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

Meeting One
Tuesday, September 24, 2013
Cape Cod Commission, 3225 Main Street, Barnstable, MA 02653
8:30 am - 12:30 pm

8:30 Welcome – *Cape Cod Commission*

8:35 Introductions, confirm working group membership and participation – *Carri Hulet (facilitator) and Working Group*

9:00 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

9:15 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *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 – *Carri Hulet 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 – *Carri Hulet (facilitator) and Working Group*

11:30 Review/Discuss Process Protocols – *Carri Hulet (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

Cape Cod Bay Group

Baseline Conditions & Needs Assessment

What is the 208 Plan?

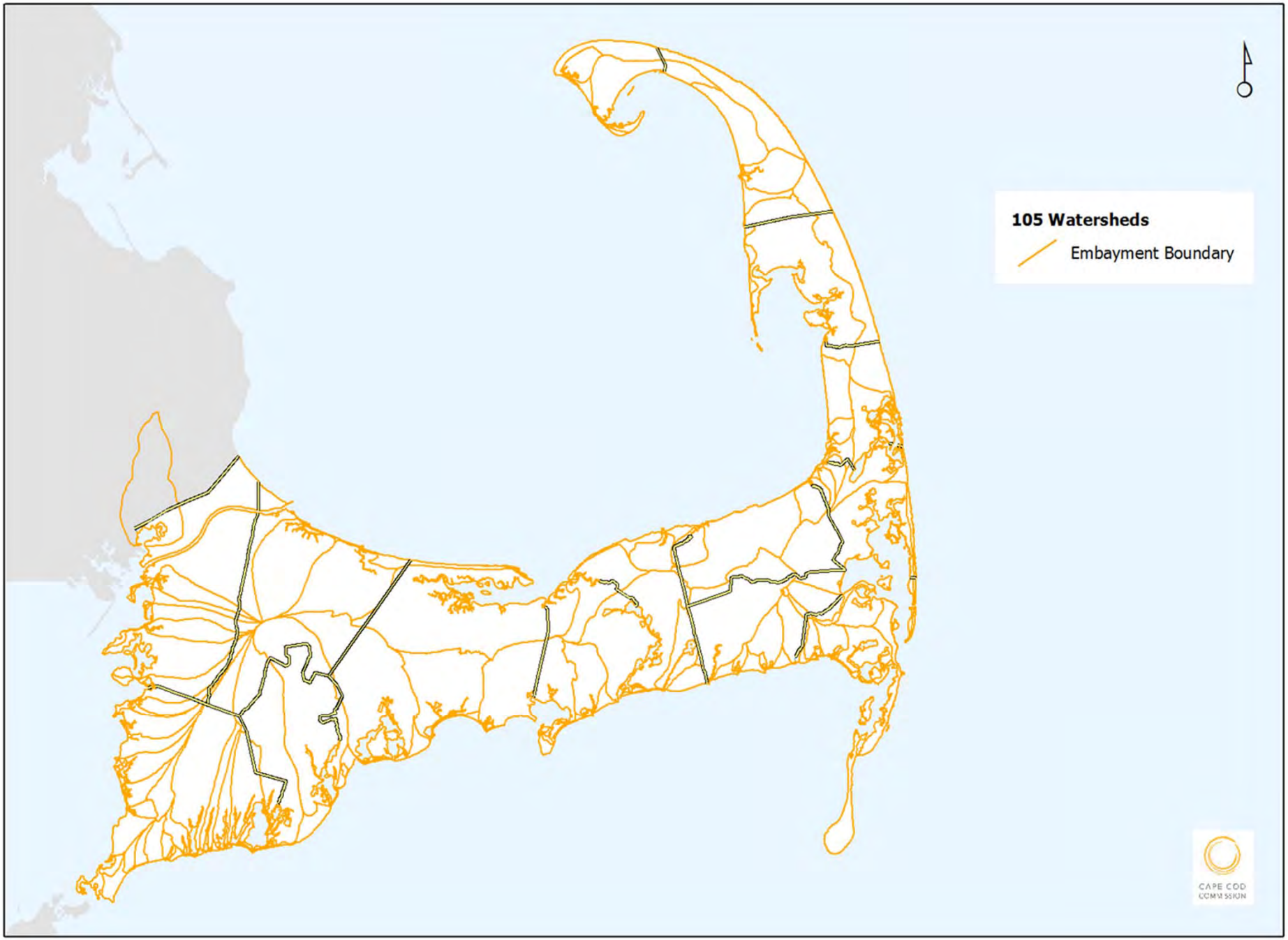
Clean Water Act Section 208

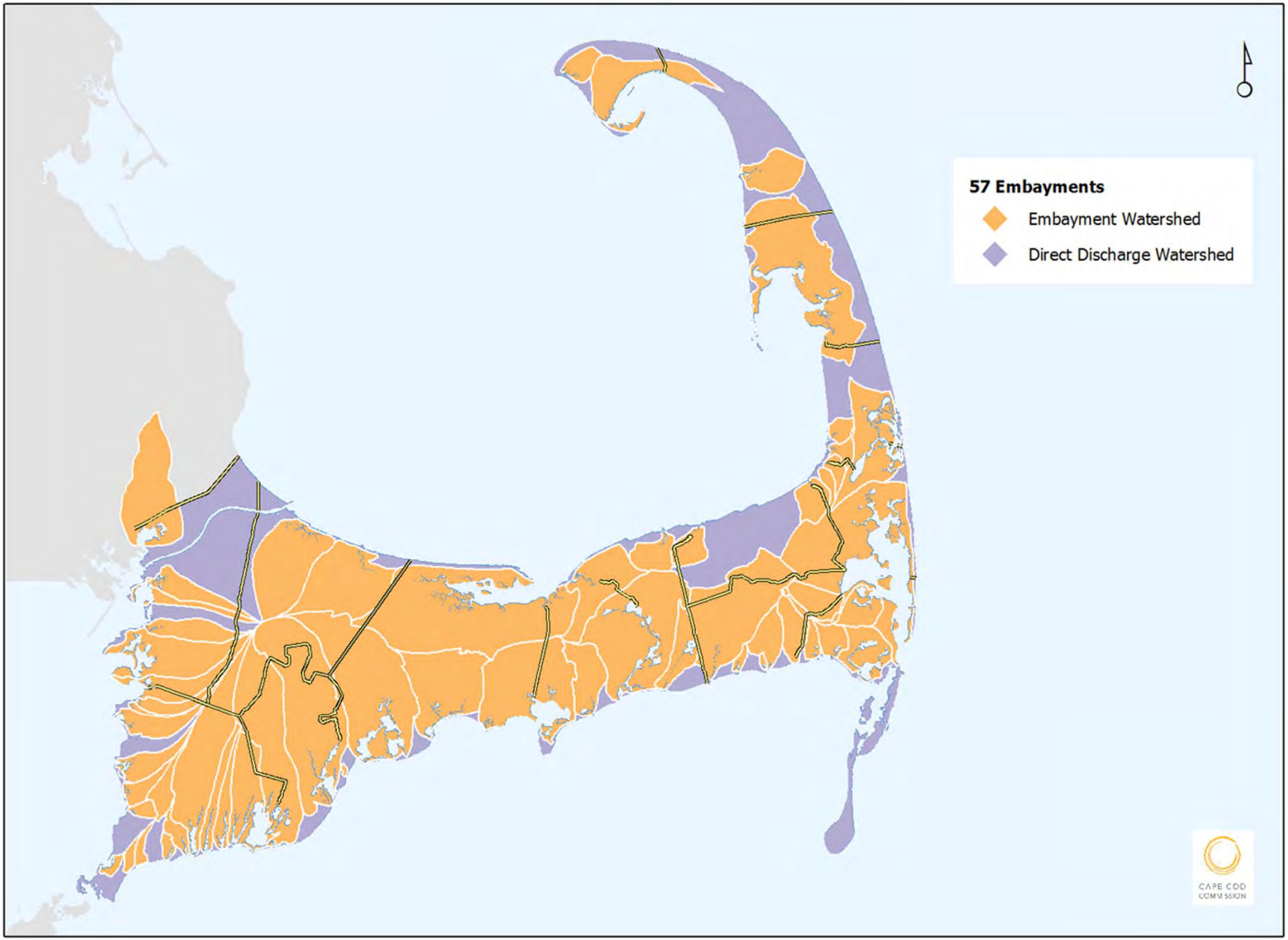
The Commission was directed to update the 1978 Plan

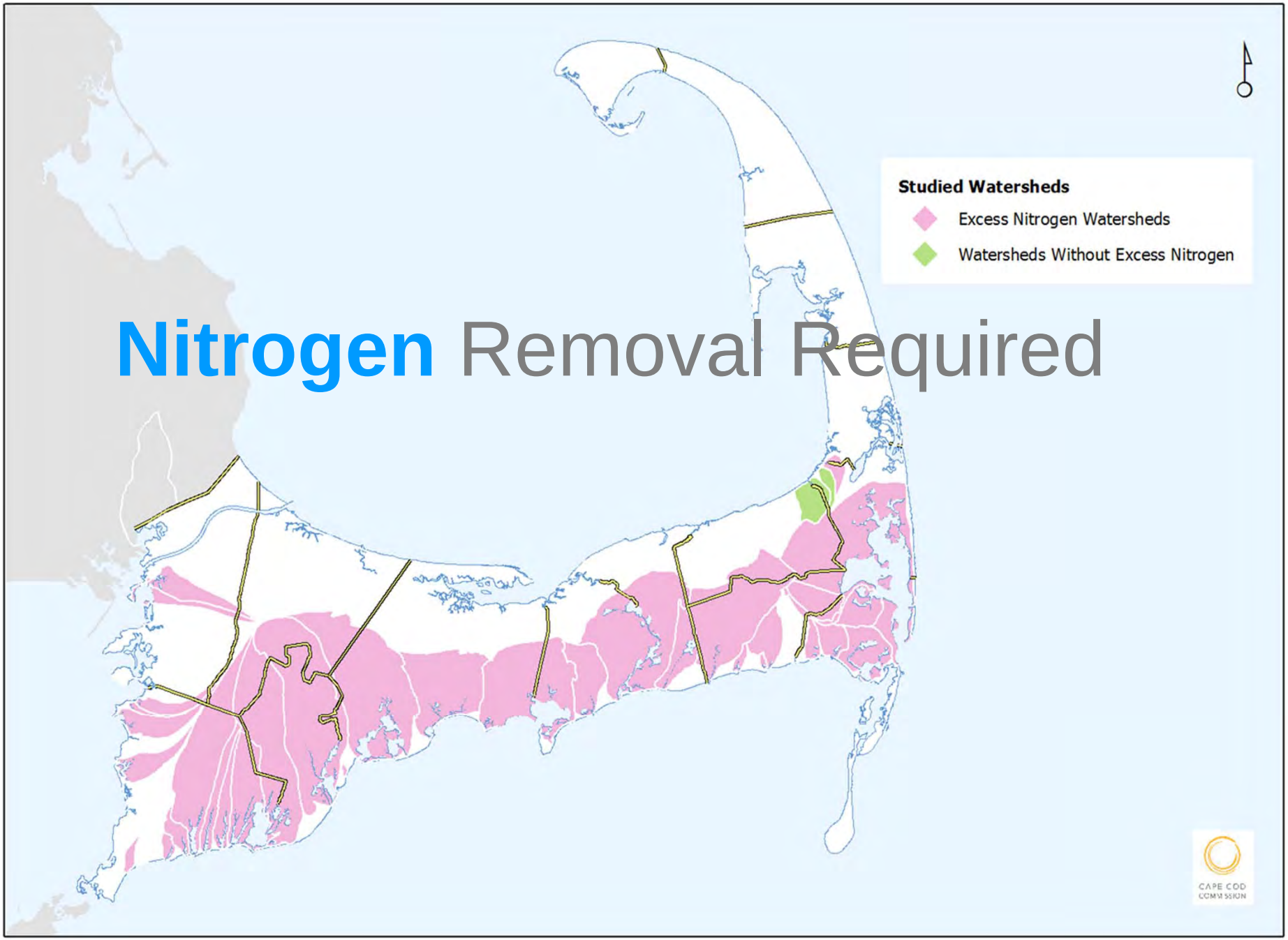
The Commonwealth provided $3 million to fund the project

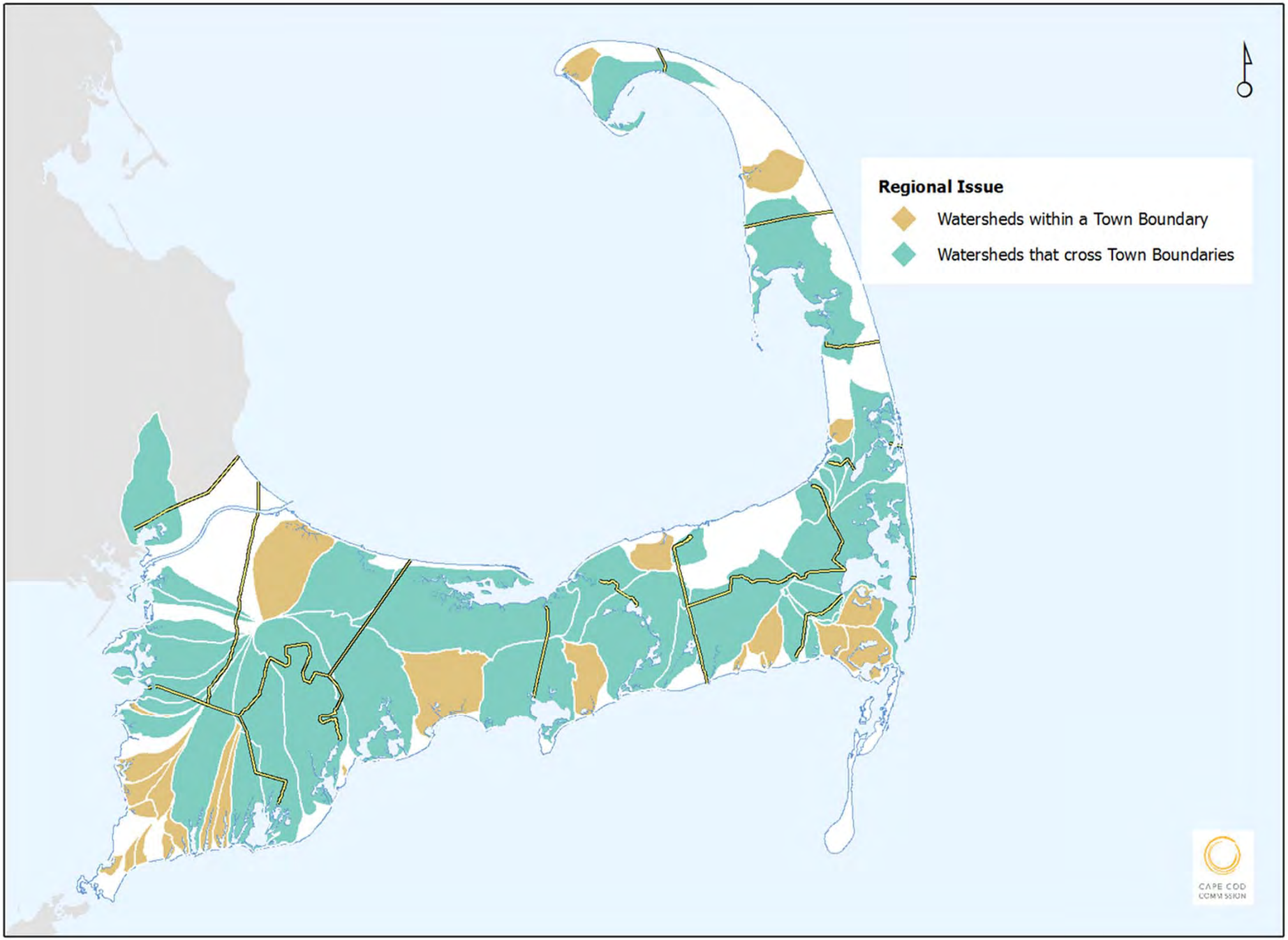
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

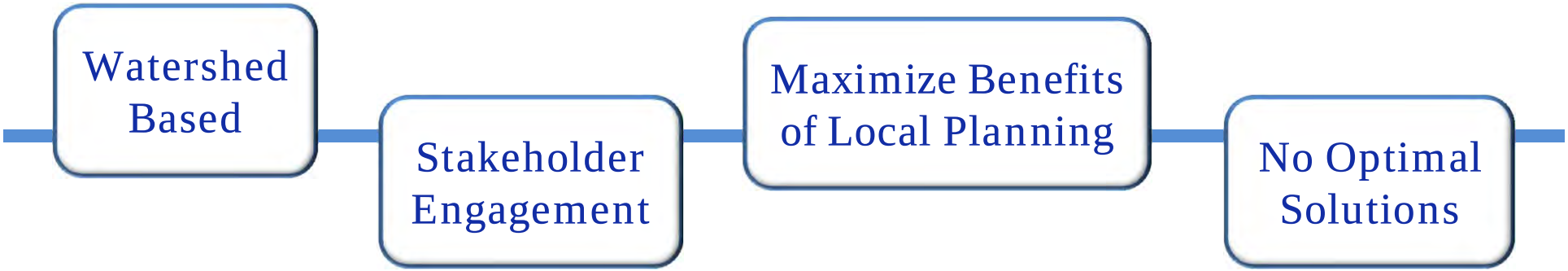

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

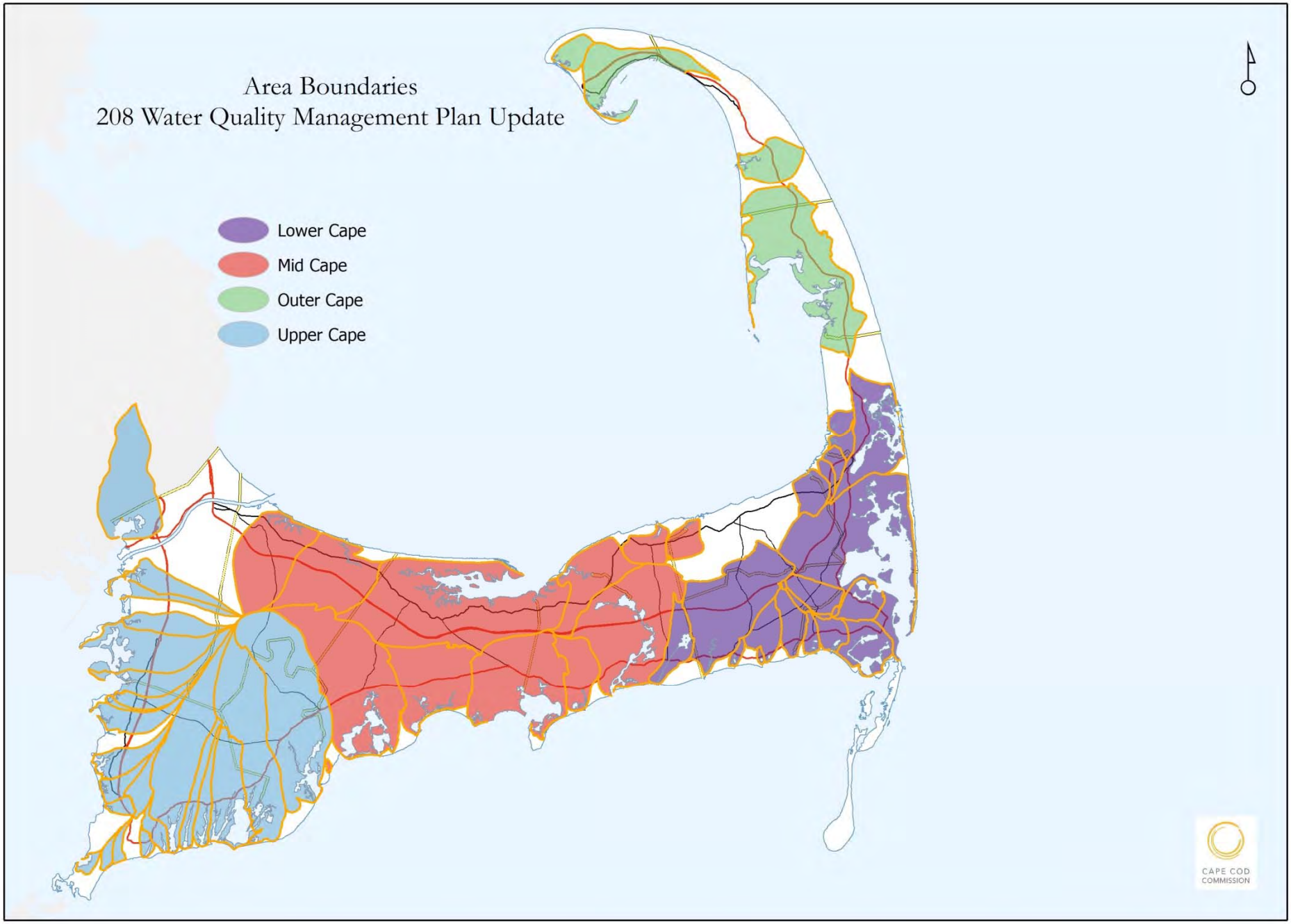

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

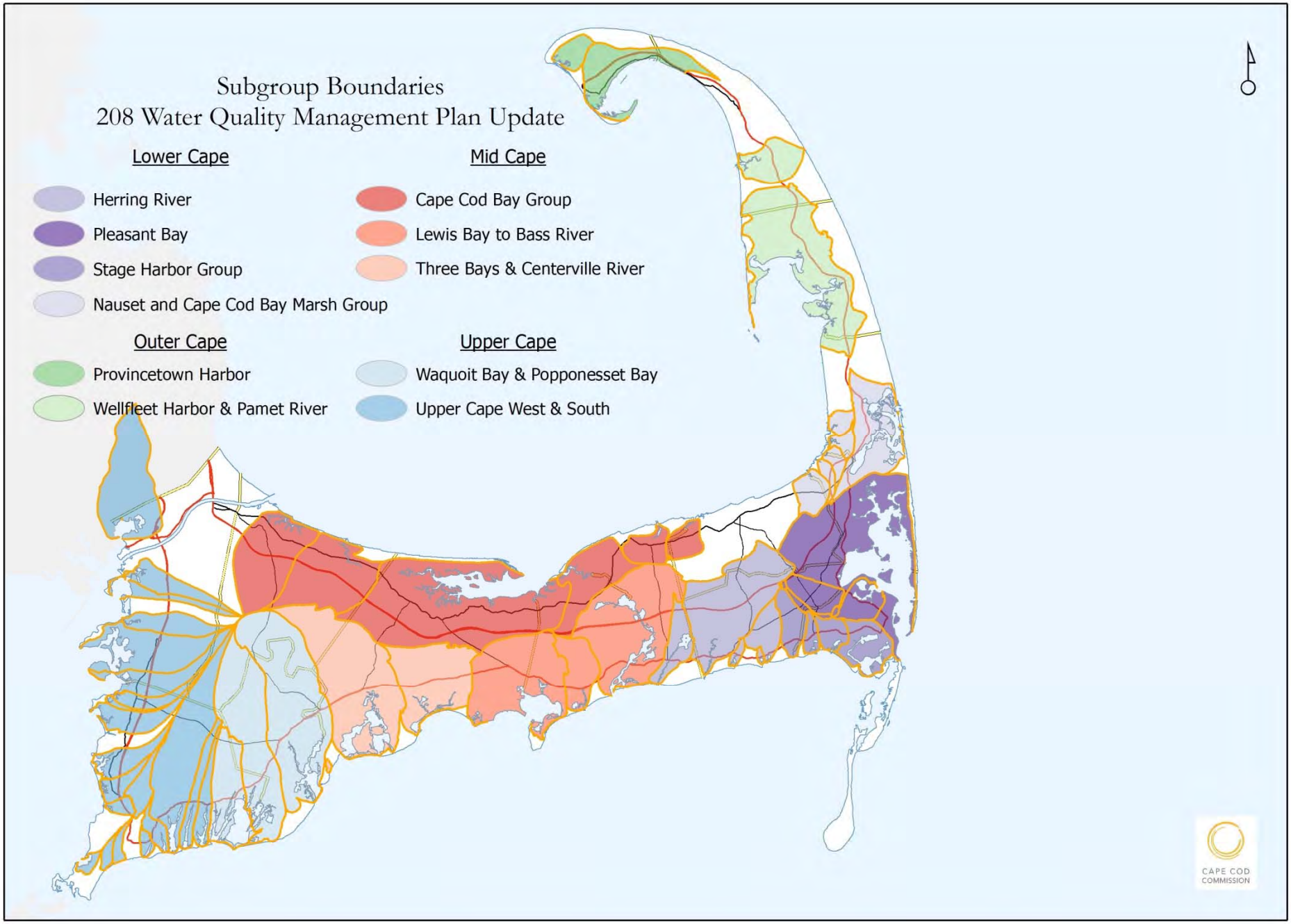

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

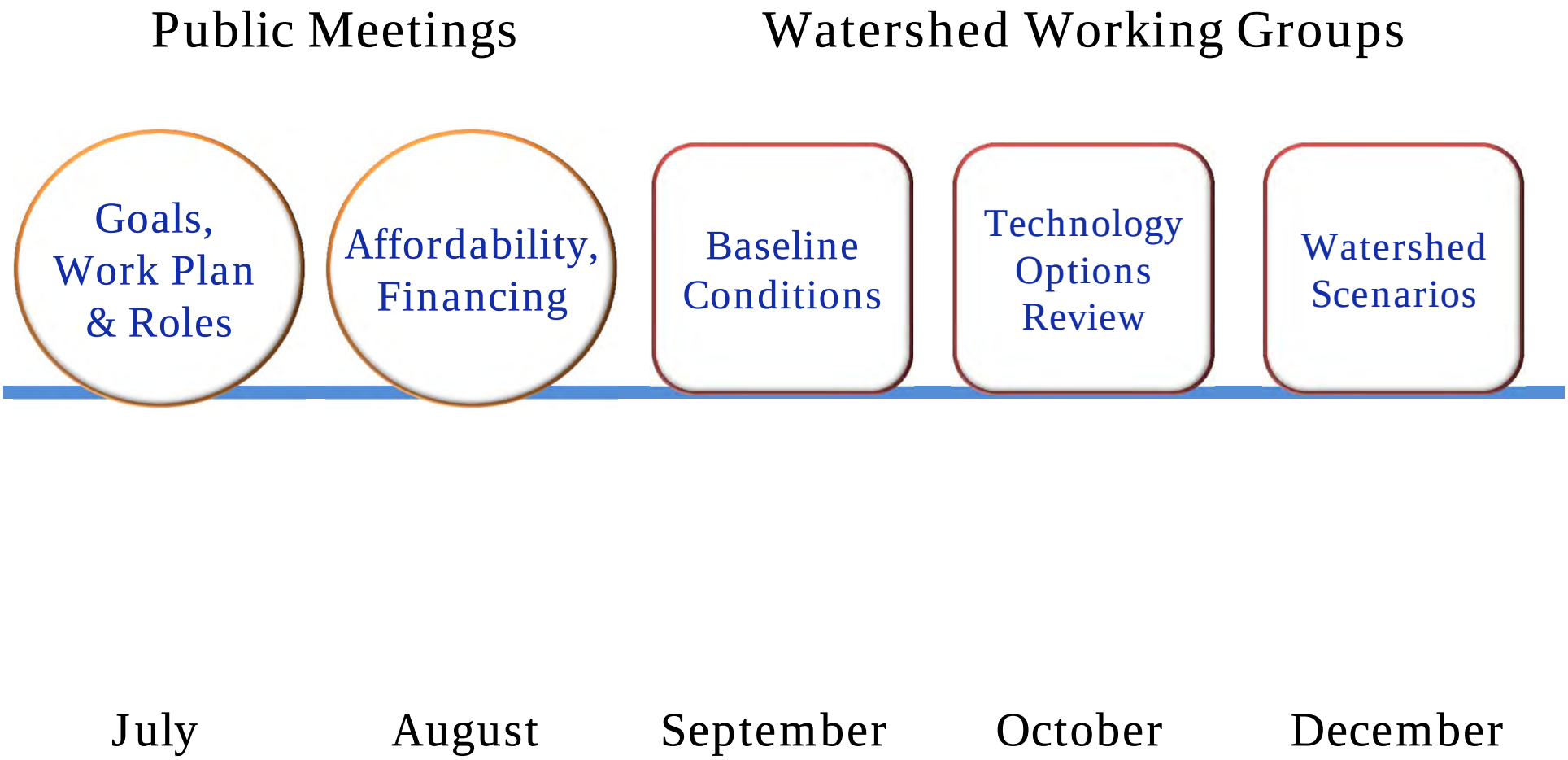


Goal:
To generate a series of approaches in each watershed that will meet water quality standards

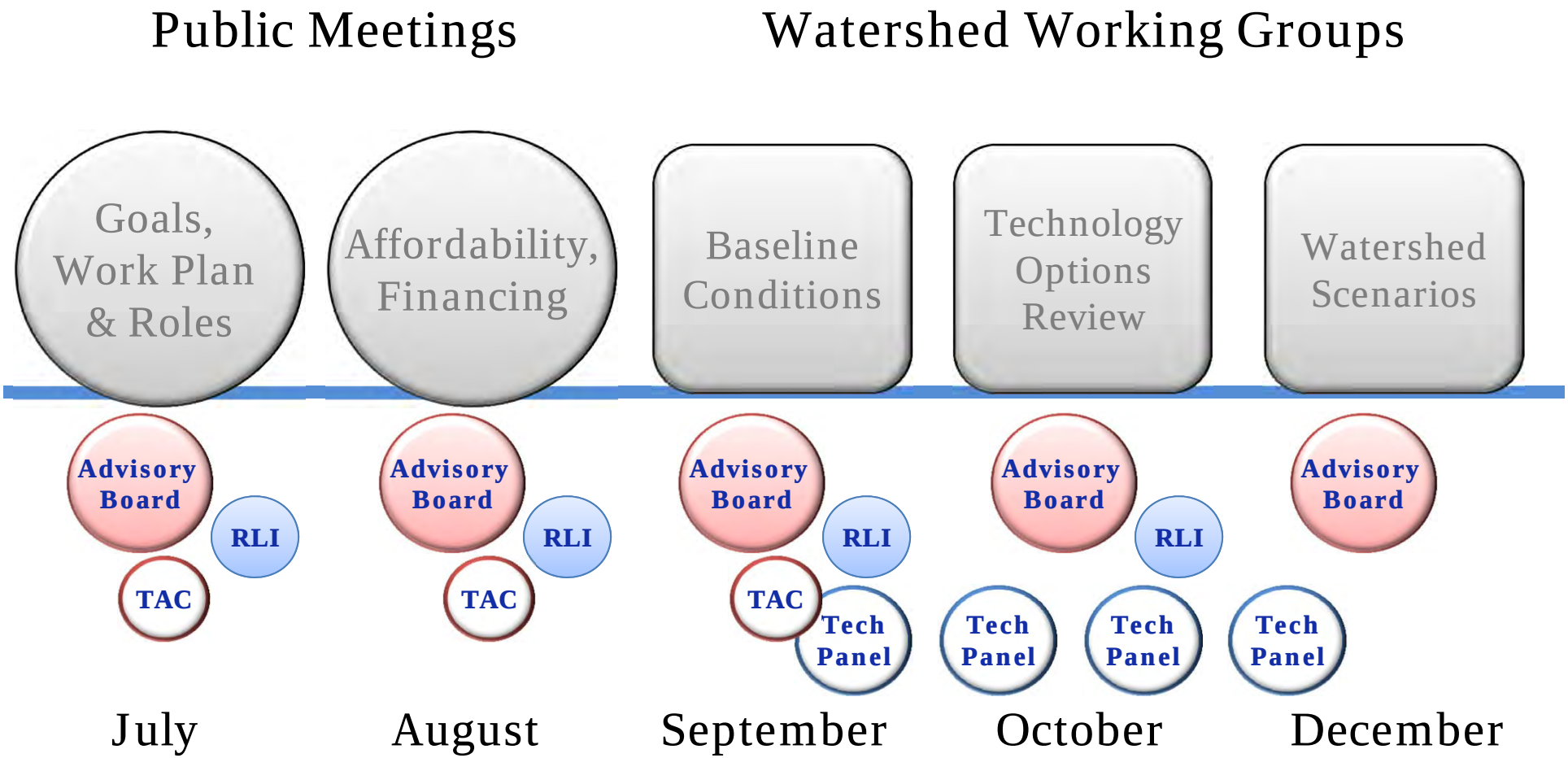

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

What is the stakeholder process?



208 Planning Process



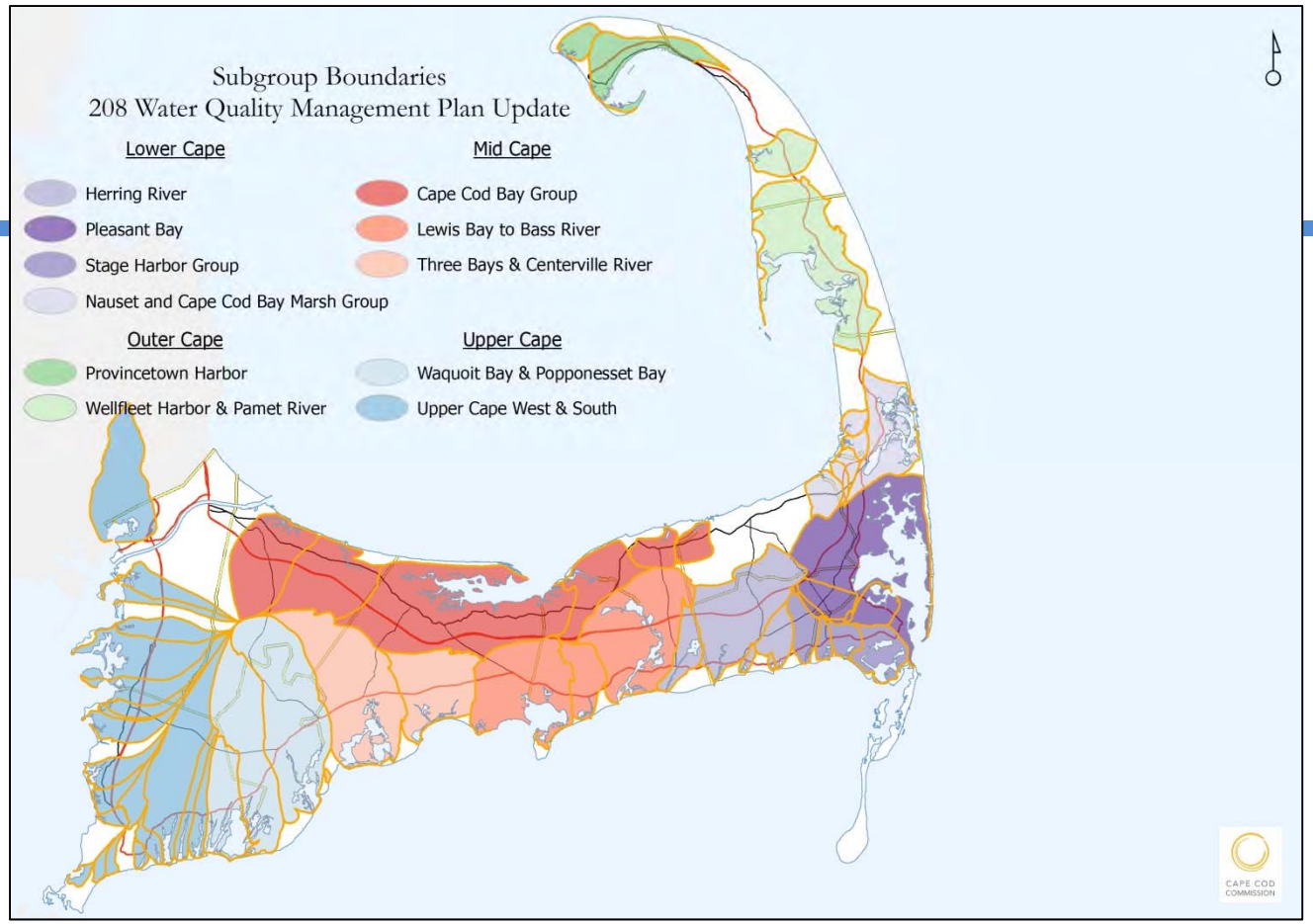
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



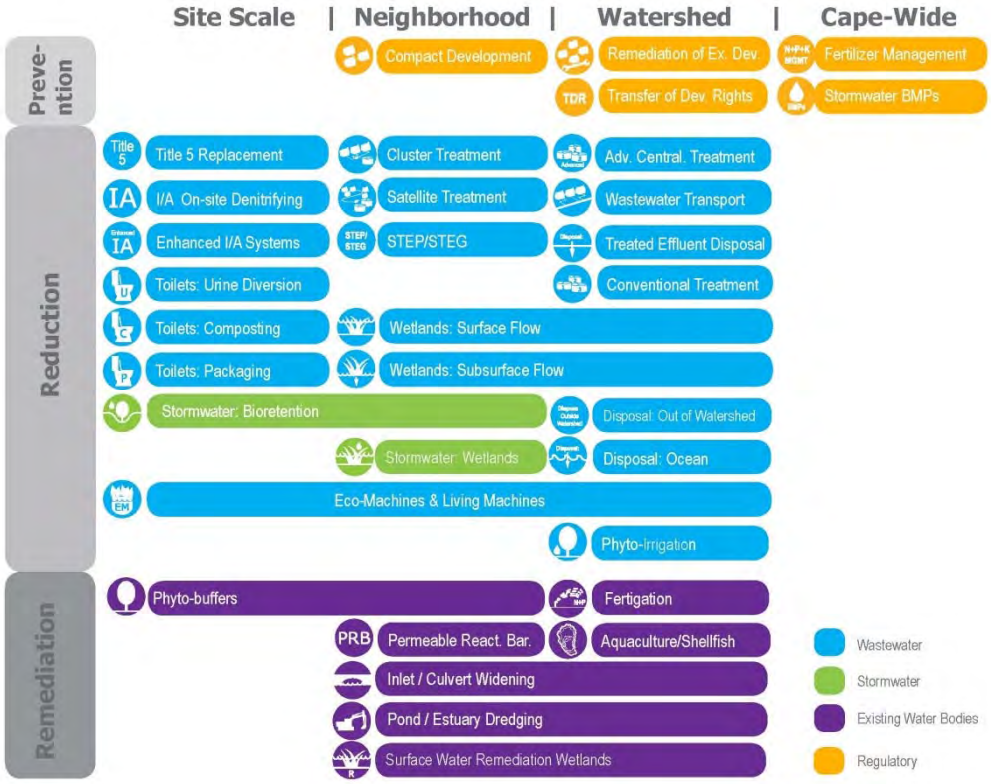
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5



