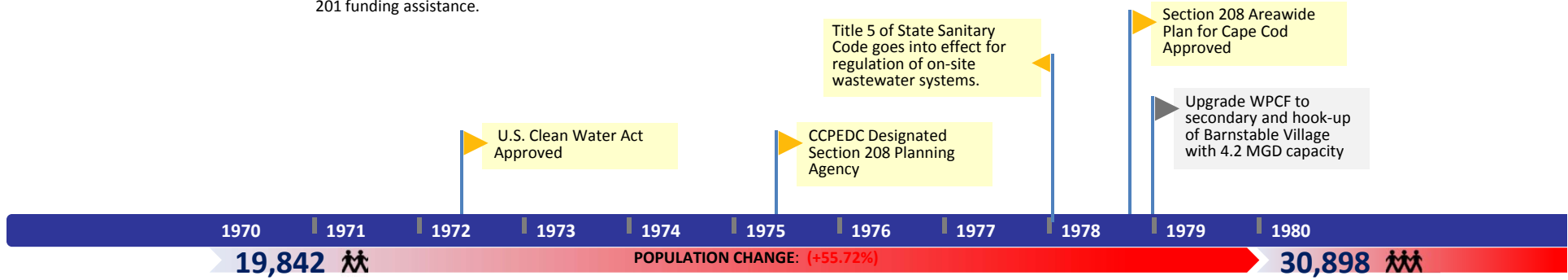
JULY - 1926

Barnstable: 1970-2013

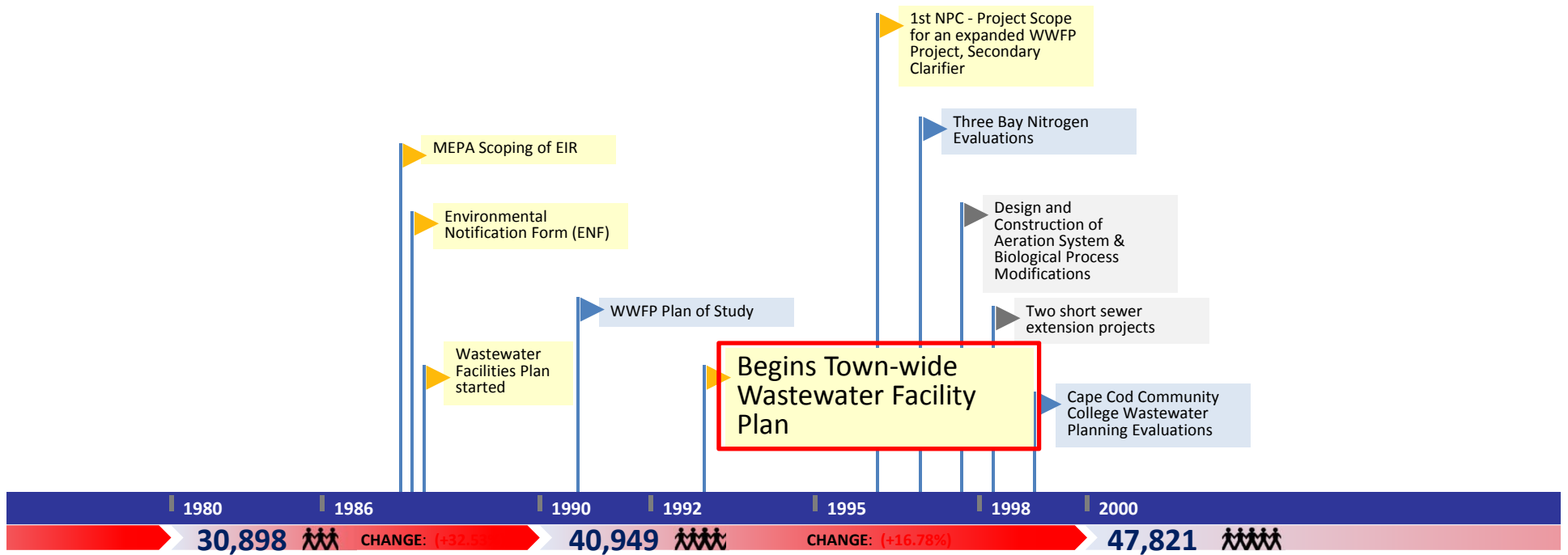
From 1978 Section 208 Plan

- ▶ 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.

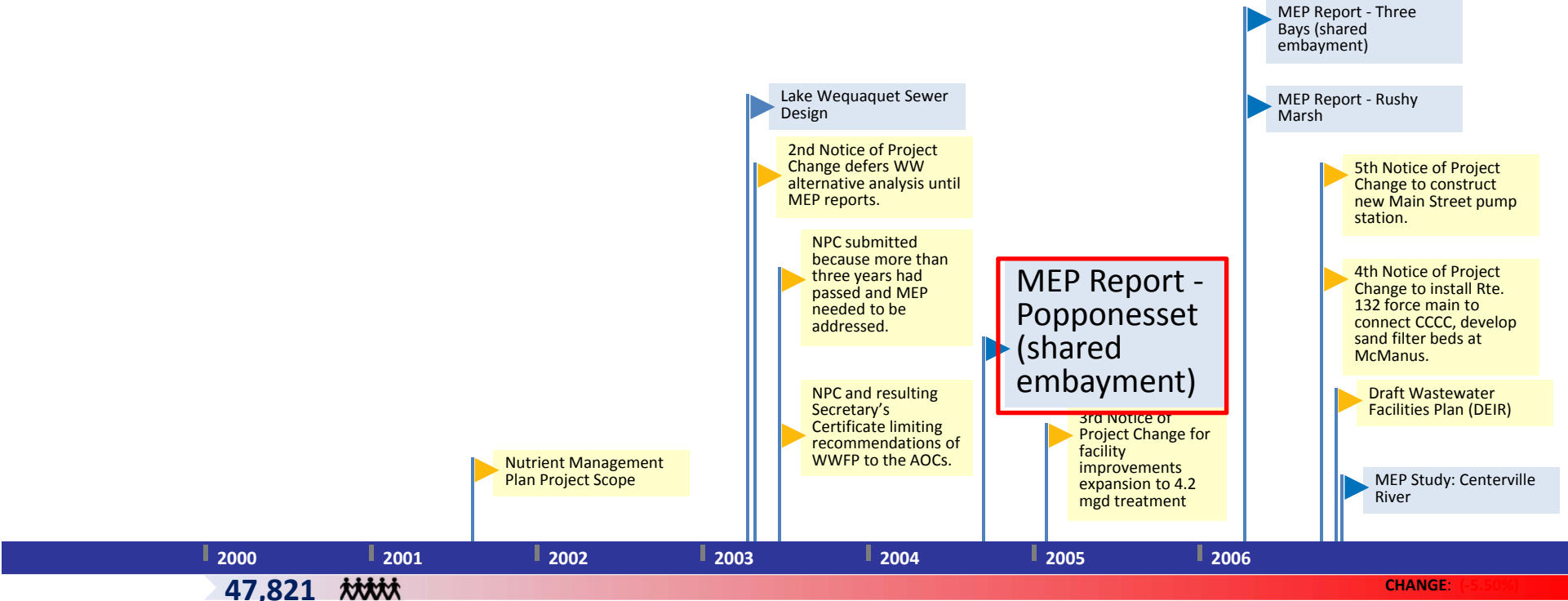
- ▶ The present Hyannis treatment plant has the necessary capacity to handle all sewer service area needs in Hyannis. Should the town want to expand the collection system beyond these sewer service areas, 201 funds will not be available for these expansions or for an additional treatment plant.
- ▶ The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



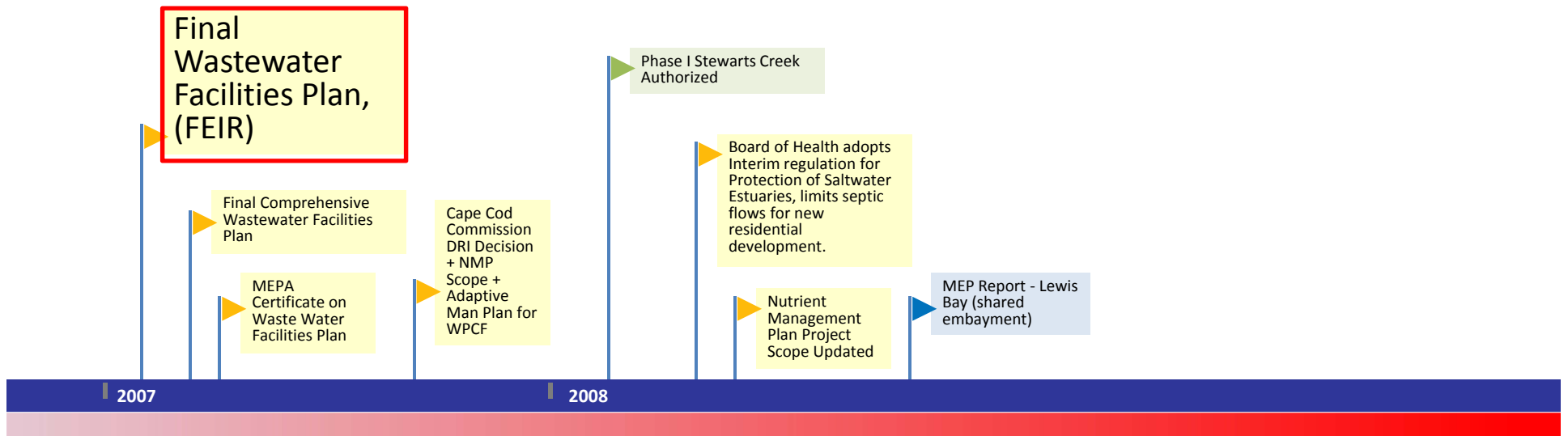
Barnstable: 1970-2013



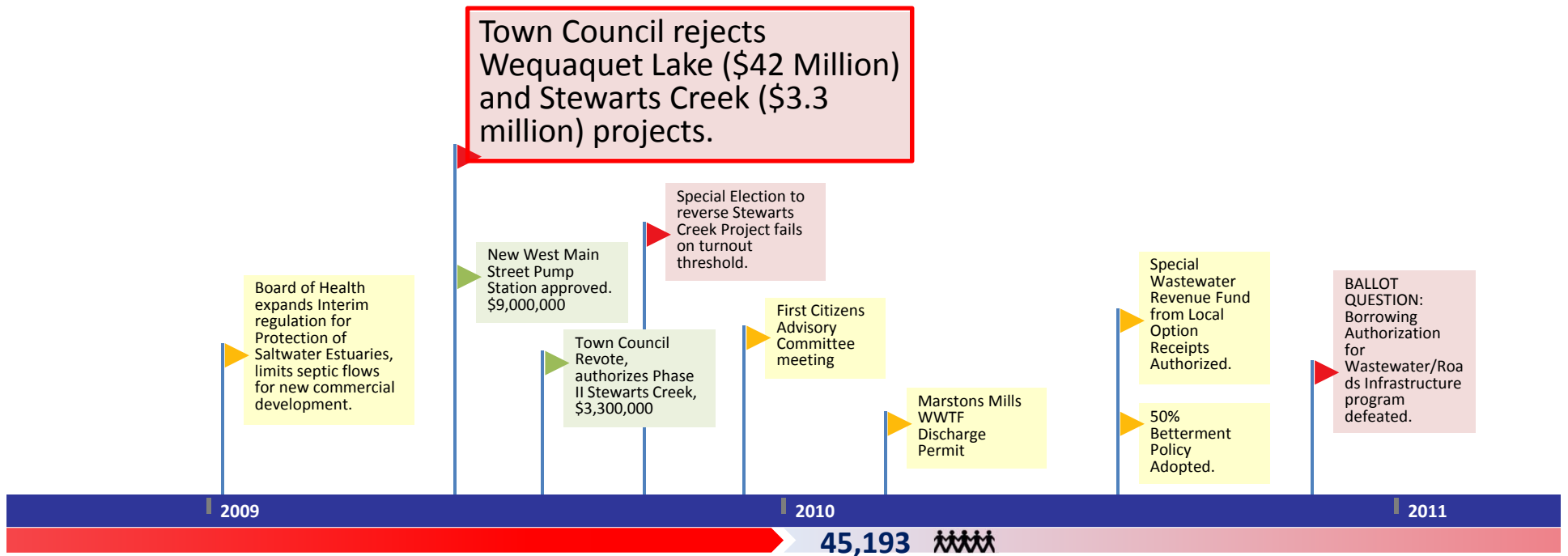
2000 47,821

CHANGE: 52,500

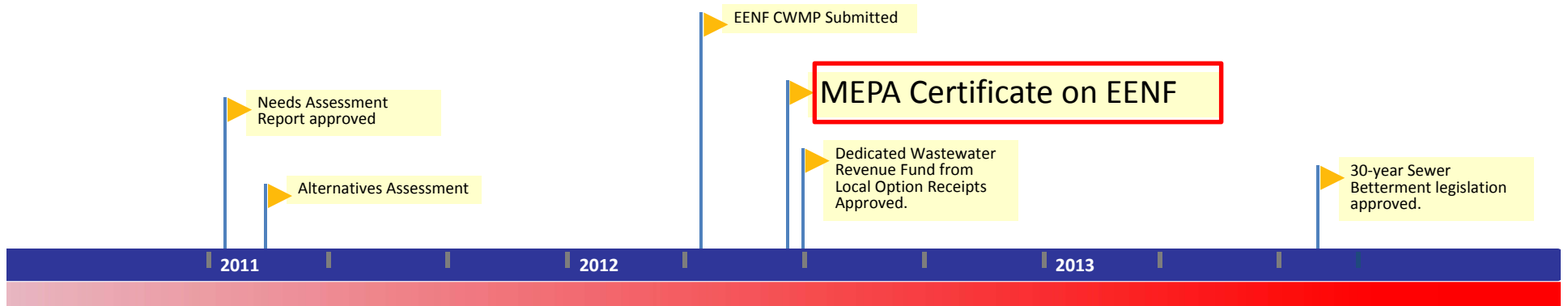
Barnstable: 1970-2013



Barnstable: 1970-2013



Barnstable: 1970-2013



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.