208 Planning Process

Baseline Conditions

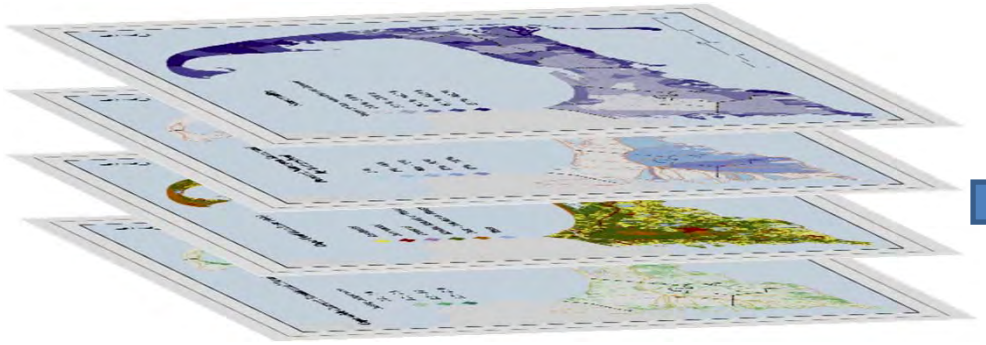
11 Working Group Meetings: Sept 18-27

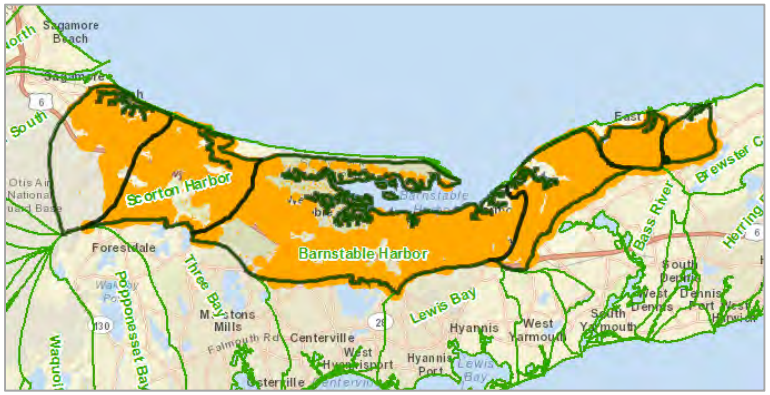
Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11





208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

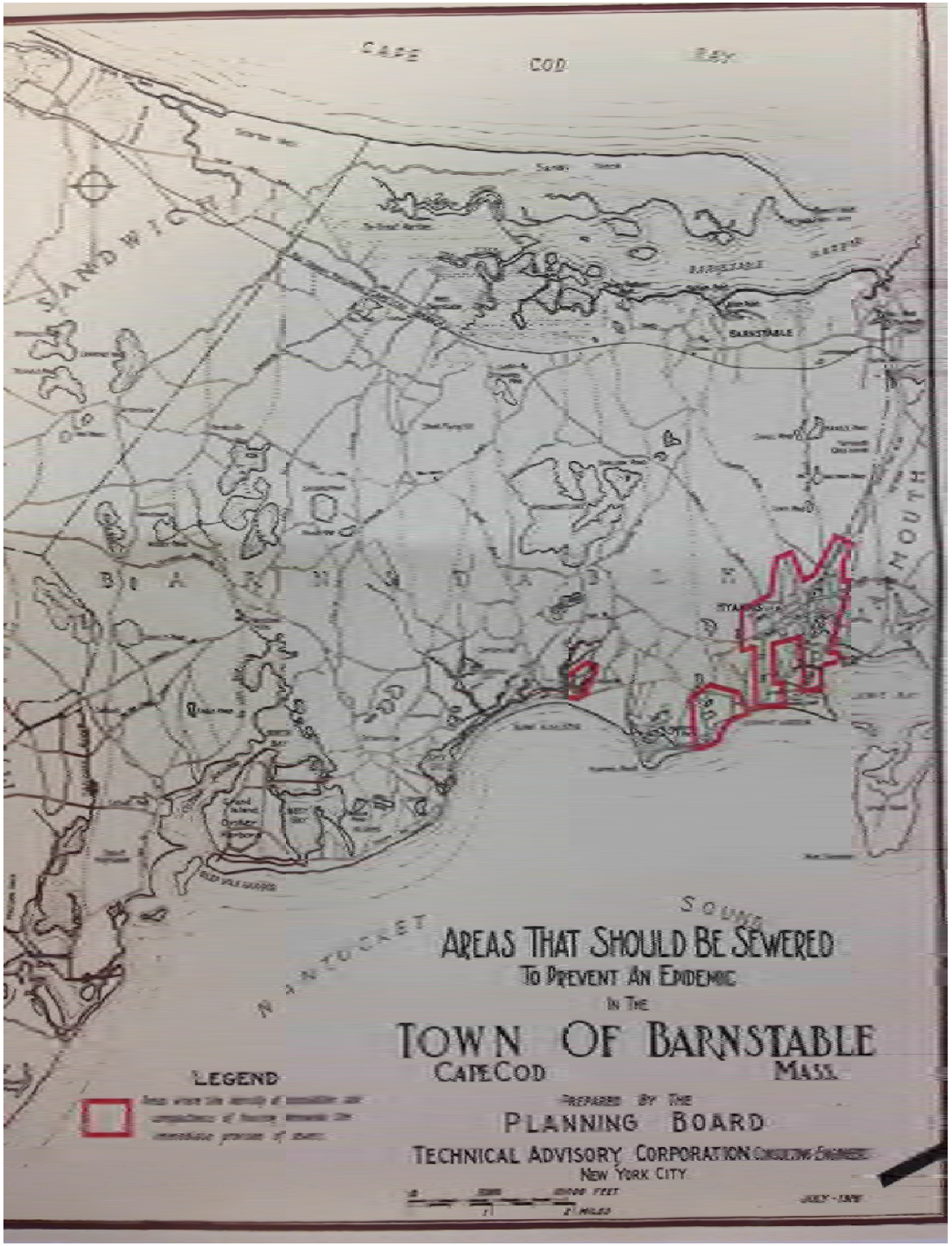
Goal of Today's Meeting:

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

208 Planning Process

Local Progress to Date

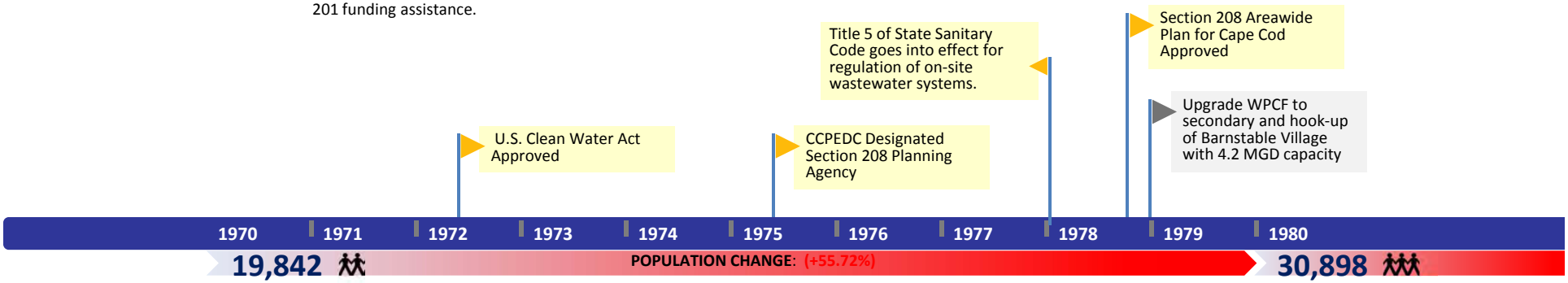
Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek


CAPE COD Bay
SANDWICH
BARNSTABLE
MOUTH
NANTUCKET SOUND
AREAS THAT SHOULD BE SEWERED
TO PREVENT AN EPIDEMIC
IN THE
TOWN OF BARNSTABLE
CAPE COD MASS.
PREPARED BY THE
PLANNING BOARD
TECHNICAL ADVISORY CORPORATION CONSULTING ENGINEERS
NEW YORK CITY
LEGEND

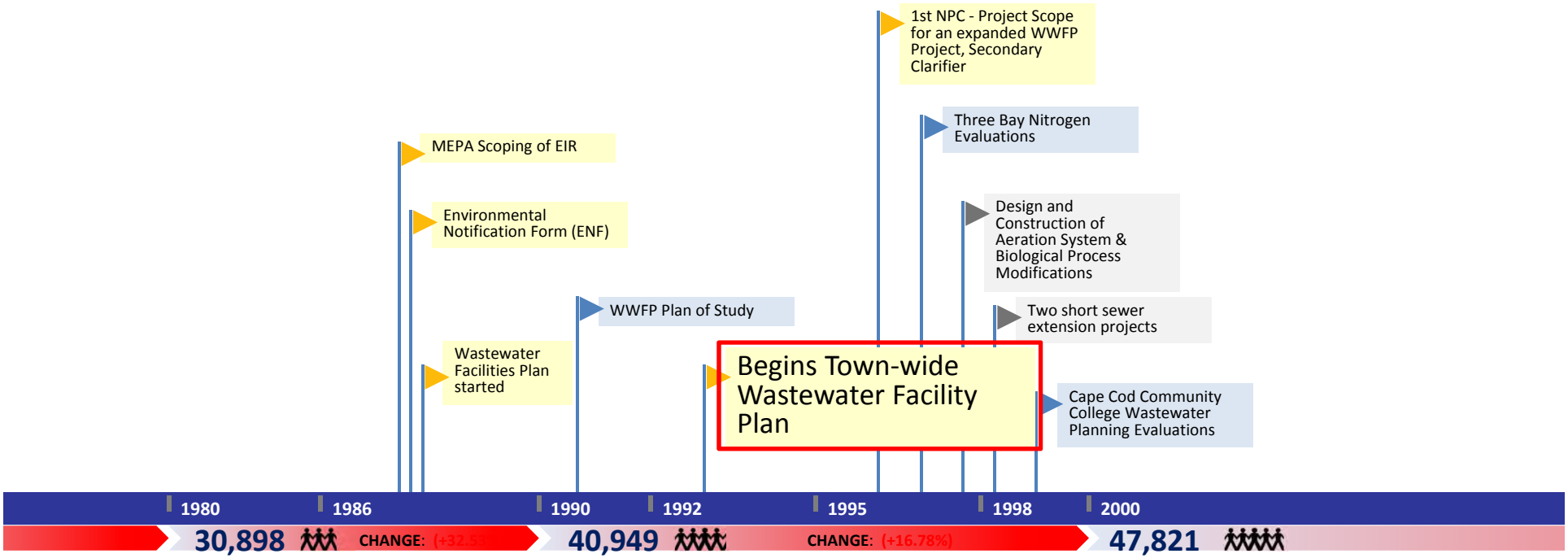
Barnstable: 1970-2013

From 1978 Section 208 Plan

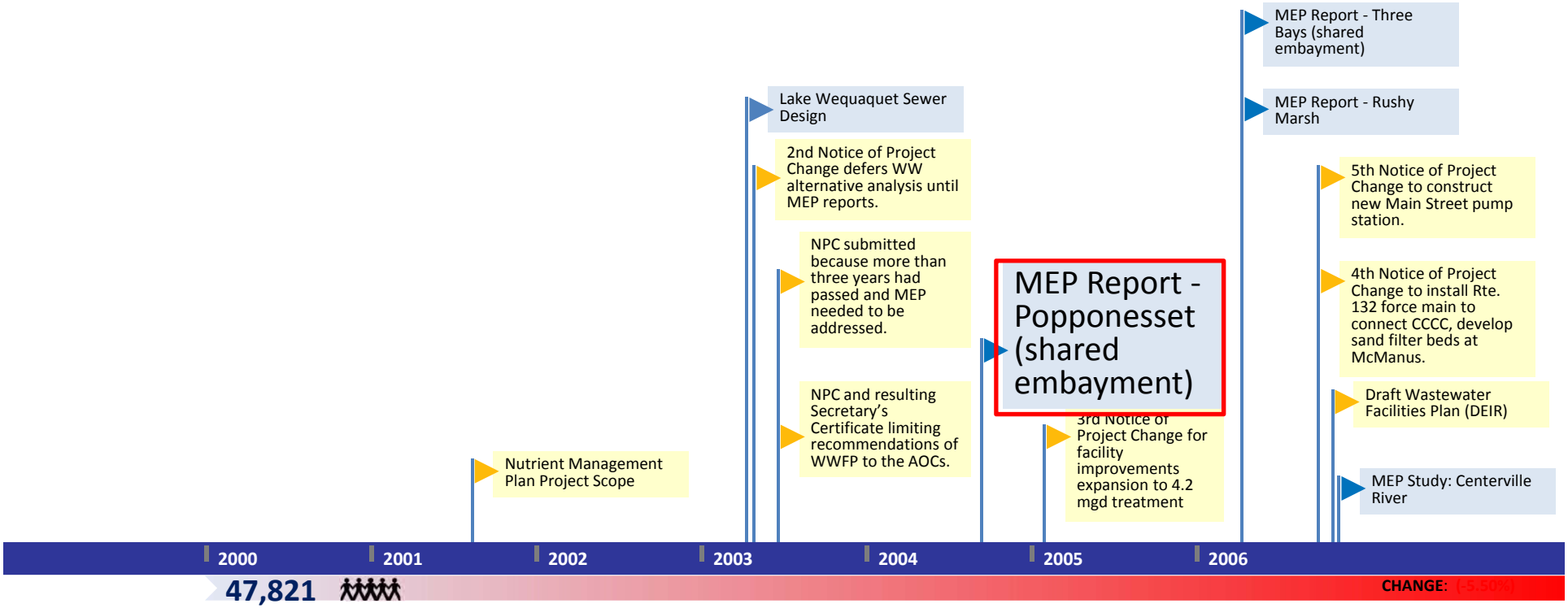
- The major 208 concern for Barnstable is the protection of its public water supply wells.
- The Planning Board appears to be interested in water supply protection as indicated by its recent zoning proposals. The coordination of town boards and the water utilities is essential to the success of this effort in Barnstable.
- Possible consolidation of the water utilities or some formal coordinative mechanism should be seriously considered to insure efficient and effective protection of the town's water resources.
- While the town is presently constructing an expansion of the sewage treatment plant and collection system with EPA 201 funds, it has not addressed all of the wastewater management problem areas in the town. Additional 201 facilities planning must be carried out to demonstrate a sewer need exists under present EPA criteria.
- Certain problem areas are included as future phases of the sewer collection system expansion in the "Sewer Service Areas" delineated in the 208 plan and would be eligible for 201 funding assistance.
- The present Hyannis treatment plant has the necessary capacity to handle all sewer service area needs in Hyannis. Should the town want to expand the collection system beyond these sewer service areas, 201 funds will not be available for these expansions or for an additional treatment plant.
- The need for collection system expansion in the Hyannis area should be carefully considered in assessing the plant's ability to accept wastewater from Yarmouth since the Hyannis treatment plant cannot be expanded beyond its present capacity.
- The town should consider, in the near future, entering into a 201 facilities plan to resolve the present Category 2 problem areas possibly through decentralized solutions.
- The 201 study and efforts of town board should address the coastal water quality problems of the town, particularly Lewis Bay.



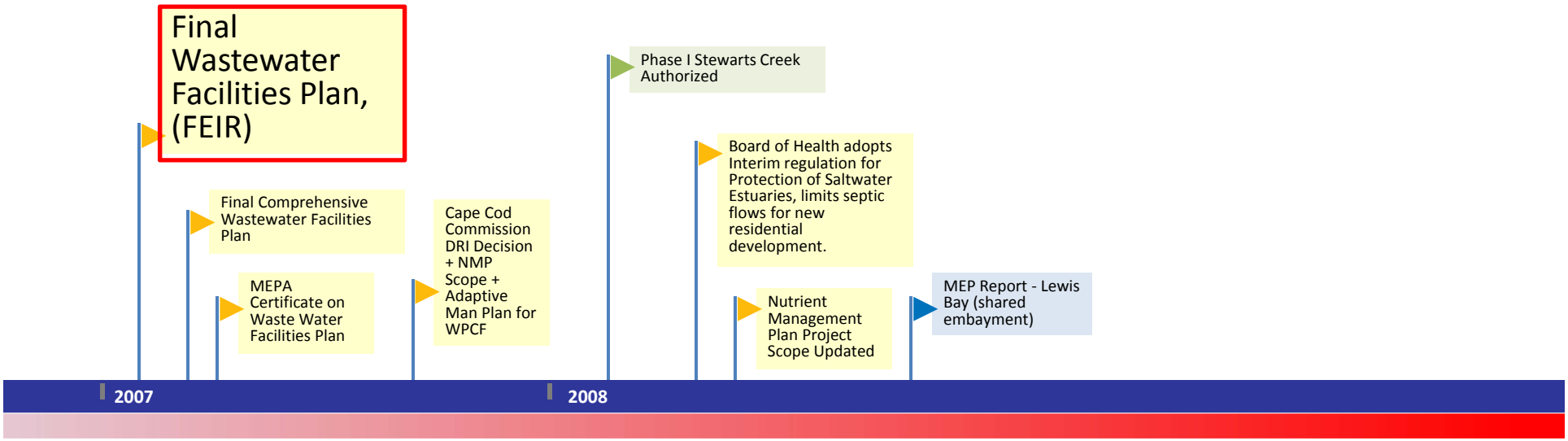
Barnstable: 1970-2013



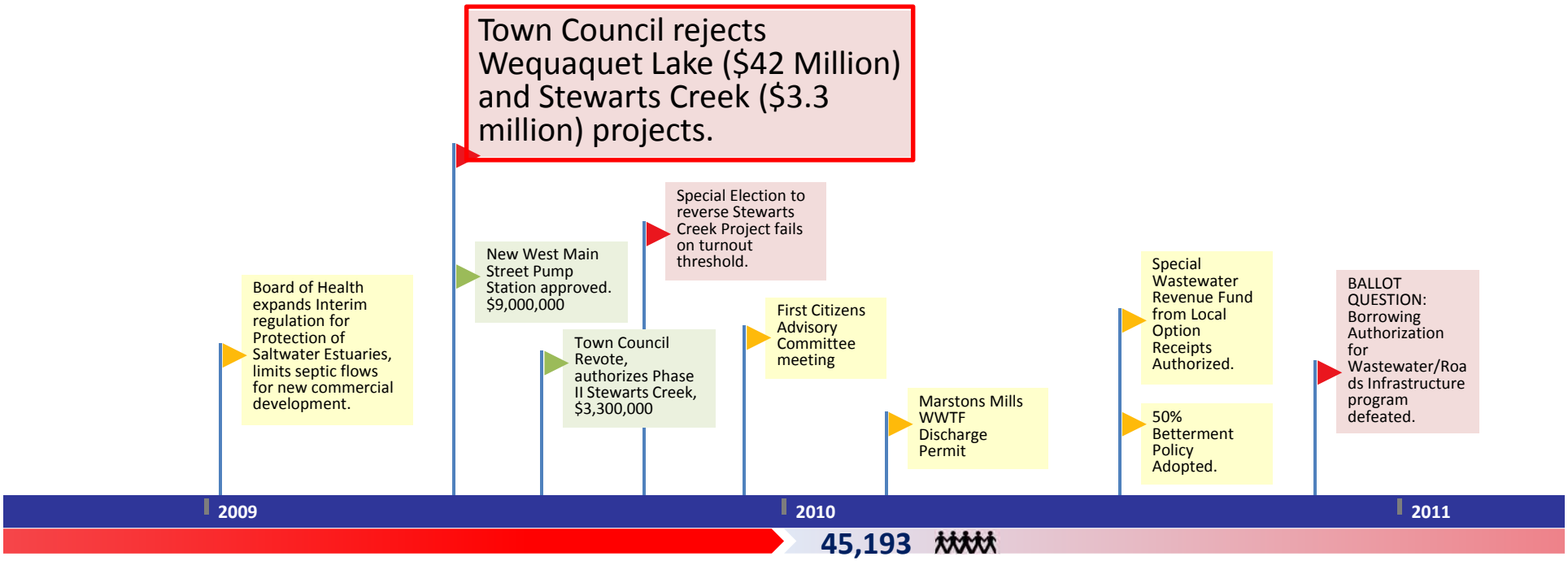
Barnstable: 1970-2013



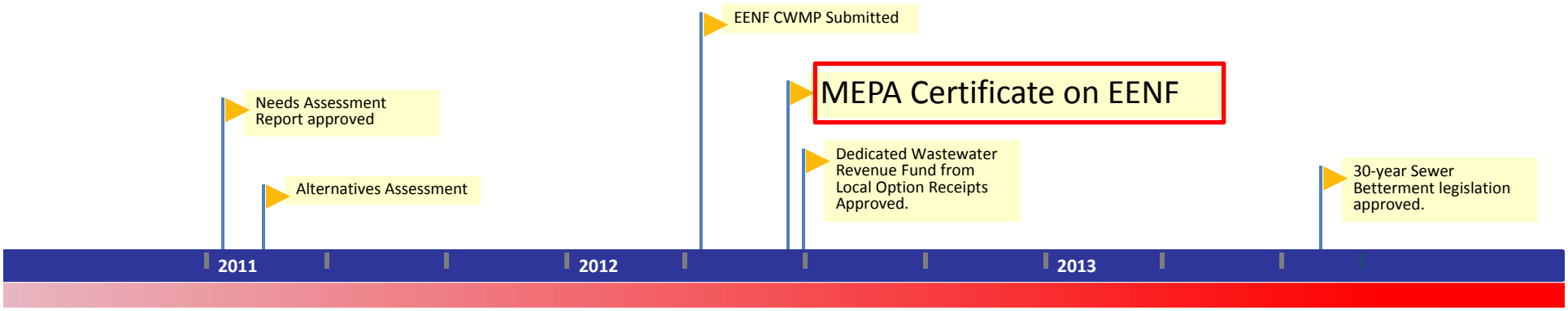
Barnstable: 1970-2013



Barnstable: 1970-2013



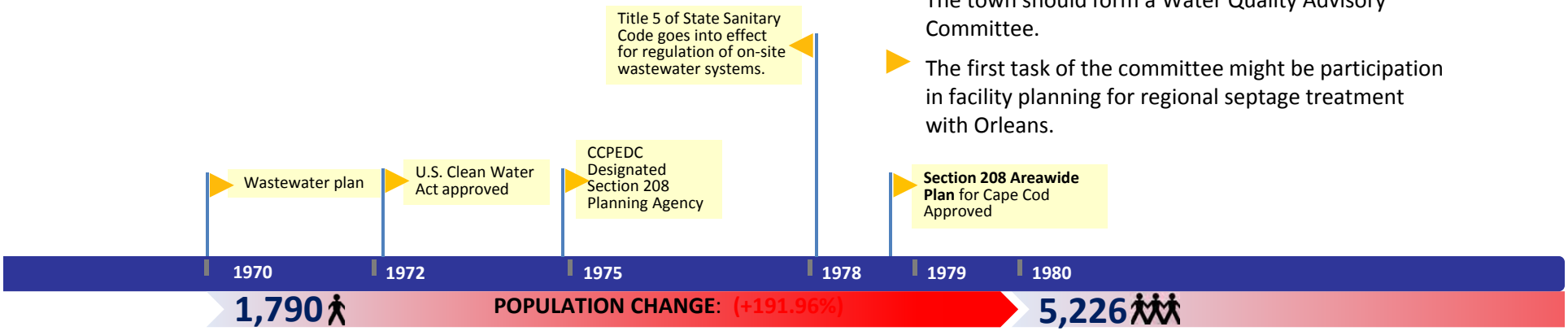
Barnstable: 1970-2013



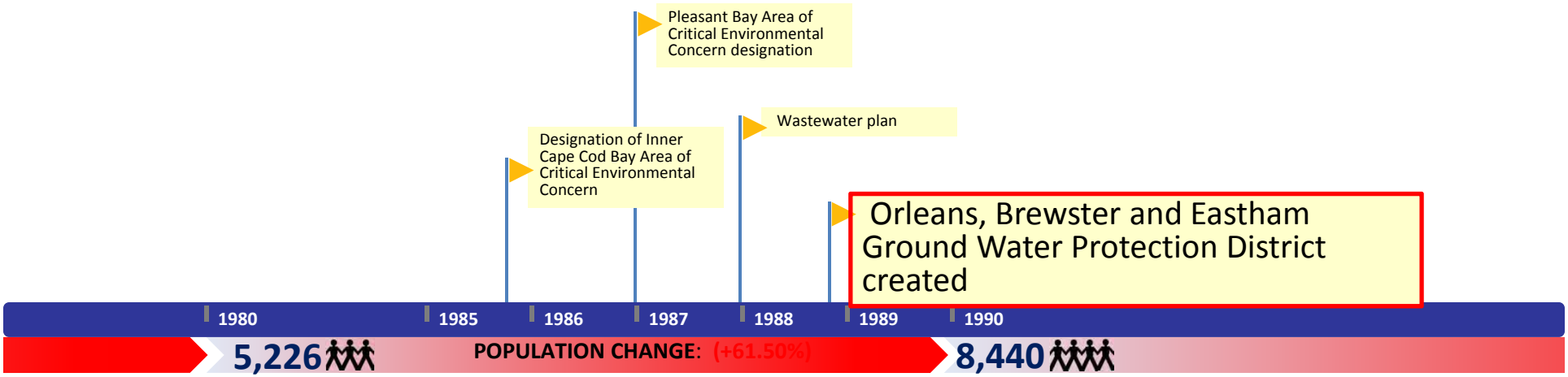
Brewster

From 1978 Section 208 Plan

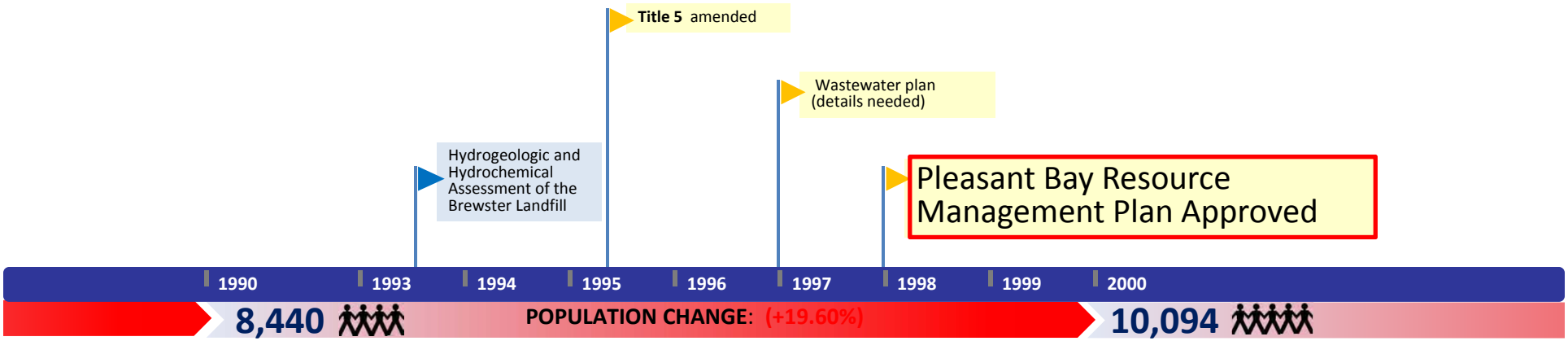
- Present and future town well sites should be protected from the non-point sources resulting from New development by creating Watershed Protection Districts.
- The town should cooperate in regional water supply planning to determine future water supply needs of neighboring towns and whether it can assist.
- 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.



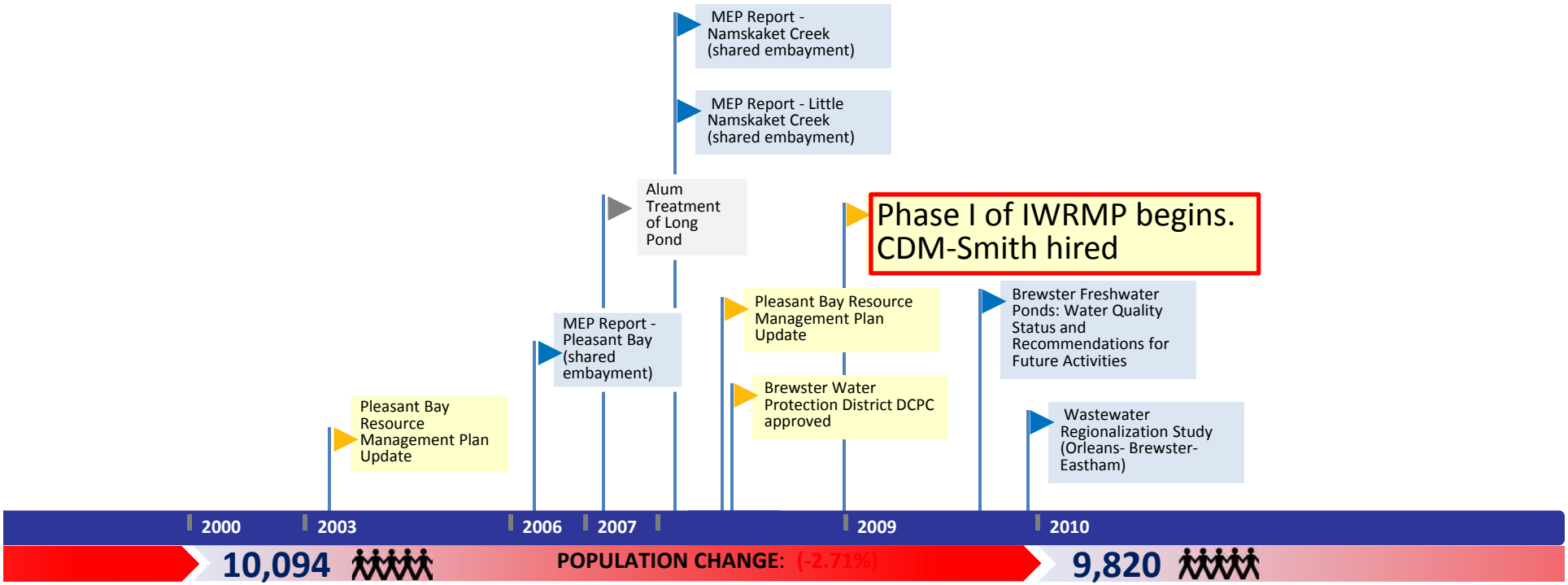
Brewster: 1970-2013



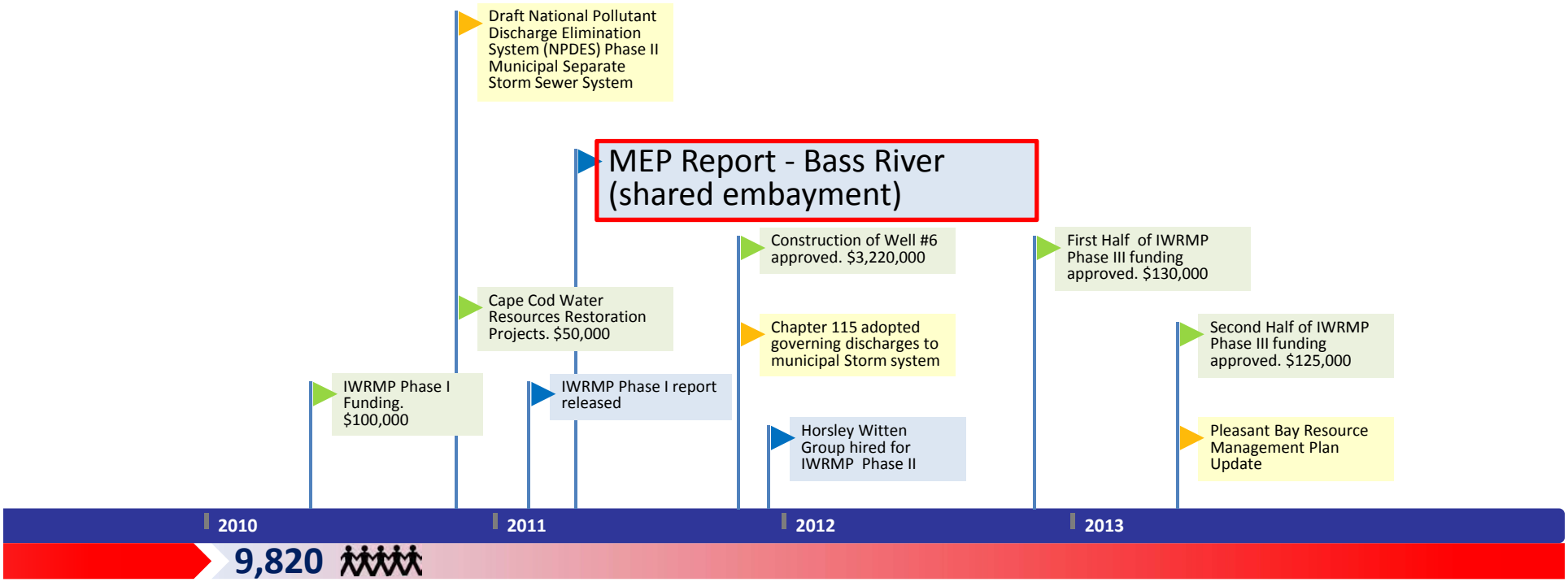
Brewster: 1970-2013



Brewster: 1970-2013



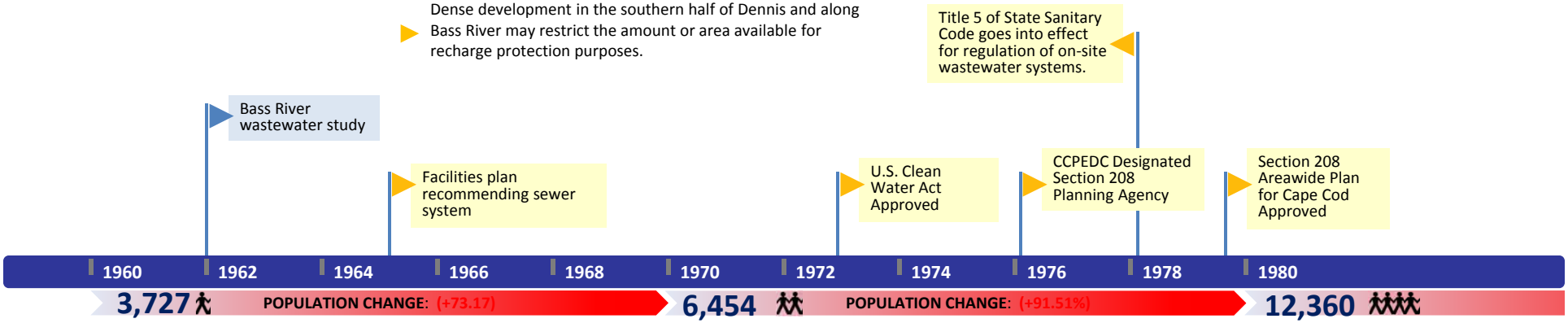
Brewster: 1970-2013



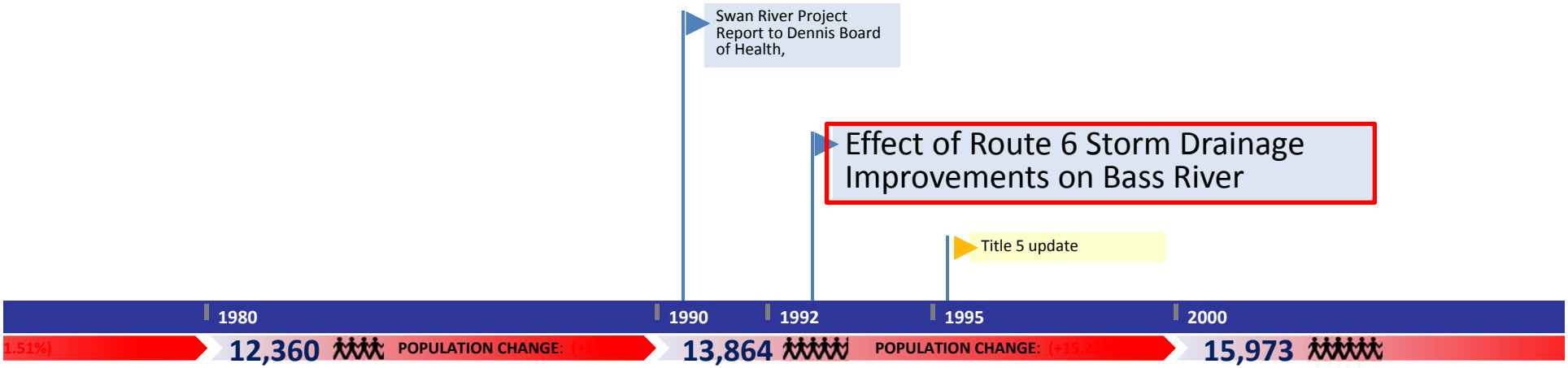
Dennis

From 1978 Section 208 Plan

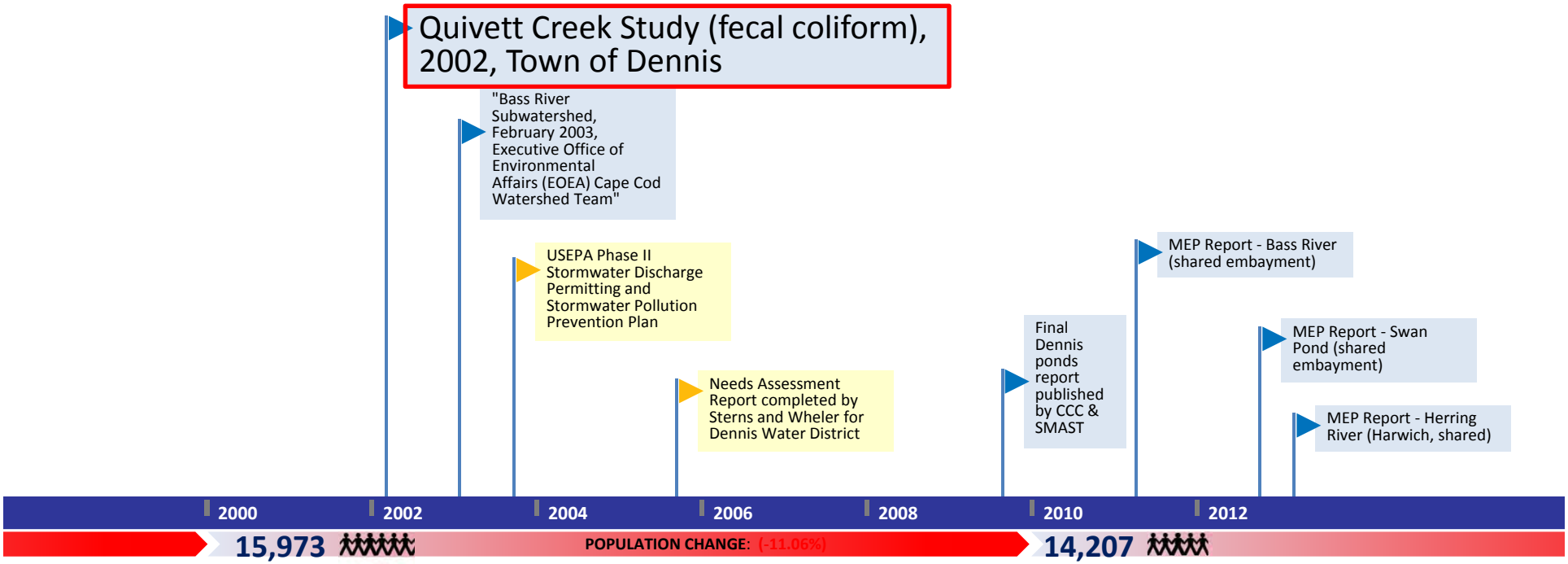
- Dennis has a professional health agent and the town's health regulations already implement many of the 208 plan recommendations.
- It is recommended that the town consider creating a "Seasonal Residential District" in the area south of Lower County Road and carefully control the conversion of seasonal 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



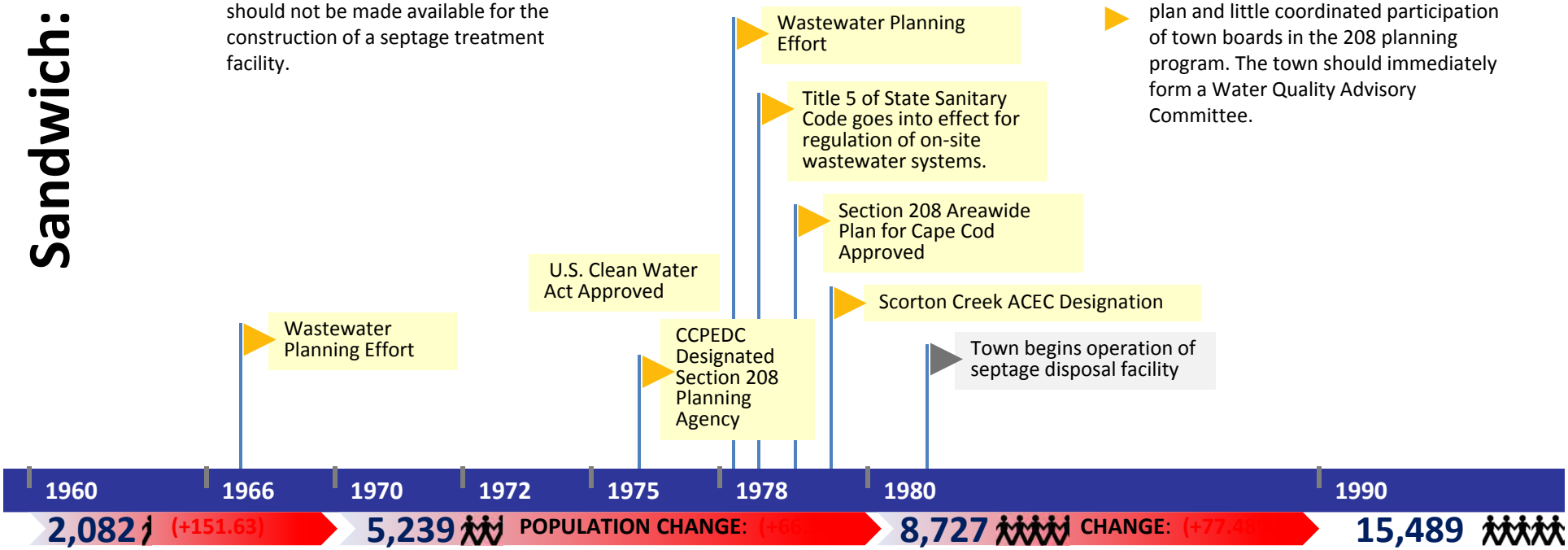
Dennis: 1970-2013



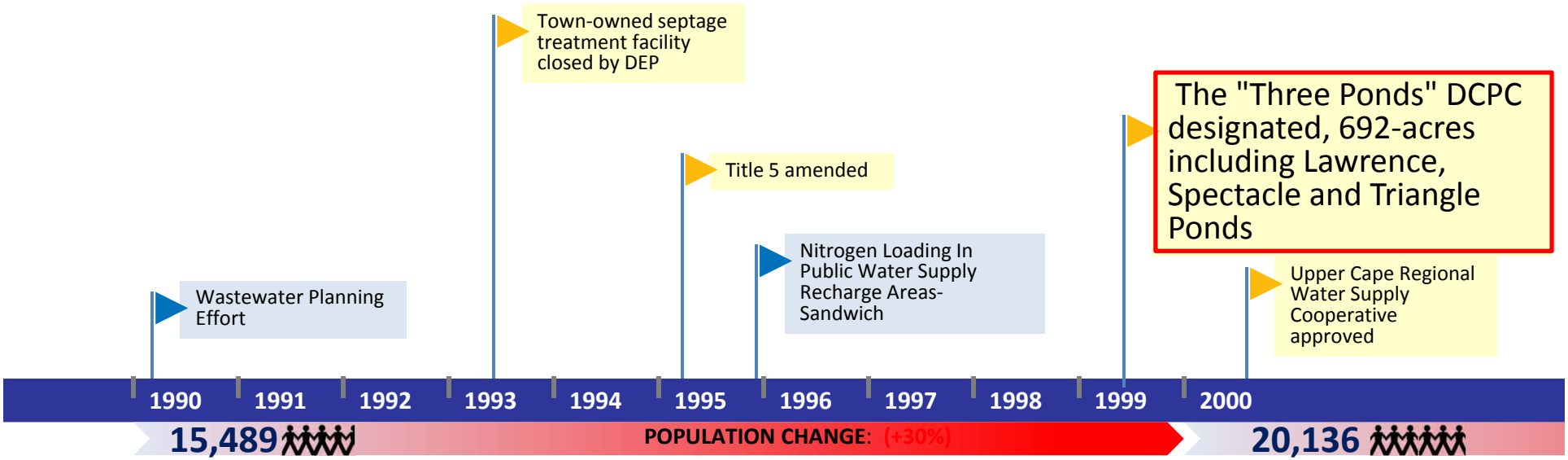
Sandwich: 1960-2013

From 1978 Section 208 Plan

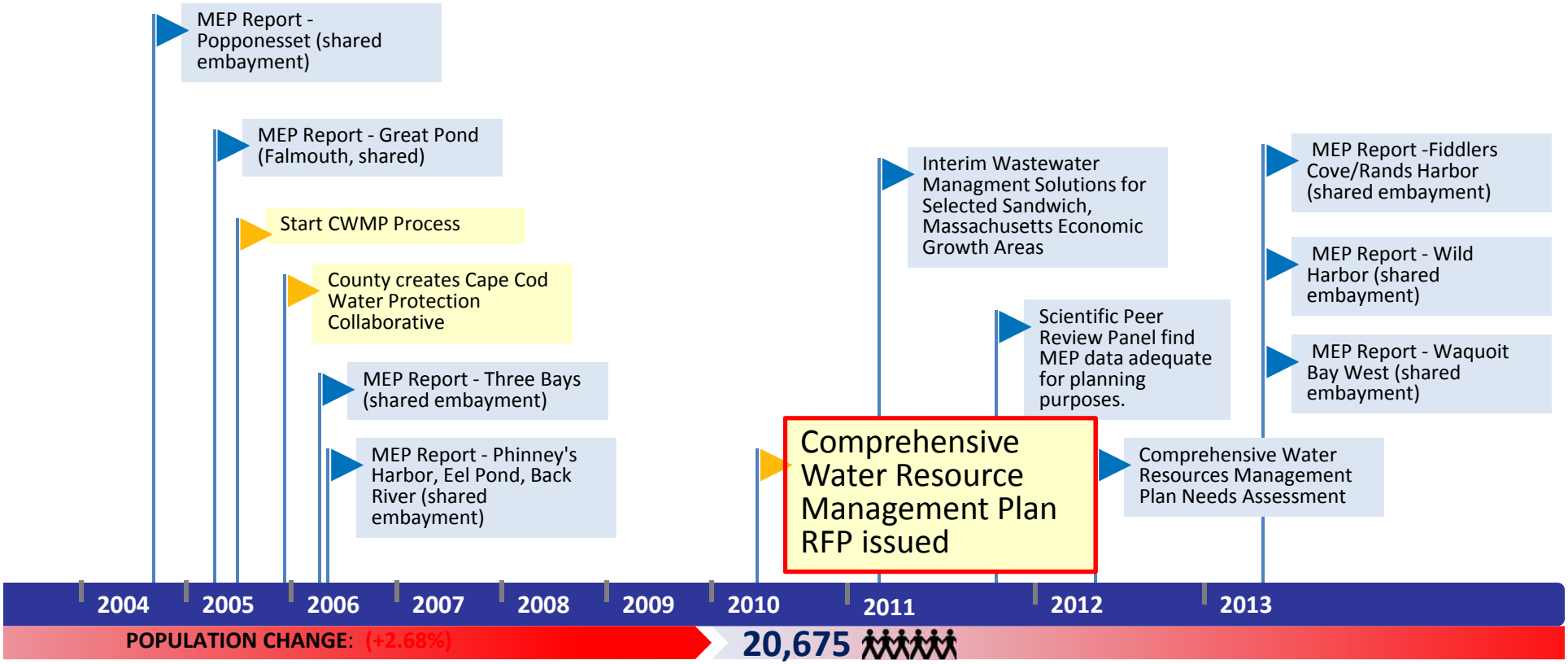
- A sewer facilities plan was completed for Sandwich in 1978. The plan calls for a small outfall into the Cape Cod Canal, which now could only be allowed through a special act of the legislature.
- Should the town fail to act by 1980, a DEQE investigation of Title 5 violations should be initiated.
- 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



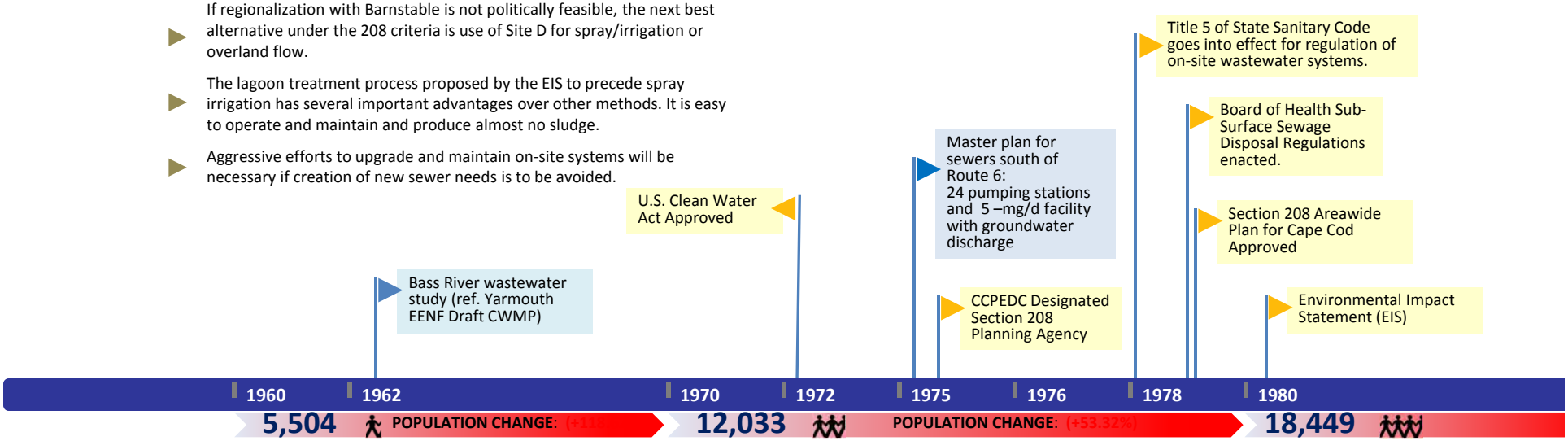
Sandwich: 1960-2013



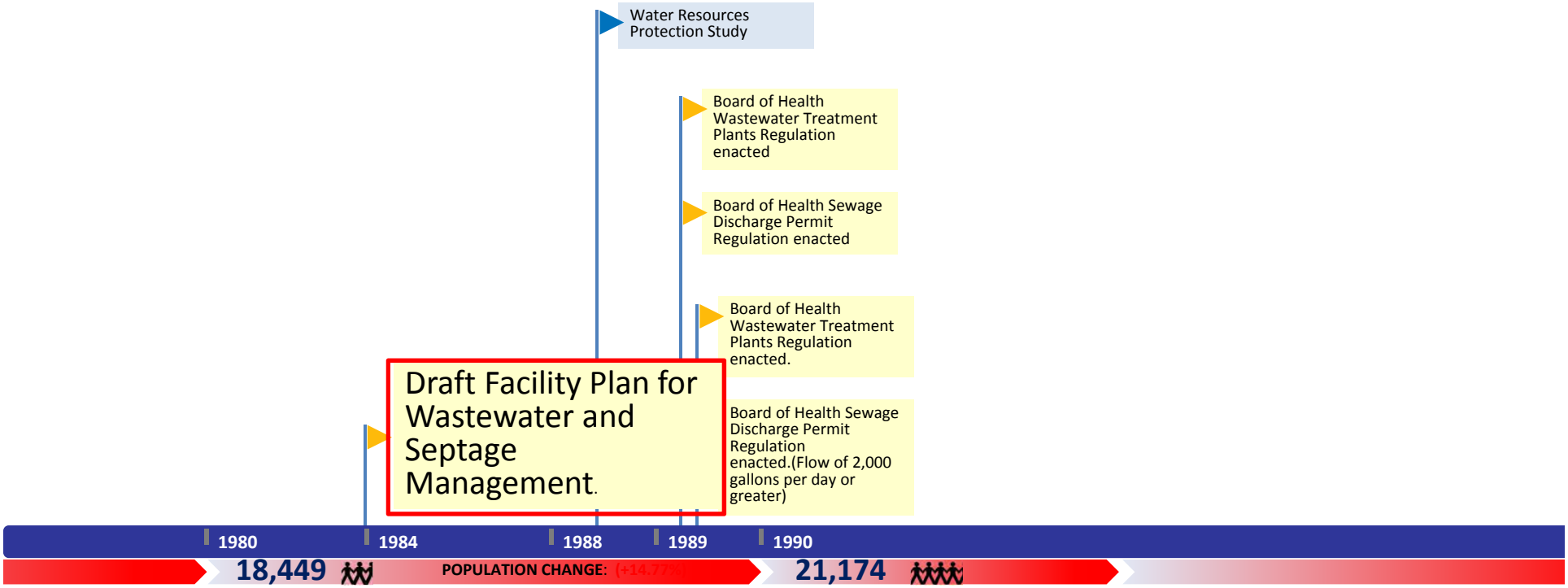
Yarmouth: 1960-2013

From 1978 Section 208 Plan

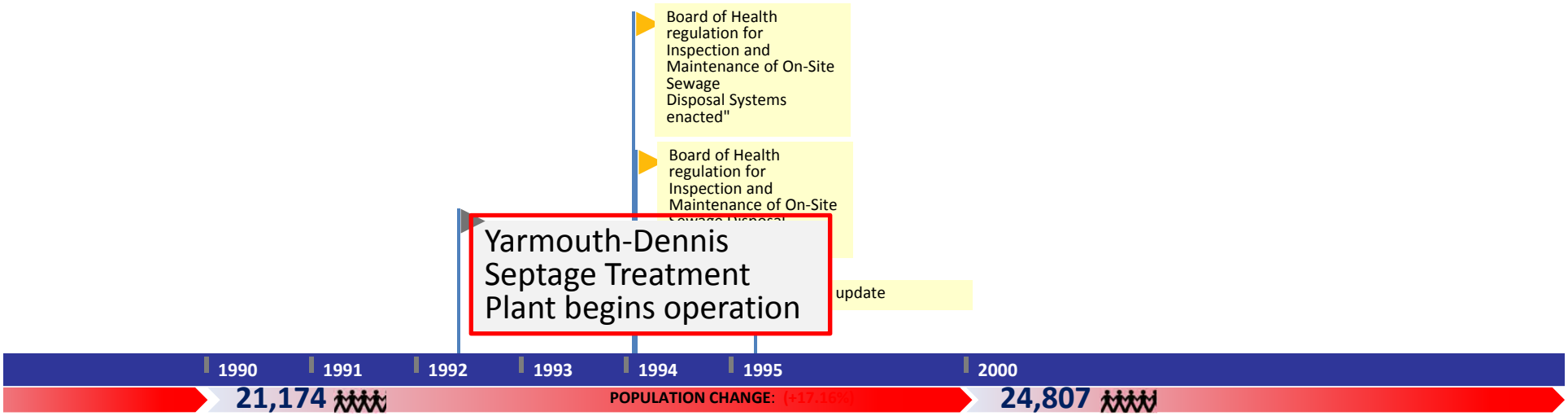
- The Wastewater management problems are reported to be severe in the commercial zone along Route 28. Water supply protection is also of critical concern to the town since development is rapidly encroaching upon existing and future wellfield areas.
- On-site system rehabilitation in problem areas is 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.



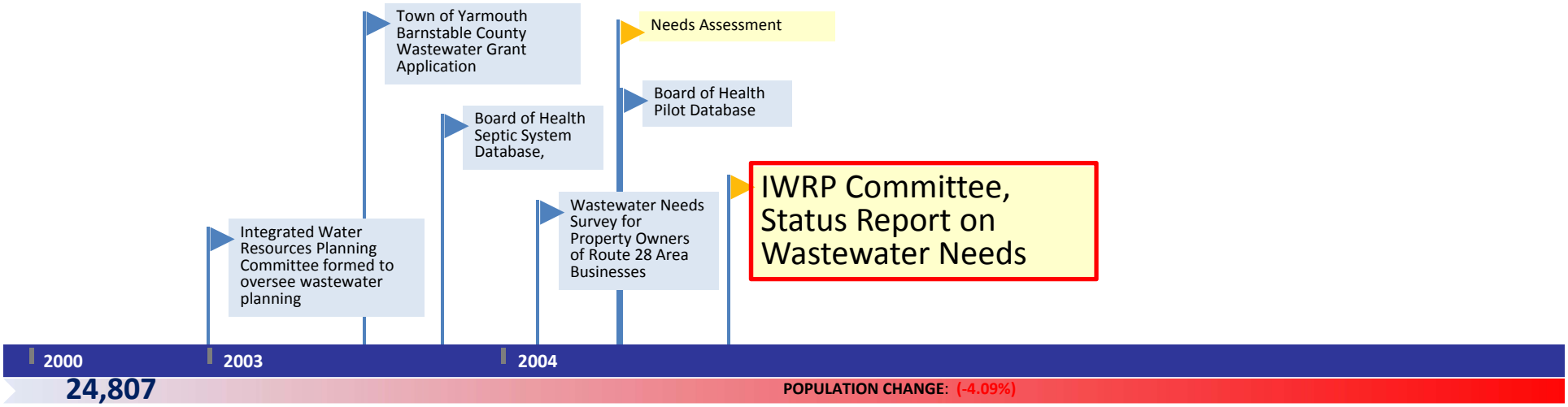
Yarmouth: 1960-2013



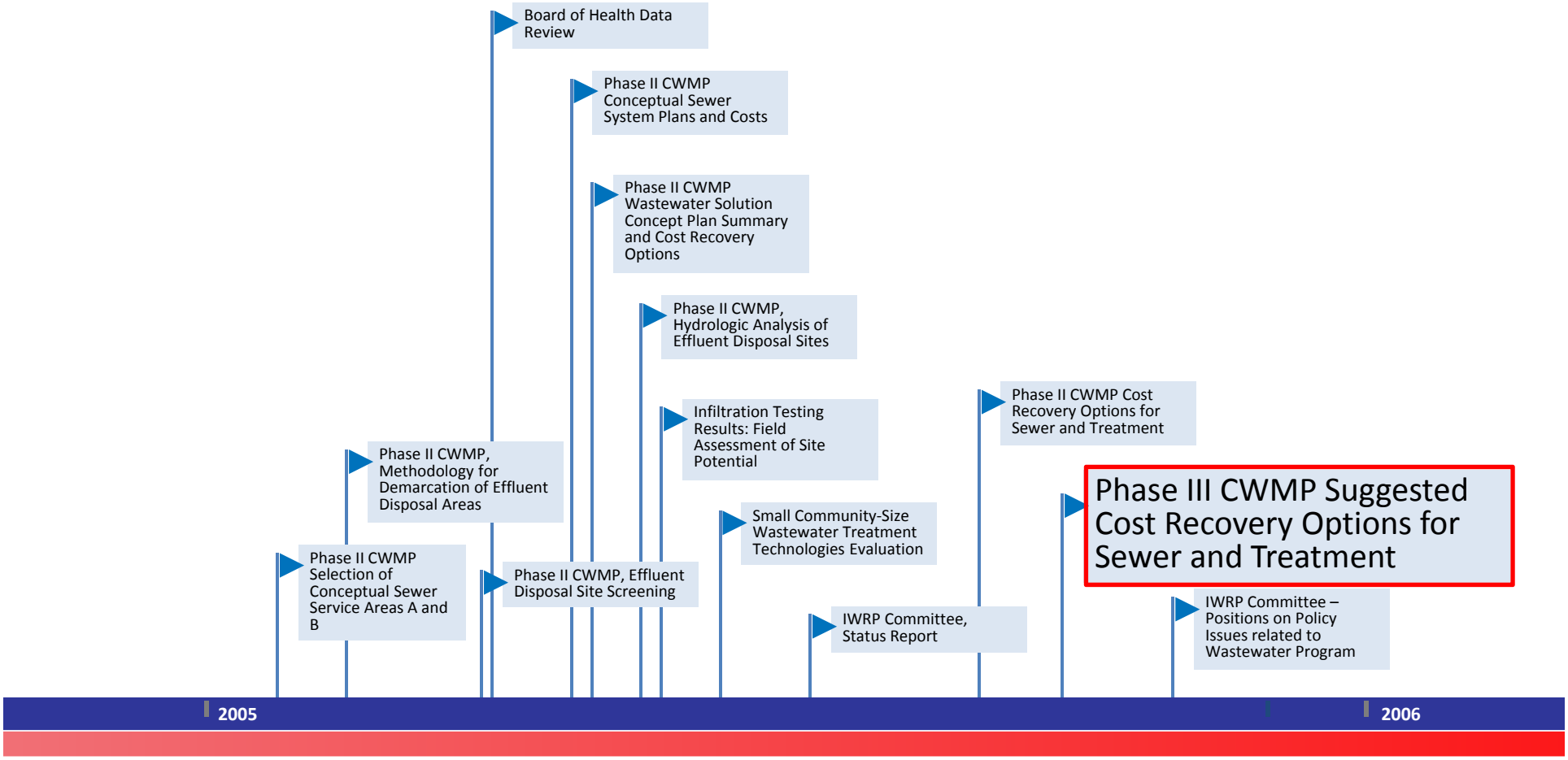
Yarmouth: 1960-2013



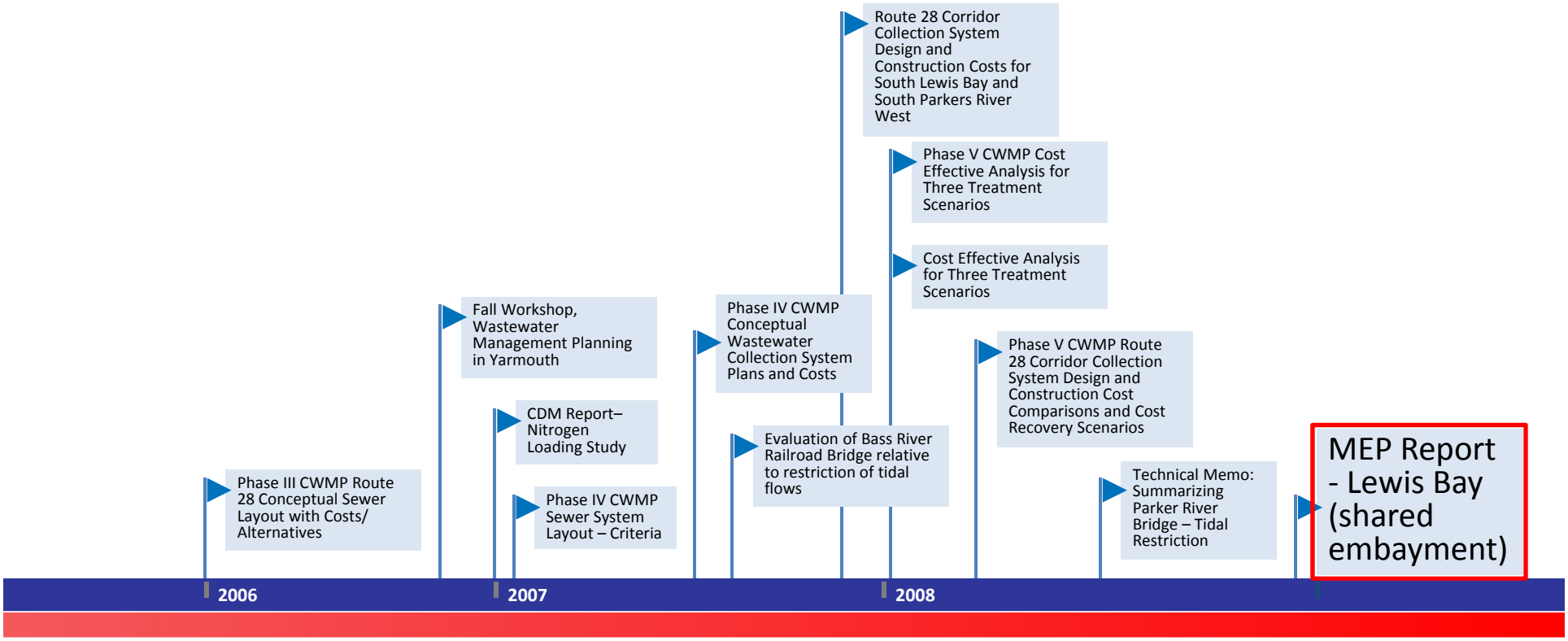
Yarmouth: 1960-2013



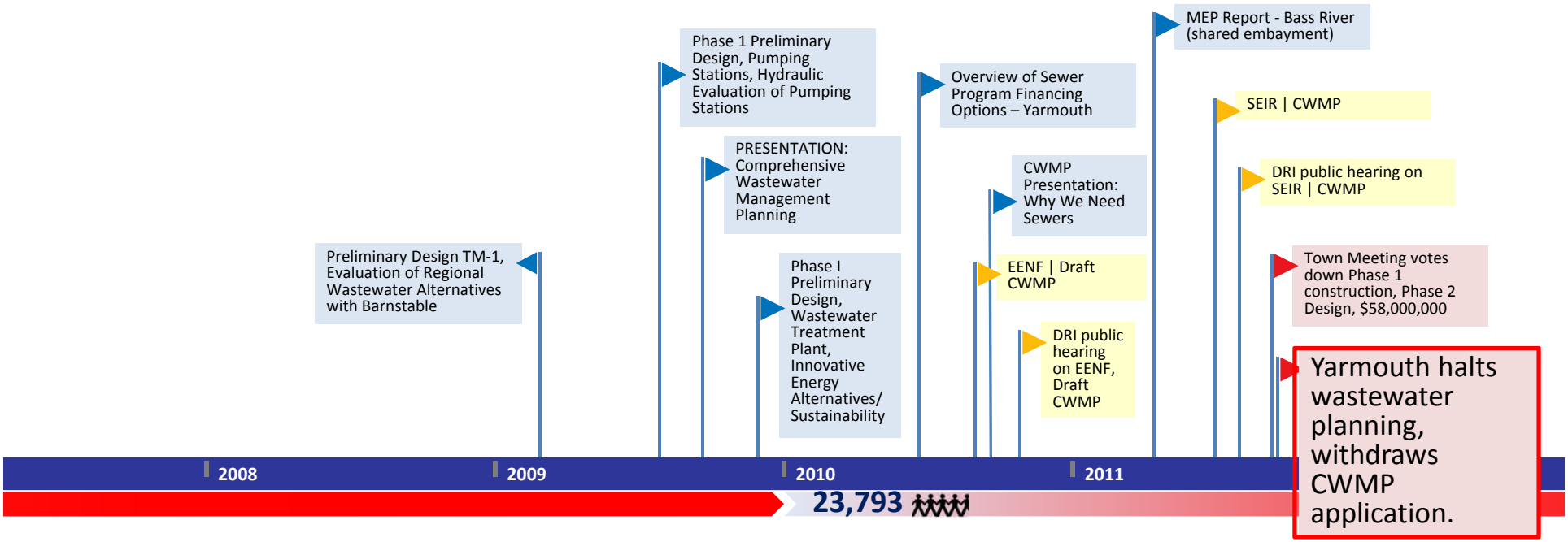
Yarmouth: 1960-2013



Yarmouth: 1960-2013



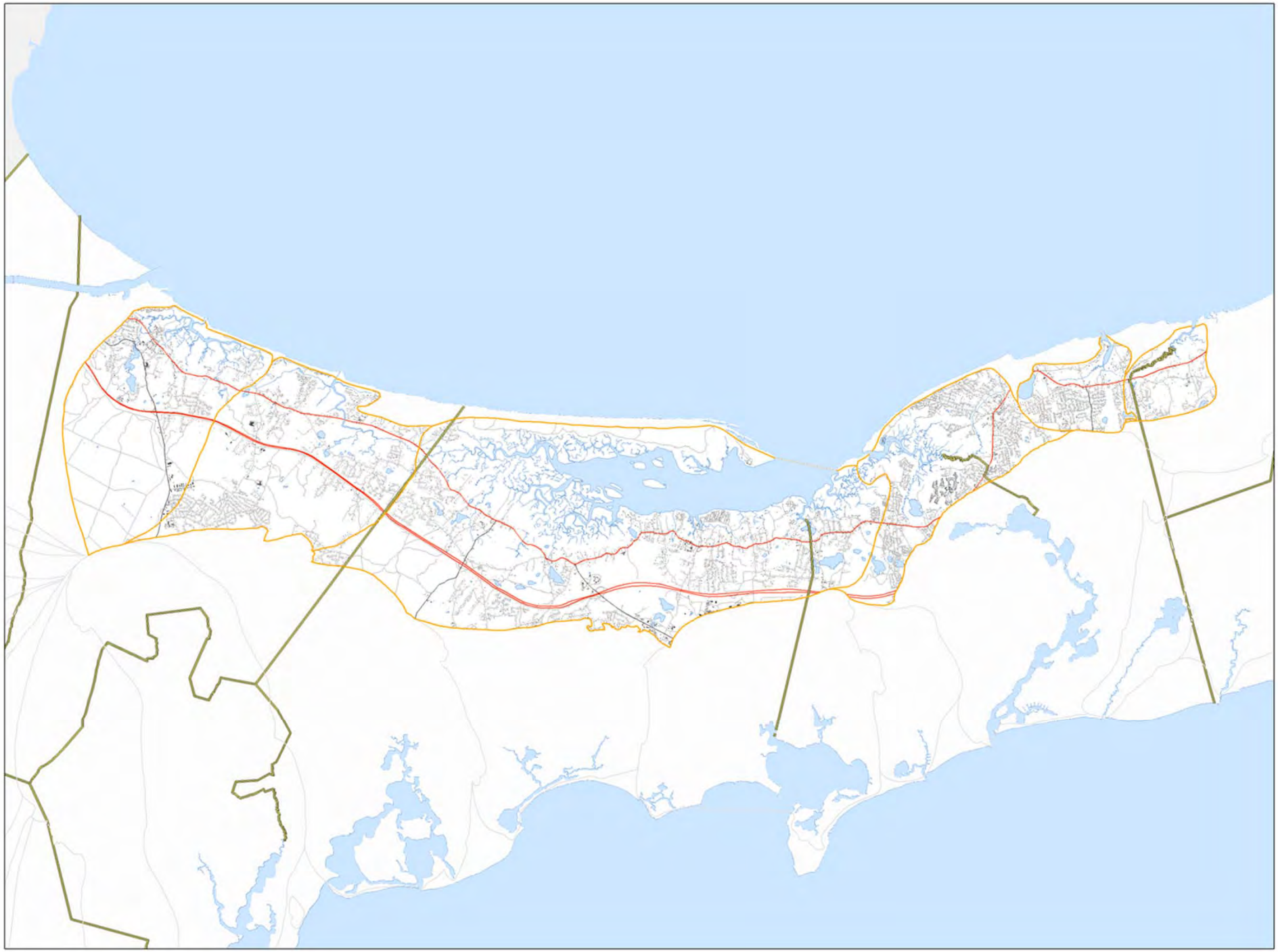
Yarmouth: 1960-2013



Did we miss anything?