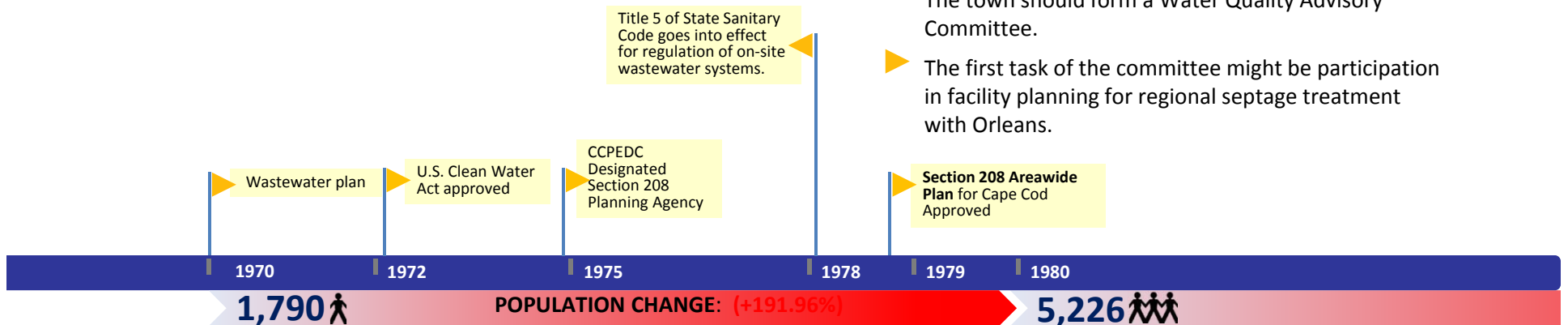
▶ WASTEWATER: It is expected that no new problem areas will develop and that present problem areas will be controlled during the planning period.

▶ 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.

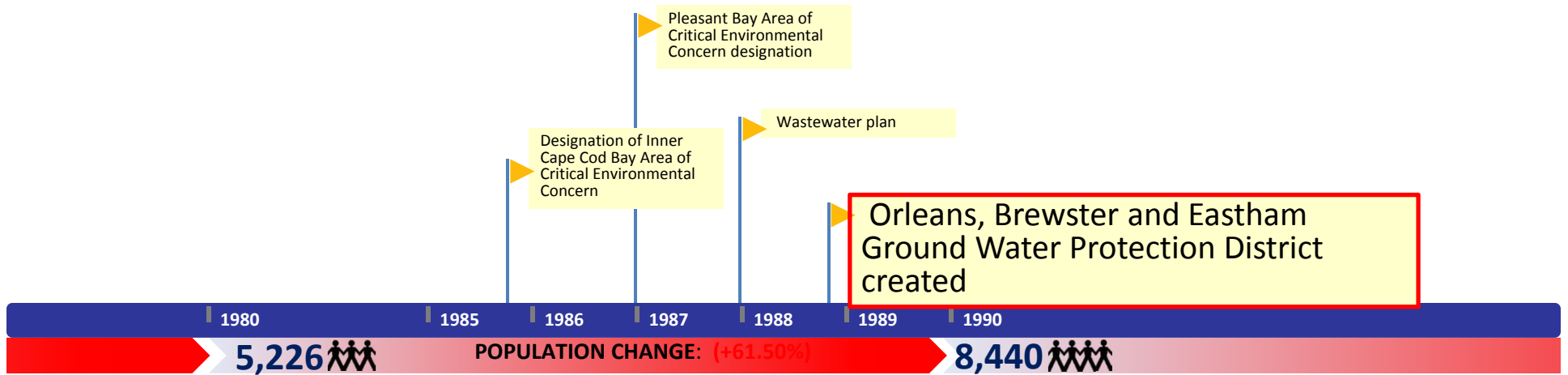
▶ It is recommended that Brewster consider cooperating in a regional landfill monitoring program.

▶ The town should form a Water Quality Advisory Committee.

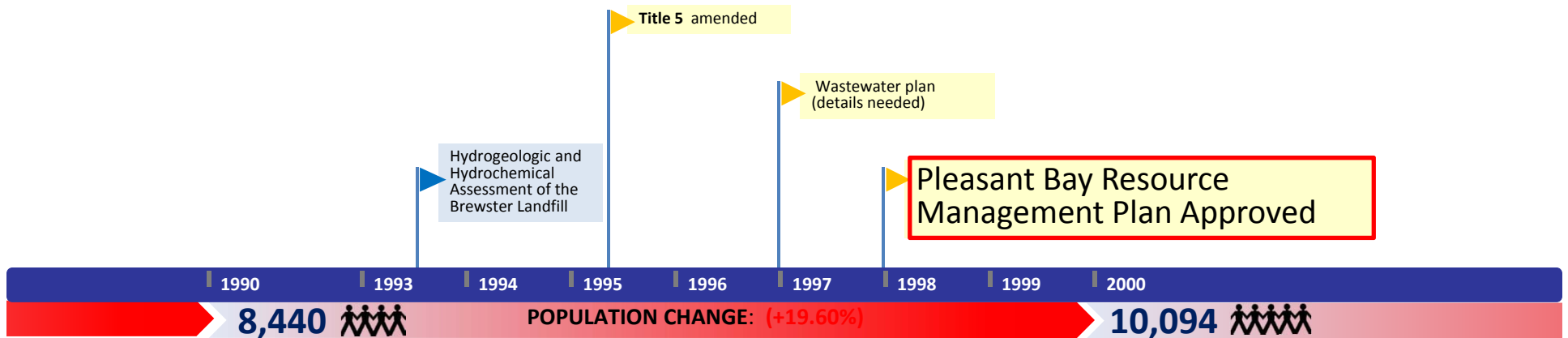
▶ The first task of the committee might be participation in facility planning for regional septage treatment with Orleans.