Your Watersheds

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




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

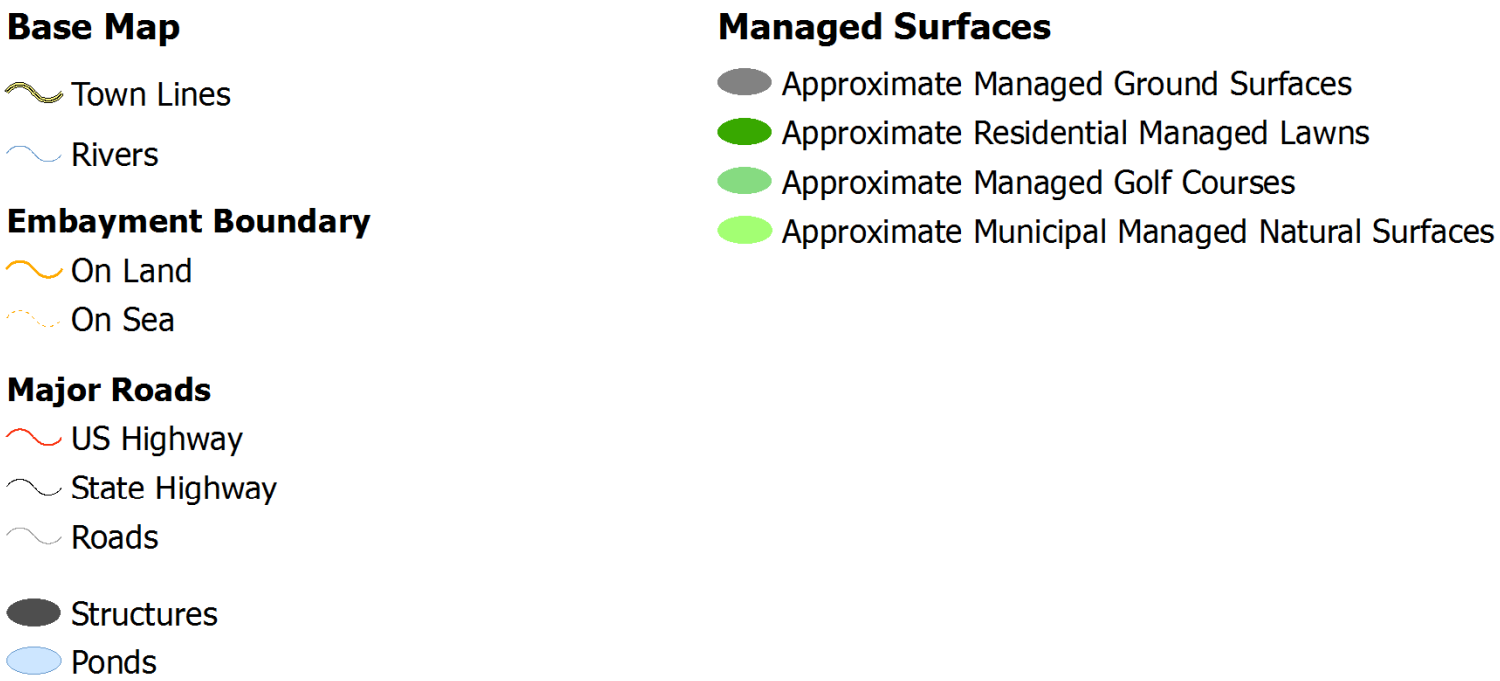
- Structures
- Ponds

Natural Areas

- Natural Heritage & Endangered Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

Managed Surfaces



Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

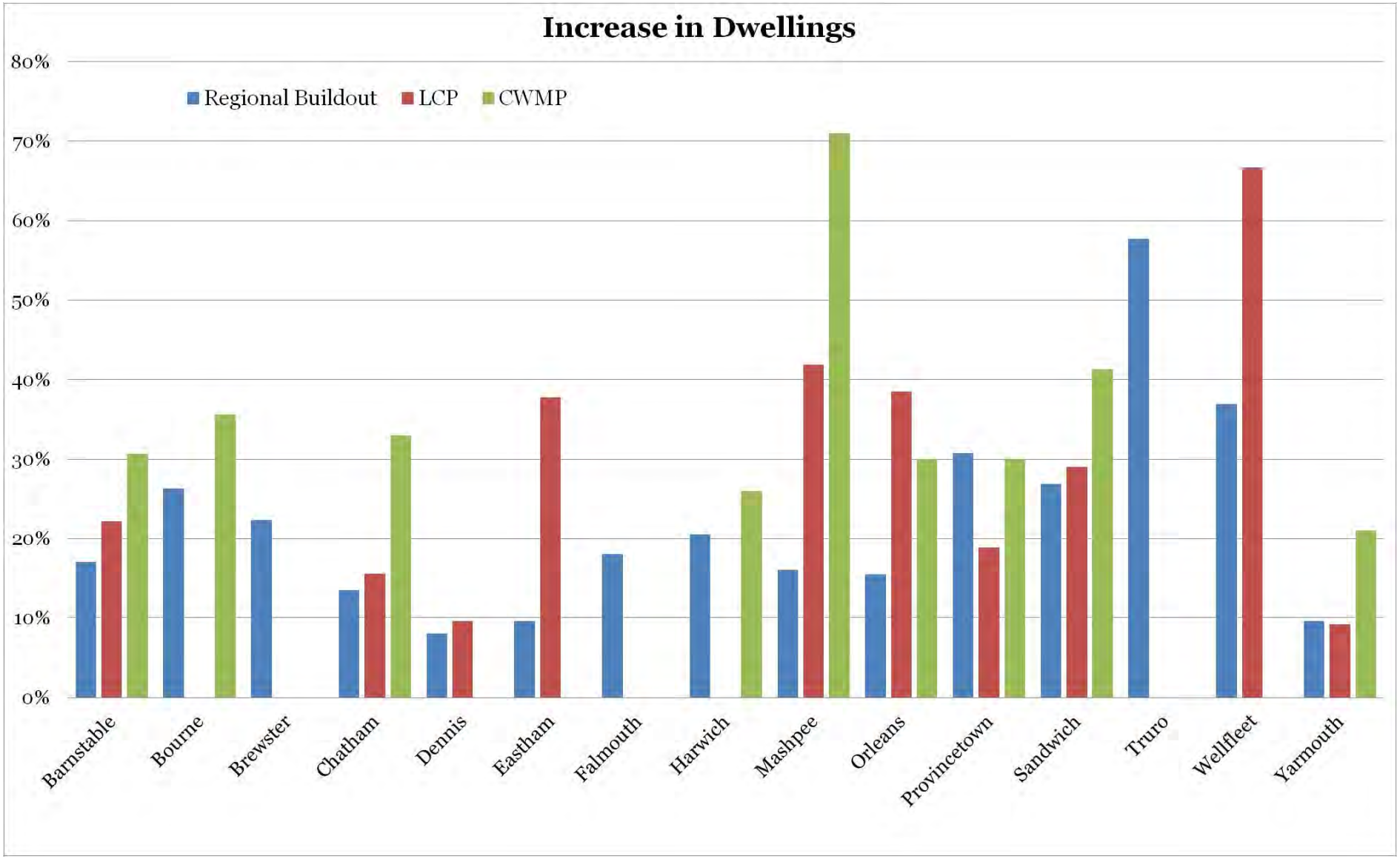
Sources: MassGIS, MassDOT

Density

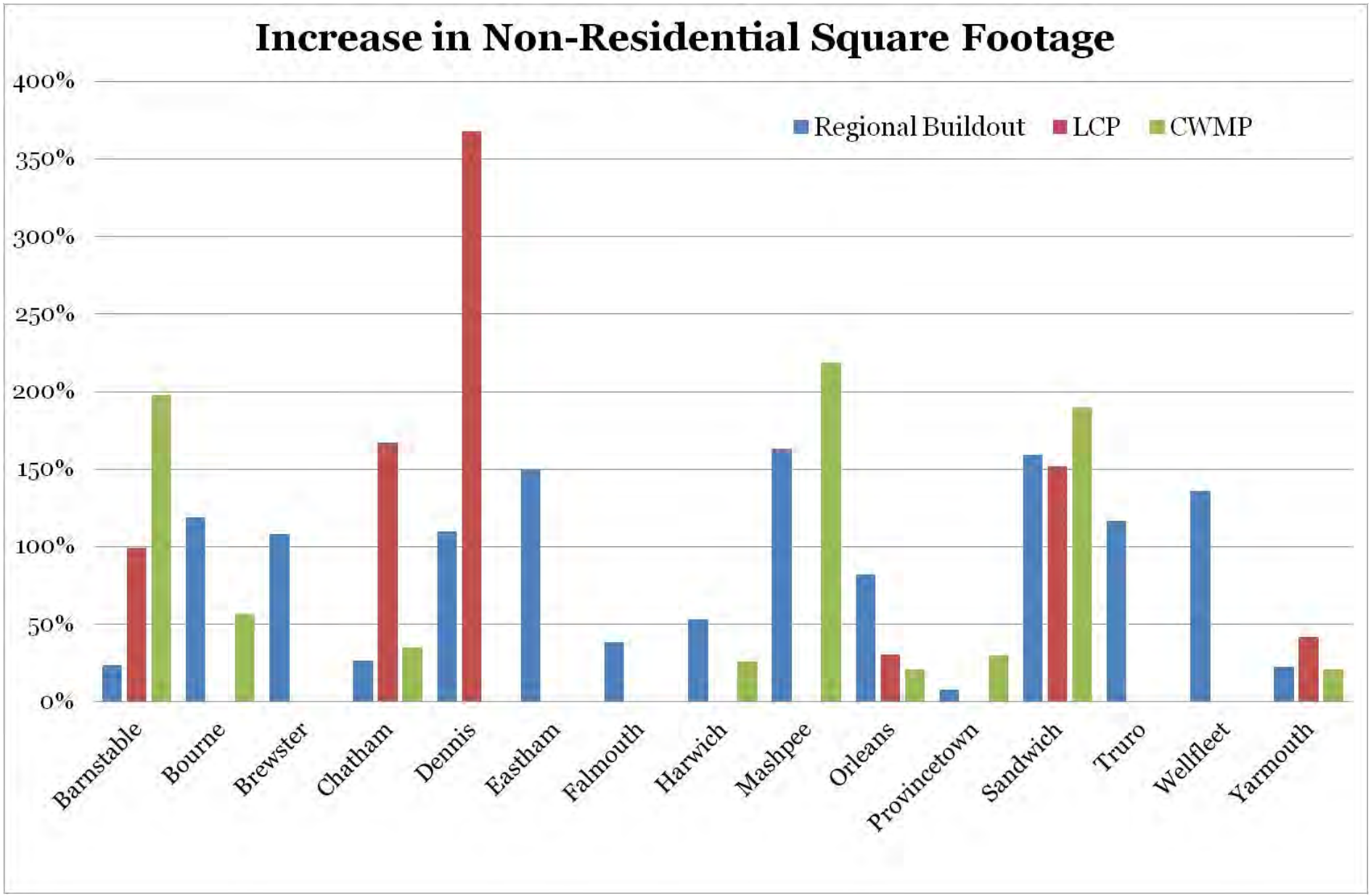
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

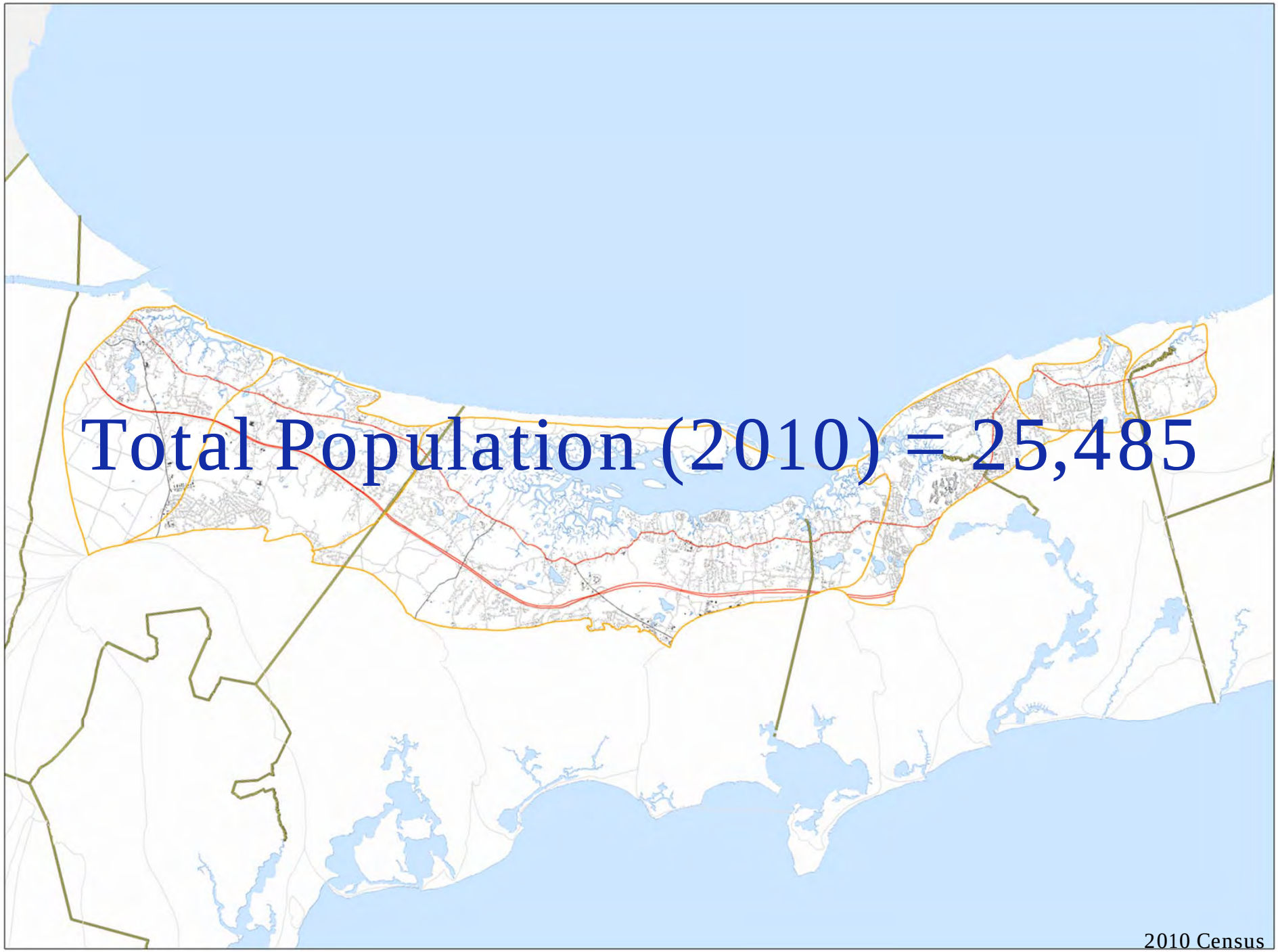

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

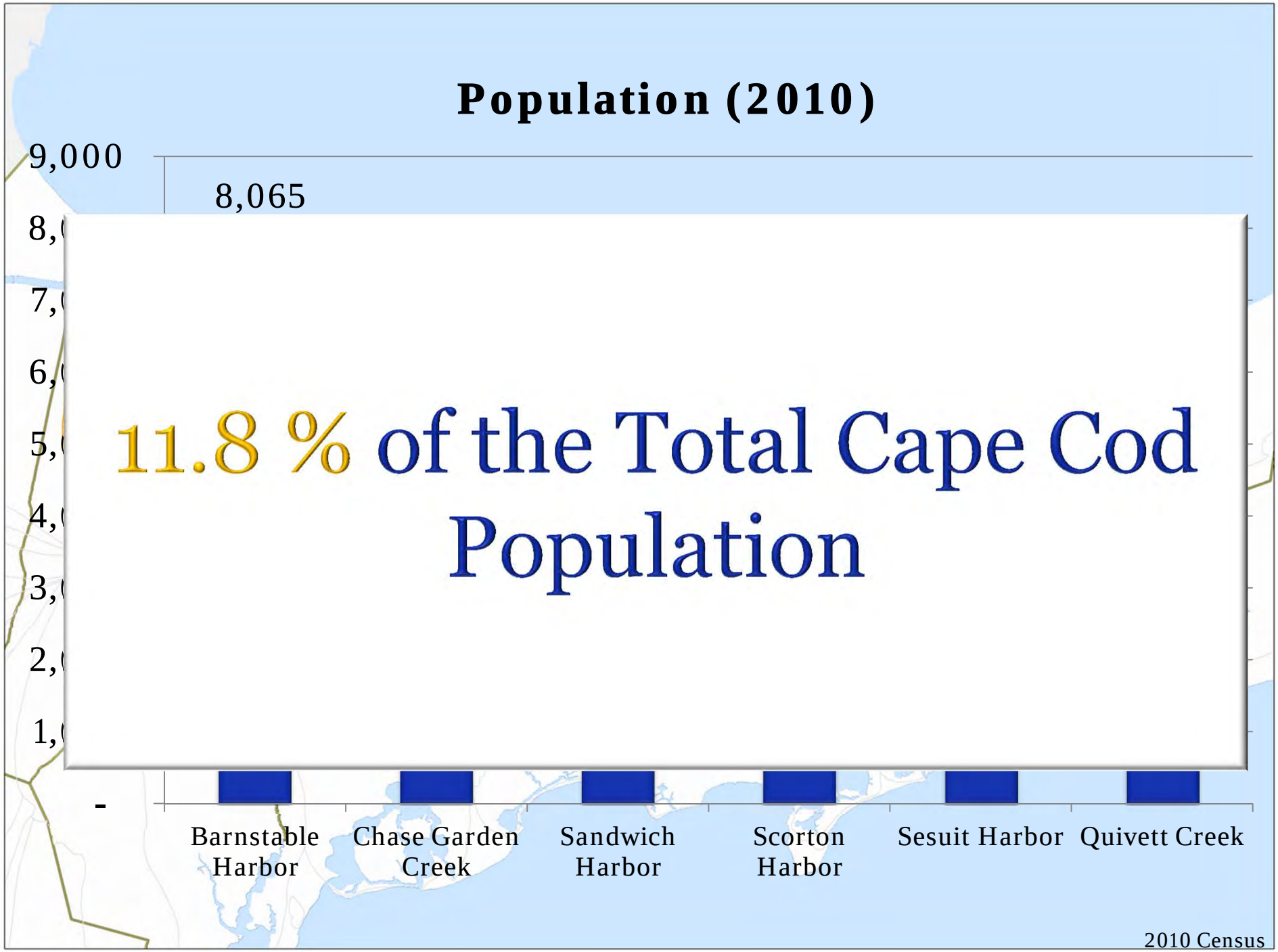
Buildout

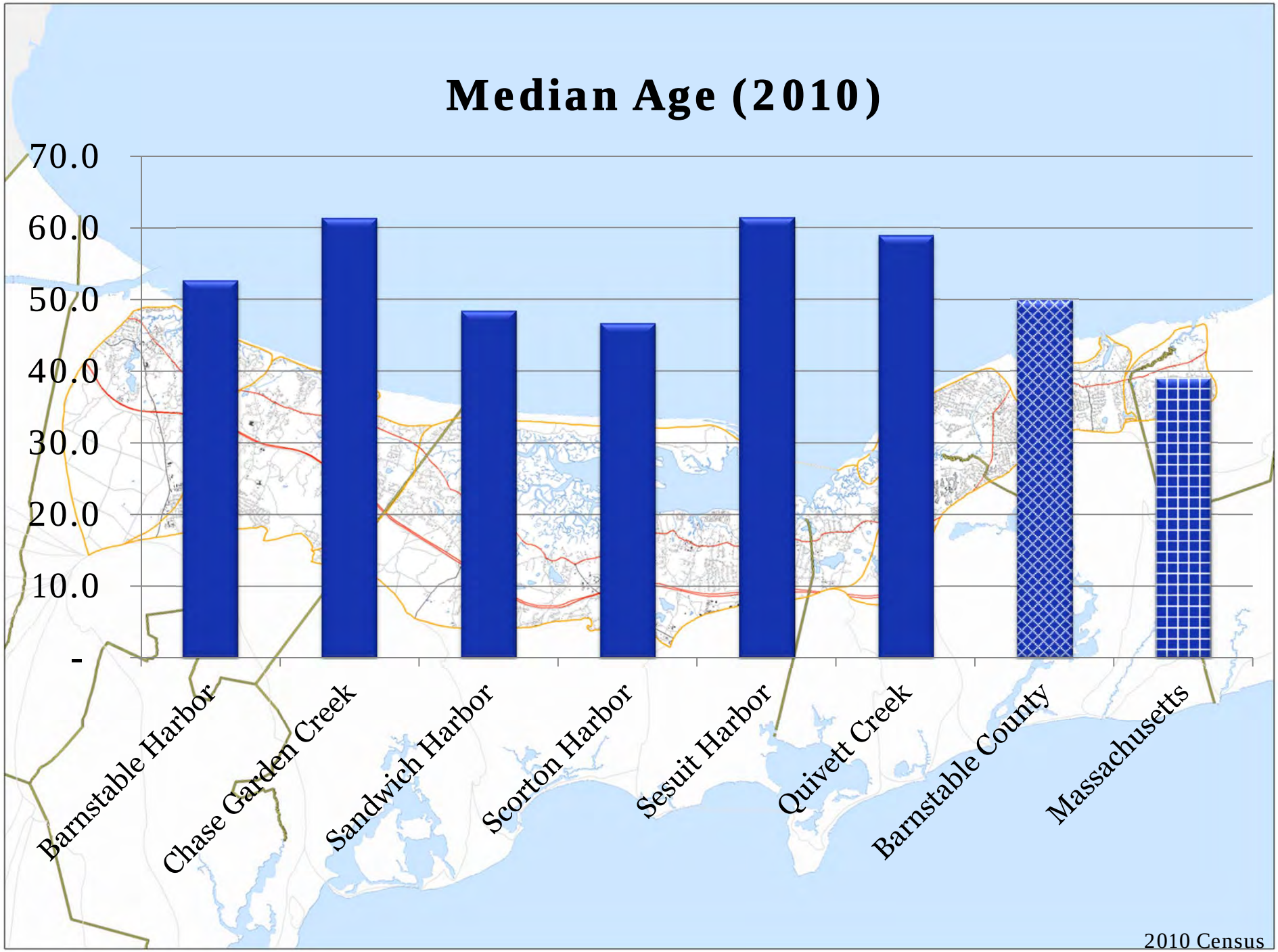

Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

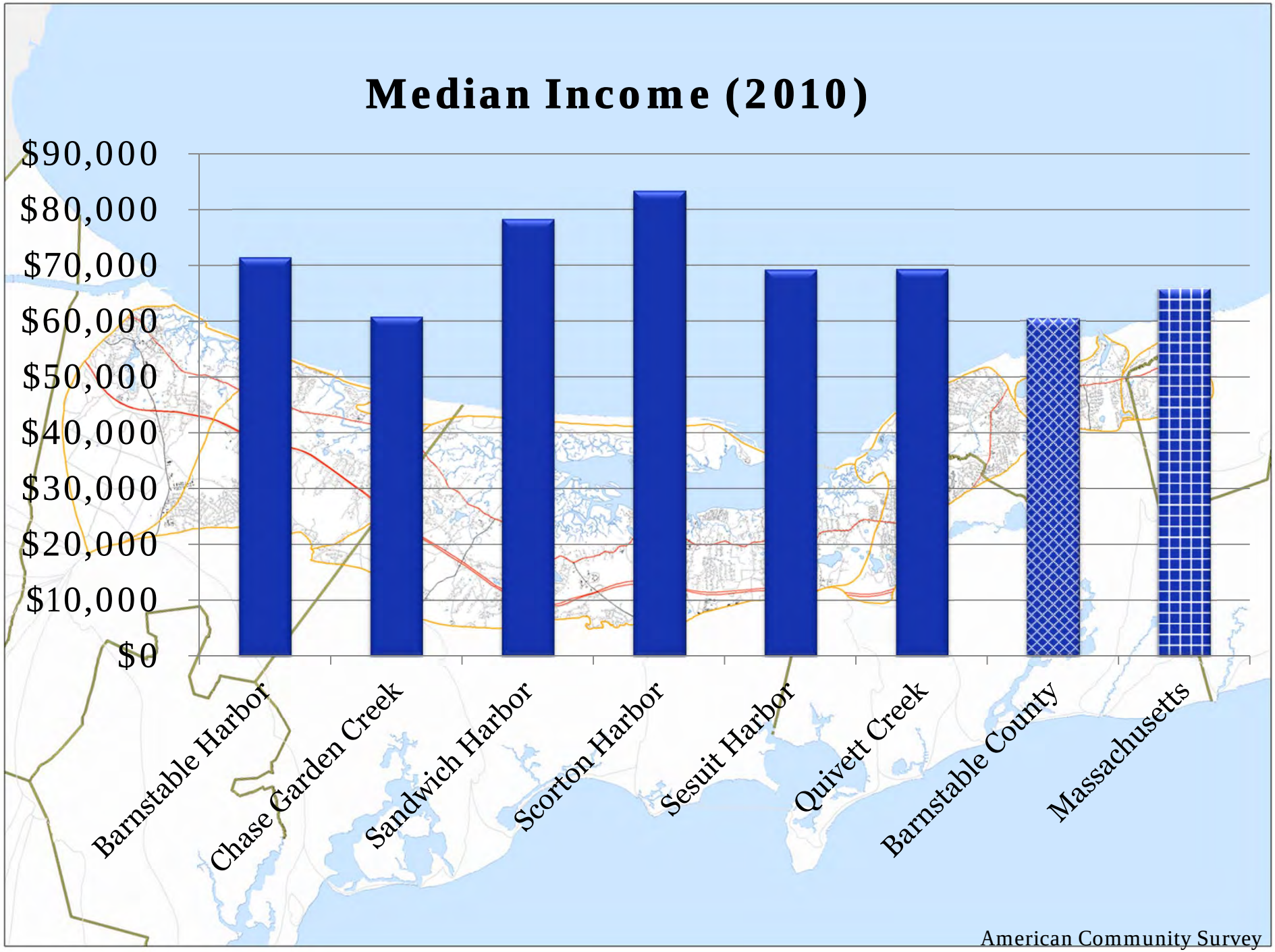
The People

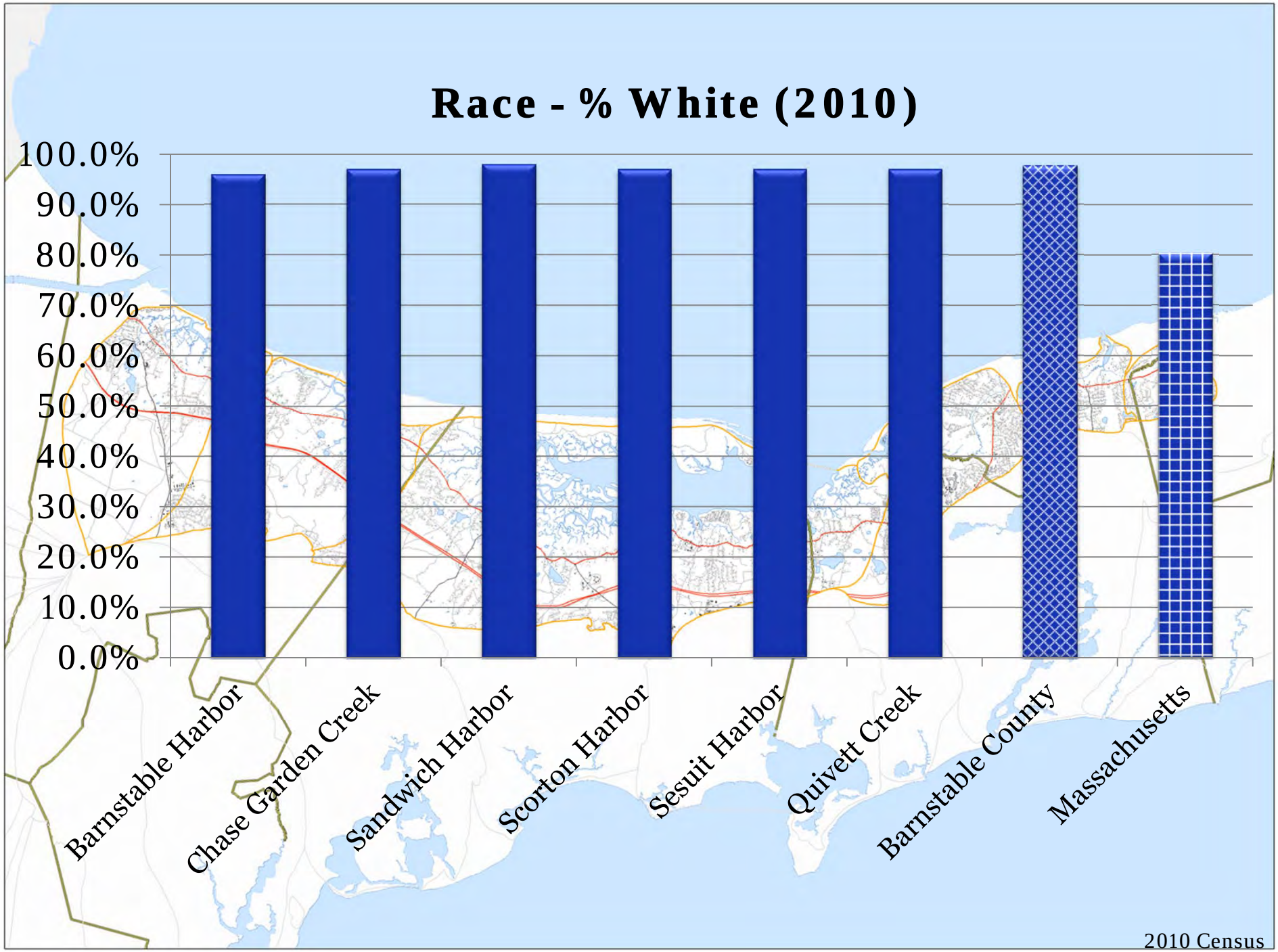
Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek

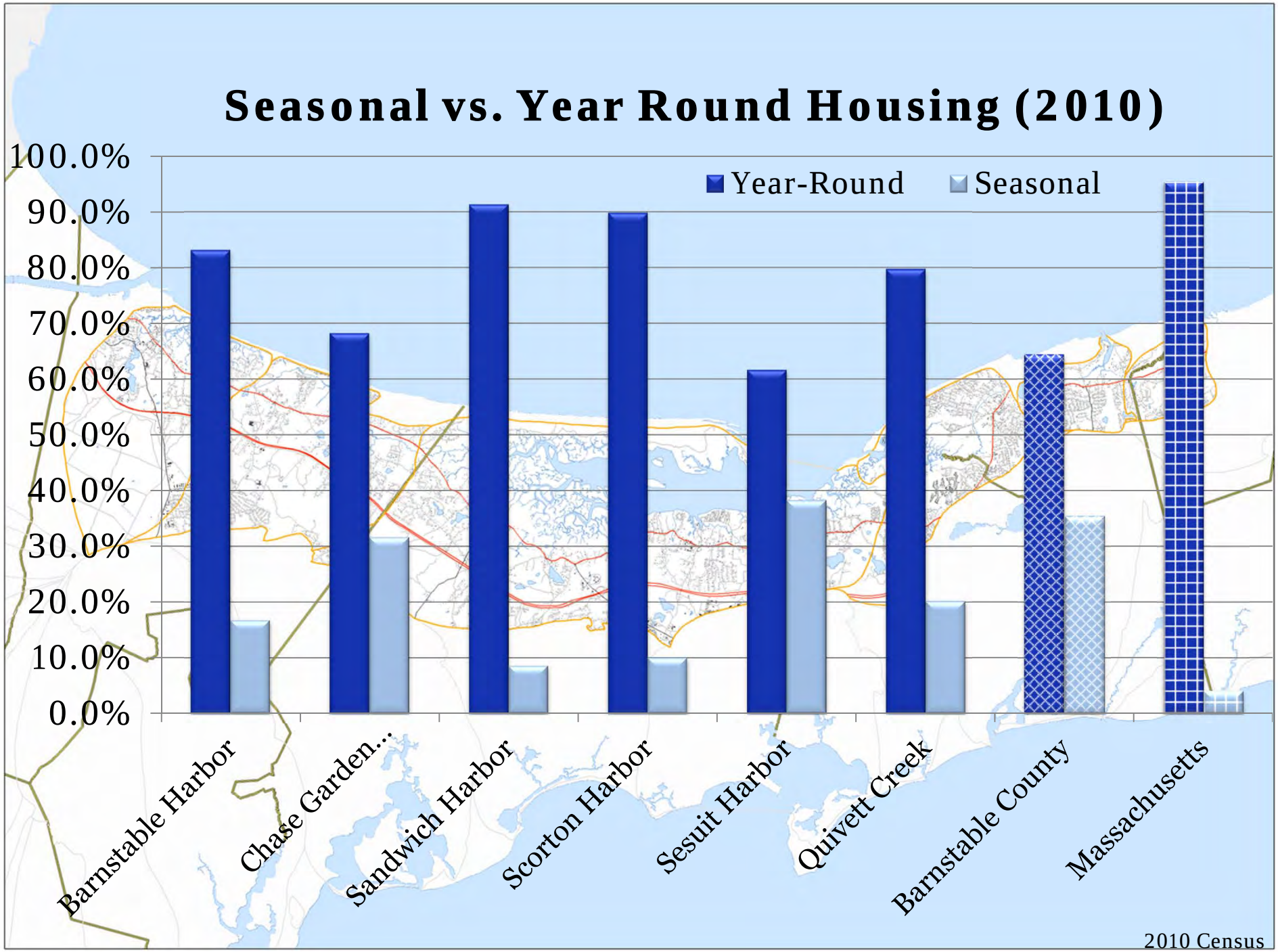

Total Population (2010) = 25,485
2010 Census


Population (2010)
9,000
8,065
11.8 % of the Total Cape Cod Population
-
Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek
2010 Census


Median Age (2010)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
-
Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek
Barnstable County
Massachusetts
2010 Census


Median Income (2010)
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek
Barnstable County
Massachusetts
American Community Survey

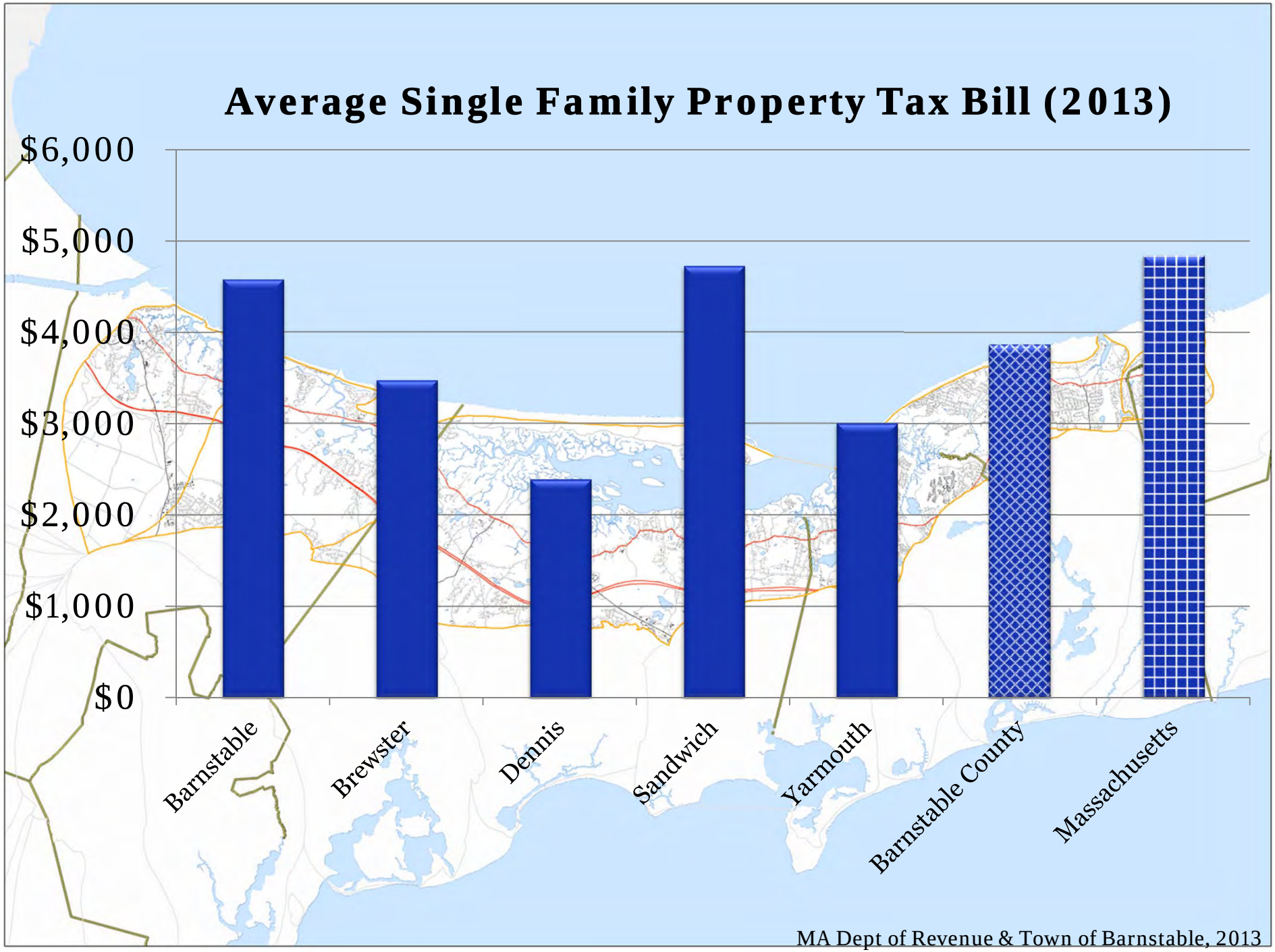

Race - % White (2010)
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek
Barnstable County
Massachusetts
2010 Census

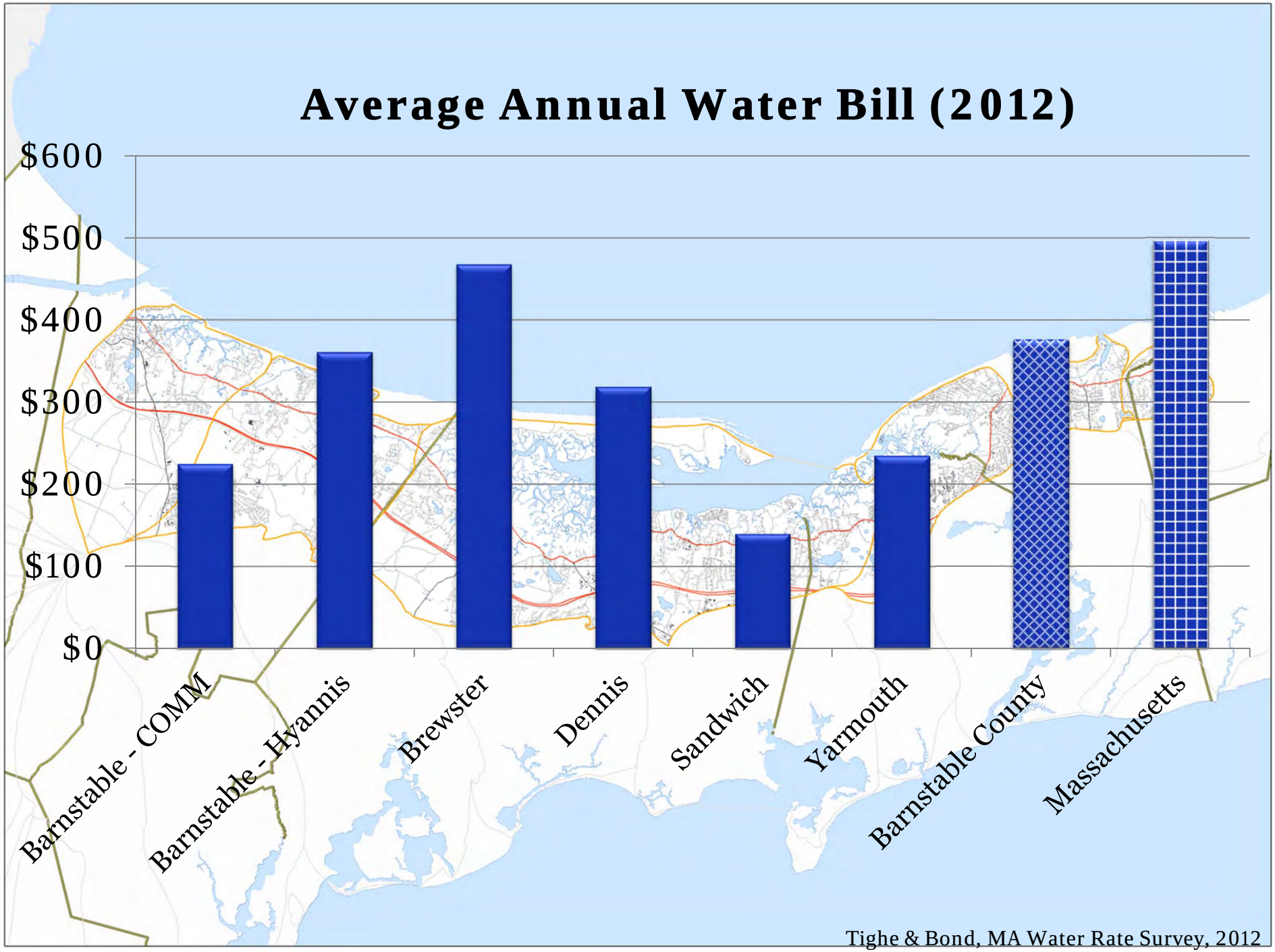

Seasonal vs. Year Round Housing (2010)
Year-Round
Seasonal
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Barnstable Harbor
Chase Garden...
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek
Barnstable County
Massachusetts
2010 Census