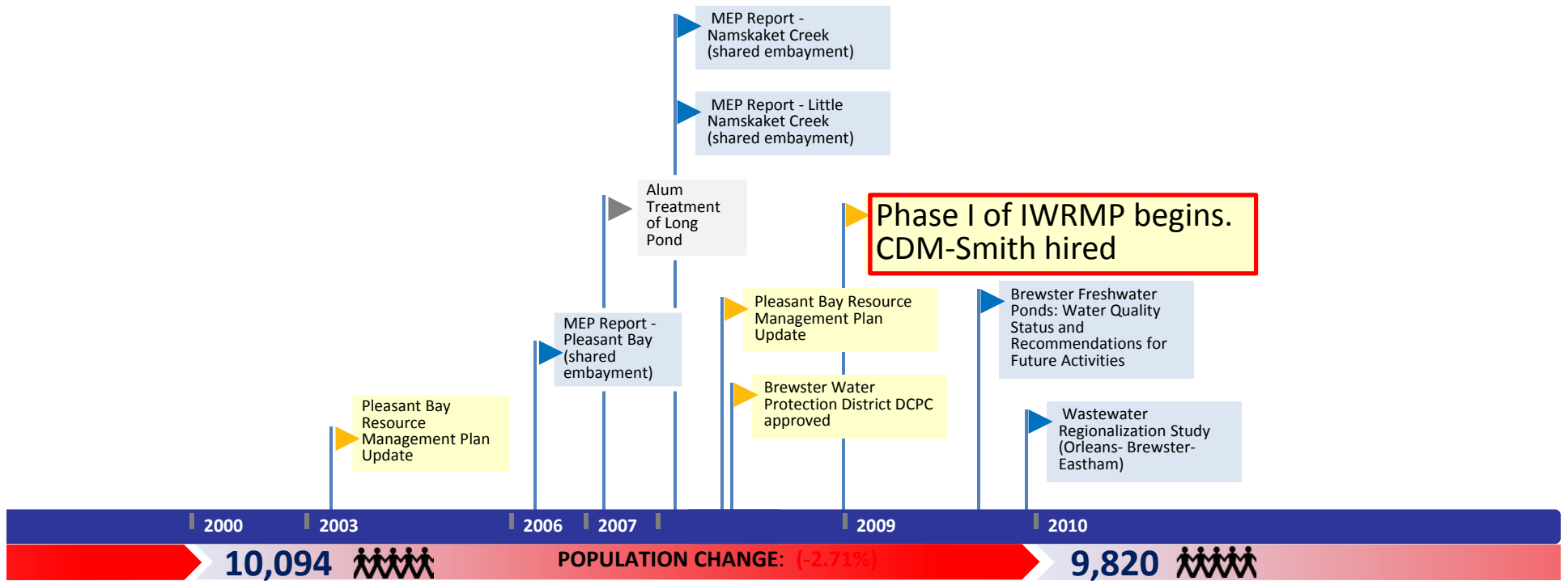
Brewster: 1970-2013



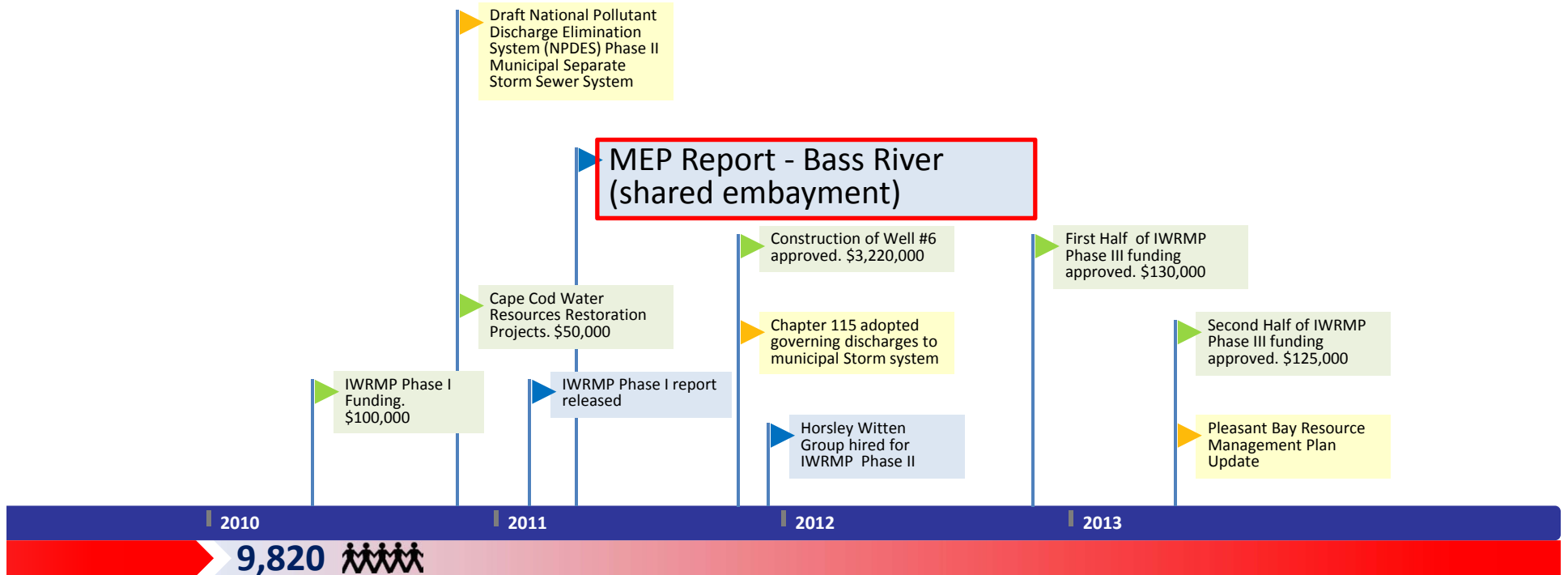
Brewster: 1970-2013



Brewster: 1970-2013



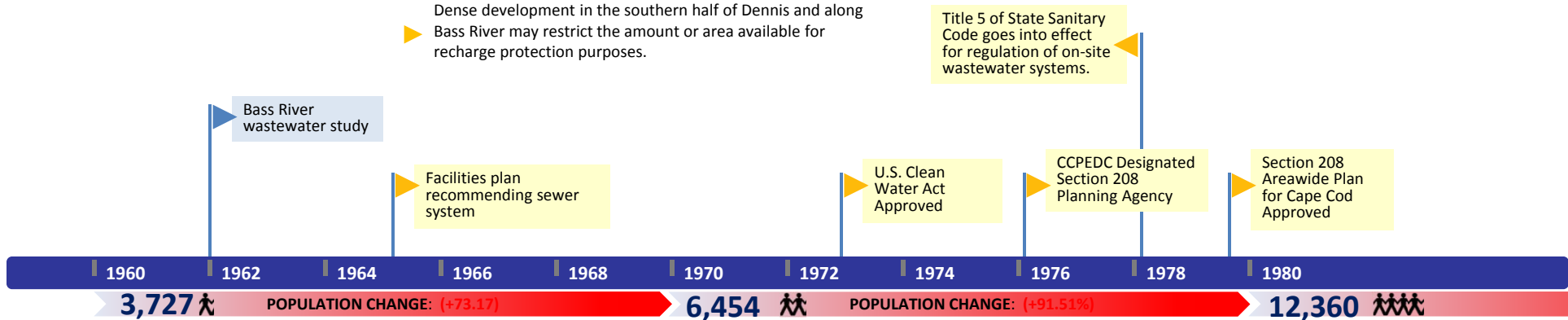
Brewster: 1970-2013



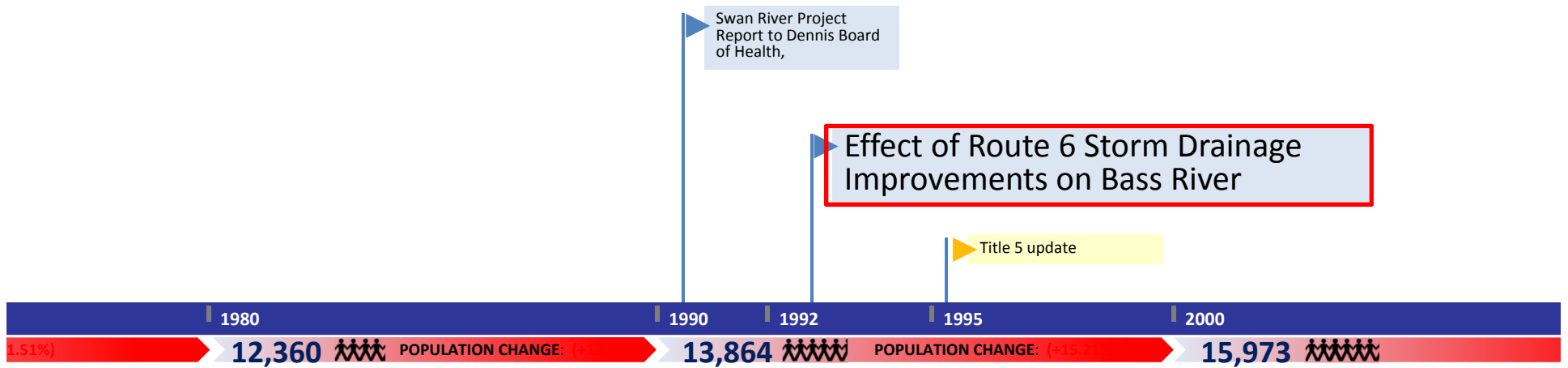
Dennis

From 1978 Section 208 Plan

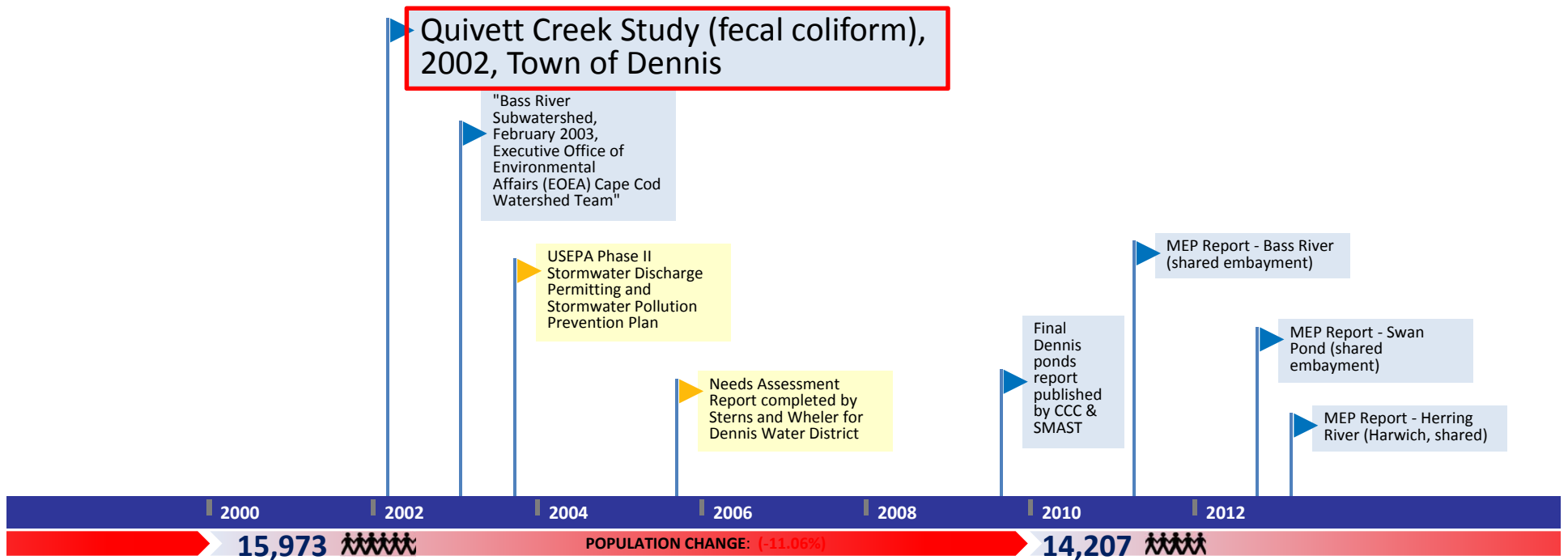
- ▶ Dennis has a professional health agent and the town's health regulations already implement many of the 208 plan recommendations.
- ▶ It is recommended that the town consider creating a "Seasonal Residential District" in the area south of Lower County Road and carefully control the conversion of seasonal dwellings in this area.
- ▶ Septage treatment is a problem in Dennis. It is recommended in the discussion of "Facility Planning in Non-Sewered Areas" that Dennis should join with Yarmouth in a regional facility.
- ▶ Since the town is not planning to construct any sewage collection systems, septage flows may be large enough to make a separate facility cost-effective. Another possibility that should be investigated is regionalization with Harwich.
- ▶ Implementation of the 208 water quality plan in Dennis should give priority to establishing watershed protection districts and implementing on-site system management and septage treatment.
- ▶ The Water District has developed extensive wellfields and pumping capacity, which should require little expansion to serve the 1995 population
- ▶ Dennis may have water resources in excess of its needs, which could be called upon to supply other towns in the future.
- ▶ Dense development in the southern half of Dennis and along Bass River may restrict the amount or area available for recharge protection purposes.



Dennis: 1970-2013



Dennis: 1970-2013



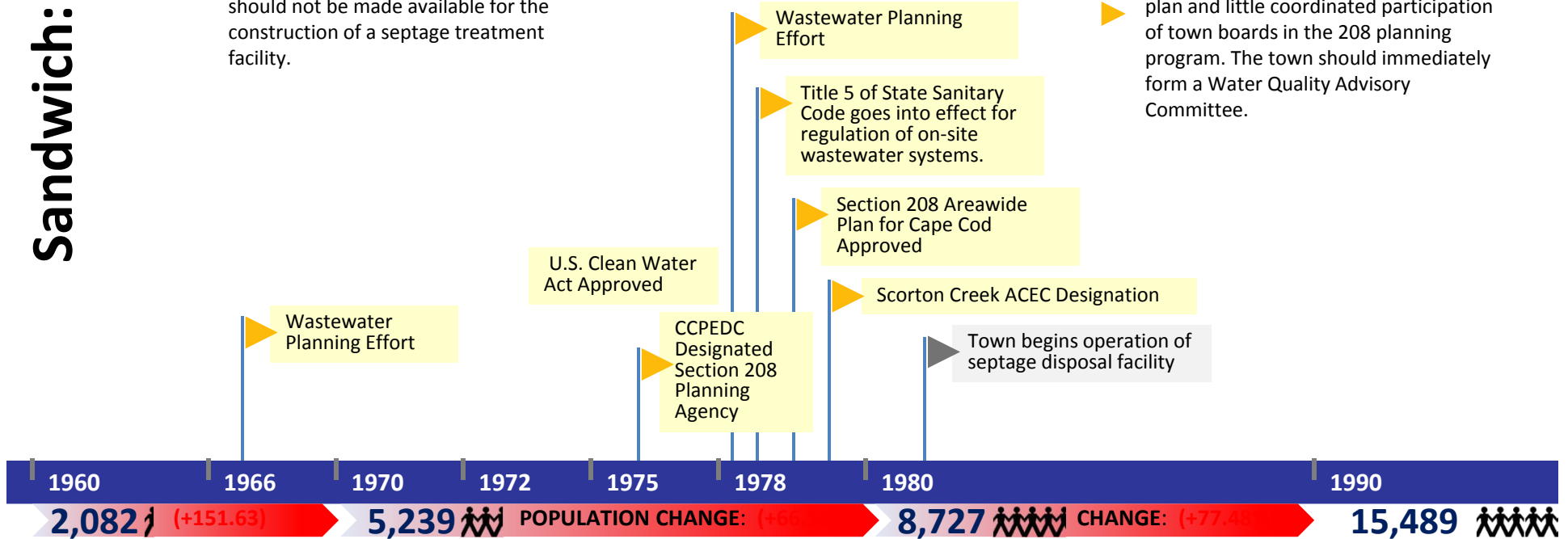
Sandwich: 1960-2013

From 1978 Section 208 Plan

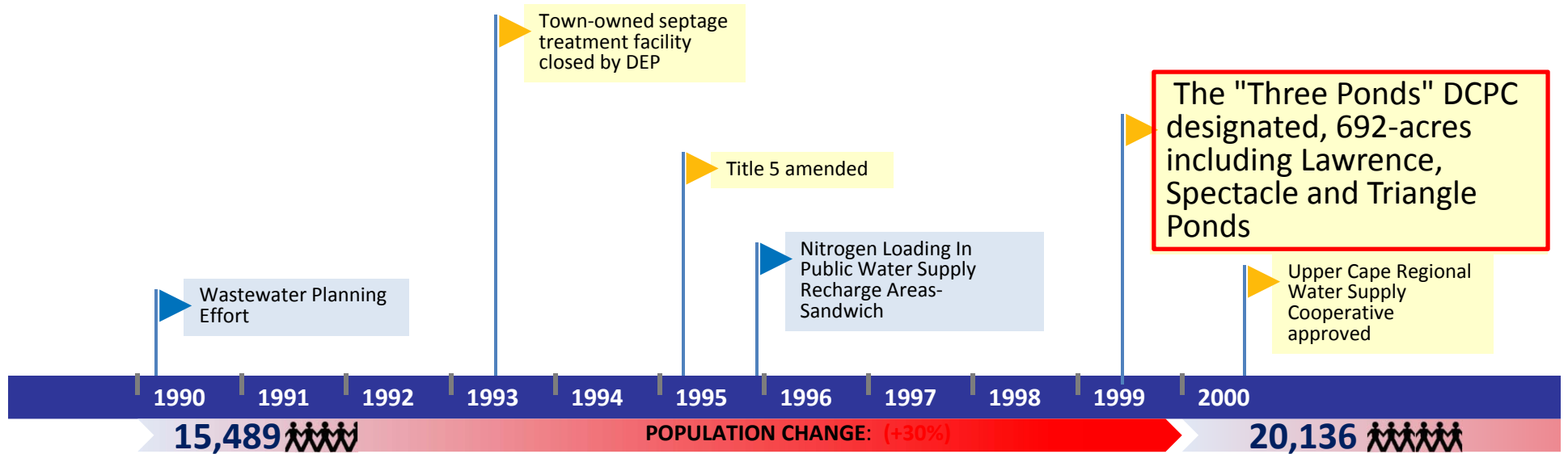
- ▶ A sewer facilities plan was completed for Sandwich in 1978. The plan calls for a small outfall into the Cape Cod Canal, which now could only be allowed through a special act of the legislature.
- ▶ Should the town fail to act by 1980, a DEQE investigation of Title 5 violations should be initiated.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

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

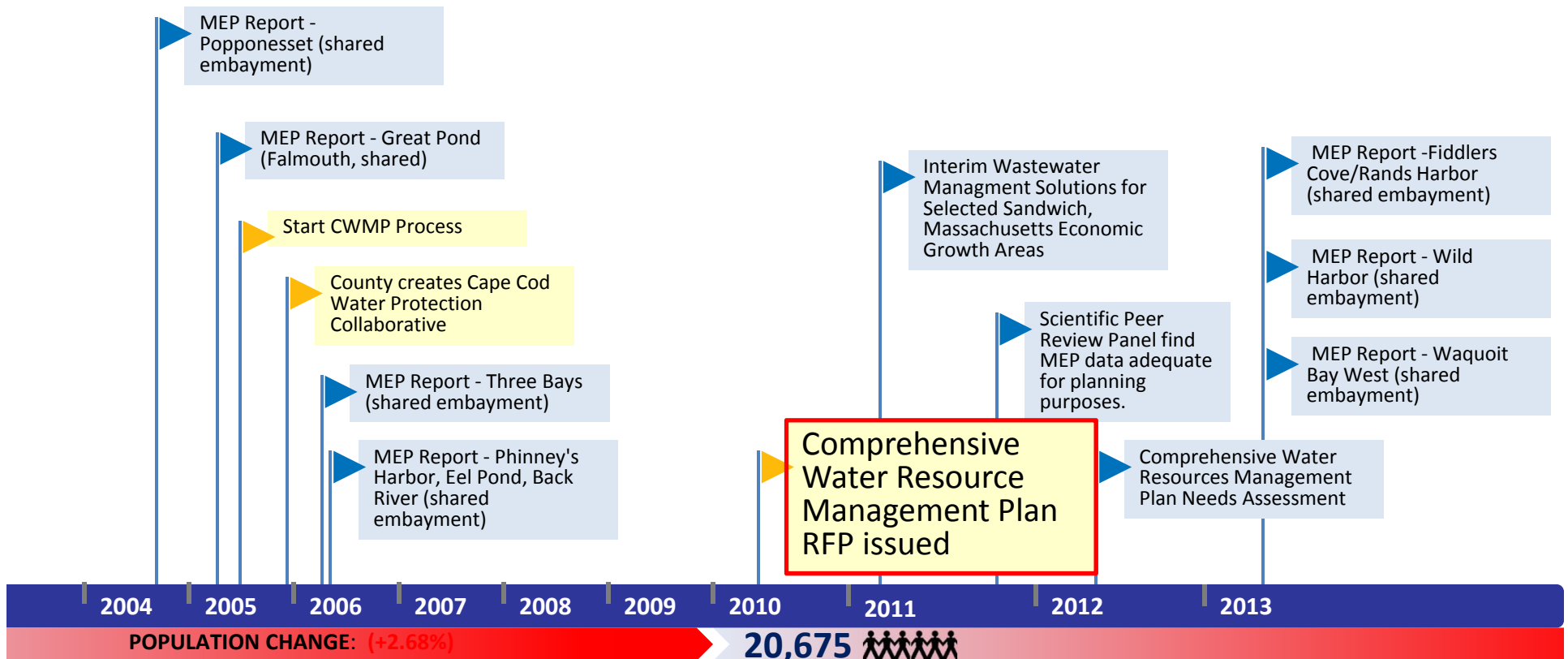
- ▶ The problem of the State Fish Hatchery discharging over half a million gallons of fresh water must be addressed by the Department of Fisheries and Wildlife as recommended in the "Water Conservation" section of the final plan.
- ▶ The town should actively participate in regional solid waste planning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