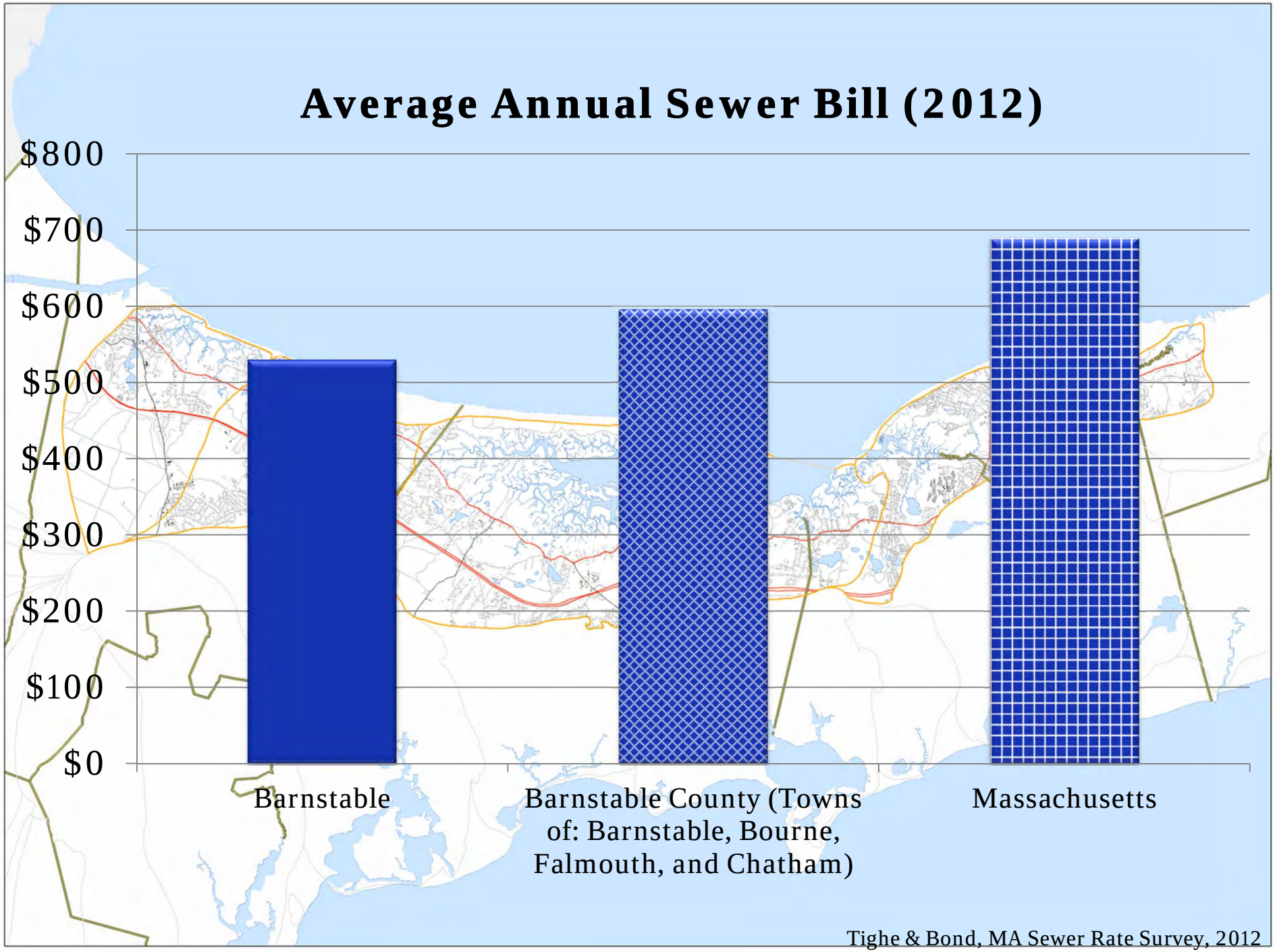

Total Assessed Value of Residential Homes=
$5,735,945,910
$70
$60
$50
$40
$30
$20
$10
$0
Barnstable Harbor
Chase Garden Creek
Sandwich Harbor
Scorton Harbor
Sesuit Harbor
Quivett Creek
Barnstable County
Massachusetts
2010 Census

Your Government & Taxes

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

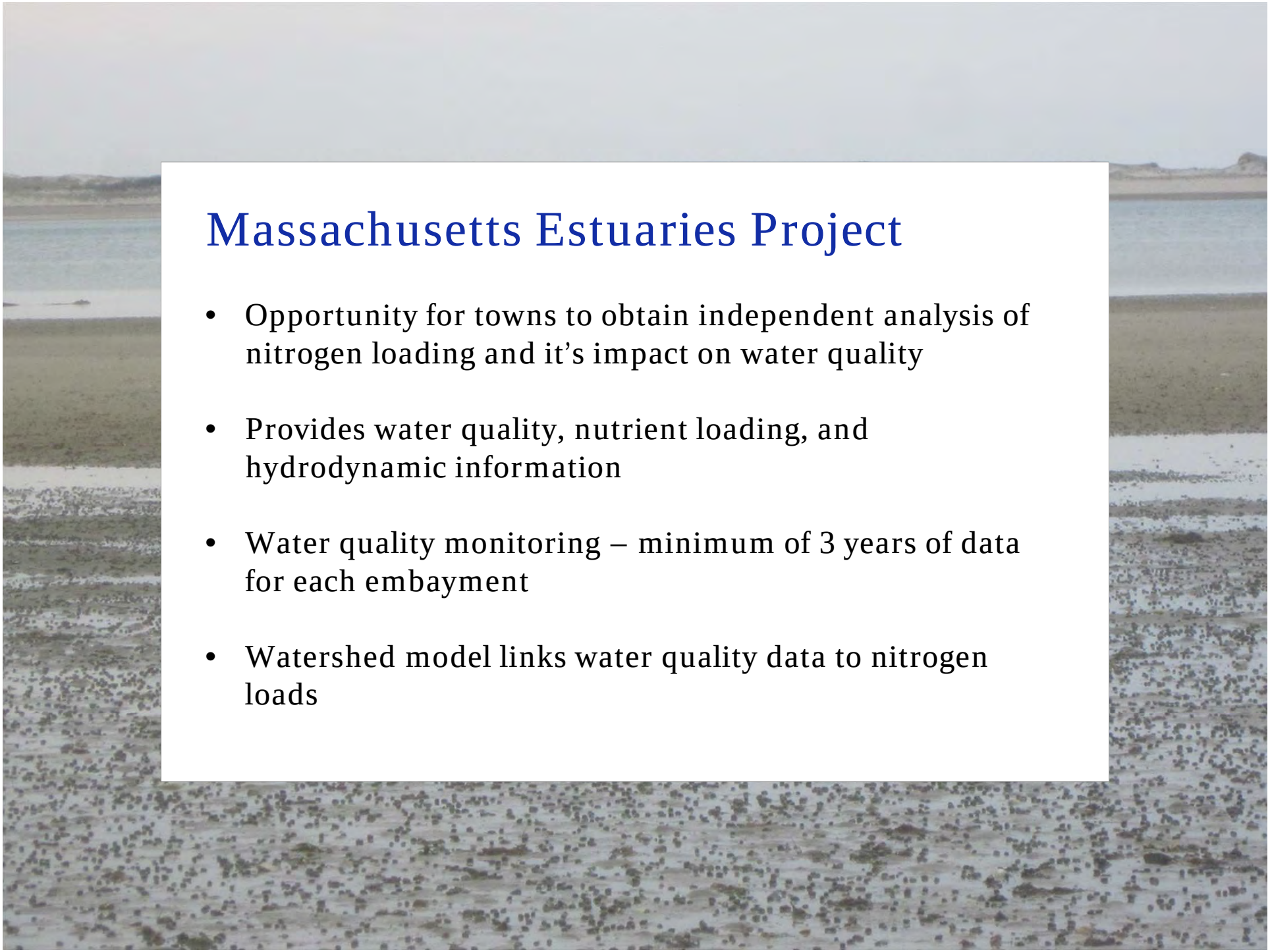

Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Barnstable
Brewster
Dennis
Sandwich
Yarmouth
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013


Average Annual Water Bill (2012)
$600
$500
$400
$300
$200
$100
$0
Barnstable - COMM
Barnstable - Hyannis
Brewster
Dennis
Sandwich
Yarmouth
Barnstable County
Massachusetts
Tighe & Bond, MA Water Rate Survey, 2012


Average Annual Sewer Bill (2012)
$800
$700
$600
$500
$400
$300
$200
$100
$0
Barnstable
Barnstable County (Towns of: Barnstable, Bourne, Falmouth, and Chatham)
Massachusetts
Tighe & Bond, MA Sewer Rate Survey, 2012

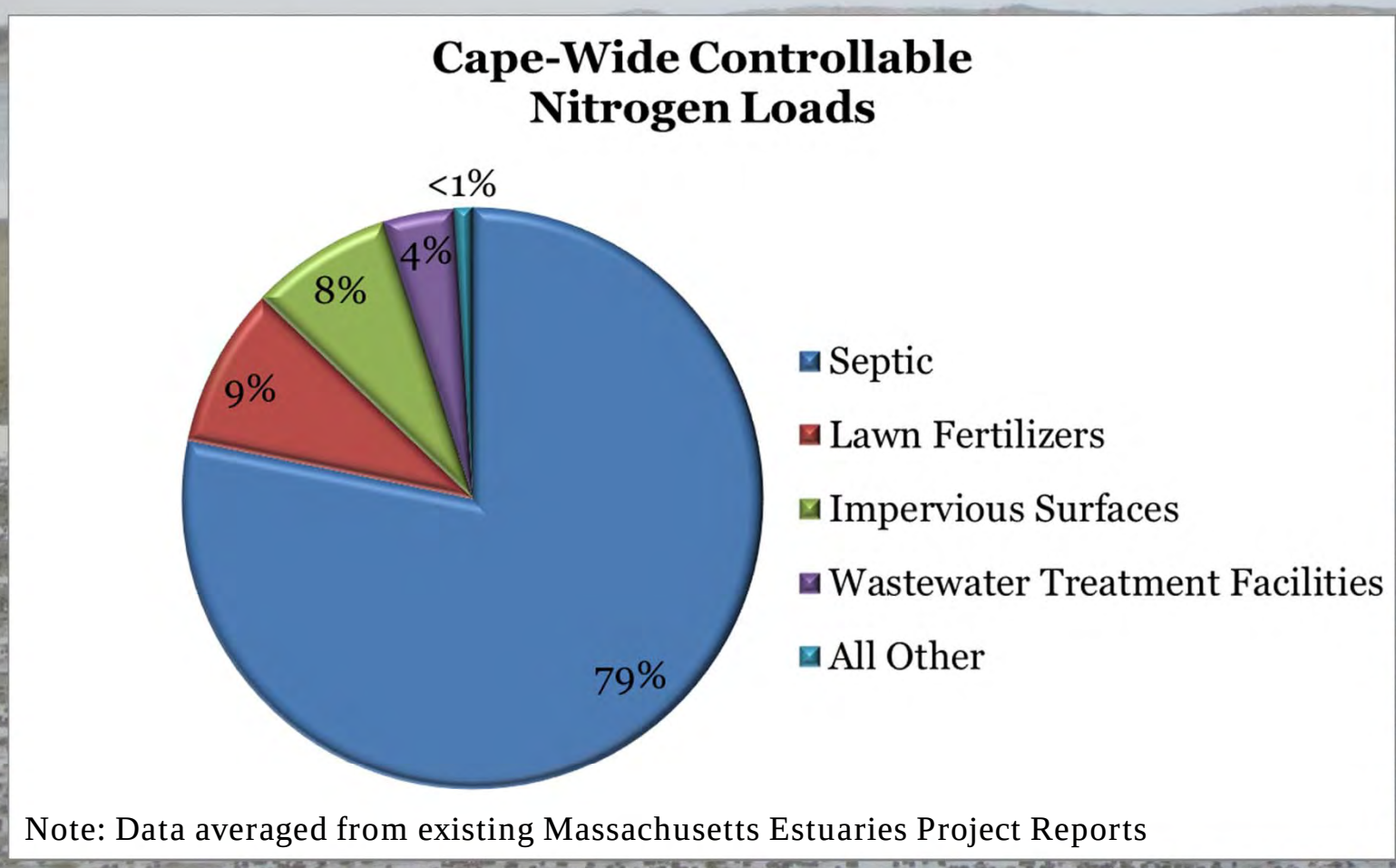
The Problem

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 it's 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



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

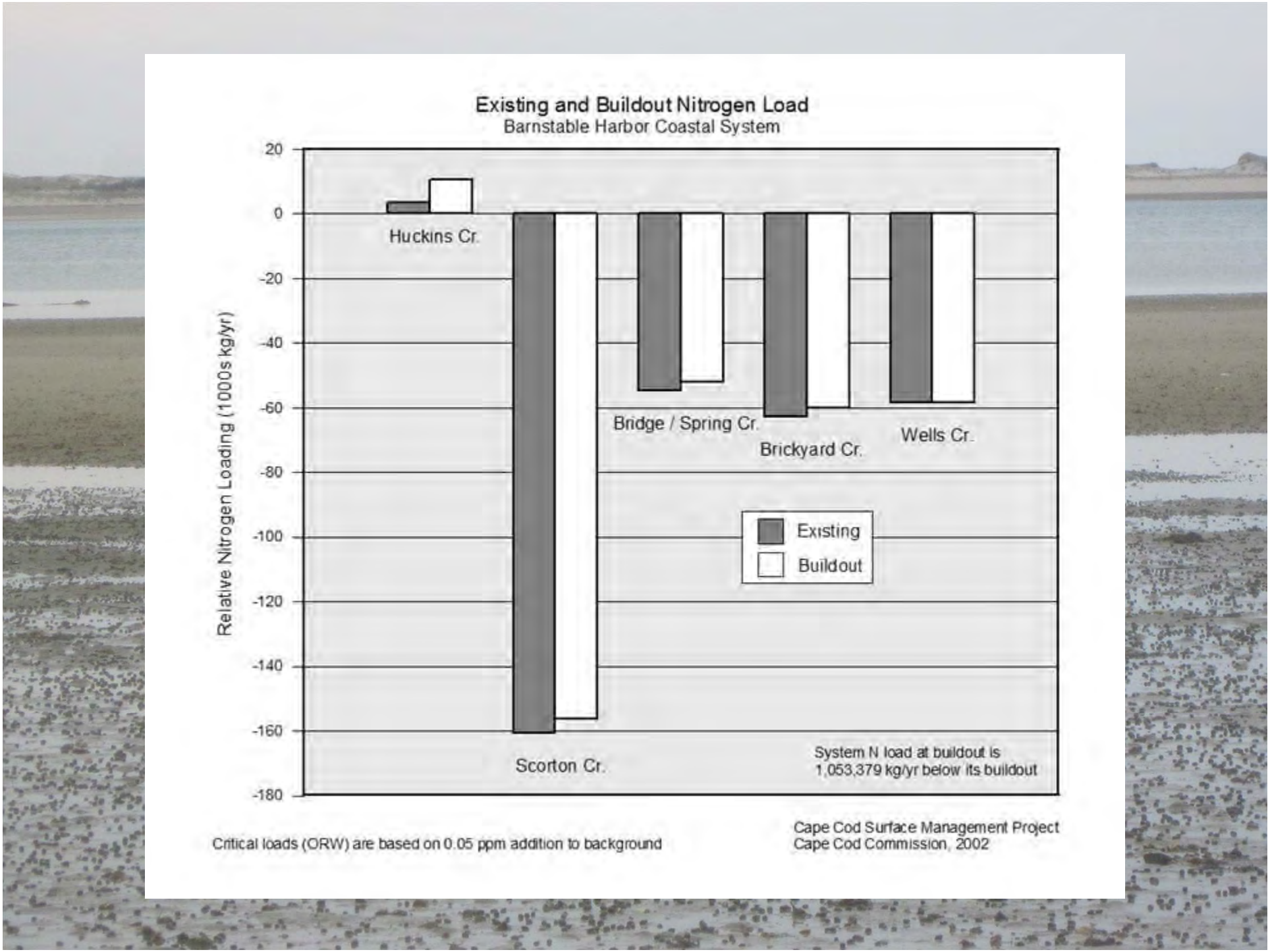
Scorton Harbor

Partial draft with DEP, still waiting on threshold loading analysis

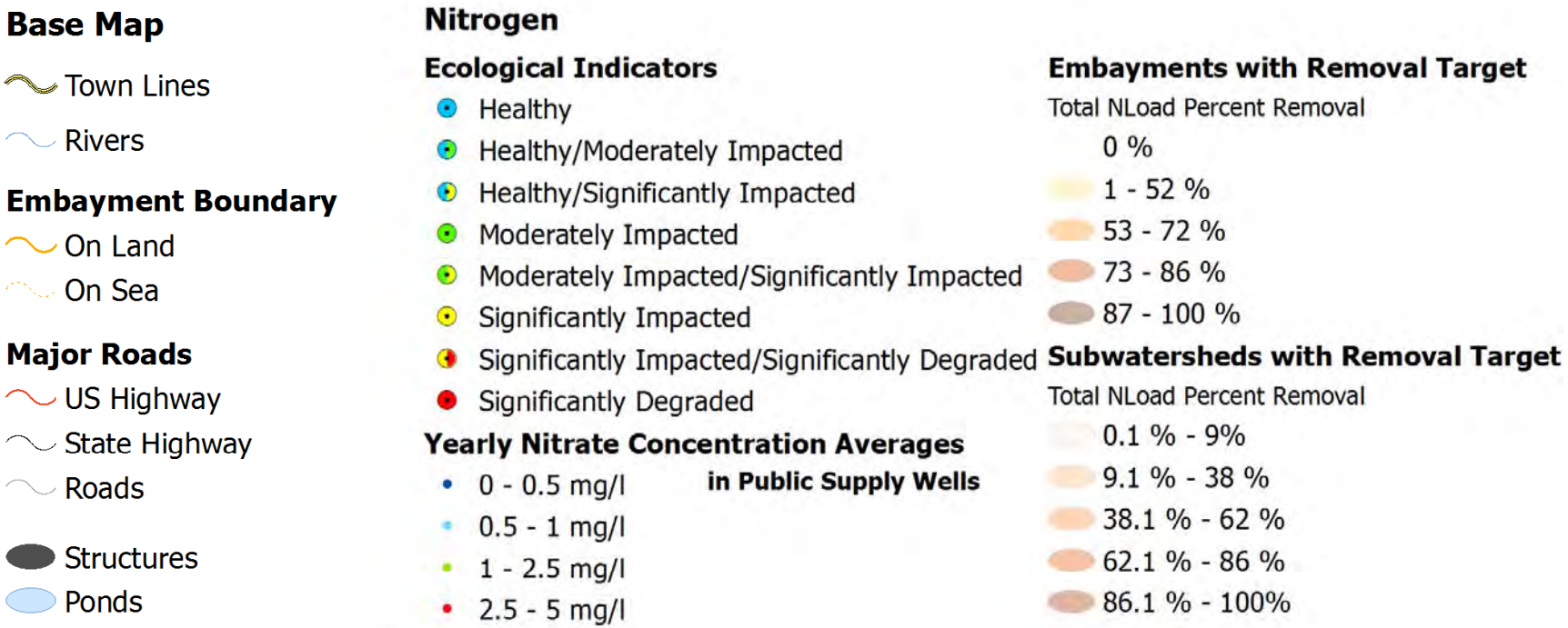
Sesuit Harbor

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
Relative Nitrogen Loading (1000s kg/yr)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
Huckins Cr.
Bridge / Spring Cr.
Brickyard Cr.
Wells Cr.
Scorton Cr.
Existing
Buildout
System N load at buildout is
1,053,379 kg/yr below its buildout
Critical loads (ORW) are based on 0.05 ppm addition to background
Cape Cod Surface Management Project
Cape Cod Commission, 2002

Nitrogen Problem



Sources: MassGIS, MEP, CCC

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

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

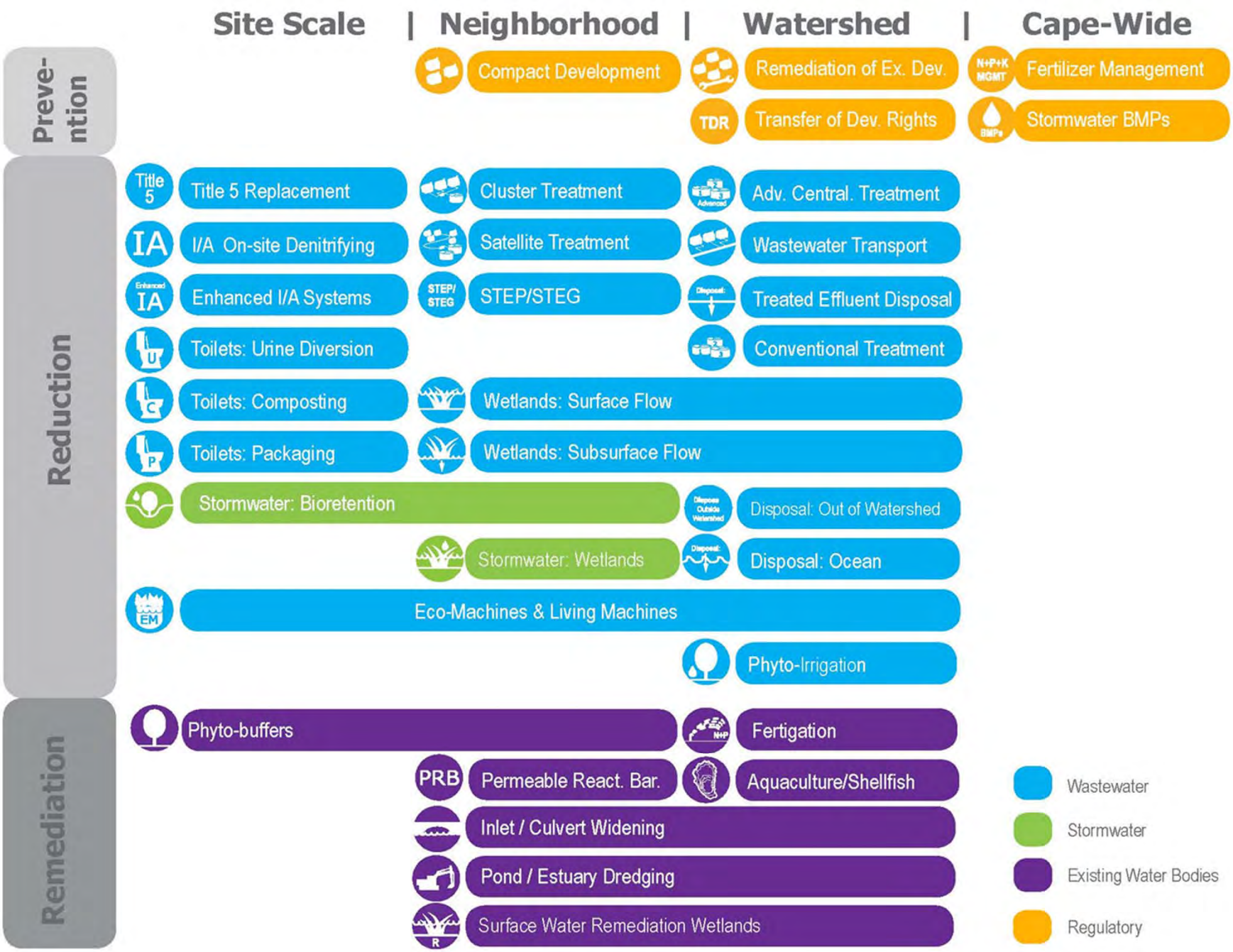
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

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


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

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

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

Cape Cod Commission 208 Area Water Quality Planning
Cape Cod Bay Watershed Working Group

Meeting One
Tuesday, September 24, 2013
Cape Cod Commission, Innovation Room, 3225 Main Street, Barnstable, MA 02630

MEETING SUMMARY

Action Items

The following action items were captured of the Working Group meeting:
Next Meeting: Tuesday, November 5, 2013
8:30 am to 12:30 pm
Cape Cod Commission

- 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.
  - Provide the Commission with information about discrepancies in the buildout data.
  - Review technology fact-sheets in advance of the November 5 meeting. (Technology fact sheets will be distributed in mid October)
  - Look up potential experts on buildout in your town to connect with the Cape Code Commission (CCC).
- Cape Cod Commission:
  - Follow-up with Sue Leven for additions to Brewster chronology.
  - Follow-up with Dave Mason for additions to Sandwich's chronology.
  - Double-check the Brewster buildout data with the Brewster Planner.
  - Provide links to the Local Comprehensive Planning reports on the website.
  - Verify whether or not atmospheric nitrogen deposits are included in the Cape-wide estimates for nitrogen from impervious surfaces.
  - Update the MEP data slide—Chase Garden Creek has been studied.
  - Make all GIS data layers publically available.
  - In the next meeting, provide answers to the questions that arose about buildout in this meeting.
  - Prepare to discuss housing seasonality and its impact on this process in the next meeting.
  - Obtain lists of targeted stormwater projects for the towns of Barnstable and Sandwich.
- Consensus Building Institute
  - Distribute list of working group member names and contact information.

Welcome and Introduction

Ms. Carri Hulet, the facilitator from the Consensus Building Institute (CBI), welcomed the members of the Cape Cod Bay Watershed Working Group, reviewed the agenda, and described CBI's role in the process. Appendix A contains a list of the group members who were in attendance. All meeting documents and presentations for the Cape Cod Bay Watershed Working Group are located here:

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

Ms. Hulet explained that the goal of the first meeting was to review and develop a 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. She emphasized that the group members' role in this meeting would be to identify inaccuracies and missing items in the chronologies and data to help create a more accurate view of the past and to make sure the Cape Cod Commission analyzes all the available data sets.

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.

The Area Manager, Mr. Scott Horsley, will attend the Cape Cod Bay Watershed Working Group meetings and the Commission will prepare materials for subsequent workshops. In Spring 2014, Mr. Horsley will work with the Cape Cod Commission staff to draft a

comprehensive Cape-wide plan that combines the specific recommendations from the Cape Cod Bay Watershed Working Group with the recommendations of the other 11 watershed working groups on the Cape.[1]

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. 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.[2] As previously noted, the September working group meetings were focused on baseline conditions. During the next working group meeting 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 TAC, which is a committee of the Cape Cod Water Protection Collaborative. The Technology Panel consists of academic and research institutions, state watershed managers, and consultants.

LOCAL PROGRESS TO DATE

Mr. Horsley highlighted past actions that had been taken in Barnstable, Brewster, Dennis, and Sandwich that would either protect or inhibit water quality in Barnstable Harbor, Chase Garden Creek, Sandwich Harbor, Scorton Harbor, Sesuit Harbor, and Quivett Creek.[3] Working group members 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 members reflected on lessons learned from reviewing the chronologies.

[1] Information about the Area Managers and their role was not described during the meeting, but is included here for general purposes.

[2] Contact Erin Perry (eperry@capecodcommission.org) if you would like to schedule an Affordability and Financing presentation.

[3] Detailed chronologies are available in the Cape Cod Bay Baseline Data Presentation located here: [LINK]

Participants made the following comments and suggestions on the Barnstable chronology:

- Participants suggested that land preservation and growth management issues should be included, as regulations in that area were major victories for managing resources.
- Revise the entry on Stewart's Creek. The town council passed a vote to authorize funds for the Stewart Creek project and it is now under construction.
- Revise the entry on Wequaquet Lake. The voters, not the Town Council, rejected this project because of several issues, including sewering problems.

Participants made the following comments and suggestions on the Brewster chronology:

- Sue Leven said she had a timeline for Brewster that could be compared to the Cape Cod Commission's chronology. Items that could be added to the Cape Cod Commission might include:
    - Add the approval of the DCPC for the Zone 2 areas, the formation of a Comprehensive Water Planning Committee to draft the Integrated Water Resource Plan, major drainage projects in 2010 and 2011 on Route 6a near Paine's Creek and near the mill site, fertilizer reduction plans at Captain's Golf Course, GIS layer update and training on direct outfalls, and a recent buildout analysis of Mill Pond to identify the source of impairment.
- Add the adoption of natural resource zoning protection

Participants made the following comments and suggestions on the Dennis chronology:

- Add the purchase of 100 acres of land for construction of a future sewage facility. The town still owns this land, but the facility was not constructed.

Participants made the following comments and suggestions on the Sandwich chronology:

- Dave Mason can provide a timeline of Sandwich for comparison.
- Include the Town Meeting approval to use open space as a trade-off for turtle habitat in the Scorton Creek watershed (Tagrest Bay)

No comments or revisions were suggested on the Yarmouth chronology.

Mr. Horsley remarked on the legacy of key decisions, for example, the 1 – 2 acre zoning codes were initiated for wellhead protection and although they worked for their intended purpose, now those areas create a real challenge for wastewater management (particularly related to the relatively high cost of sewering at that density).

BASELINE CONDITIONS

Mr. Horsley and Mr. Shawn Goulet, Cape Cod Commission GIS Analyst, presented GIS data layers, demographic data, and water quality data both Cape-wide and specific to the watersheds to be addressed by the Cape Cod Bay Watershed Working group. Working group members and members of the public are encouraged to view the layers on the Cape Cod Commission website. Mr. Horsley described how the lack of data was a key issue twenty-five years, but the abundance of data now available is a challenge and requires that the Stakeholders make sure that we are focusing on the most relevant information.

Mr. Horsley noted that the area is mostly rural, there are no sewer systems (with the exception of a limited area of Barnstable Village) and many homes have private wells. Additionally, pathogens are a concern in addition to high nitrogen levels in this watershed due to the high runoff rates associated with the lower-permeability soils. 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, as well as any differences of opinion they had with the Commissions' analysis or methodology.

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.

Mr. Horsley pointed out the high number of wetlands on the northern reach of the watershed and indicated the wetlands capacity to assimilate nitrogen is a positive characteristic that will help control nitrogen concentration levels in this area. He also noted the high flushing rate associated with a large tidal range.

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.

Mr. Horsley mentioned that although there is less impervious area in this area, storm water runoff might be a bigger issue due to the low-permeability soils in the area that encourage runoff during storm events.

Regulatory Layer – Mr. Horsley covered regulatory areas, which includes Areas of Critical Environmental Concern (ACECs), MassDEP-approved wellhead protection areas,

Economic Centers, Village Centers and Growth Incentive Zones (GIZ). Open Space data is displayed in terms of three levels of land protection: land protected in perpetuity, limited protection, and no protection. There are two Growth Incentive Zones in this area, in Barnstable and Hyannis.

Mr. Horsley noted that the nitrate concentration standard for drinking water is 10mg/liter, whereas the standard for estuaries is approximately 0.4mg/liter. In this sense, dealing with estuaries is much more challenging than dealing with groundwater.

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

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, which is based on 2012 data, shows the maximum potential buildout over a 20-25 year time horizon using the towns zoning regulations and normalizing that data by applying state designated zoning layers. Mr. Horsley emphasized that buildout scenarios are an art, not a science, and that there are many ways to conduct a buildout analysis. He illustrated this point by showing a slide that depicted differences between the Regional Buildout, the Comprehensive Waste Management Plan buildout, and the Local Comprehensive Planning Buildout for communities across the Cape. The Commission came up with a standardized buildout methodology for all towns across the Cape so there would be a consistent standard throughout the 208 Plan Update process. Mr. Horsley noted that buildout and future growth is a critical component to the 208 Update Plan since 30% growth could increase capital costs by 40%.

Working group members made the following comments and questions on the GIS data layers:

- A group member commented that the buildout seems very high and noted that Brewester has buildout data that could be included in the analysis.
- Noting the importance of buildout data, a group member said it would be useful to create a buildout specific for this study area, instead of looking at buildout across the entire Cape. Mr. Goulet responded that the Commission could create this type of layer with the data they currently have, but they need a consistent data set to compare across towns for the 208 Plan Update.
- Another member asked how the Commission will address differences between local and regional buildouts. For example, Dennis and Chatham predicted greater non-residential development in their buildouts than is predicted by the Commission's buildout. Mr. Goulet said commercial buildout is the most difficult

to predict due to the assumptions used for mapping the non-residential buildout projections.

- A group member asked how the Commission will address a town's desire to do something that is not represented in the regional buildout. Mr. Goulet requested the group members to provide buildout data or development plans, along with the assumptions made about those data sources, to the Commission.

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.[4] 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. The average annual single-family property tax bill includes fire district taxes. After reviewing this data, the group members made the following comments and questions.

- Several discussants felt the seasonal housing data might be inaccurate. In particular, one group member noted the Sesuit Harbor seasonal and year round data should be reversed. Ms. Perry said members of watershed working groups suggested determining seasonality data by looking at water use. A participant indicated water use might not be accurate given other influential variables, including sprinkler use. Another member said Barnstable is currently collecting seasonality data.
- Another participant suggested it would be impossible to determine whether or not a seasonal house would be seasonable in the future. The participant said many seasonal homes have been converted to primary homes over the past 50 years.
- Another group member wondered how the seasonal use of septic systems, (whether the systems are used 3-months versus 9-12 months), might influence management decisions.

THE PROBLEM

Mr. Horsley explained that nitrogen loading in coastal estuaries and phosphorous loading in ponds and lakes are the primary problems to address in the 208 Plan. In many areas of the Cape, the Massachusetts Estuary Project (MEP) provides at least three years of nutrient loading, water quality monitoring data, and hydrodynamic information to link water quality data to nitrogen loads. However, MEP data is not yet available for this study area. The final MEP for Barnstable Harbor is due on February 28, 2014; the draft MEP report for Sandwich Harbor is due August 30, 2013; the Scorton Harbor report is only partially completed; the final Sesuit Harbor report is due December 30, 2013, and Quivett Creek and Chase Garden Creek have not been studied.

Mr. Horsley 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 wasterwater treatment facility effluent and natural sources comprise the remaining one percent. Mr. Horsley stated that in the absence of completed MEP data analysis in this area, Cape-wide averages could be used for this area in the 208 Plan Update as one option. He requested group members to provide any water quality data they may have to aid the analysis. Mr. Tom Cambareri said water quality data the Commission developed a nutrient analysis in 1998 that could be incorporated into the study area on an interim basis. It was noted that nitrogen reduction may not be as important as pathogen reduction since the watersheds in this study area have a high capacity to assimilate nitrogen.

Participants had the following questions and comments:

- In response to a question about whether or not the 208 Plan Update will address nitrogen deposition originating from the Midwest, Mr. Horsley said the 208 Plan Update will not focus on “uncontrollable” nitrogen from sources like rainfall.
- A participant commented that the group should mention in the 208 Plan Update the presence of uncontrollable nitrogen sources in Cape Cod’s system.
- A participant said the Chase Garden Creek has been studied.
- A participant asked whether nitrogen on impervious surfaces represented atmospheric nitrogen or controllable sources. Mr. Tom Cambareri, the Cape Cod Commission’s Water Resource Program Manager, said he did not think it contained atmospheric nitrogen.
- Another participant inquired if the Commission had data on 100% of nitrogen loads to understand the percentage of the total nitrogen load the group would address through the controllable nitrogen sources. Mr. Cambareri said the Commission does not have data on total natural loads but might be able to provide some local examples.
- A group member asked if the ‘other’ category included pesticides and chemicals. Mr. Cambareri said he thought it only included nitrogen from natural load sources.
- A participant asked if phragmites growth is an indicator of nitrogen. Mr. Horsley said it is an invasive that grows in areas of disturbance, but it is not necessarily an indicator of nitrogen.

In regards to the phosphorous issue, Mr. Cambareri said the Pond and Lake Stewardship Project (PALS) provides a snapshot of the physical water quality parameters of 200 inland water bodies and connects this data to trophic status. Mr. Cambareri clarified that the ponds highlighted as ‘priority’ have not been prioritized. Instead, they represent ponds that have been sampled. He added that the working group should keep in mind the pathogen issues in these ponds, since the PALs data does not include pathogens. Participants made the following comments:

- One member suggested the town of Brewster should encourage homeowners to implement water quality improvement measures in their ponds before requesting assistance from the town.
- A group member commented on a recent publication about pharmaceutical pollution in the water.[5] Mr. Cambareri said the pharmaceutical issue will not be the priority of the 208 Plan Update, but the group should keep in mind contaminants of emerging concern as they develop solutions.

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. Goulet offered a few caveats with the data: 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 more likely to exhibit compliance issues due to the small size of the land parcels, shallow depth to groundwater at the parcel locations, soil structure, 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.

EXISTING AND PROPOSED SOLUTIONS

Mr. Horsley and Mr. Goulet 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 sewershed phasing, if applicable. They requested group members provide additional information on planned stormwater upgrades to existing infrastructure. One group member said the towns of Barnstable and Sandwich have maps of targeted stormwater projects. A group member said the Engineering Department and the Department of Public Works should have information on stormwater infrastructure.

NEXT STEPS

Mr. Horsley presented the technologies matrix and described the upcoming meetings. The technologies matrix organizes a mixture of remediation, reduction, and prevention techniques that can be deployed at the site level, neighborhood level, watershed level, or Cape wide. He noted that the packaging toilets option would likely be removed from the matrix. 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.

[5] Referring to a study done by Silent Springs, which can be found here: http://www.silentspring.org/pdf/our_research/Contaminants%20of%20Emerging%20Concern%20and%20Septic%20Systems%202013%20Report.pdf.

Mr. Horsley then reviewed the screening method for the different plans, emphasizing that the goal is not to pick a definitive solution but a range of approaches for future discussion. The group will:

1. Decide upon target goals (which will be challenging for this area given the lack of clear numbers)
2. Examine approaches with low barriers to implementation, including existing programs to address fertilizers and stormwater
3. Study watershed abatement options such as permeable reactive barriers, inlet/culvert openings, constructed wetlands, dredging, etc.
4. Consider alternative on-site options such as eco-toilets (UD and compost), I/A technologies, enhanced I/A technologies, shared systems, etc.
5. Research plans for priority collection and high density areas
6. Look into supplemental sewering if all other options fail as this approach is not necessarily cost effective or politically achievable

A participant asked if they would talk more about effluent discharge from collection systems at the next meeting. Mr. Cambareri responded that this area is unique as there is less nitrogen, so this is not a large problem, but there may be opportunities for regional cooperation by participating in sewer trading with the south side of Cape Cod.

Ms. Hulet asked the group to reflect upon what it can learn from the past and how it can use these lessons to develop guiding principles going forward. Several different comments and themes emerged from this discussion:

- Participants discussed the hidden cost of title 5 systems and the need to make this cost apparent to the general public.
- Reflecting on past failures to advance water quality initiatives, several participants discussed the value of and need for more public education. Group members described the importance of interpreting this issue for a general audience to help people understand the problem and support the proposed solutions.
- A participant asked if the group was creating a problem by linking the Title 5 compliance issue to climate change and expressed skepticism about the reality of global warming and sea level rise. Mr. Horsley responded that there is little debate that sea level is rising, though there is disagreement about the timeframe in which sea level rise will occur. Ms. Hulet said the group could use sea level rise as a potential screen when deciding upon proposed technologies. The same participant suggested using the SLOSH data to look at storm surges rather than uncertain climate change science.
- Another discussant suggested using aesthetic considerations as another screen, especially for managing growth on the north side
- Some agreed that land management is important.

- A group member suggested the need to coordinate between the fire districts and the town since the fire districts plan their own wells
- A participant noted potential conflicts between ground water and wastewater management goals.
- While describing a potential agreement between Dennis and Barnstable to jointly purchase a dredge, a group member suggested that cost efficiency for regional or shared solutions could be another screen to apply.

OPERATING PROTOCOL

Ms. Hulet reviewed a draft of the operating protocols and asked the group for their feedback, specifically mentioning the role of the group, the expectations for membership in the group, and communication protocols. 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. She requested any suggested revisions to the protocols within the next week.