Sandwich: 1960-2013



Sandwich: 1960-2013

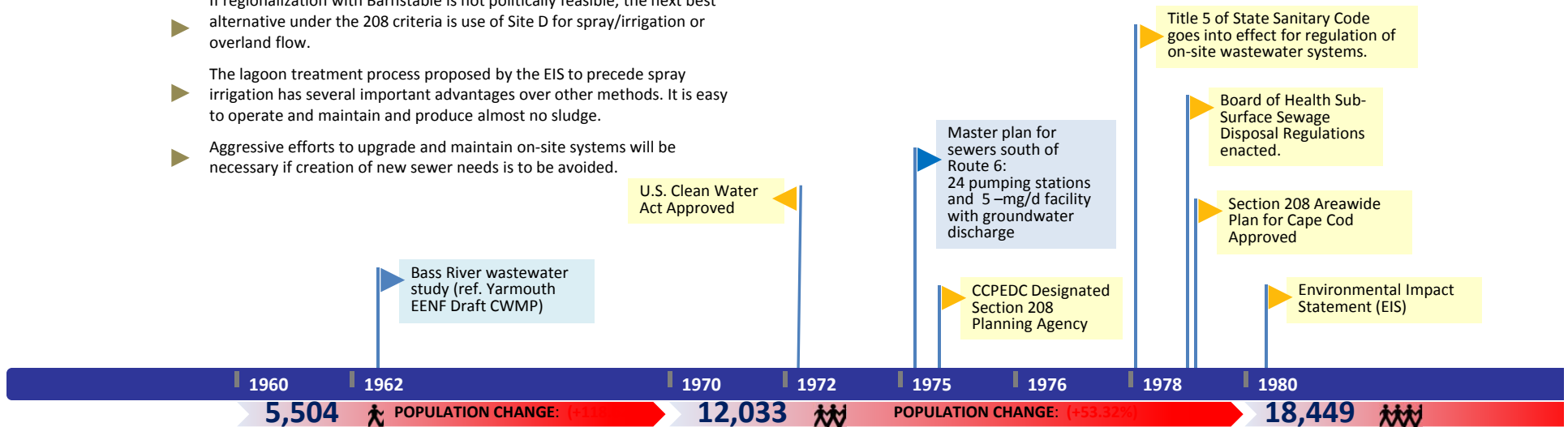


Yarmouth: 1960-2013

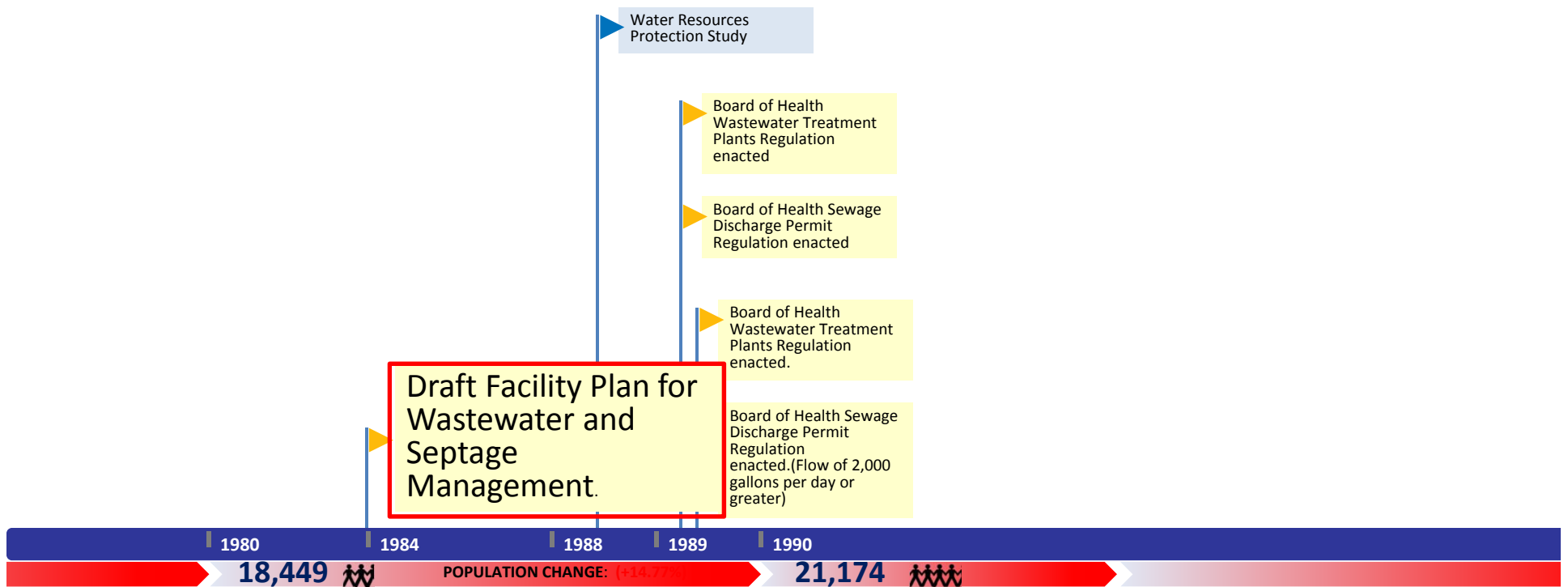
From 1978 Section 208 Plan

- ▶ The Wastewater management problems are reported to be severe in the commercial zone along Route 28. Water supply protection is also of critical concern to the town since development is rapidly encroaching upon existing and future wellfield areas.
- ▶ On-site system rehabilitation in problem areas is recommended, and would be eligible for funding.
- ▶ A sewer to serve the commercial Route 28 strip is necessary and cost-effective. The projected plan is approximately 0.5 MGD.
- ▶ Regionalization with Barnstable, (i.e. purchase of capacity at the Barnstable treatment plant) is desirable.
- ▶ It is recommended that the town immediately investigate the possibilities for regionalization with Barnstable. A separate septage facility would then be necessary, and regionalization with Dennis should be considered.
- ▶ If regionalization with Barnstable is not politically feasible, the next best alternative under the 208 criteria is use of Site D for spray/irrigation or overland flow.
- ▶ The lagoon treatment process proposed by the EIS to precede spray irrigation has several important advantages over other methods. It is easy to operate and maintain and produce almost no sludge.
- ▶ Aggressive efforts to upgrade and maintain on-site systems will be necessary if creation of new sewer needs is to be avoided.

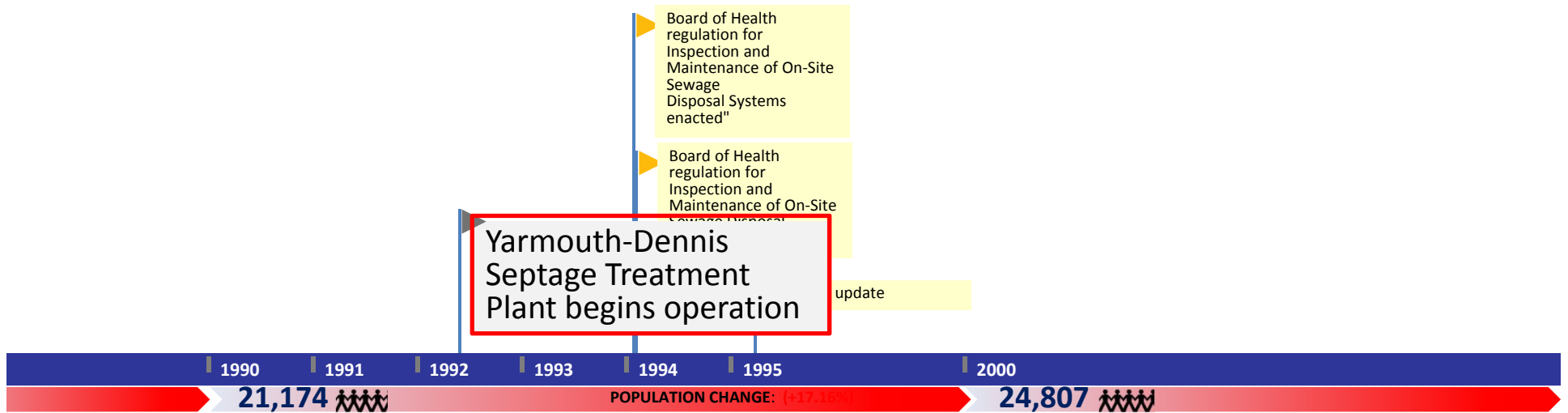
- ▶ As soon as construction of the sewage/septage facilities is underway, the town should begin setting up a mandatory on-site system pumping program.
- ▶ Non-structural controls, including control of multi-family dwellings and possibly larger lot zoning, could help to prevent the development of serious problems.
- ▶ The town will have to face growth control issues in the implementation of its sewer construction project and water quality planning efforts.
- ▶ If limited sewage treatment and disposal capacities are available, the town will have to pass special bylaws to control the rate of hook-up and to allocate capacities to abutters.
- ▶ The planning board is proposing to eliminate the grandfather clause on substandard lots south of Route 28, and should also consider a "Seasonal Residential District" overlay to control conversions.



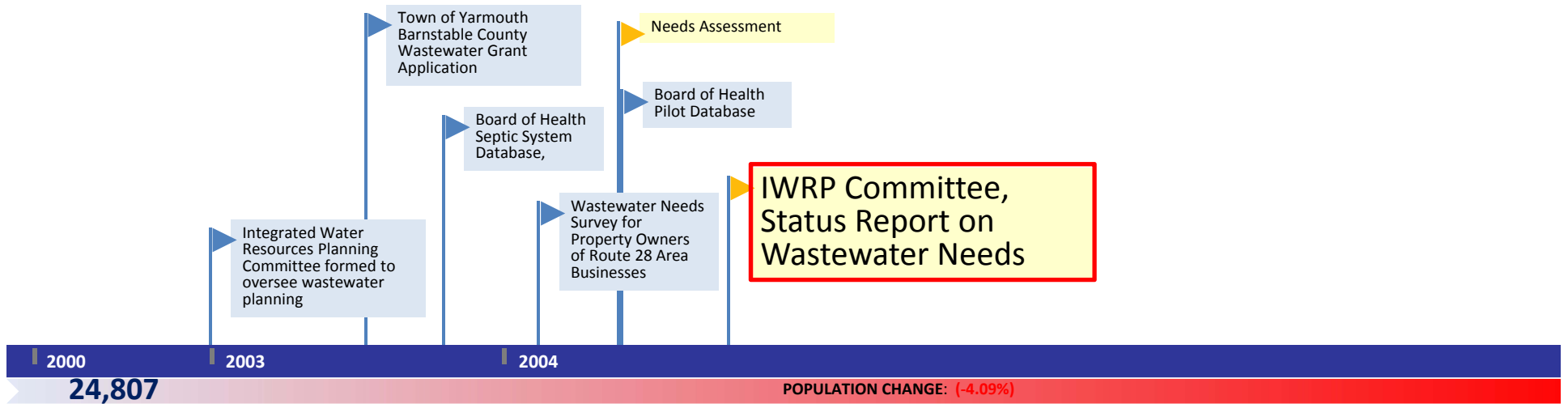
Yarmouth: 1960-2013



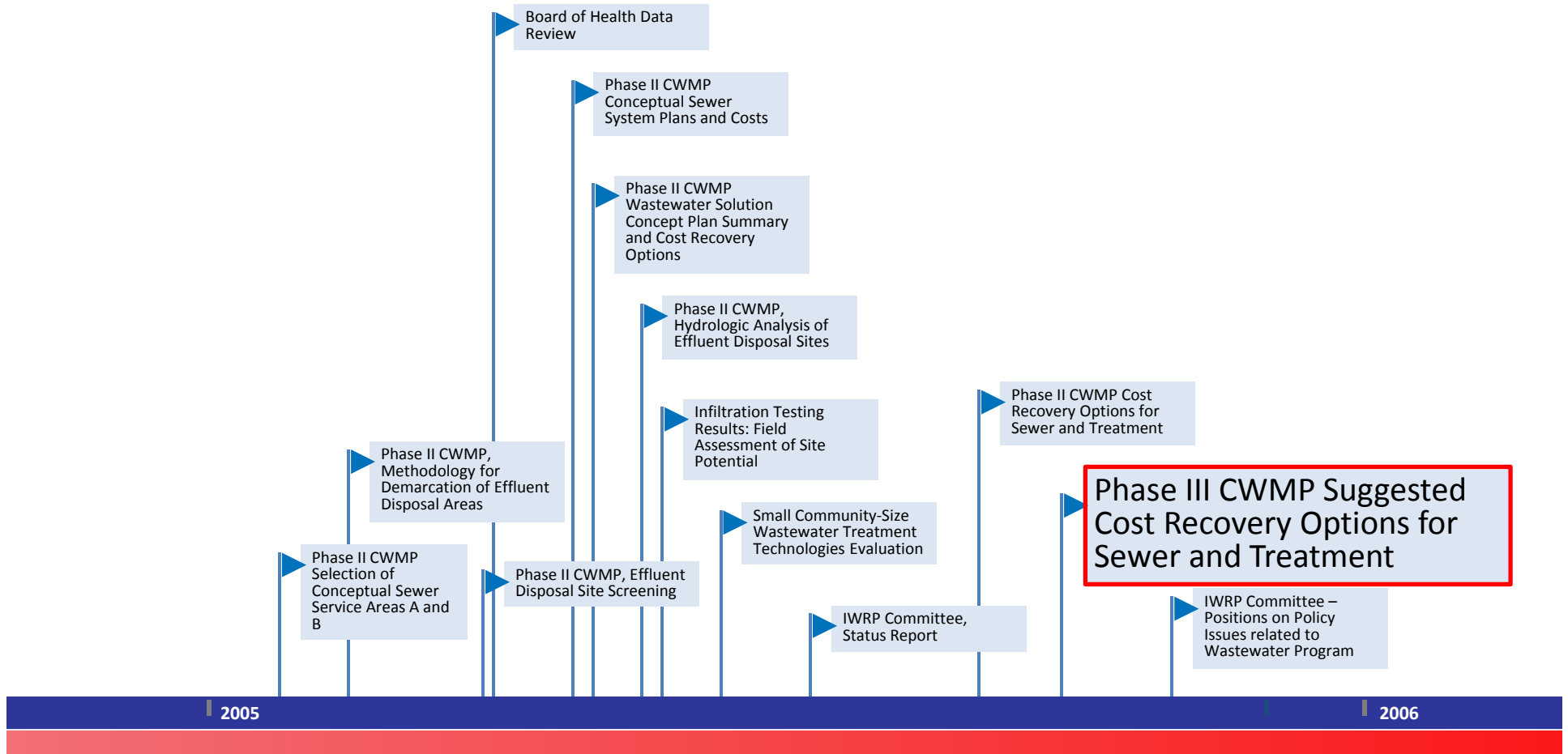
Yarmouth: 1960-2013



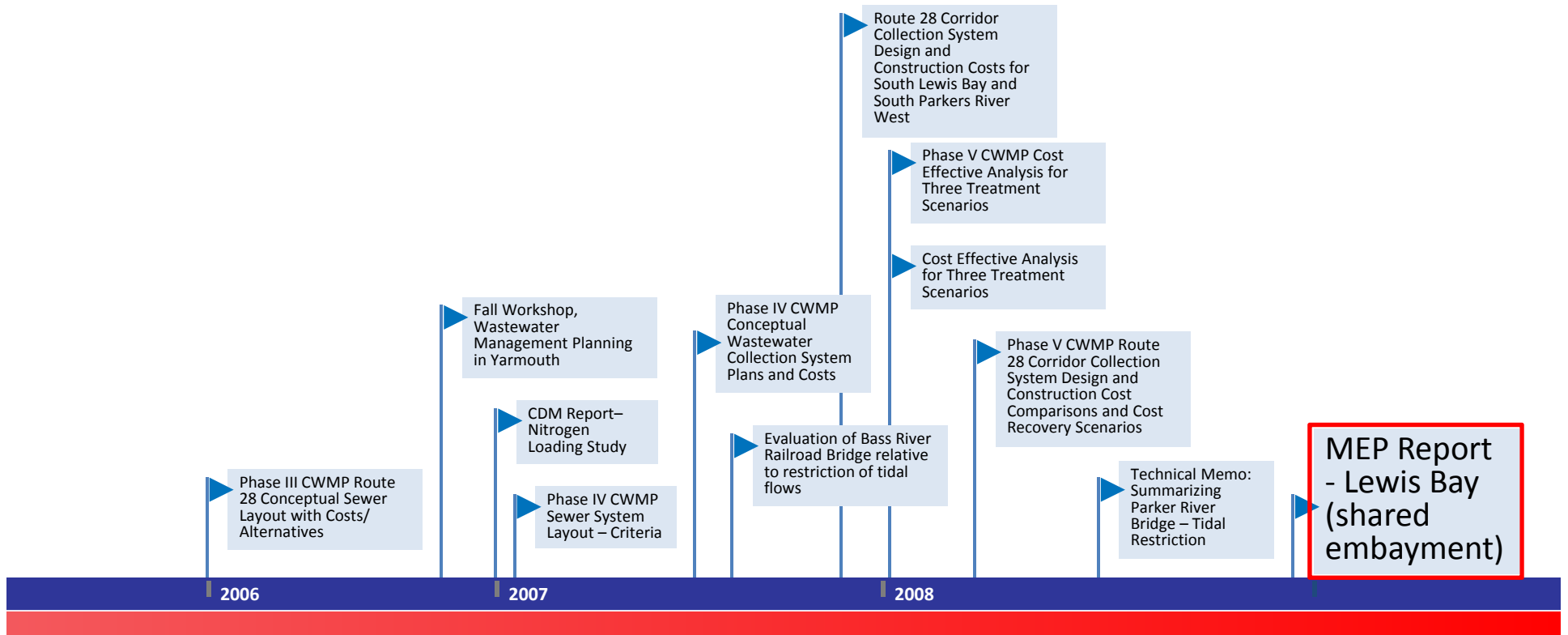
Yarmouth: 1960-2013



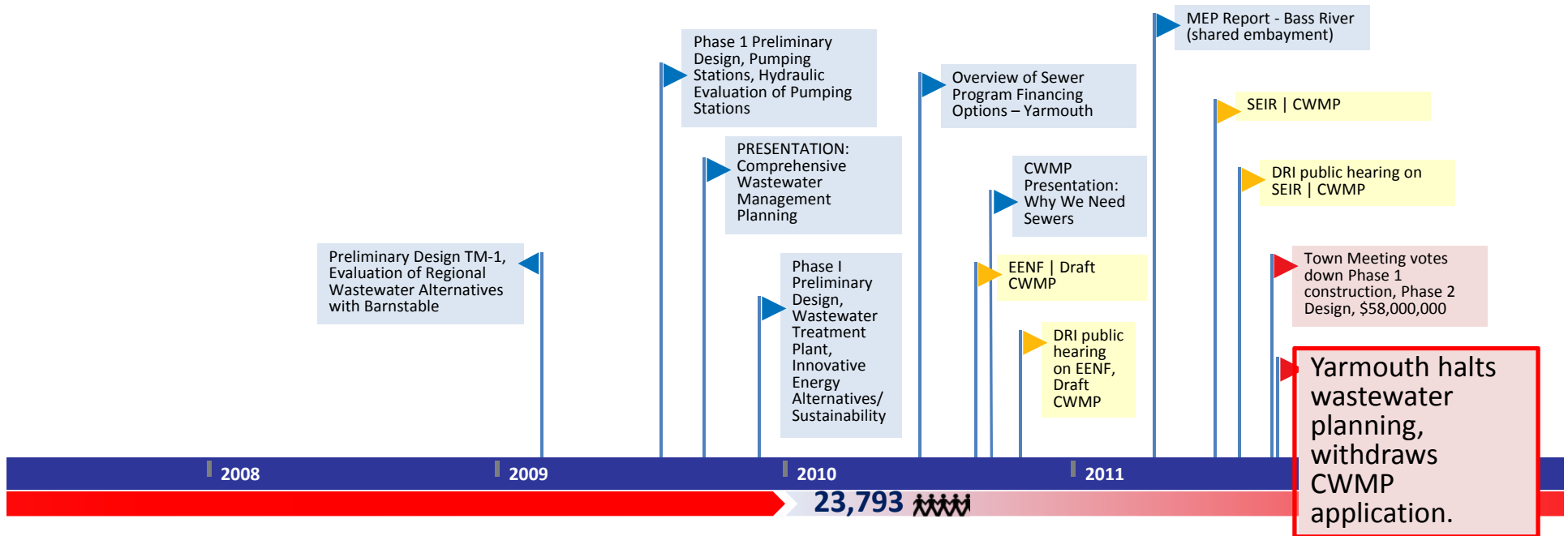
Yarmouth: 1960-2013



Yarmouth: 1960-2013



Yarmouth: 1960-2013

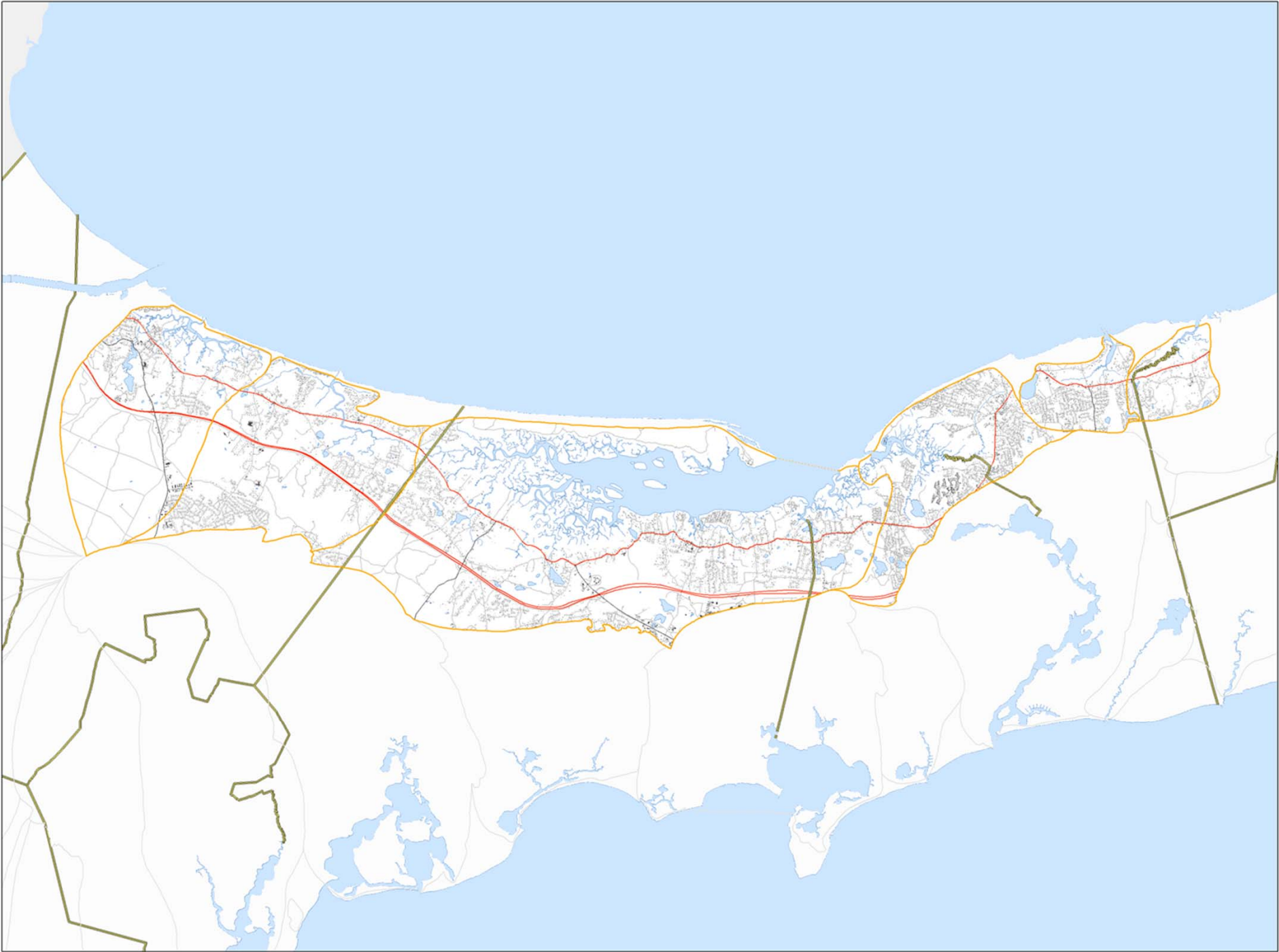


Did we miss anything?

Your Watersheds



**Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek**



A map of a coastal region, likely a bay or estuary, with a large area highlighted in orange. The highlighted area follows the coastline and includes several smaller, irregularly shaped regions outlined in red. The text "59.9 square miles" is overlaid in the center of the orange area. The map shows various water bodies, including a large one at the top and several smaller ones at the bottom, along with a network of roads and other infrastructure.