PUBLIC COMMENTS

Ms. Hulet opened the floor for public comments. One member of the public, Alex Marks, said he was glad to be included in the process and learn from it.

Appendix A
Attendance

Name	**Affiliation**
Working Group Members	
Kyle Hinkle	Executive Director, Brewster Chamber of Commerce
Bill McMahon	Robert B. Our
Sue Leven	Town Planner, Town of Brewster
Peter McDowell	Dennis Water District Wastewater Committee
Ed Nash	Golf Course Superintendents Association of Cape Cod
Elizabeth Jenkins	Principal Planner, Town of Barnstable
Charles Spooner	Yarmouth Port
David Mason	Health Agent, Town of Sandwich
Ann Canedy	Town Councilor, Town of Barnstable
Dan Santos	Director of Public Works, Town of Barnstable
Observers	
Matthew Capone	Tufts University
Alex Marks	MIT
Staff	
Scott Horsley	Area Manager for the Mid Cape Groups and Consultant to the Cape Cod Commission
Erin Perry	Special Projects Coordinator, Cape Cod Commission
Shawn Goulet	GIS Analyst, Cape Cod Commission
Carri Hulet	Facilitator, Consensus Building Institute
Eric Roberts	Associate, Consensus Building Institute
Griffin Smith	Associate, Consensus Building Institute

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

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

Meeting Agenda

8:30 am Welcome – *Cape Cod Commission*

8:35 Introductions, confirm working group membership and participation – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*

9:00 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

9:15 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Patty Daley (Area Manager, Cape Cod Commission)*

9:30 Review and add to chronology of work to date – *Working Group*

9:45 Discussion: drawing on past work to move forward – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*

10:00 Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Patty Daley (Area Manager, Cape Cod Commission)*

10:45 Break

11:00 Discussion of Baseline Conditions – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*

11:30 Framework for Moving Forward: Preview Meetings 2 and 3 – *Patty Daley (Area Manager, Cape Cod Commission)*

11:45 Review/Discuss Process Protocols - *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*

12:10 pm Public Comments

12:30 Adjourn

Upper Cape West & South Group

Baseline Conditions & Needs Assessment

What is the 208 Plan?

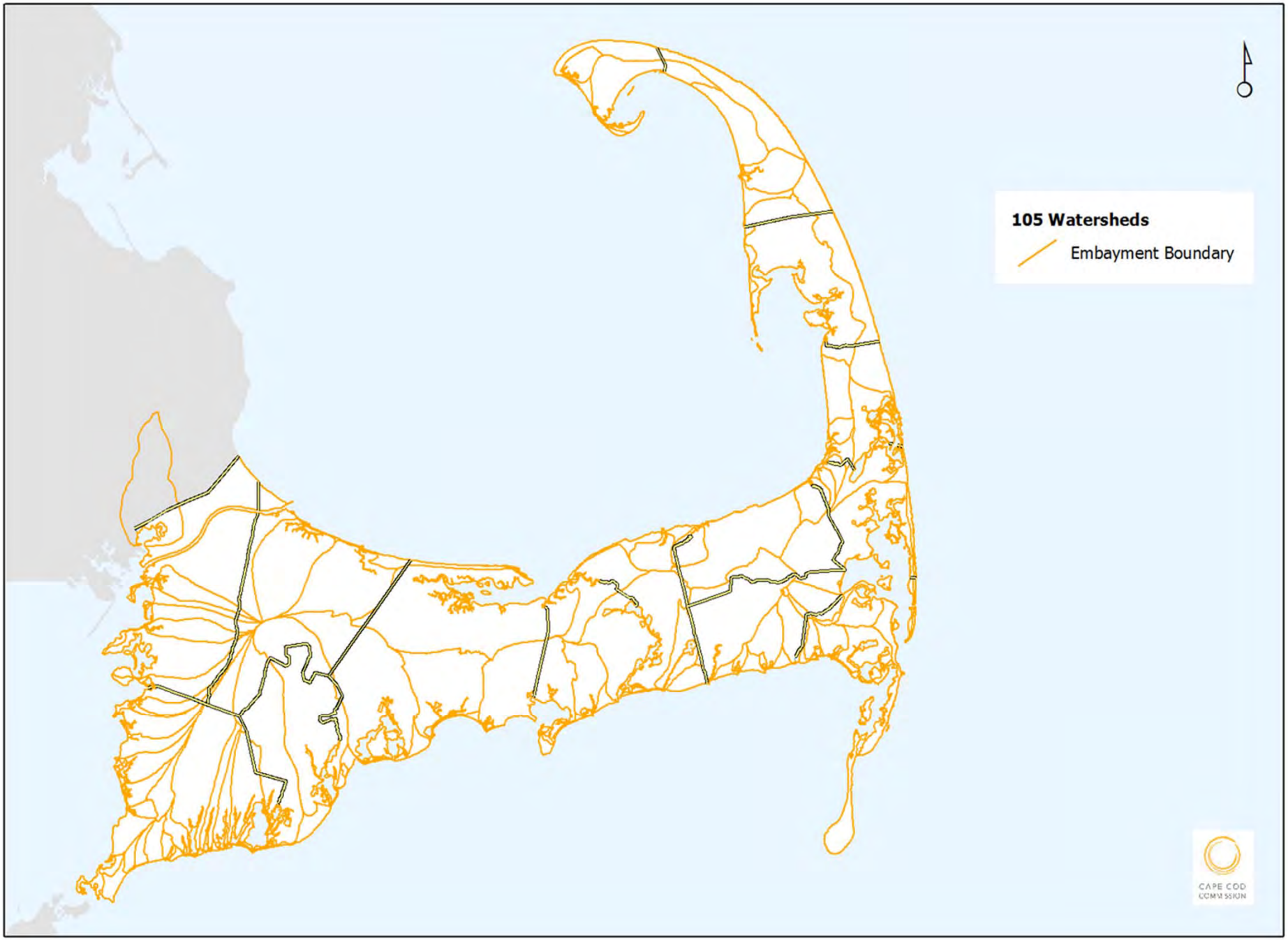
Clean Water Act Section 208

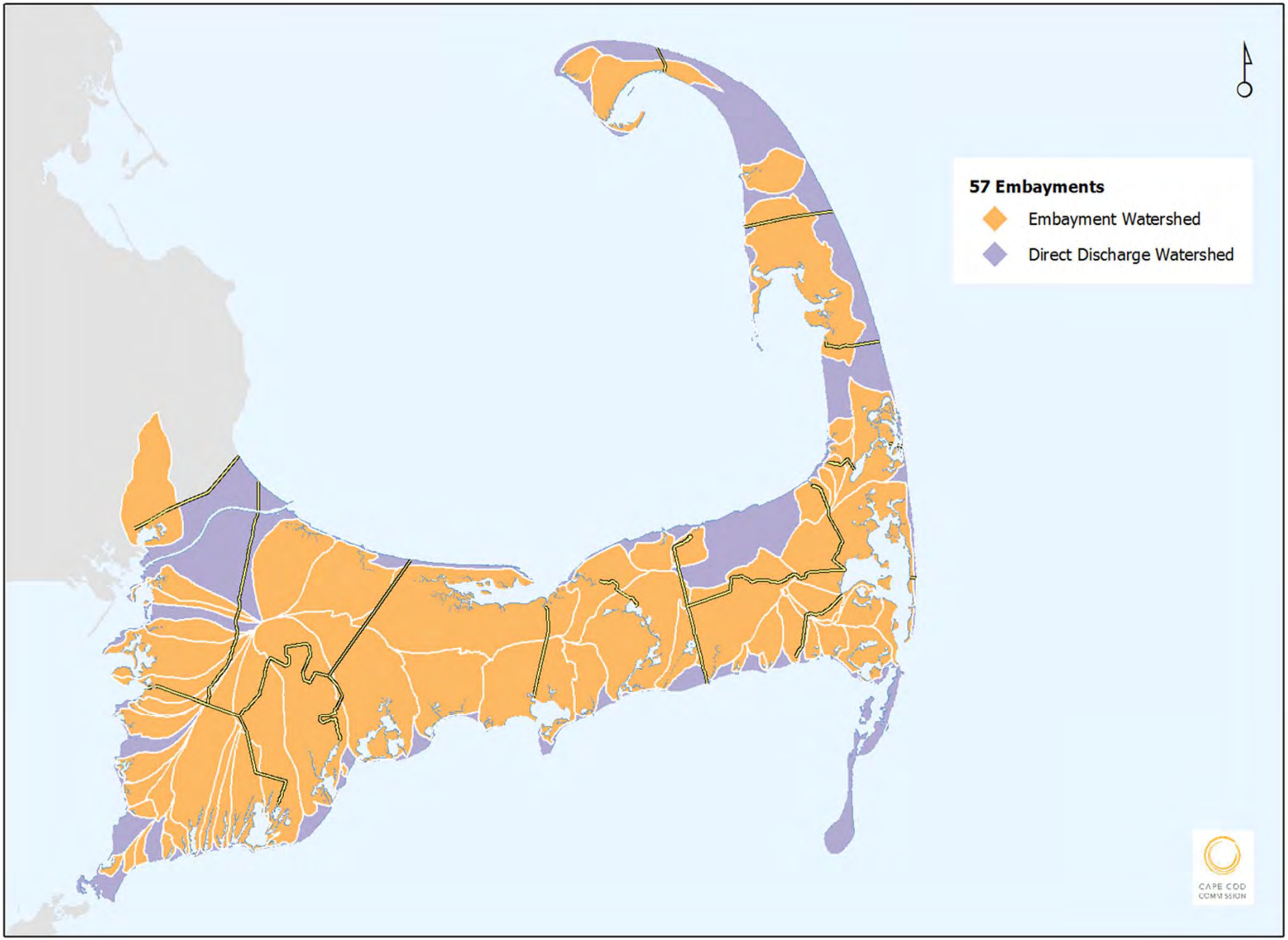
The Commission was directed to update the 1978 Plan

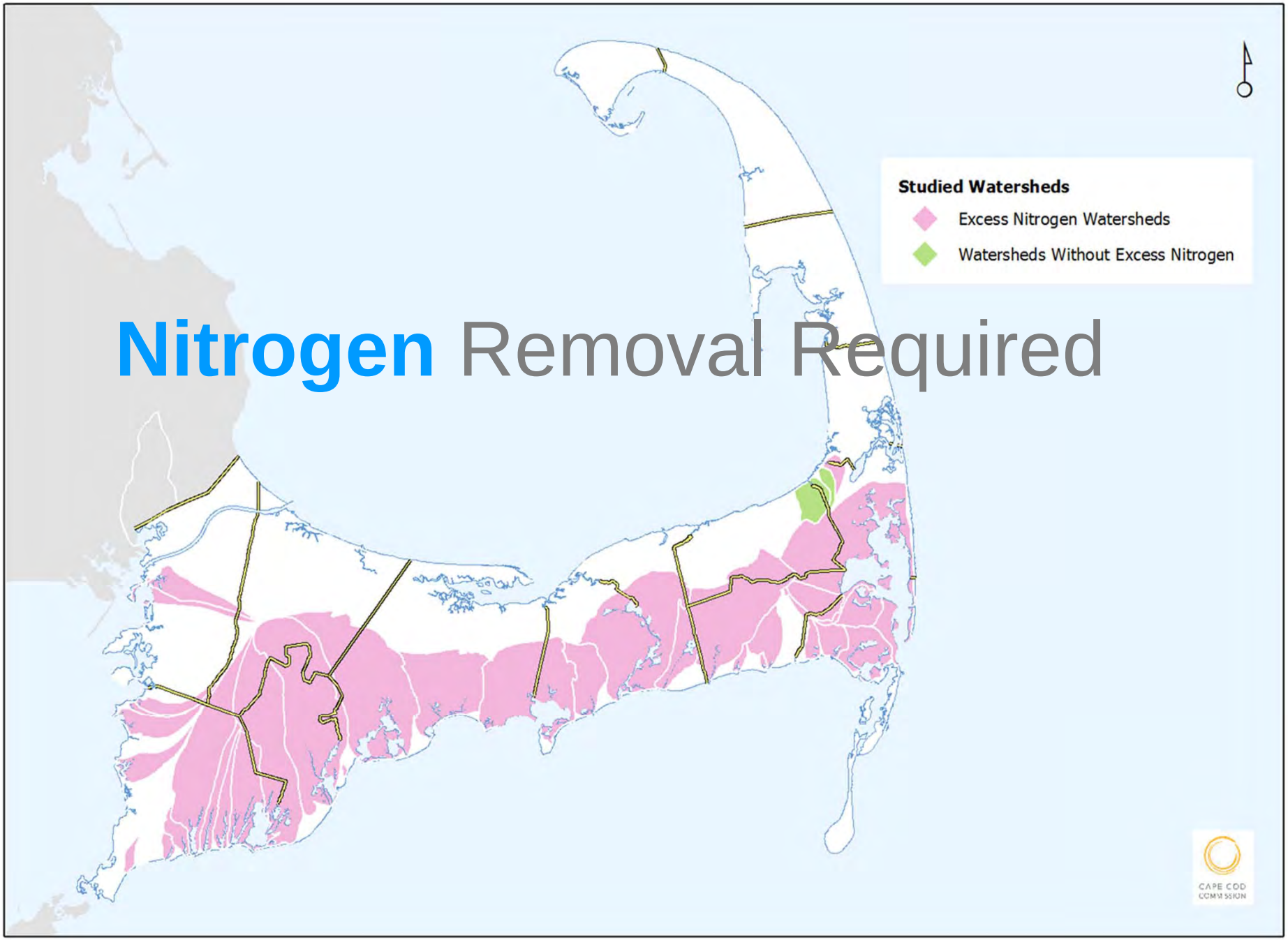
The Commonwealth provided $3 million to fund the project

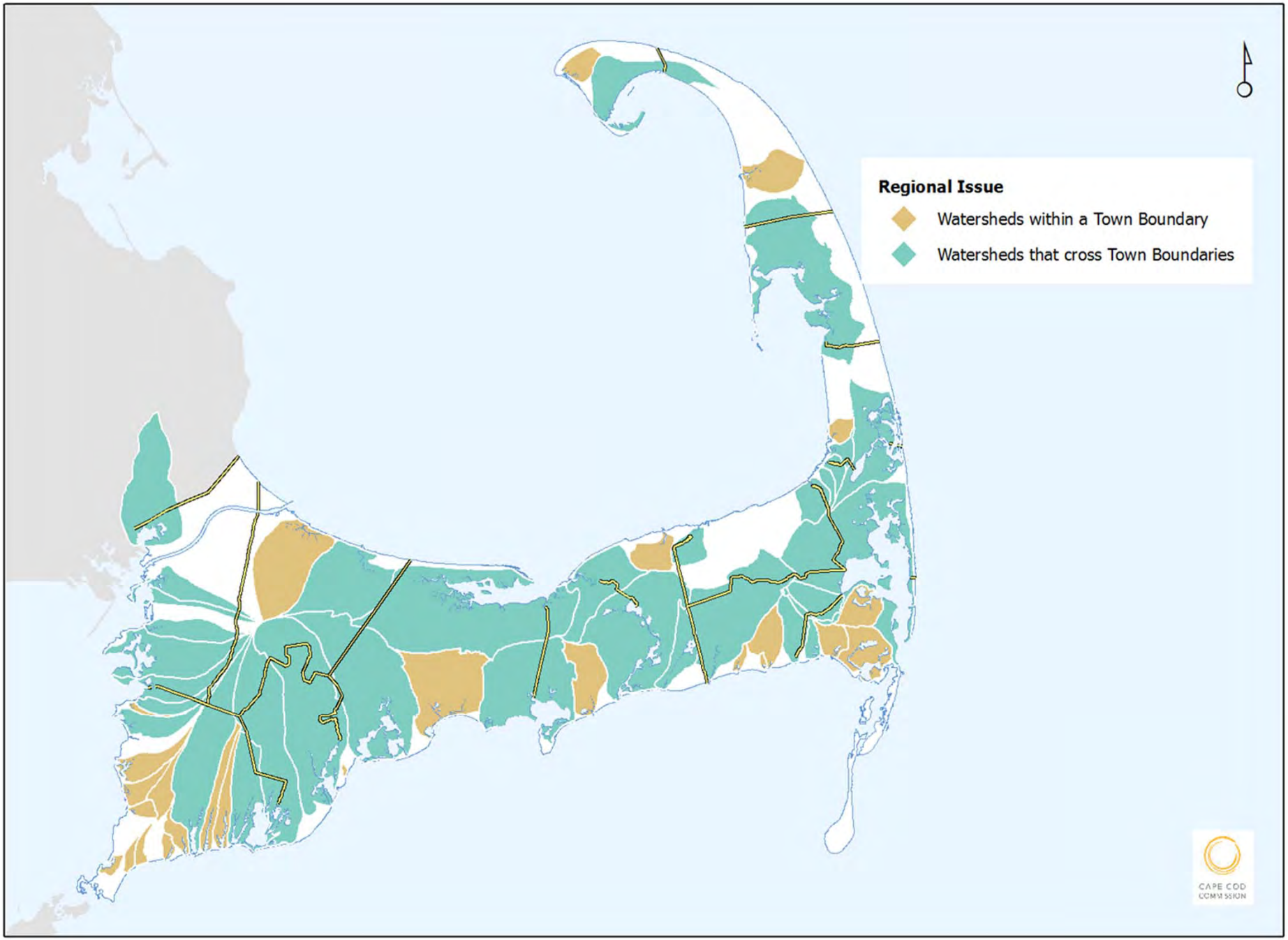
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

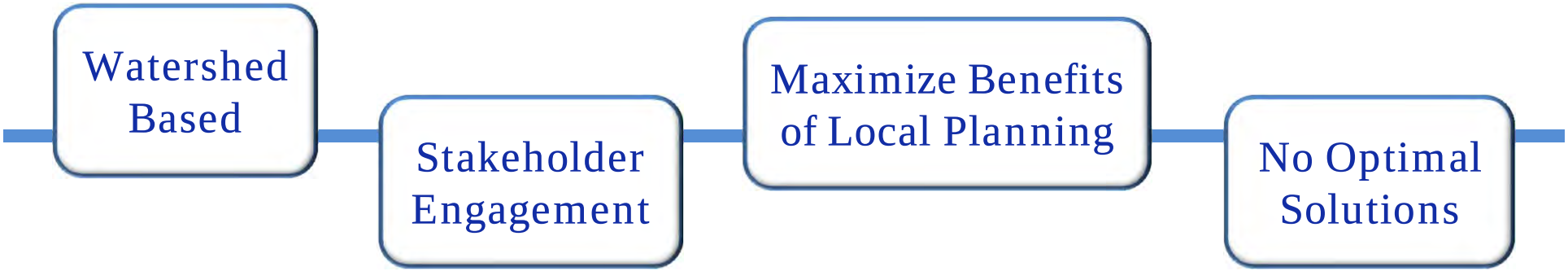

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

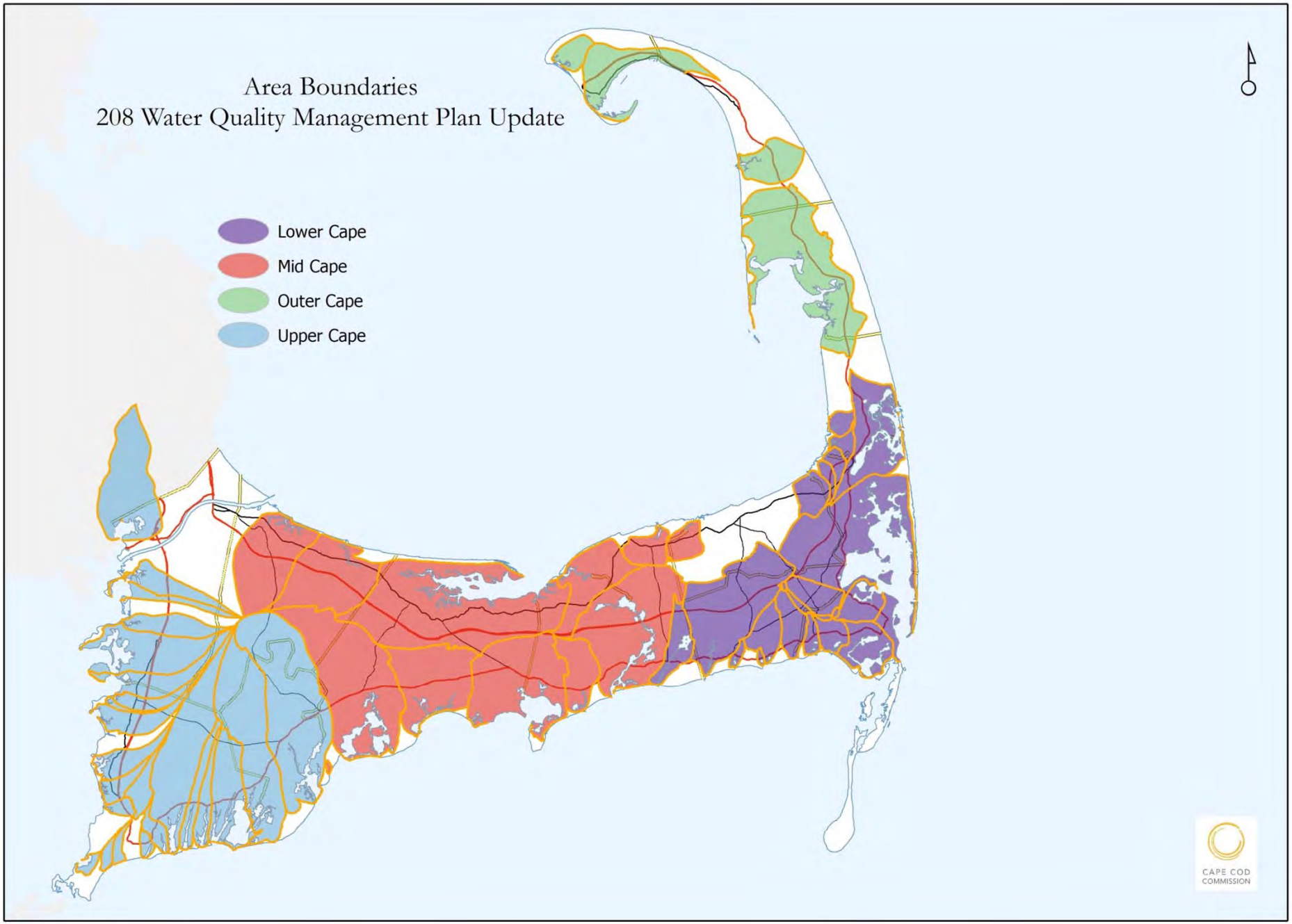

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

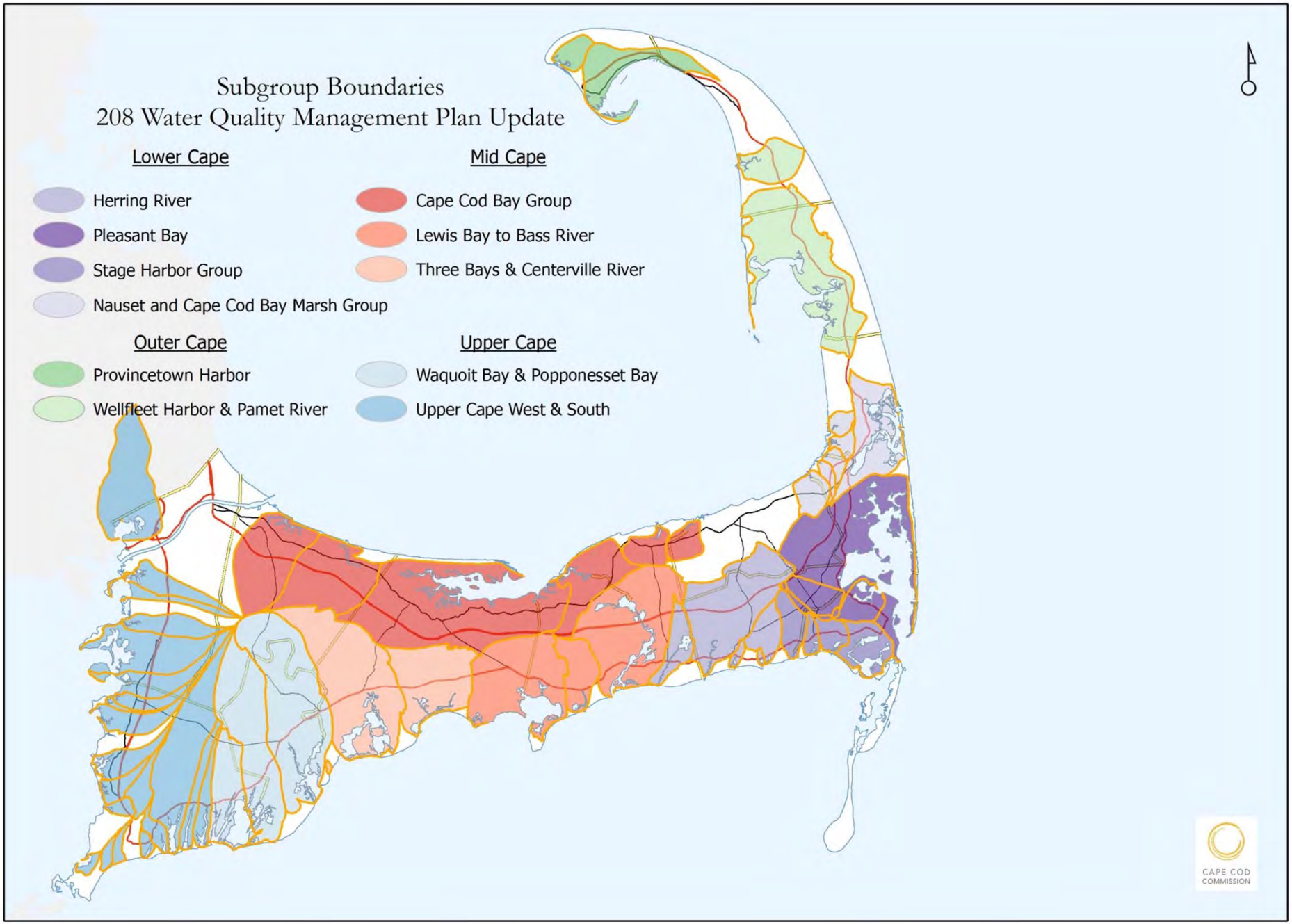

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

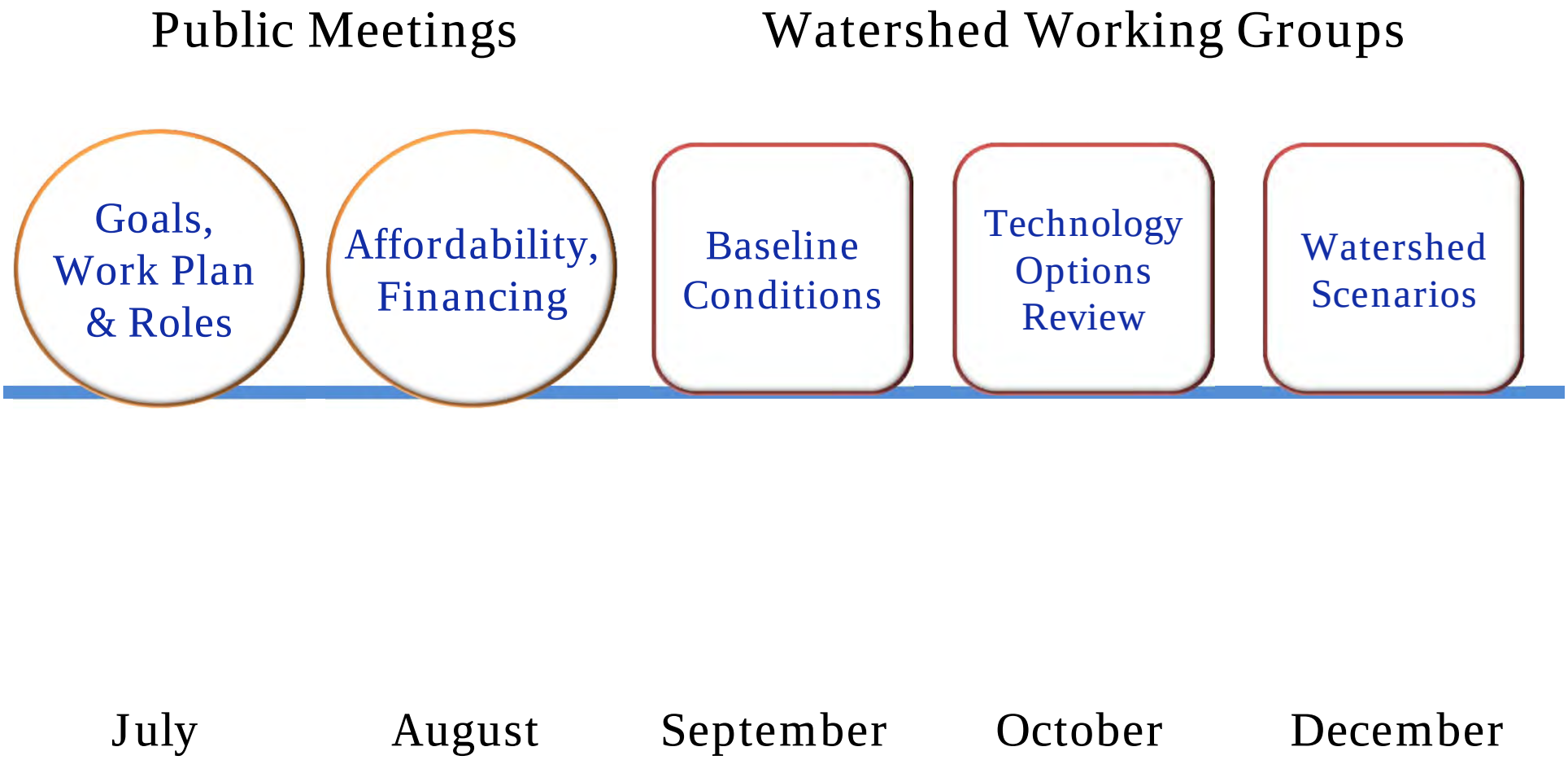


Goal:
To generate a series of approaches in each watershed that will meet water quality standards

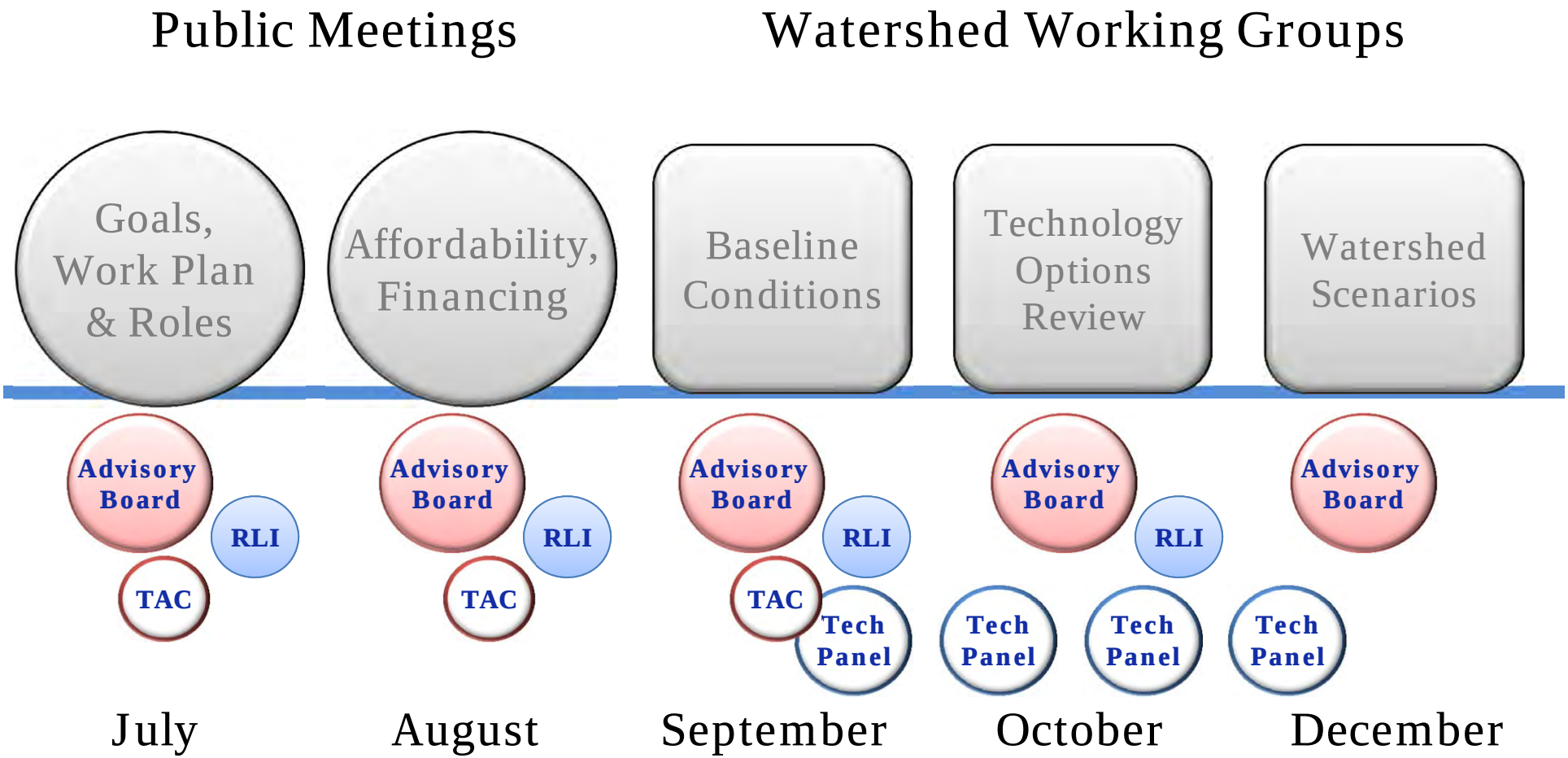

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

What is the stakeholder process?



208 Planning Process



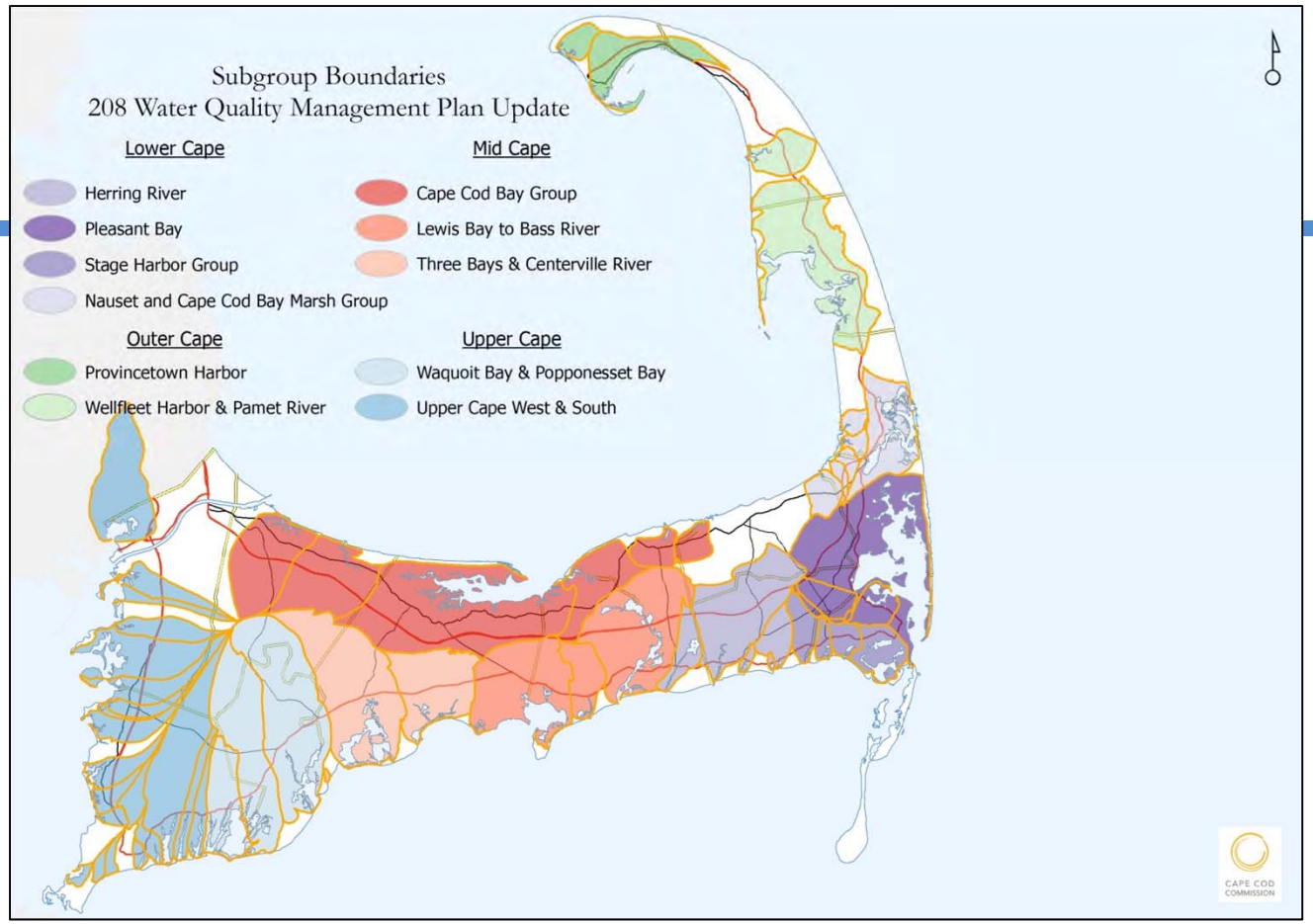
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

208 Planning Process

Baseline Conditions

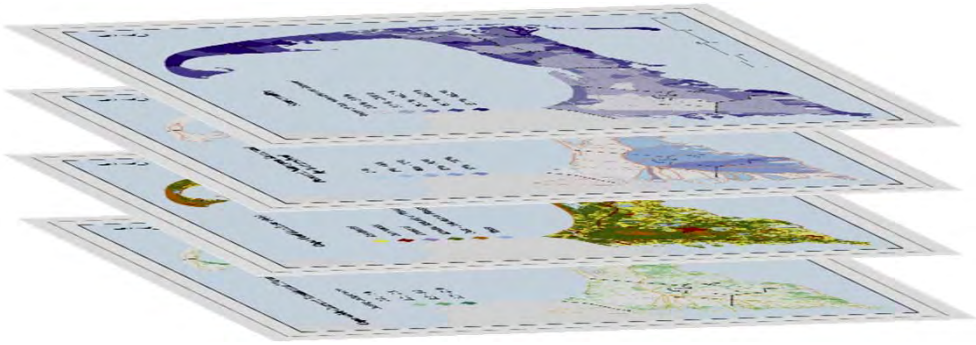
11 Working Group Meetings: Sept 18-27

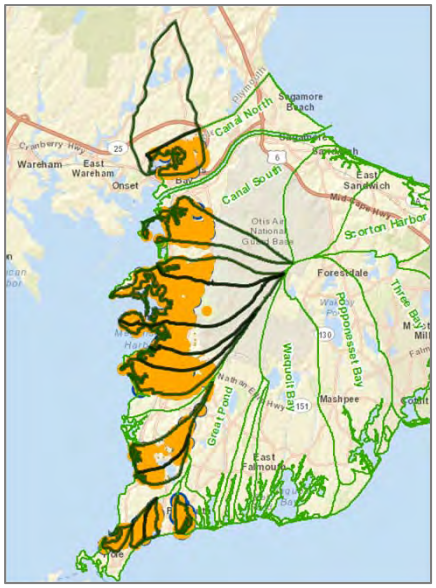
Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11





208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Goal of Today's Meeting:

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

208 Planning Process

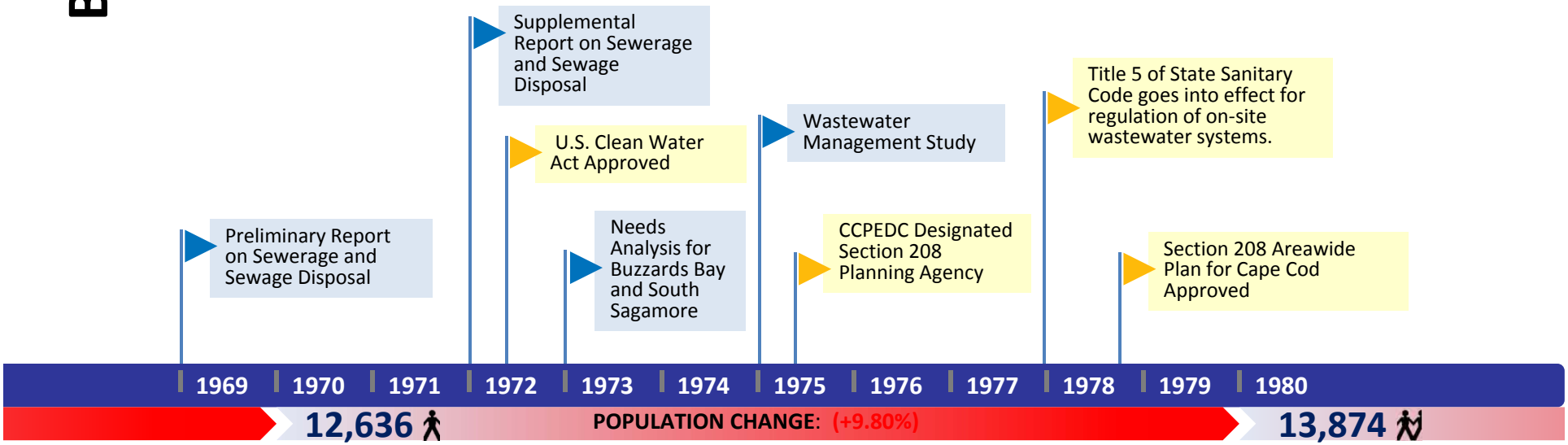
Local Progress to Date

Buttermilk Bay
Phinney's Harbor
Back River/Eel Pond
Pocasset River
Pocasset Harbor
Megansett Harbor
Fiddler Cove
Rands Canal
Wild Harbor
Great Sippewisset Creek
Little Sippewisset Marsh
Falmouth Inner Harbor
Quissett Harbor
Oyster Pond
Salt Pond

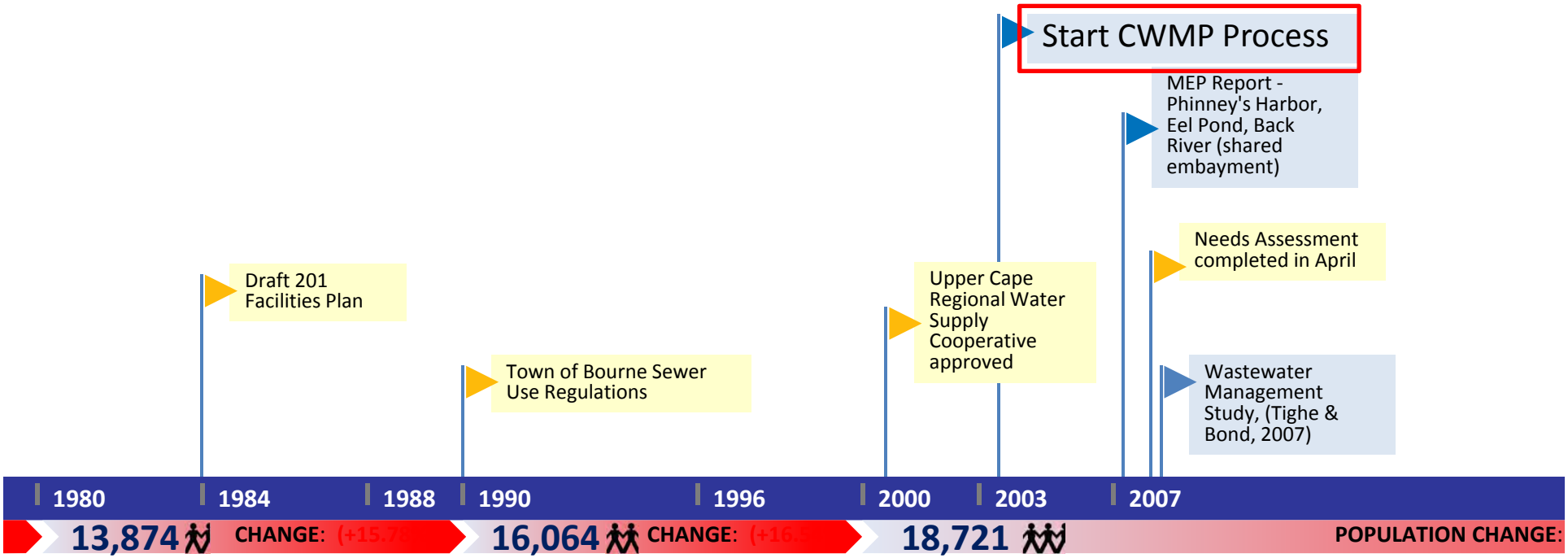
Bourne: 1969-2013

From 1978 Section 208 Plan

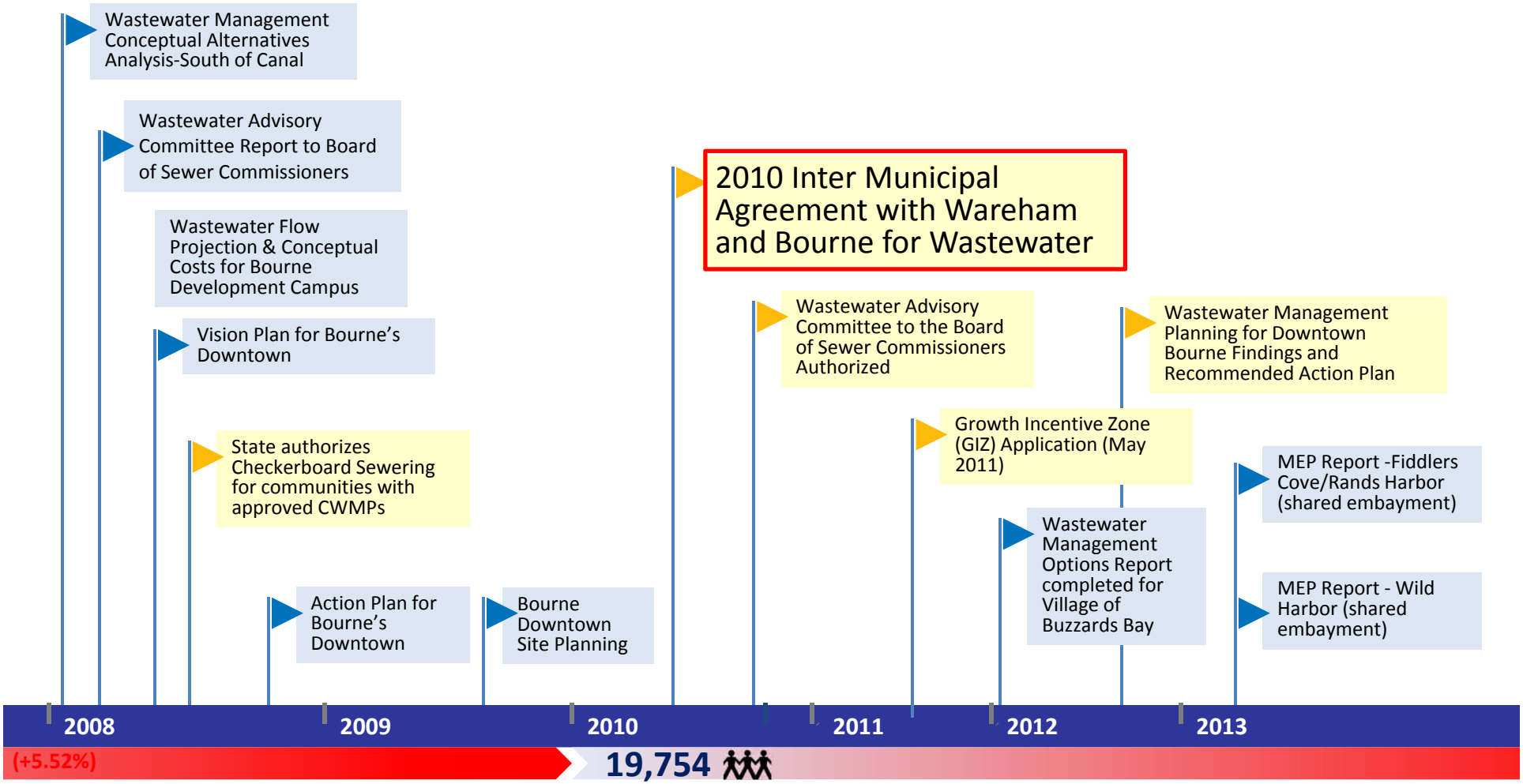
- The Town of Bourne presents unique geographic difficulties to be overcome in water quality management due to its physical division by the Cape Cod Canal.
- The Town of Bourne has a major Category 1 problem area in Buzzards Bay, a densely developed commercial area. On-site system failures in this area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



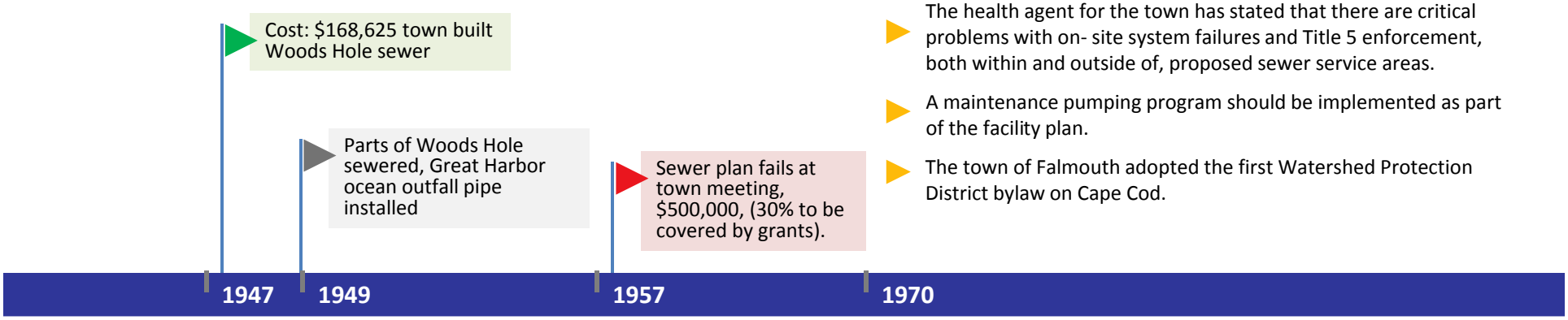
Bourne: 1969-2013



Bourne: 1969-2013



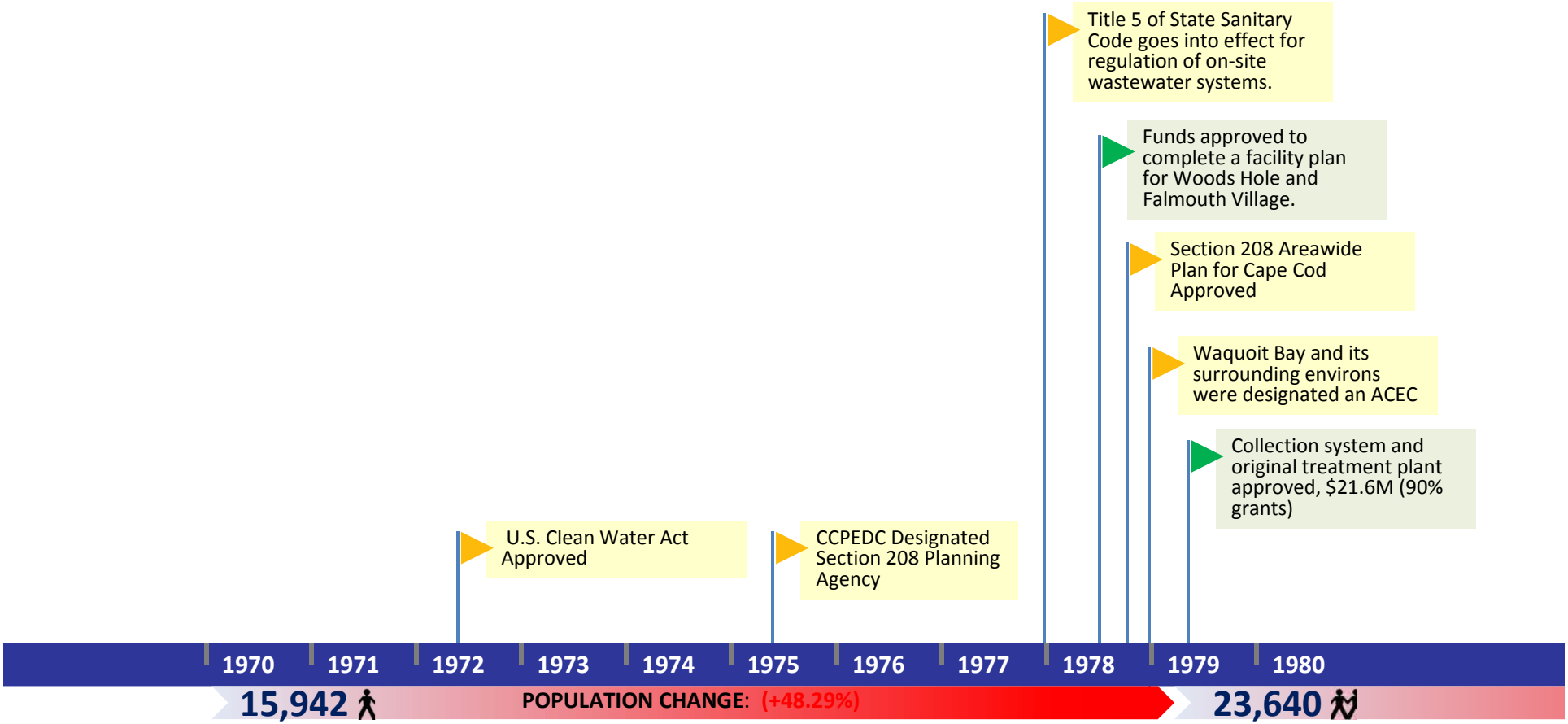
Falmouth: 1947-2013



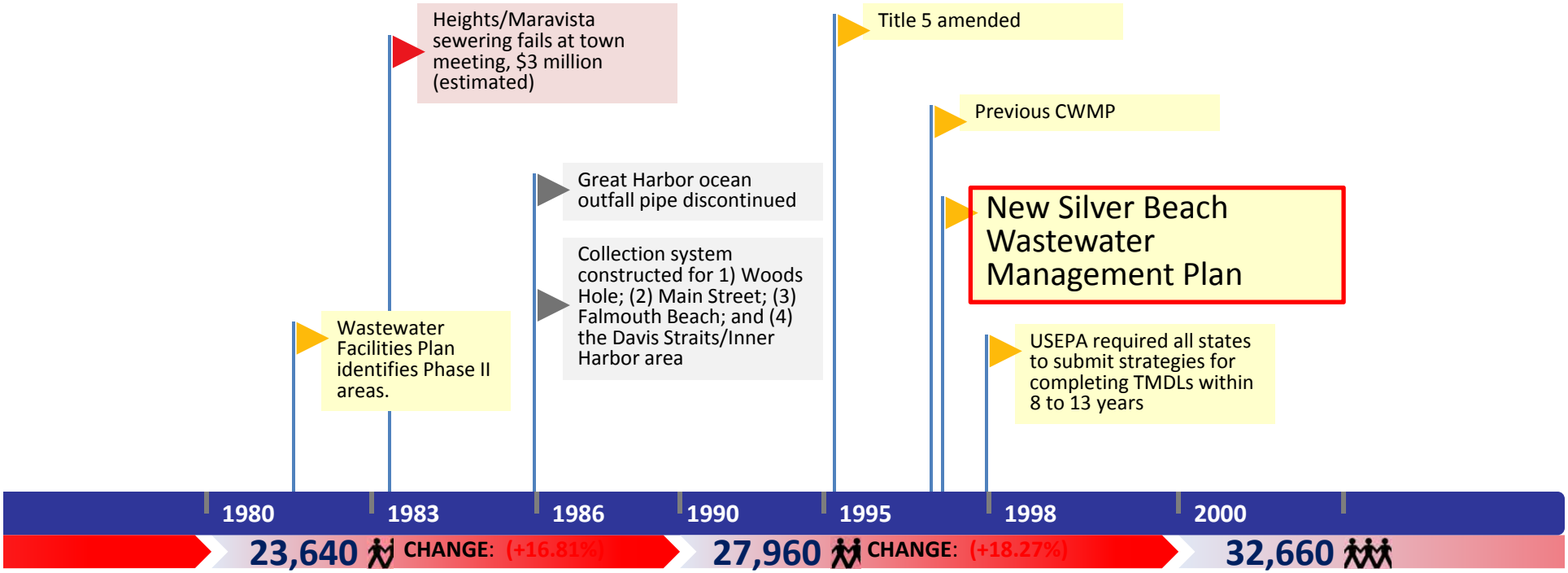
From 1978 Section 208 Plan

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

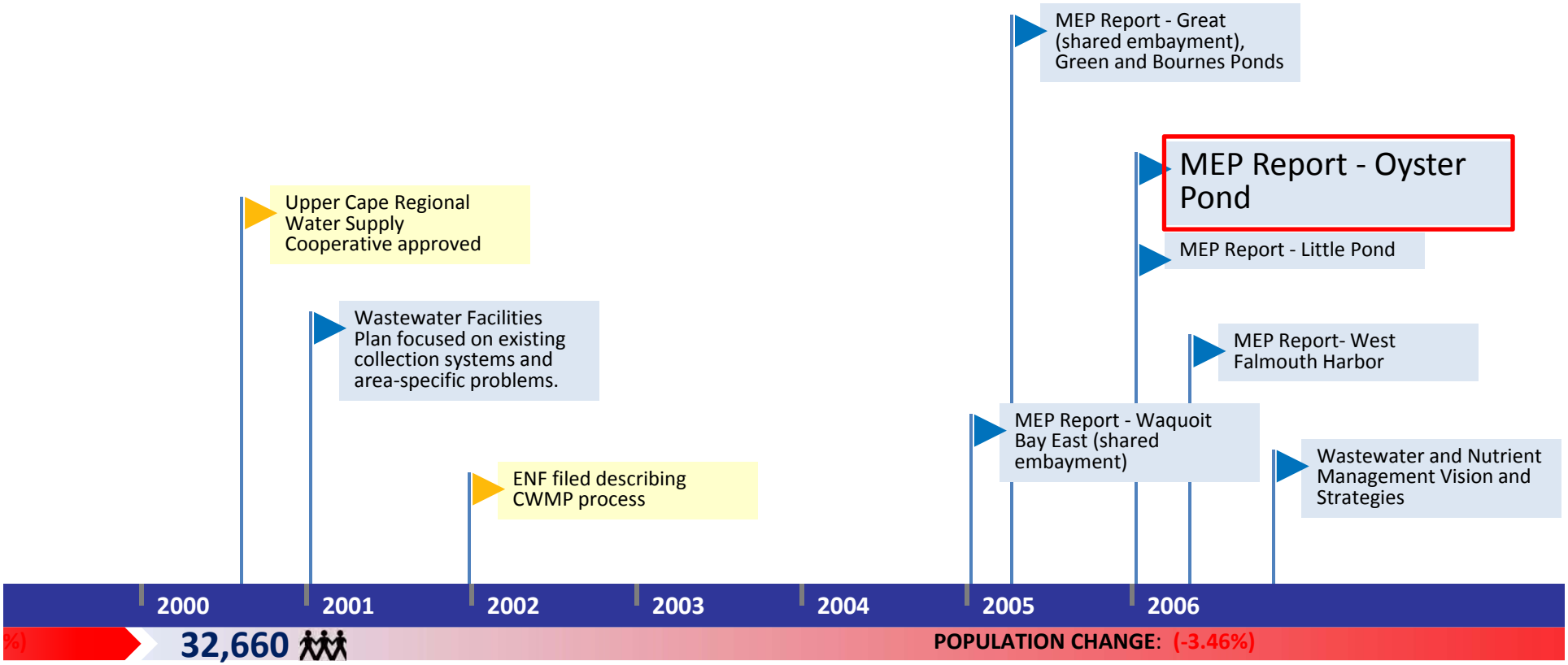
Falmouth: 1947-2013



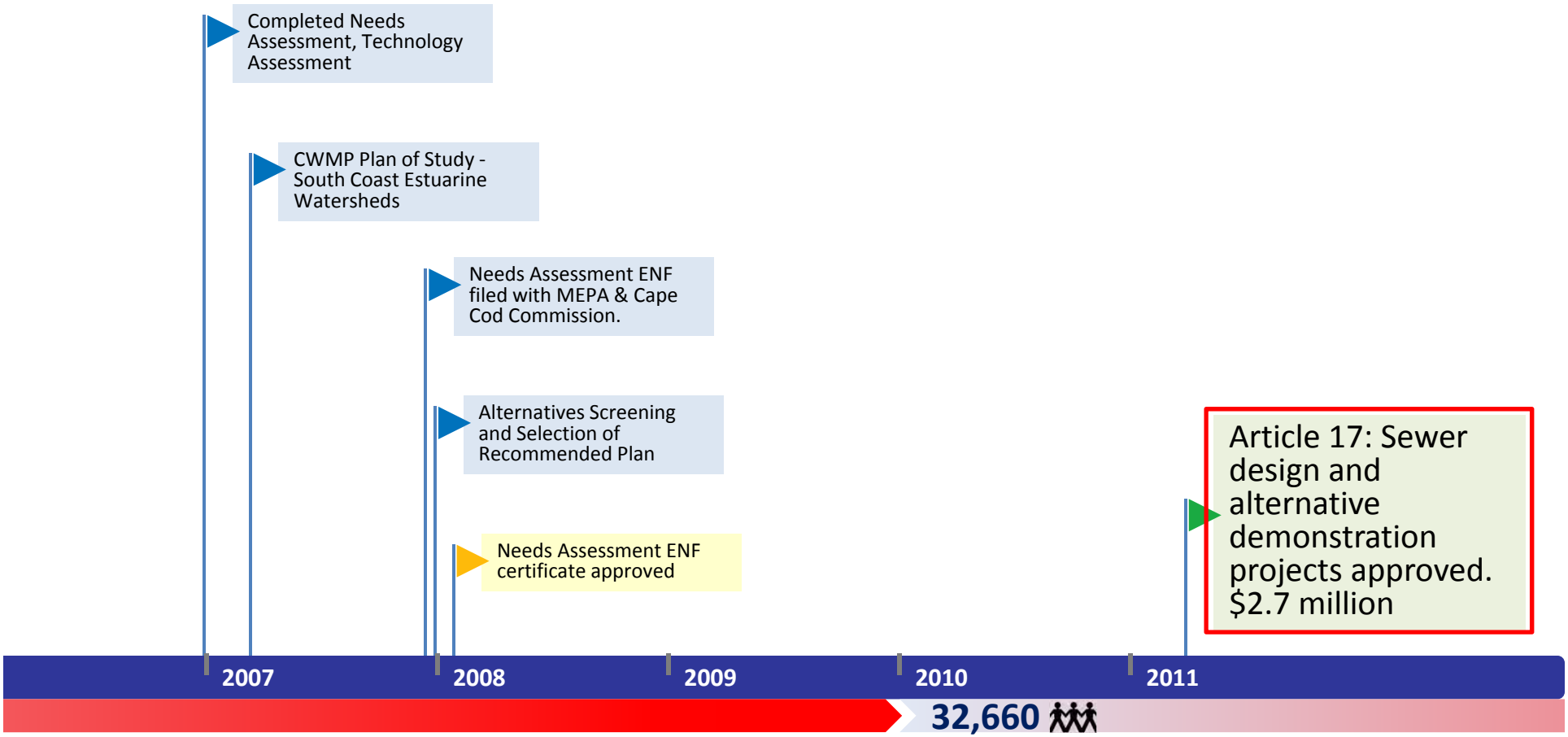
Falmouth: 1947-2013



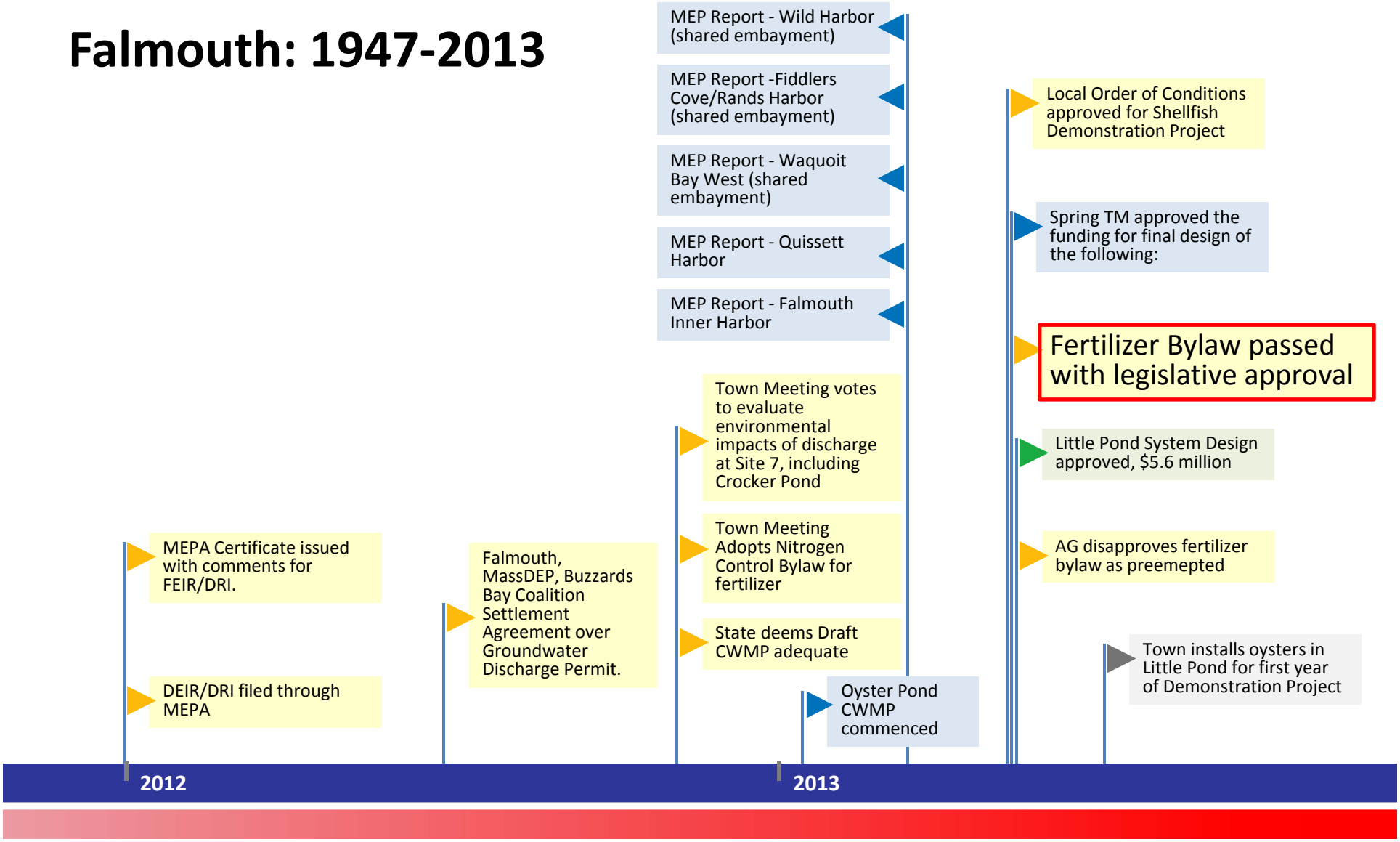
Falmouth: 1947-2013



Falmouth: 1947-2013



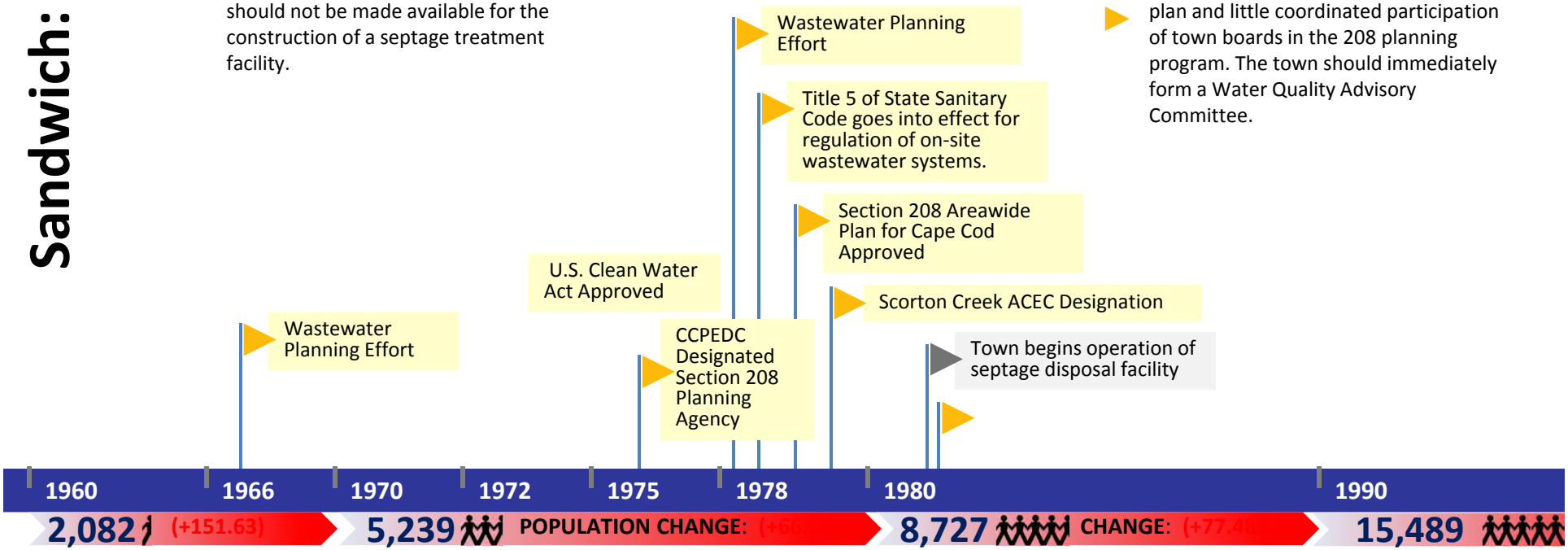
Falmouth: 1947-2013



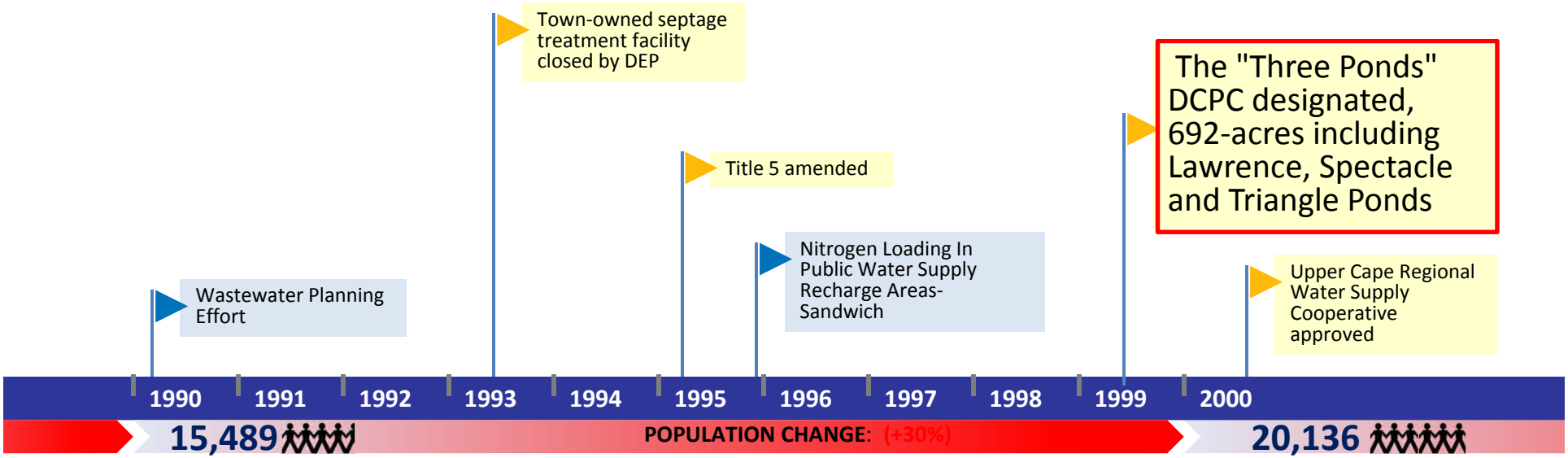
Sandwich: 1960-2013

From 1978 Section 208 Plan

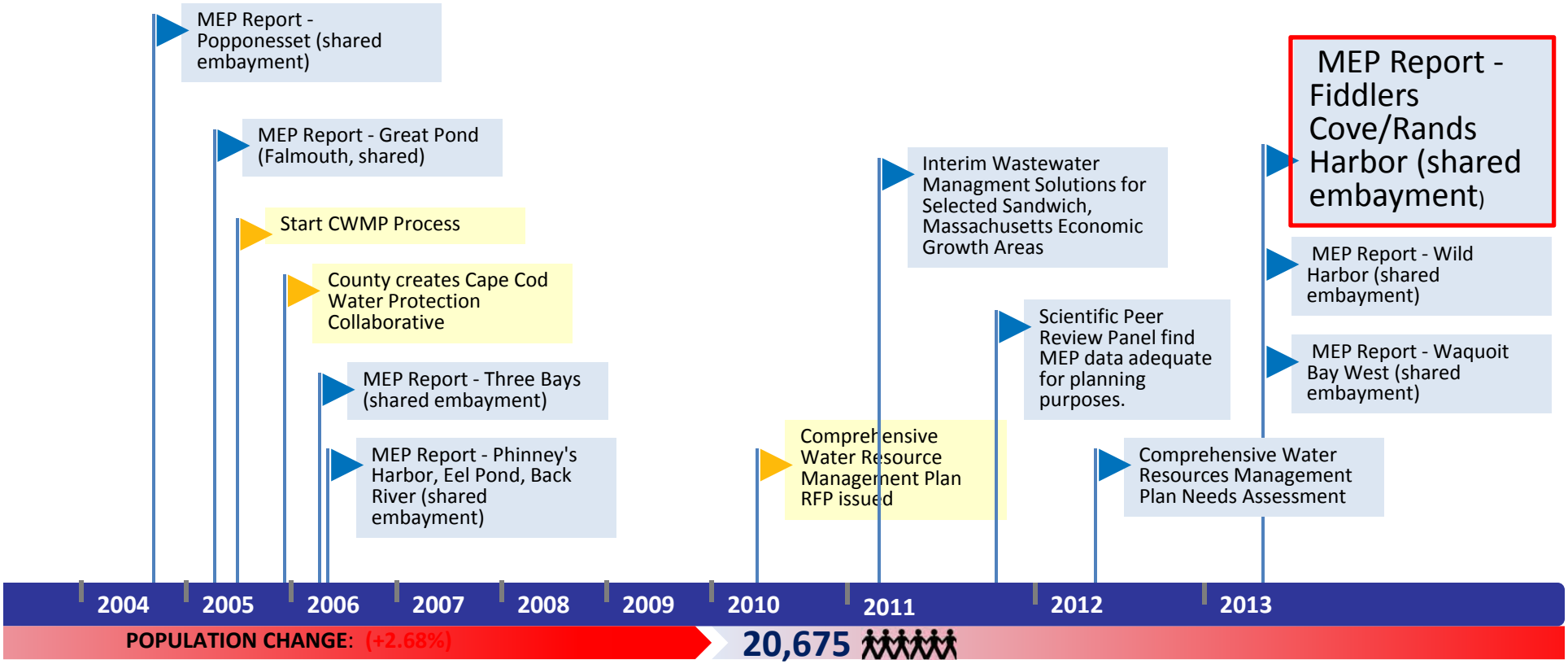
- A sewer facilities plan was completed for Sandwich in 1978. The plan calls for a small outfall into the Cape Cod Canal, which now could only be allowed through a special act of the legislature.
- Should the town fail to act by 1980, a DEQE investigation of Title 5 violations should be initiated.
- A septage treatment facility would not provide a comprehensive solution and could not be considered to be consistent with the 208 plan. Funds should not be made available for the construction of a septage treatment facility.
- The town health agent should strictly enforce Title 5 and should seek additional qualified personnel to implement the 208 recommended on-site systems management program.
- The town has taken progressive steps to increase lot sizes to at least one acre in most areas of town. The town has indicated willingness to cooperate with the 208 staff in delineating watershed areas and in adopting Watershed Protection Districts.
- The problem of the State Fish Hatchery discharging over half a million gallons of fresh water must be addressed by the Department of Fisheries and Wildlife as recommended in the "Water Conservation" section of the final plan.
- The town should actively participate in regional solid waste planning to develop a long-range solution to its solid waste management problems.
- There has been a serious delay in action on the town's proposed sewer facility plan and little coordinated participation of town boards in the 208 planning program. The town should immediately form a Water Quality Advisory Committee.