59.9 square miles

5 Towns




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

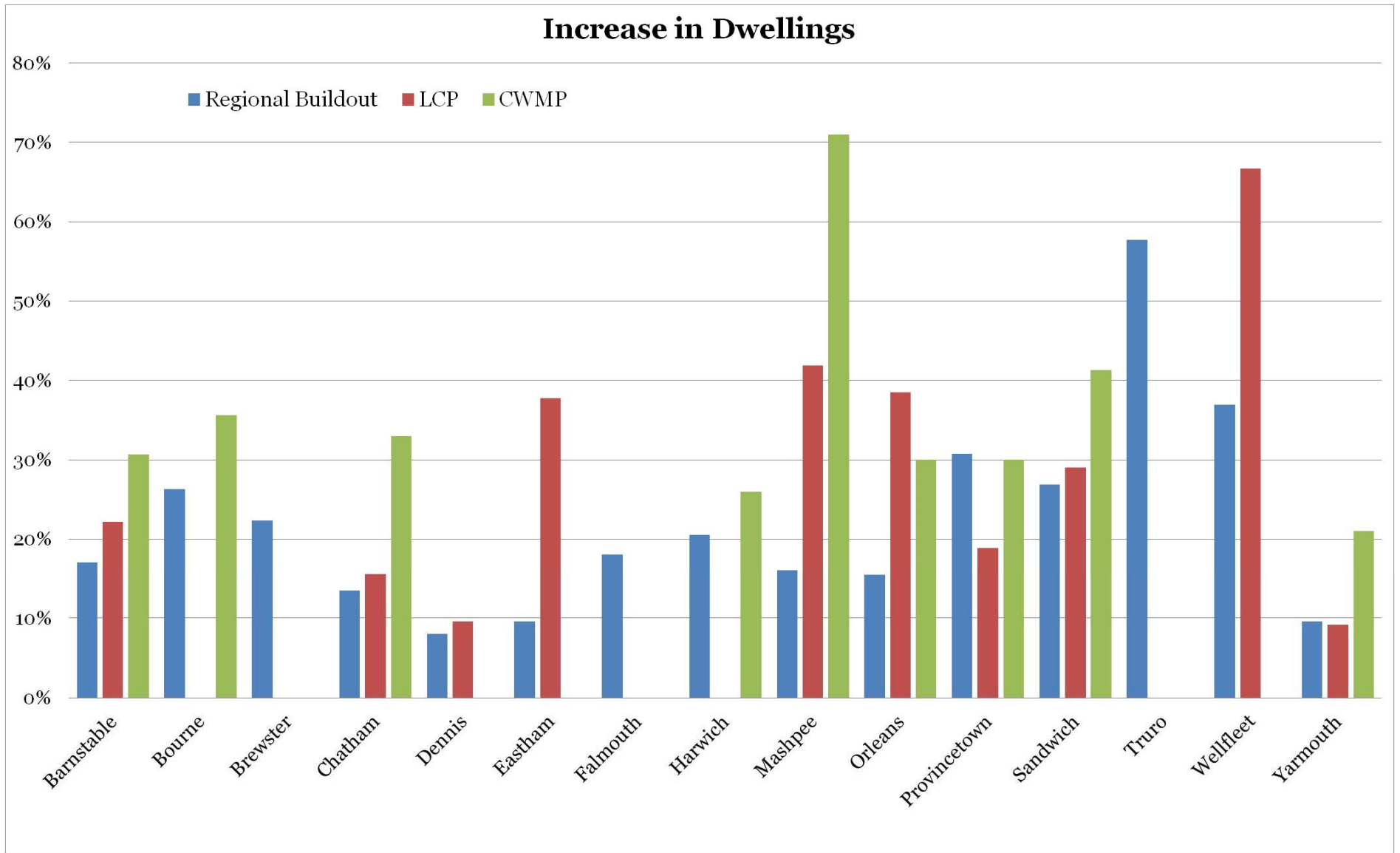
 Open - Disturbed or Managed

 Water

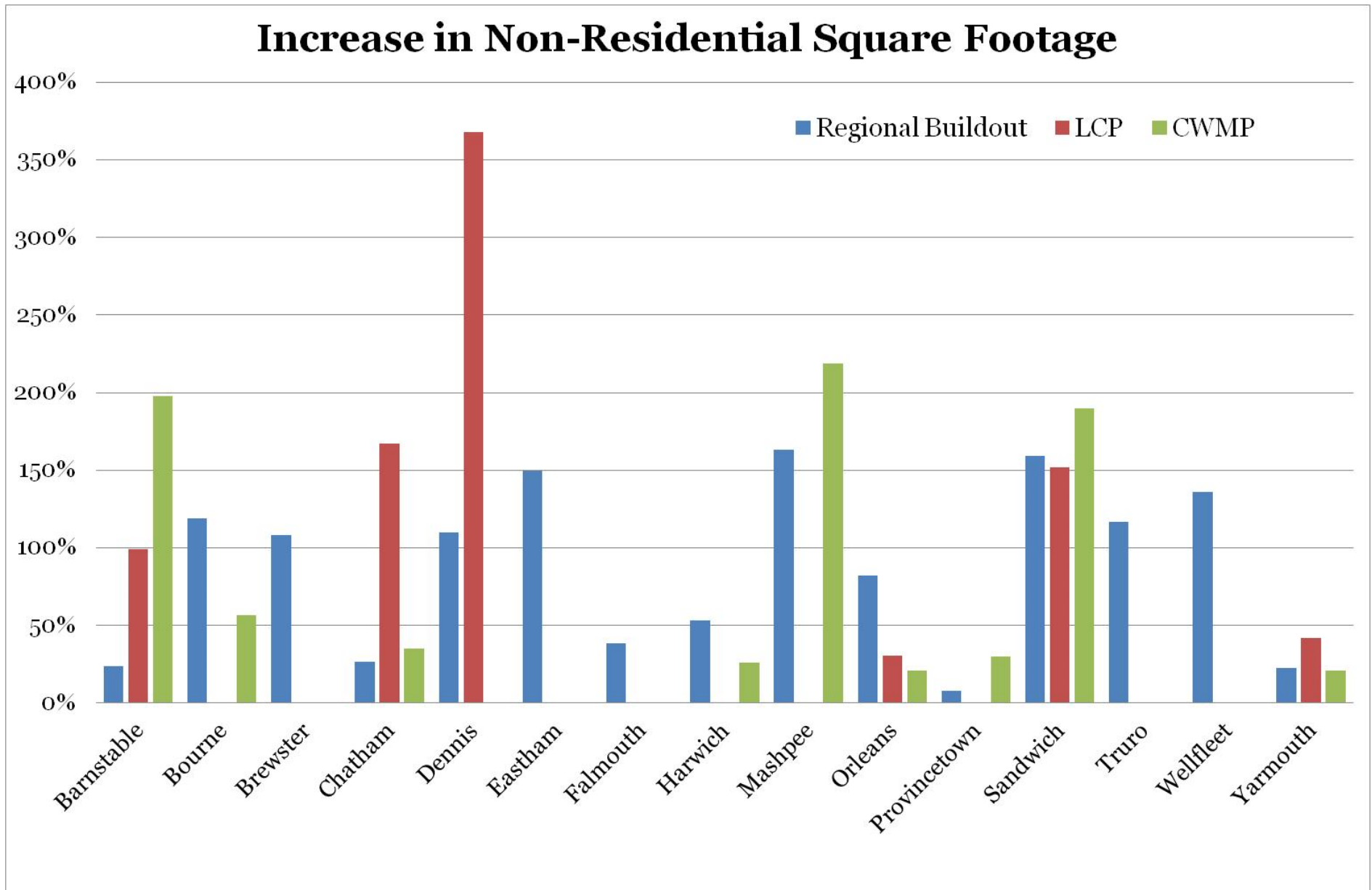
Density

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

Buildout



Buildout



The People



Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek

A map of a coastal region, likely a peninsula or a narrow strip of land, with a large body of water to the north and south. The land area is divided into several irregularly shaped regions outlined in orange and red. A large blue text overlay is centered on the map. The text reads:

Total Population (2010) = 25,485

Population (2010)

9,000

8,065

8,000

7,000

6,000

5,000

4,000

3,000

2,000

1,000

11.8 % of the Total Cape Cod
Population

Barnstable
Harbor

Chase Garden
Creek

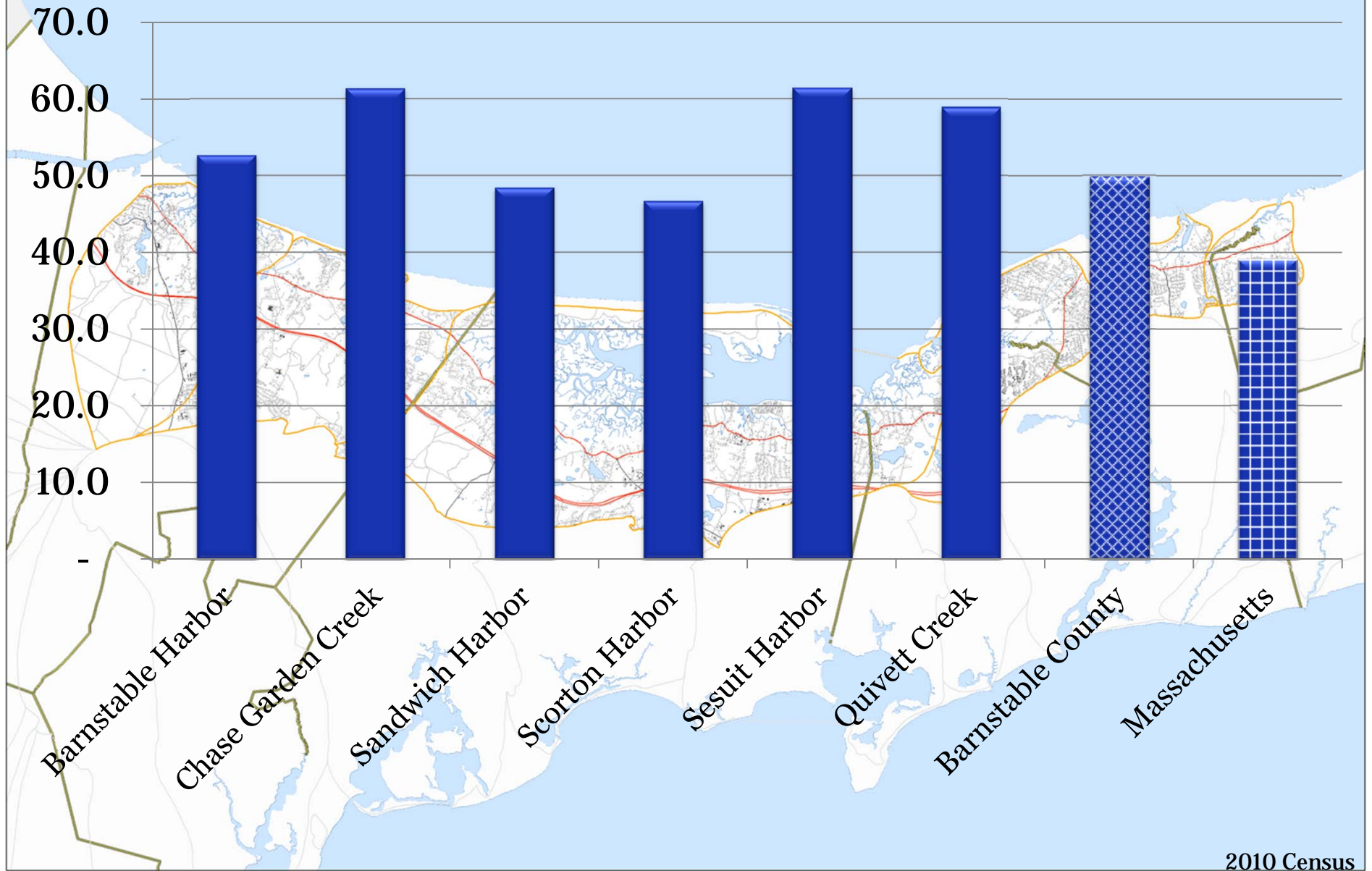
Sandwich
Harbor

Scorton
Harbor

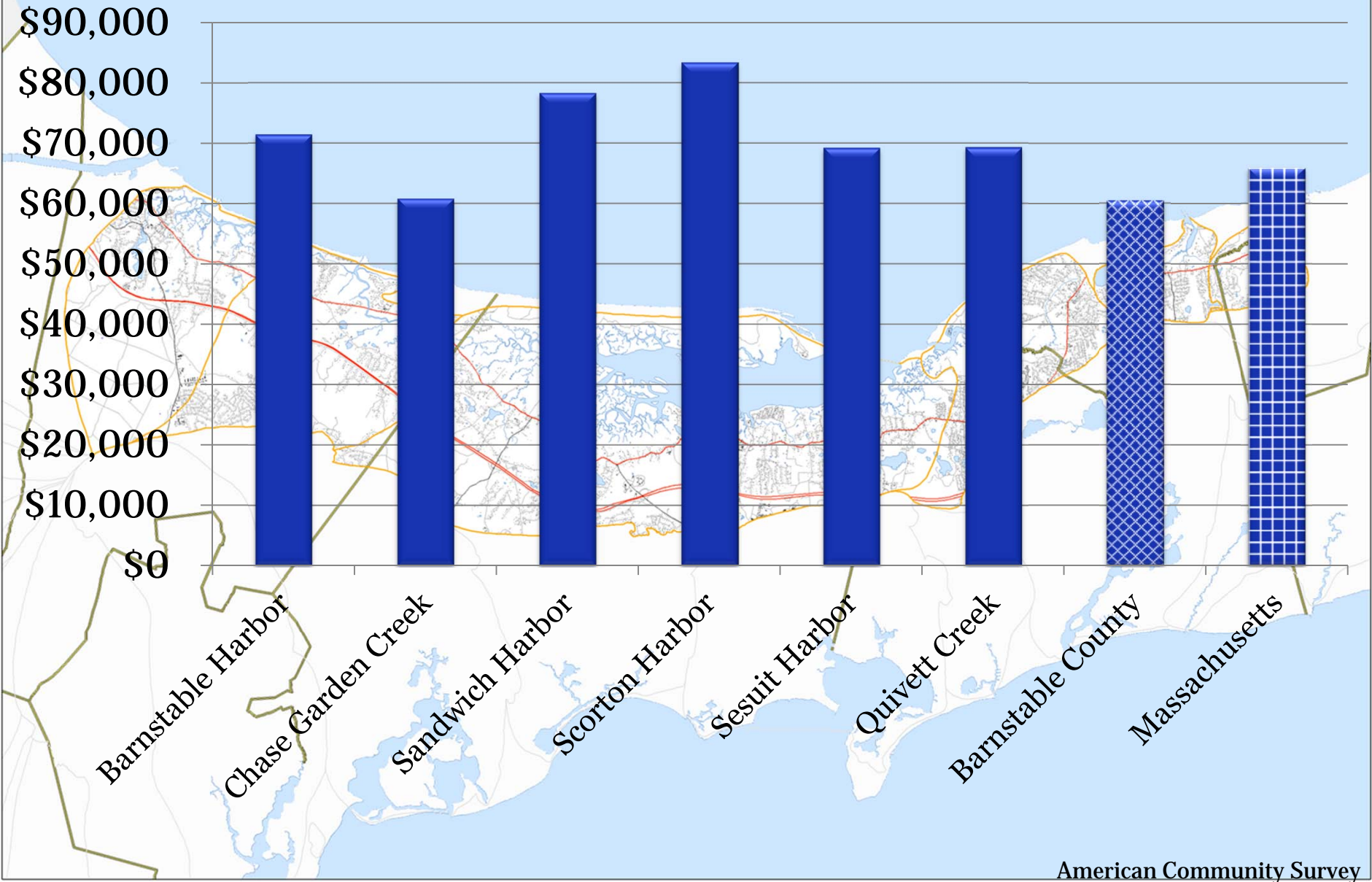
Sesuit Harbor

Quivett Creek

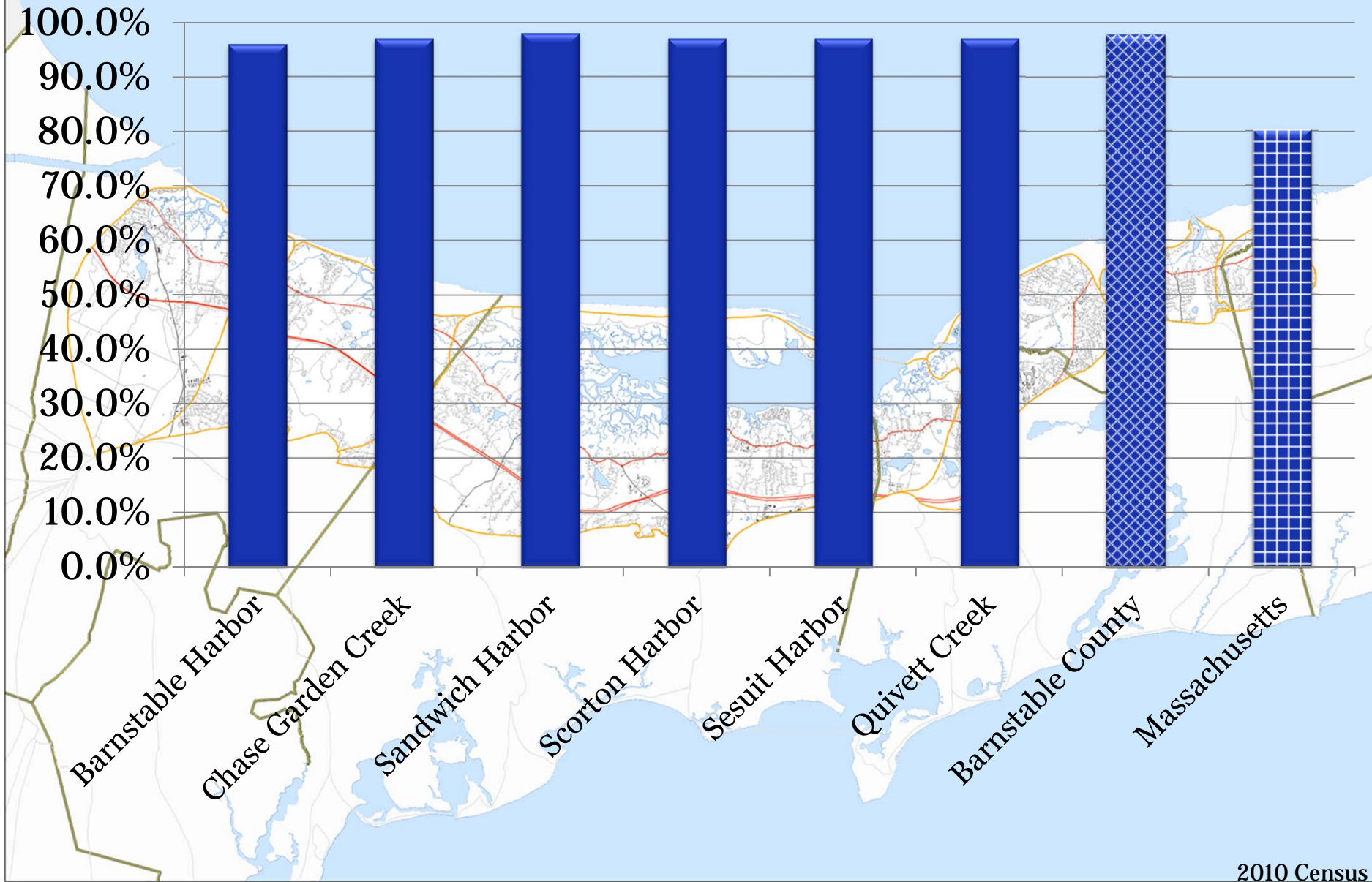
Median Age (2010)



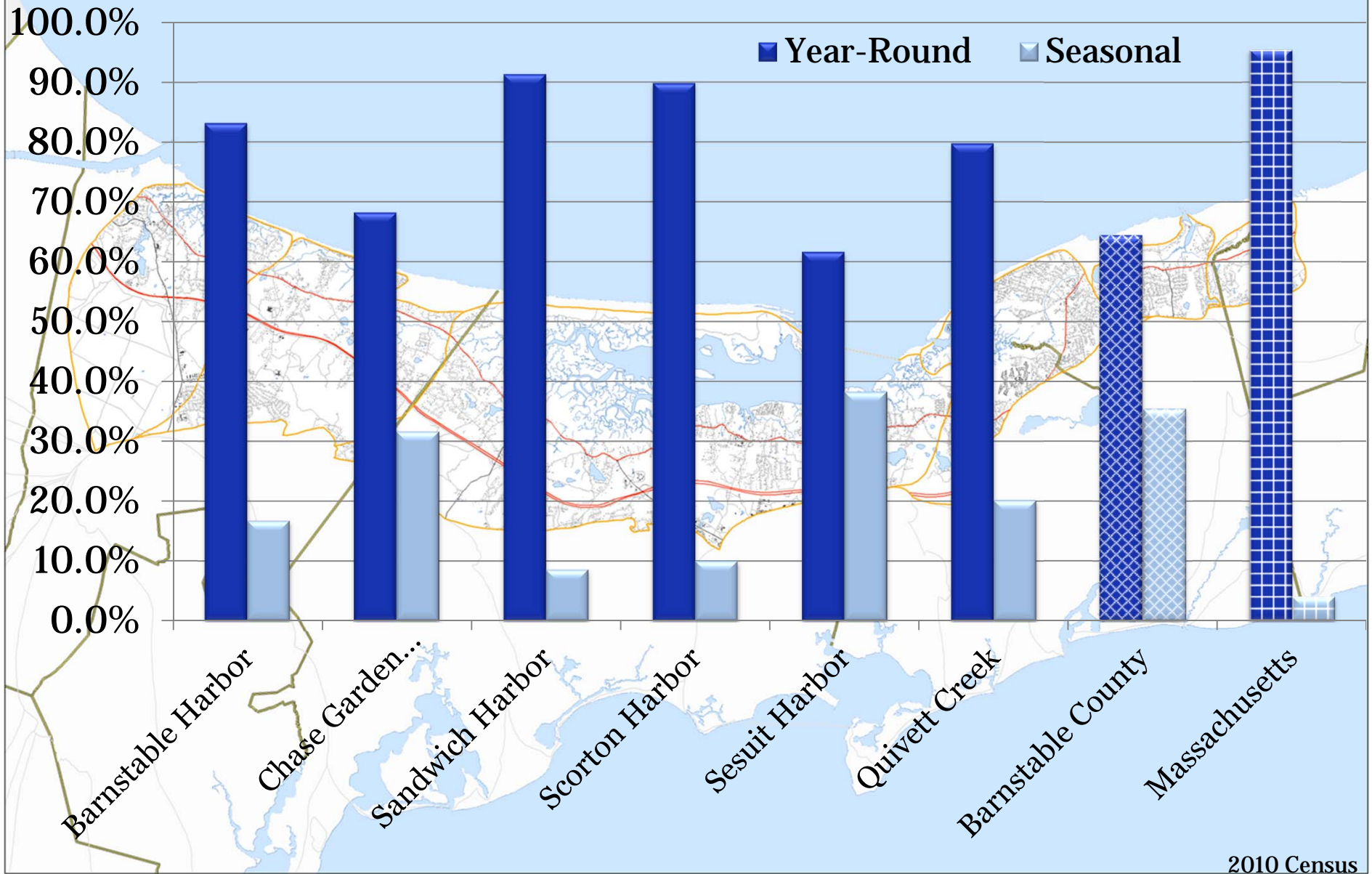
Median Income (2010)



Race - % White (2010)



Seasonal vs. Year Round Housing (2010)



Total Assessed Value of Residential Homes =

\$5,735,945,910

Barnstable Harbor

Chase Garden Creek

Sandwich Harbor

Scorton Harbor

Sesuit Harbor

Quivett Creek

Barnstable County

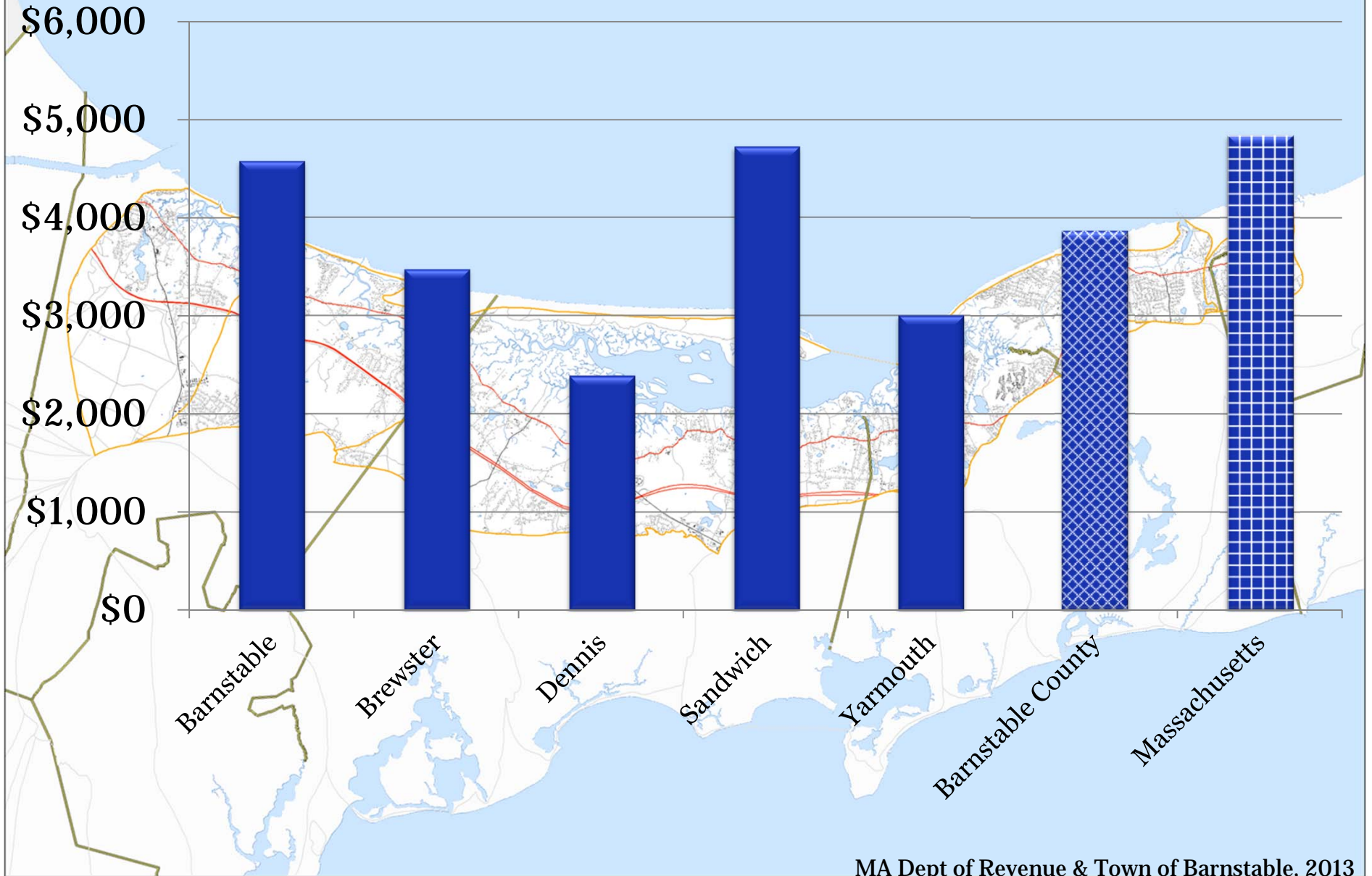
Massachusetts

Your Government & Taxes

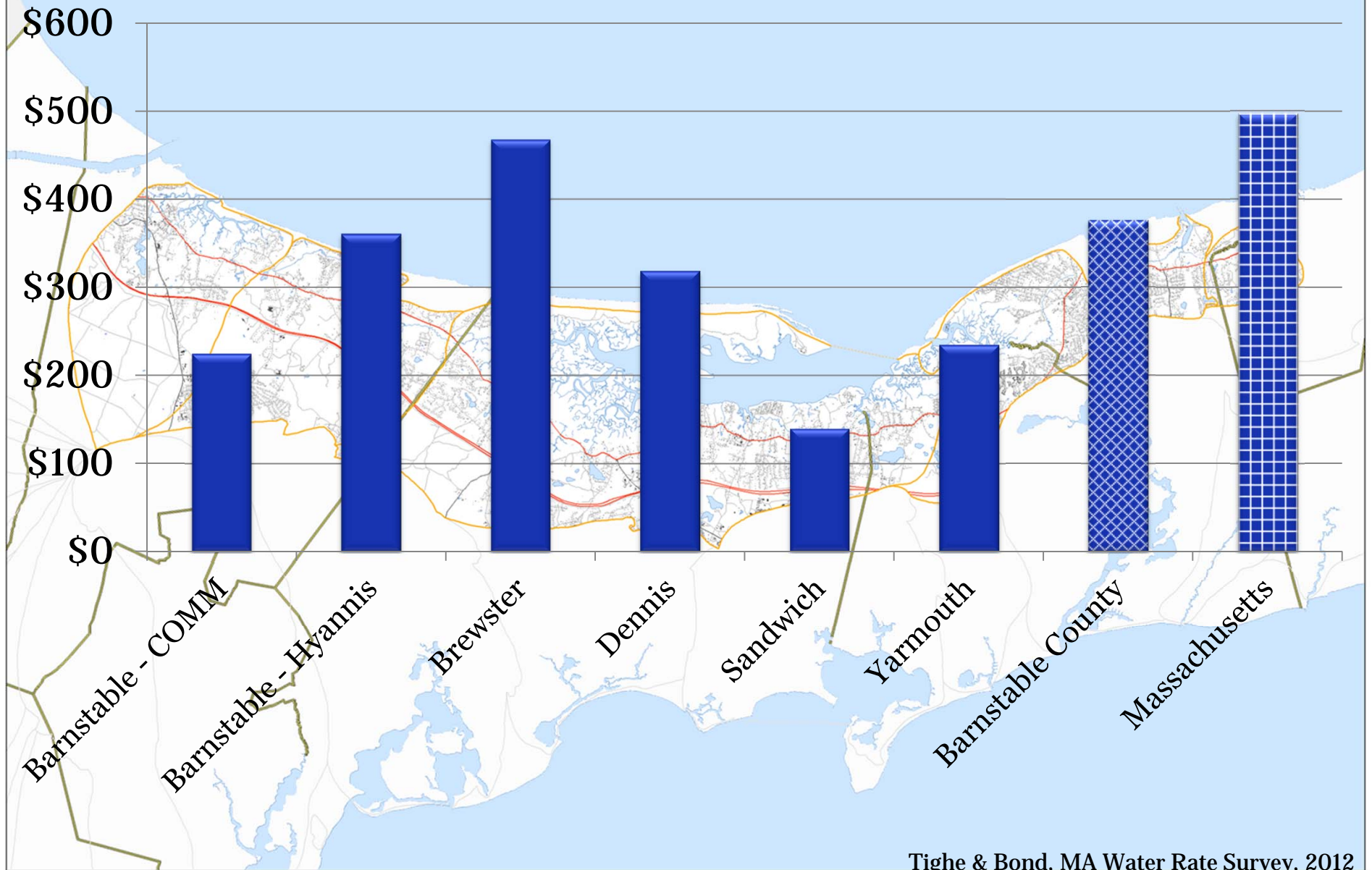


**Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek**

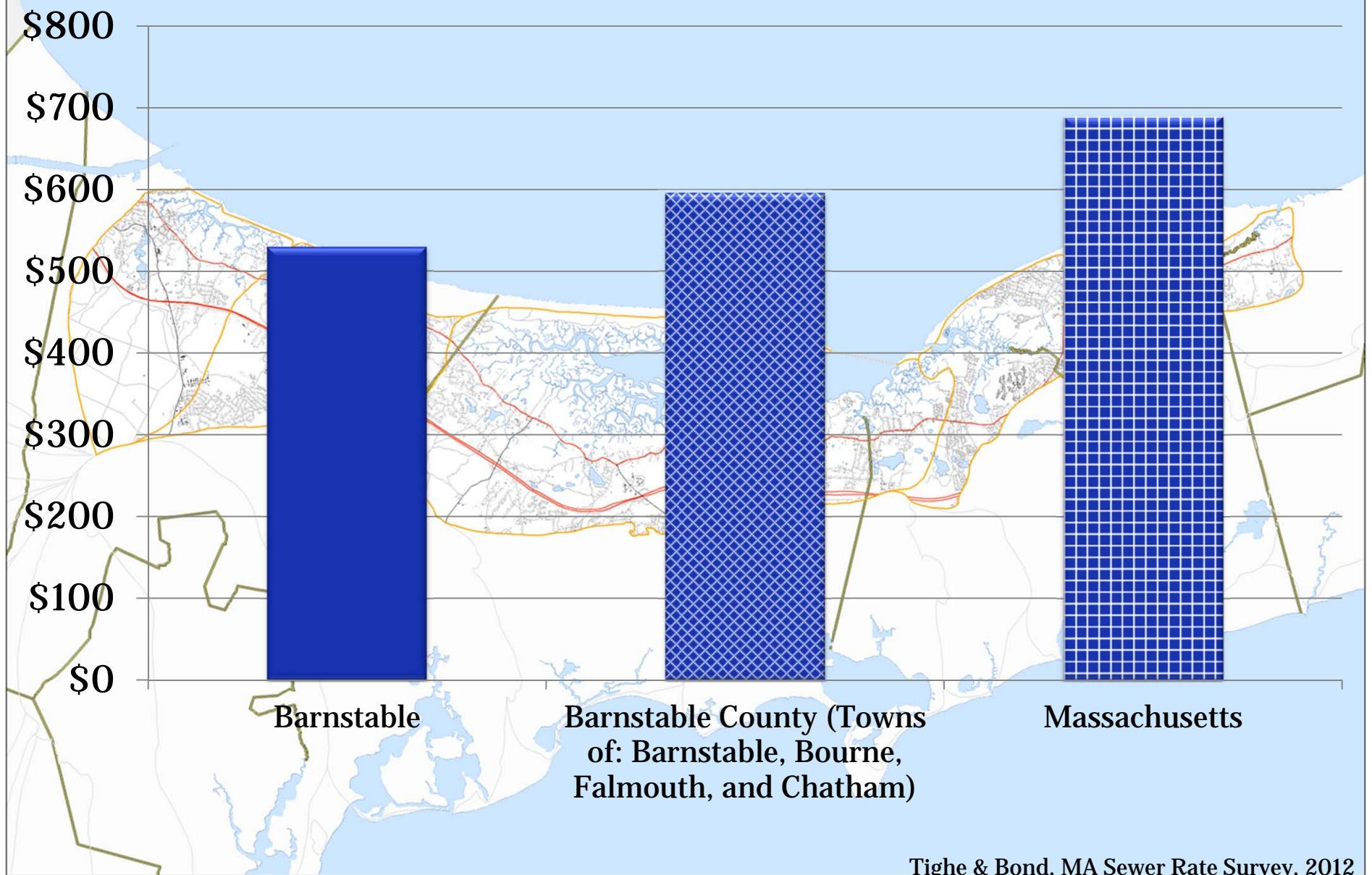
Average Single Family Property Tax Bill (2013)



Average Annual Water Bill (2012)



Average Annual Sewer Bill (2012)



The Problem



Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek

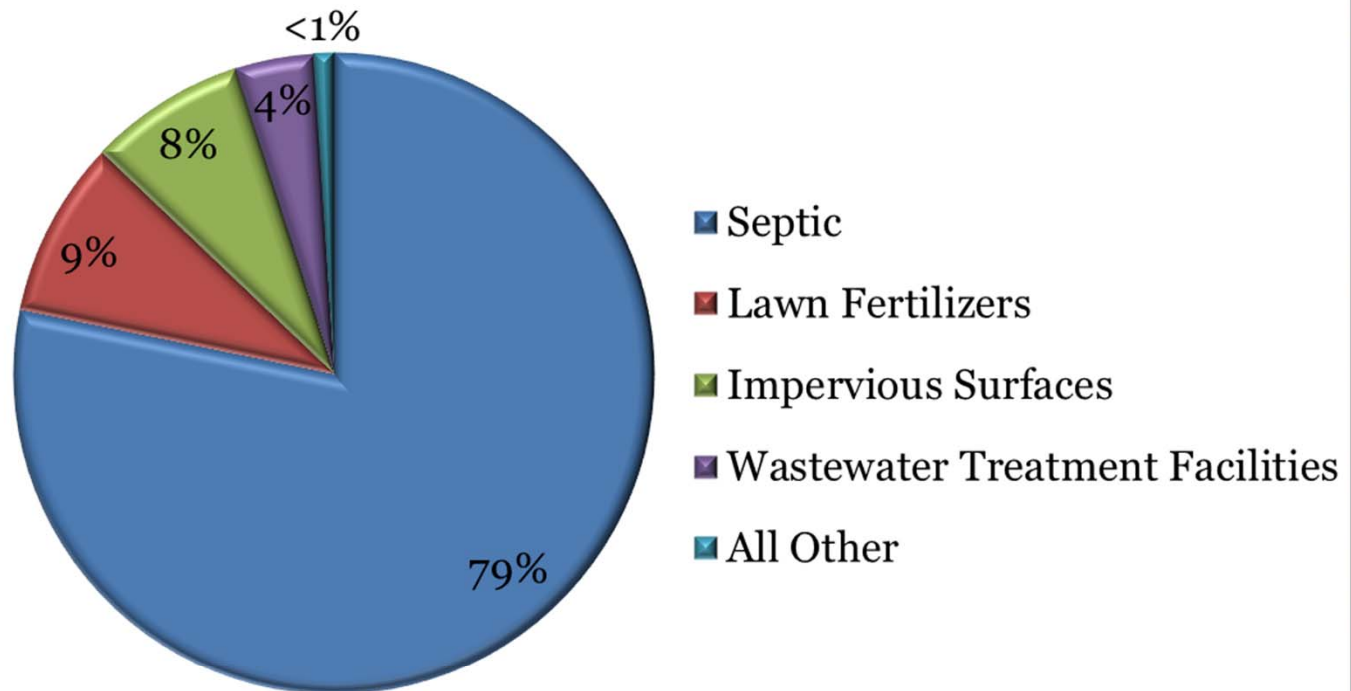




Massachusetts Estuaries Project

- 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



Status of your MEP reports

Barnstable Harbor

Draft due by 11/2013, final due by 2/28/14

Sandwich Harbor

Draft due by 8/30/2013

Scorton Harbor

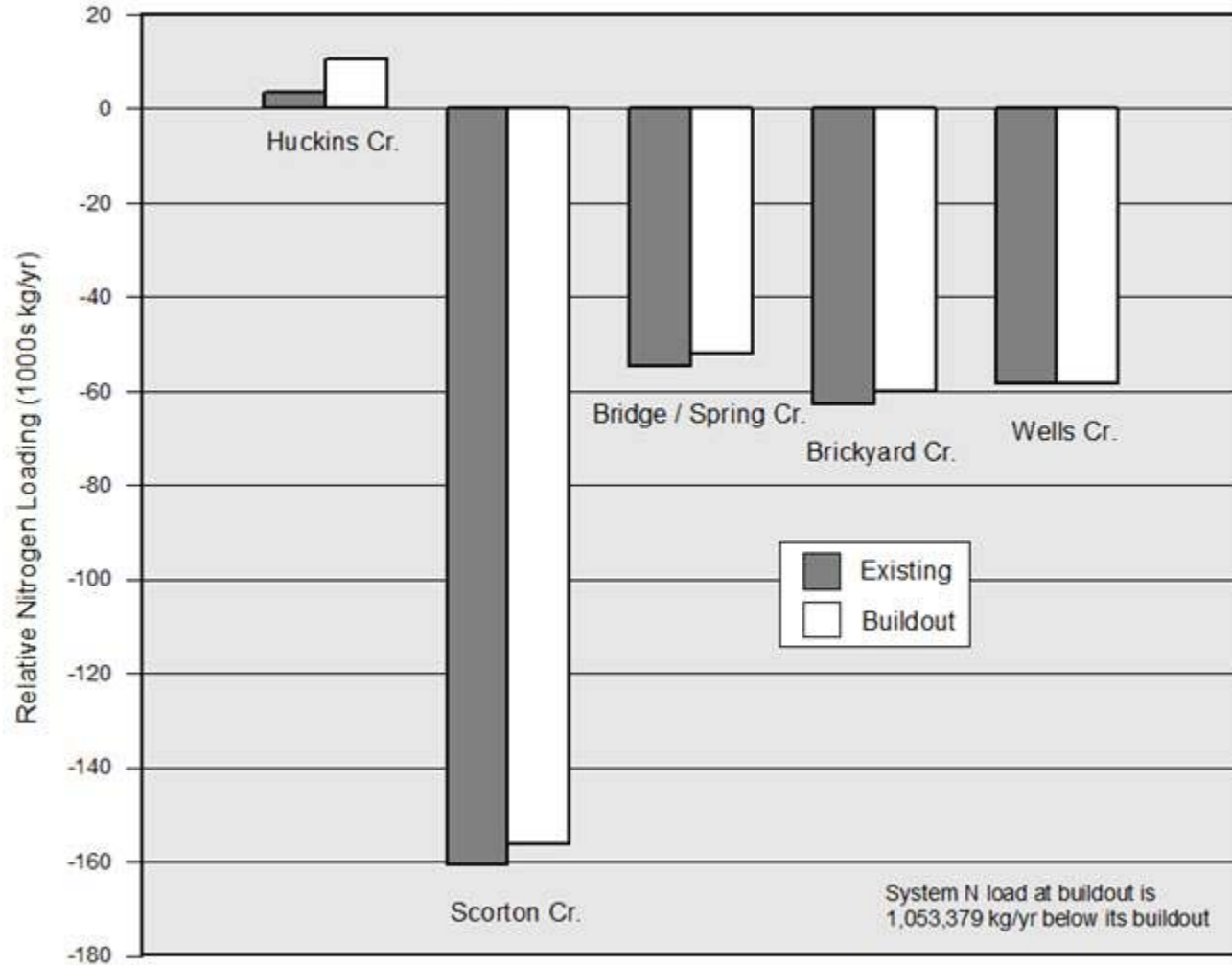
Partial draft with DEP, still waiting on threshold loading analysis

Sesuit Harbor

Draft due by 9/30/13, final due by 12/30/13

Quivett Creek and **Chase Garden Creek** are not studied

Existing and Buildout Nitrogen Load Barnstable Harbor Coastal System




Critical loads (ORW) are based on 0.05 ppm addition to background

Cape Cod Surface Management Project
Cape Cod Commission, 2002


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



**Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek**


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

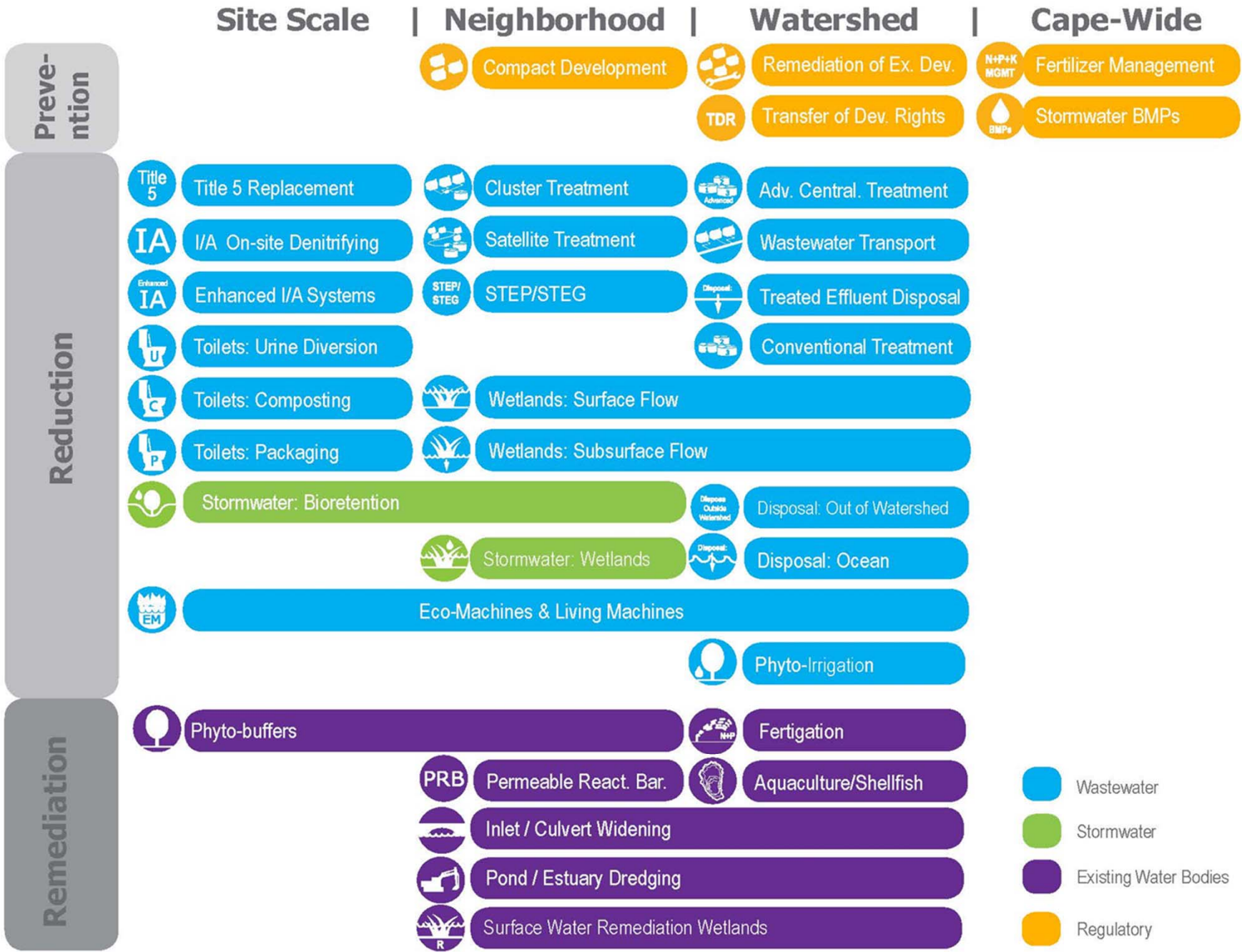
 2031 - 2040

 2041 - 2050



Framework for Addressing Solutions Moving Forward

Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek



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

<http://watersheds.capecodcommission.org/index.php/watersheds/mid-cape/cape-cod-bay-group>

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