Sandwich: 1970-2013



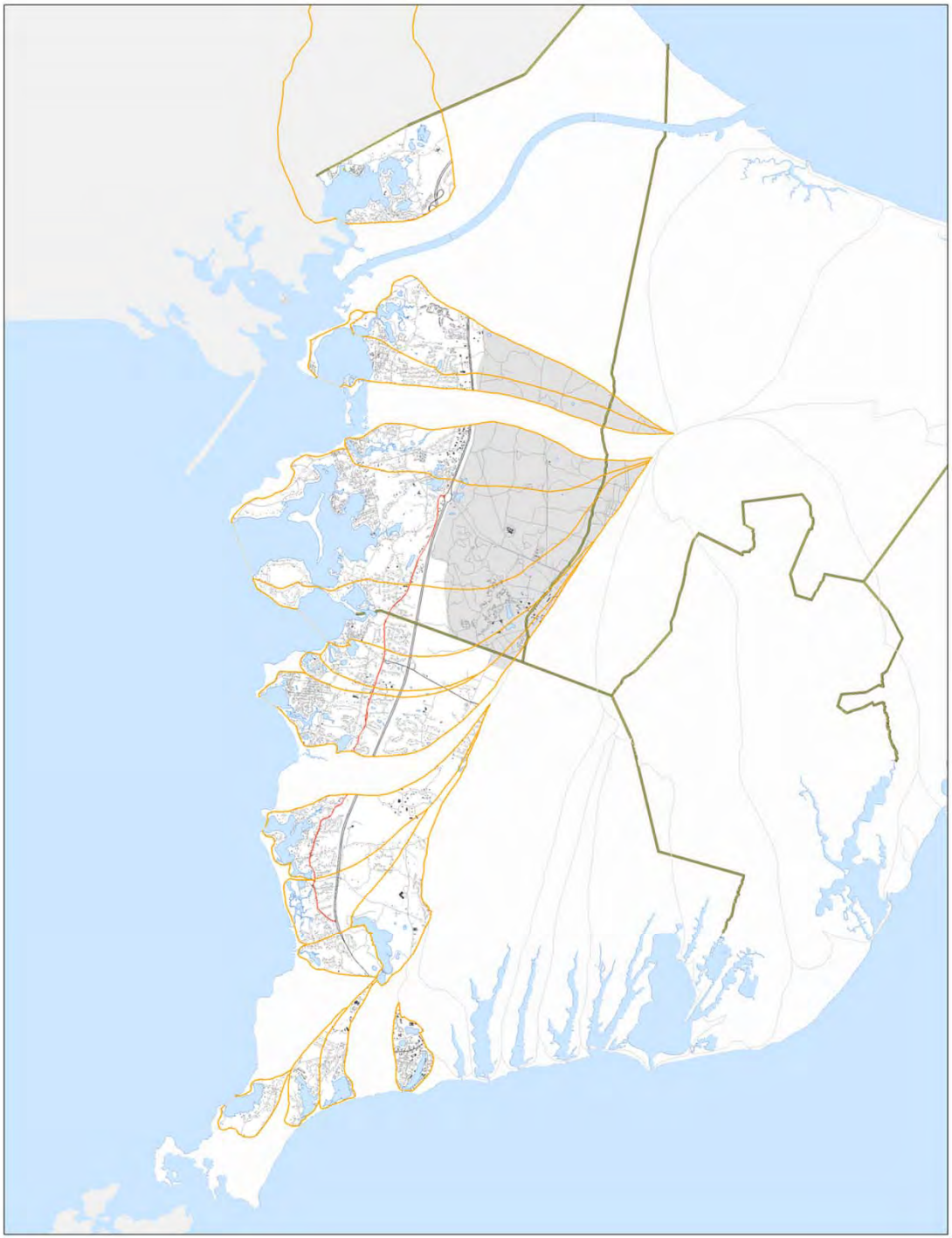
Sandwich: 1970-2013

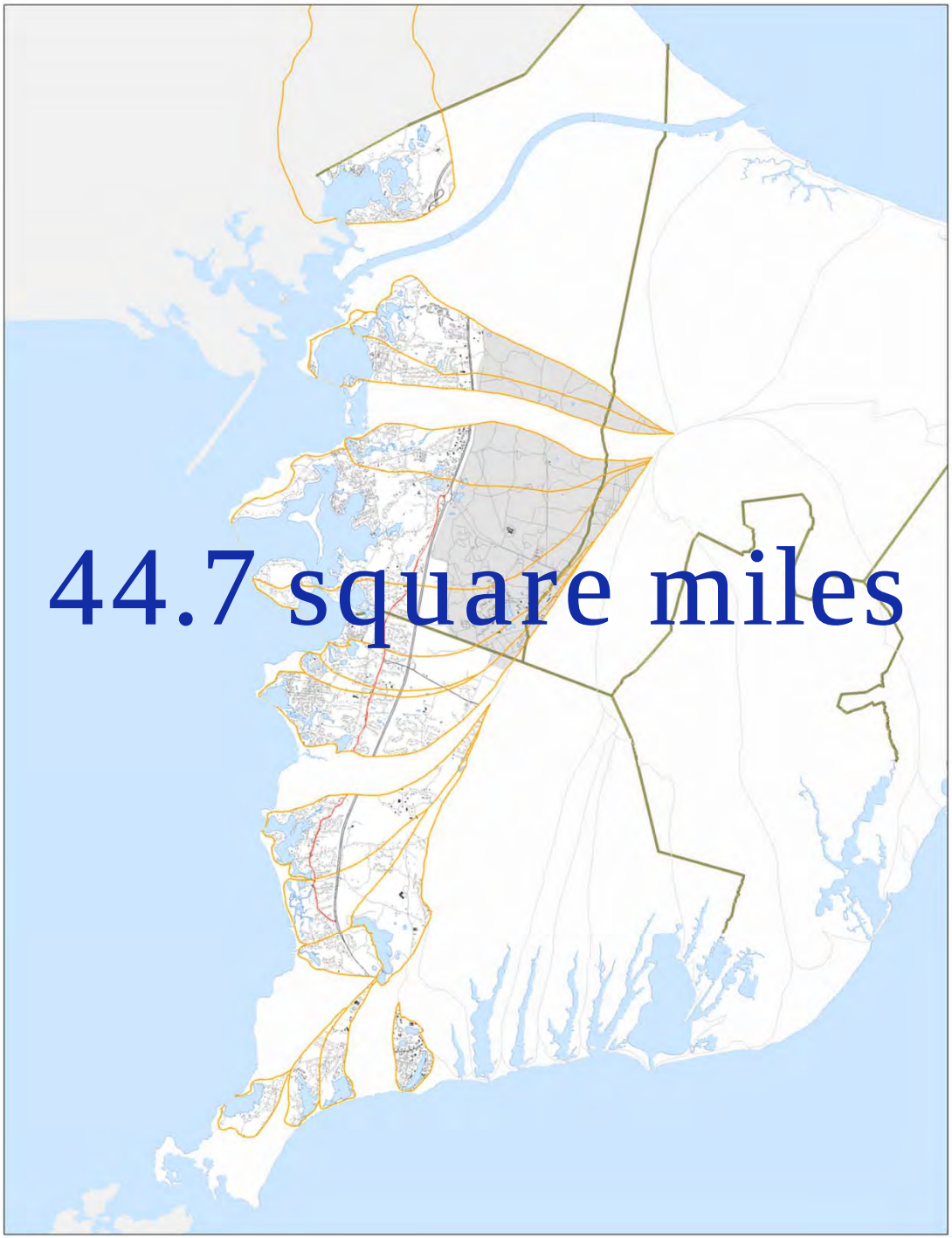


Did we miss anything?

Your Watersheds

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor




44.7 square miles


3 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 Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

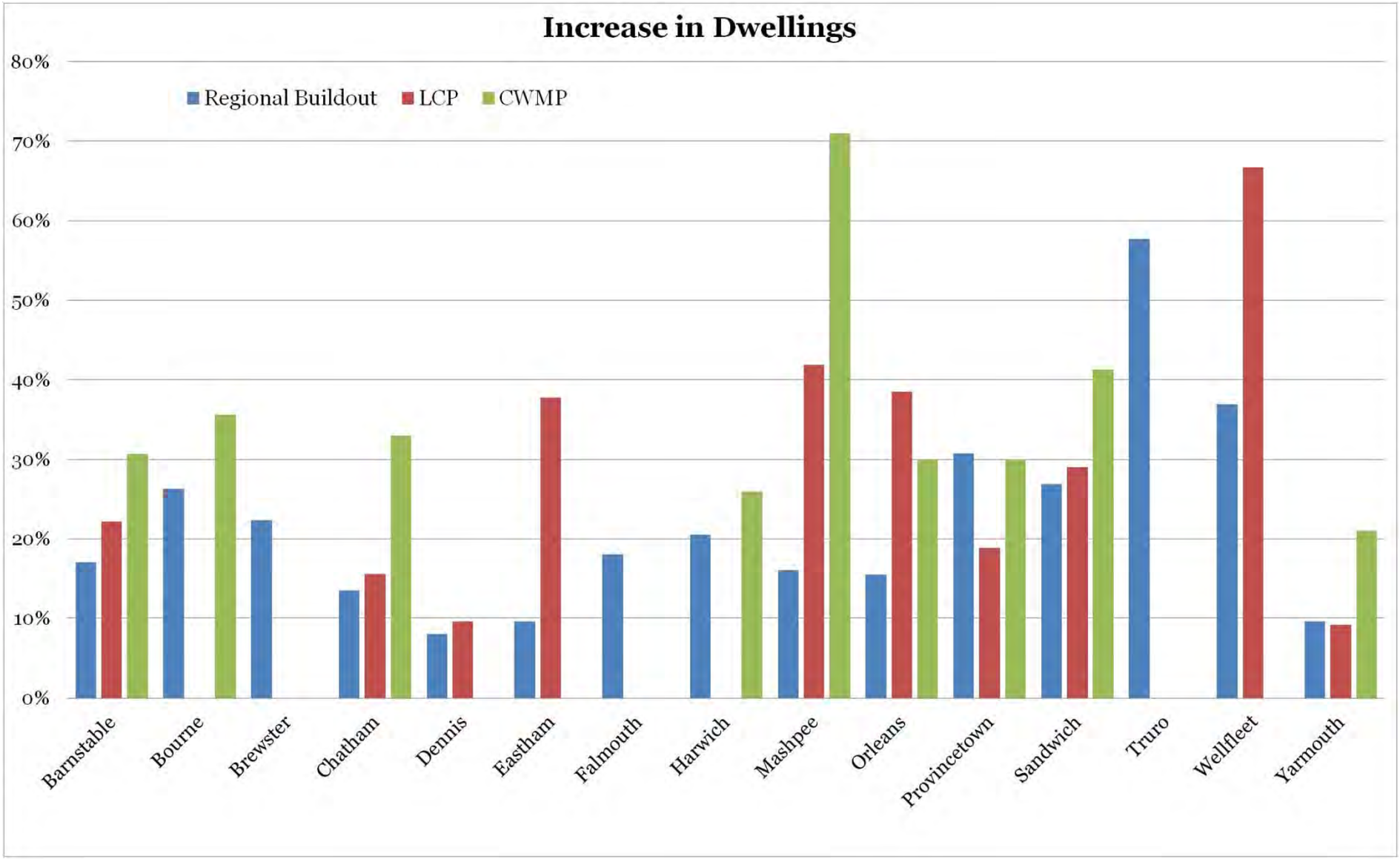
Sources: MassGIS, MassDOT

Density

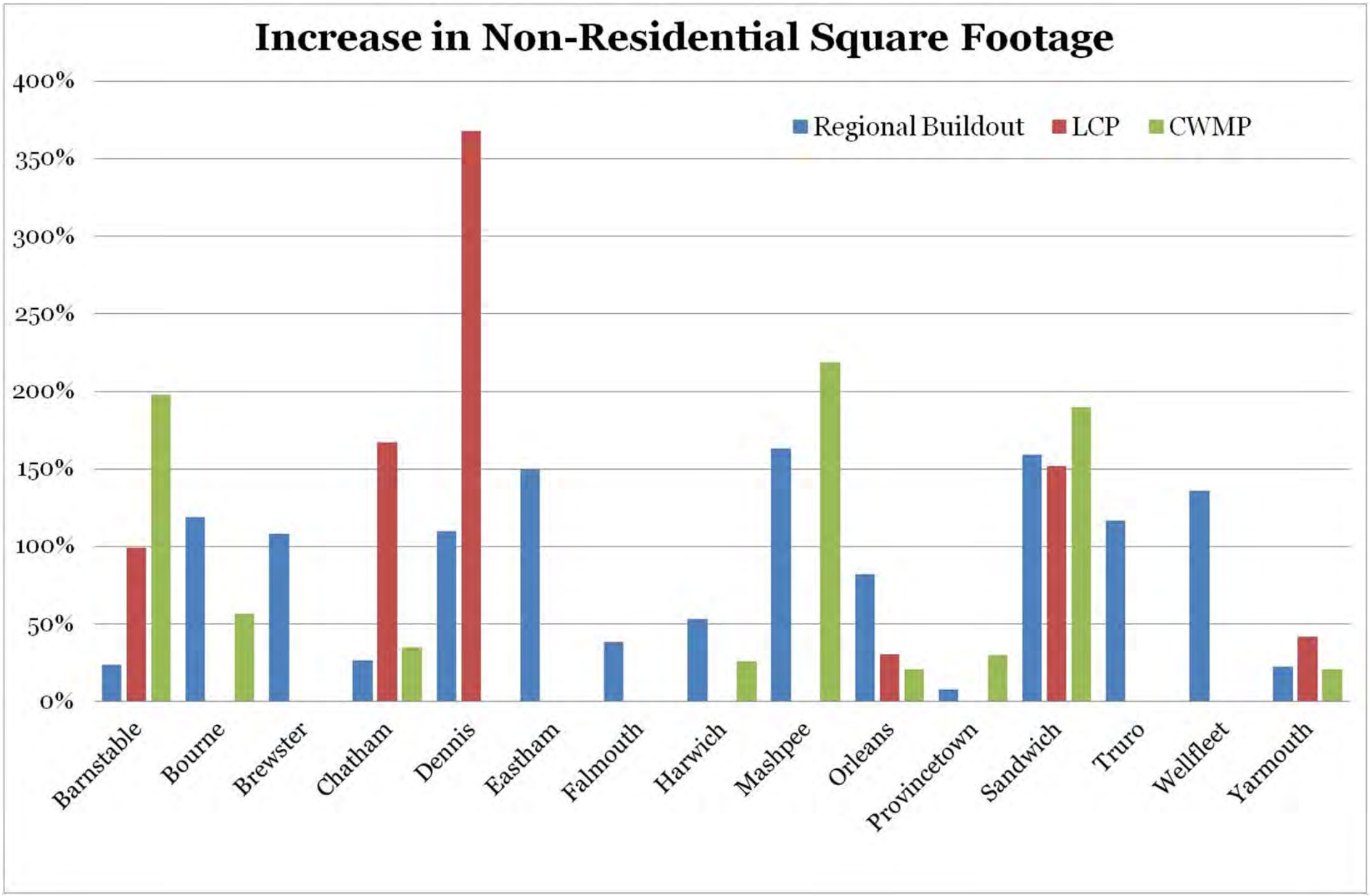
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

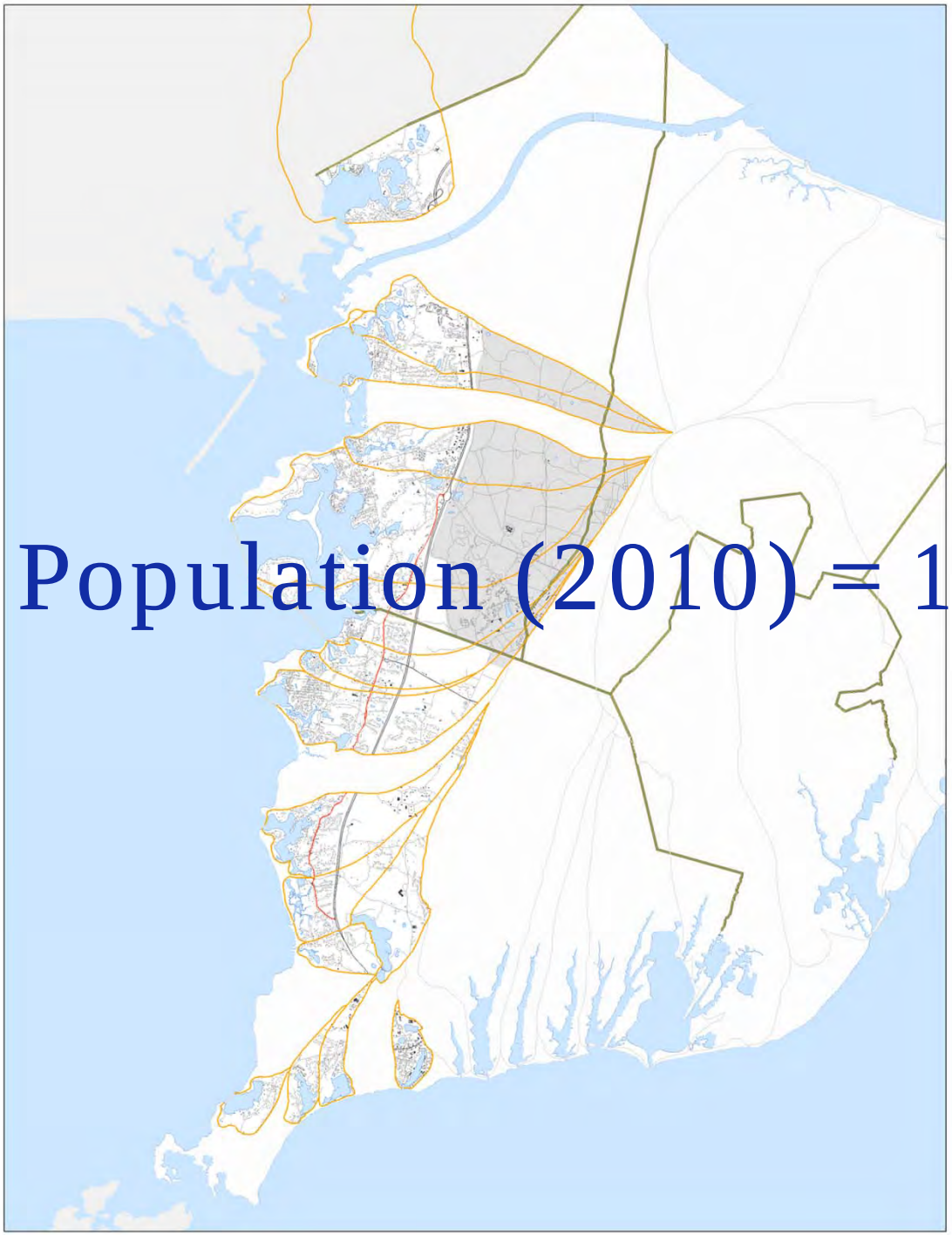

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout


Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

The People

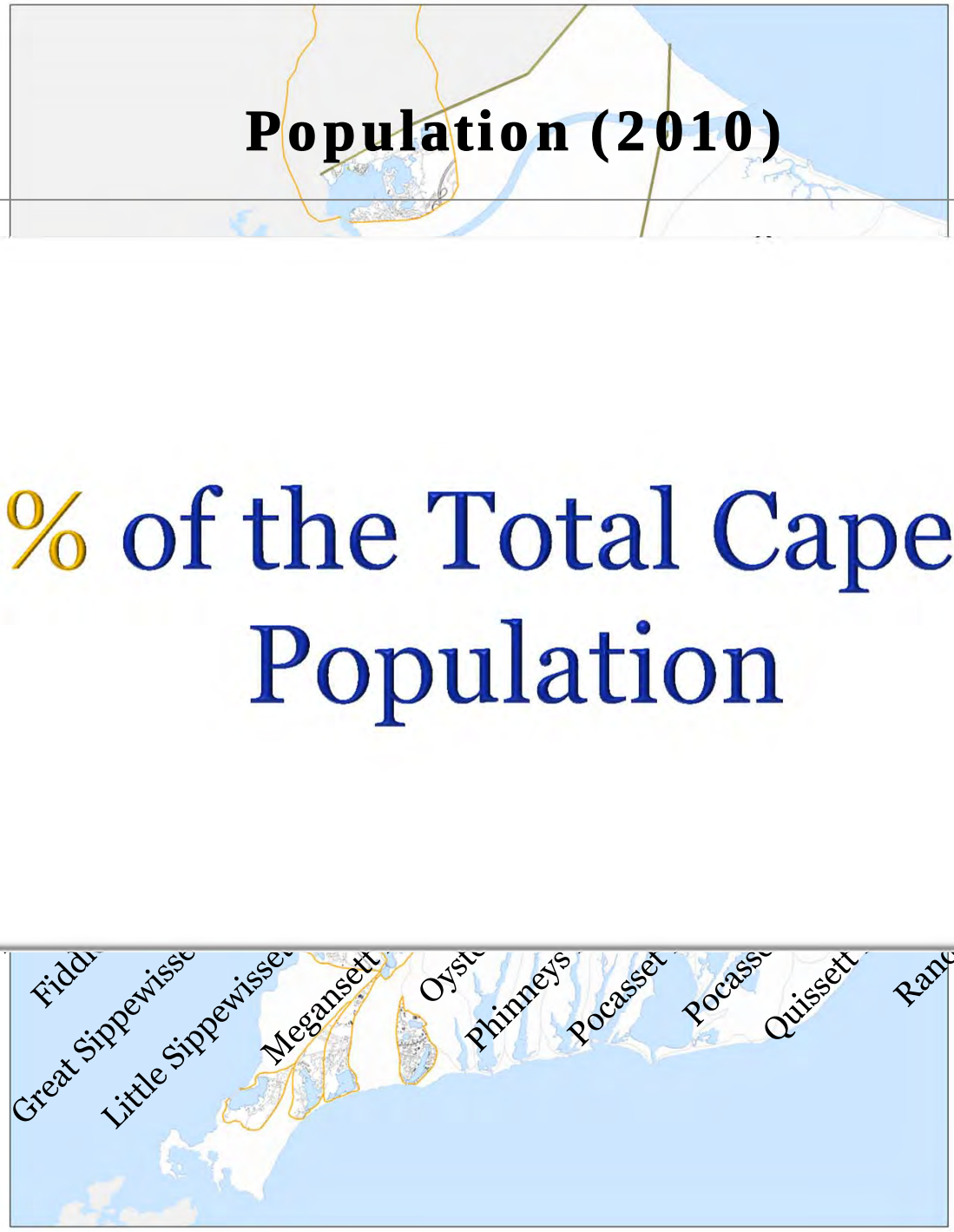
Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor



Total Population (2010) = 16,516

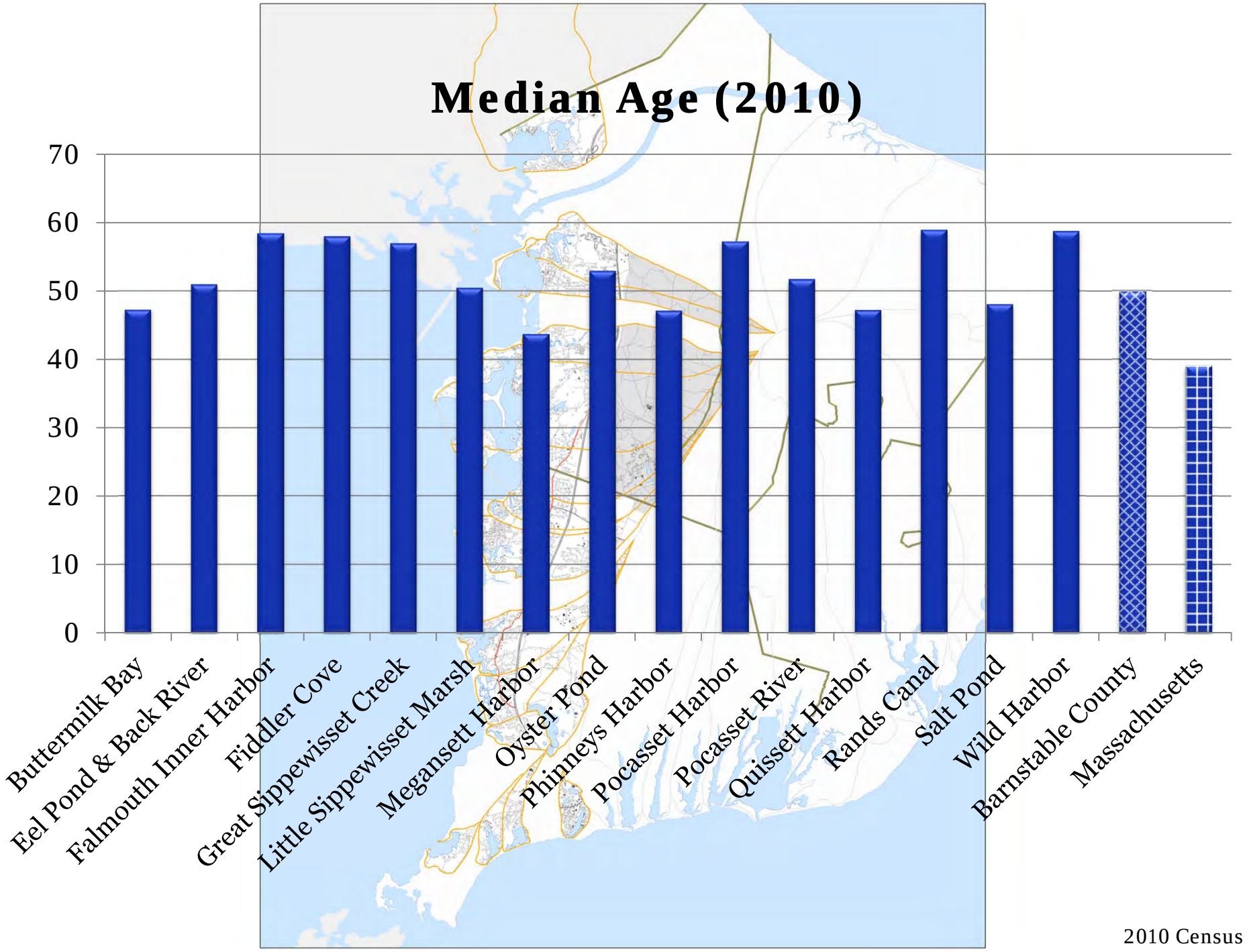
2010 Census

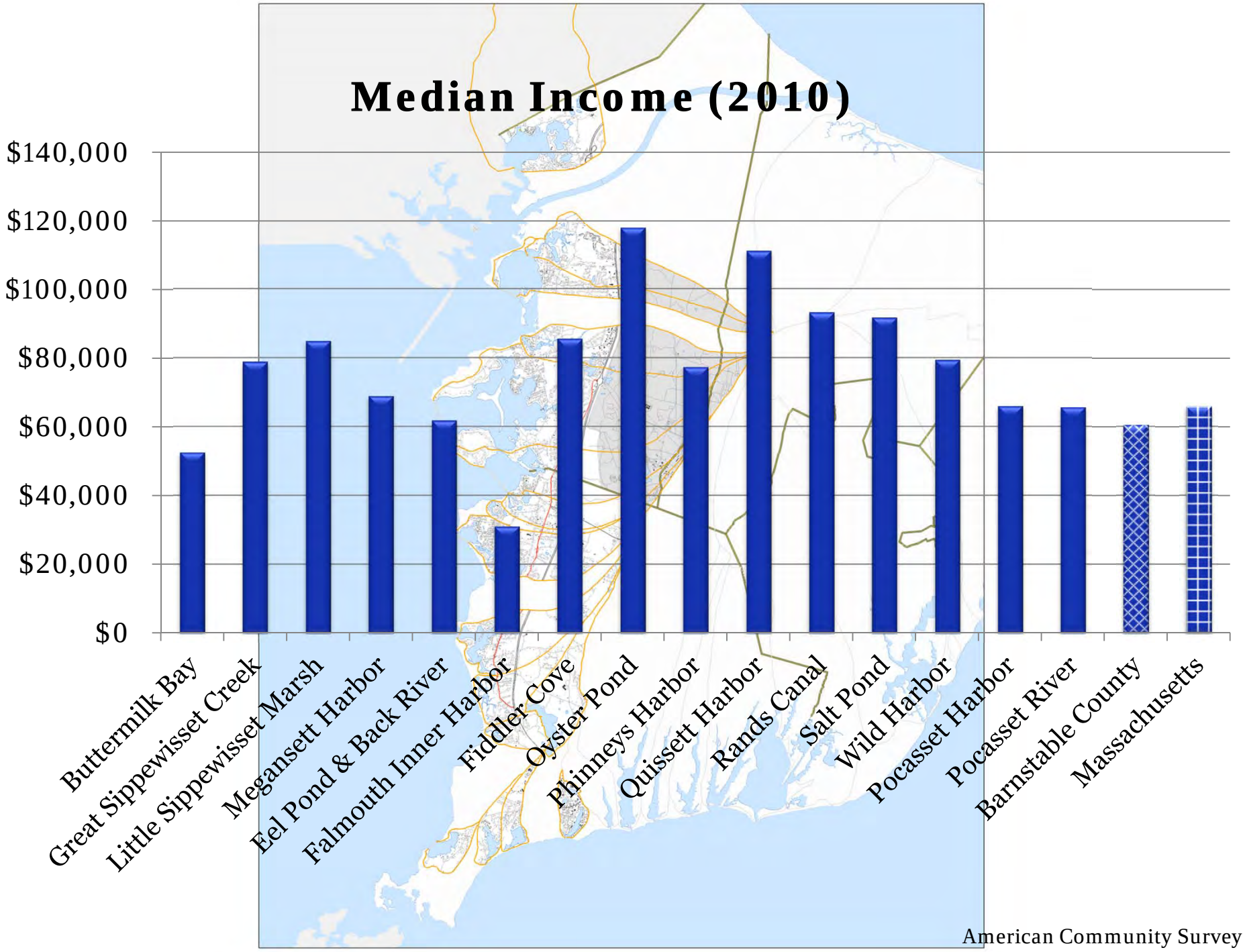
Population (2010)

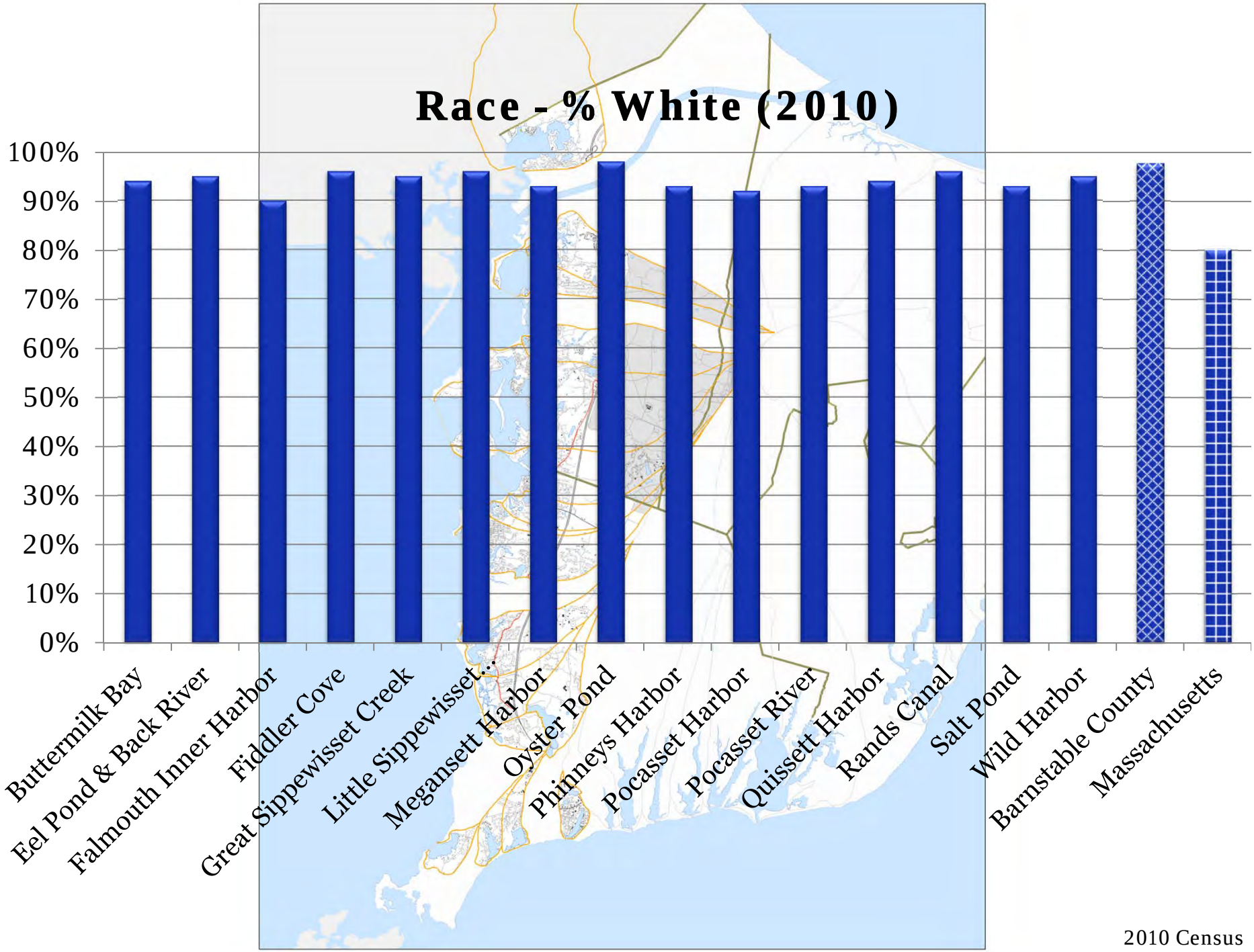


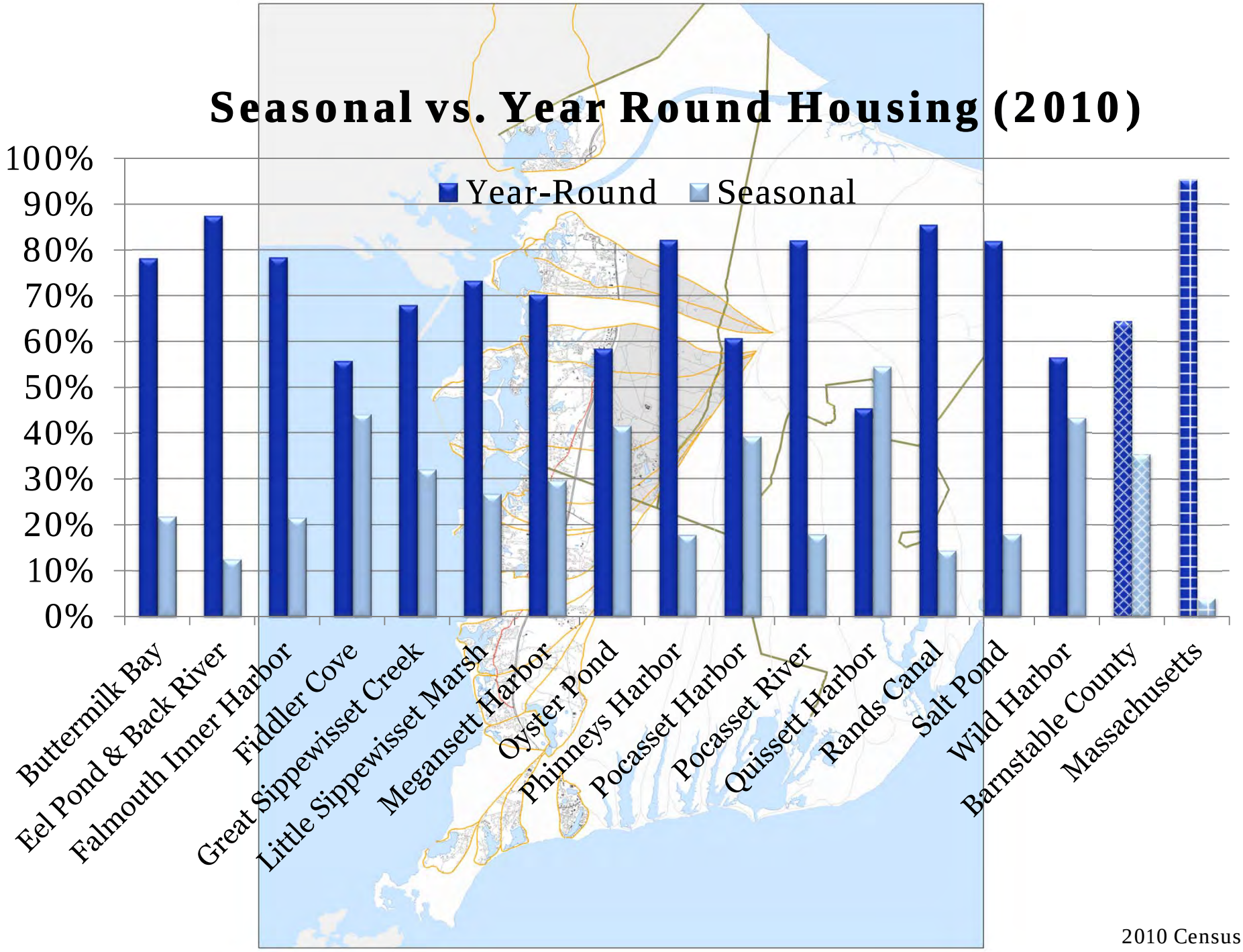
7.3% of the Total Cape Cod Population

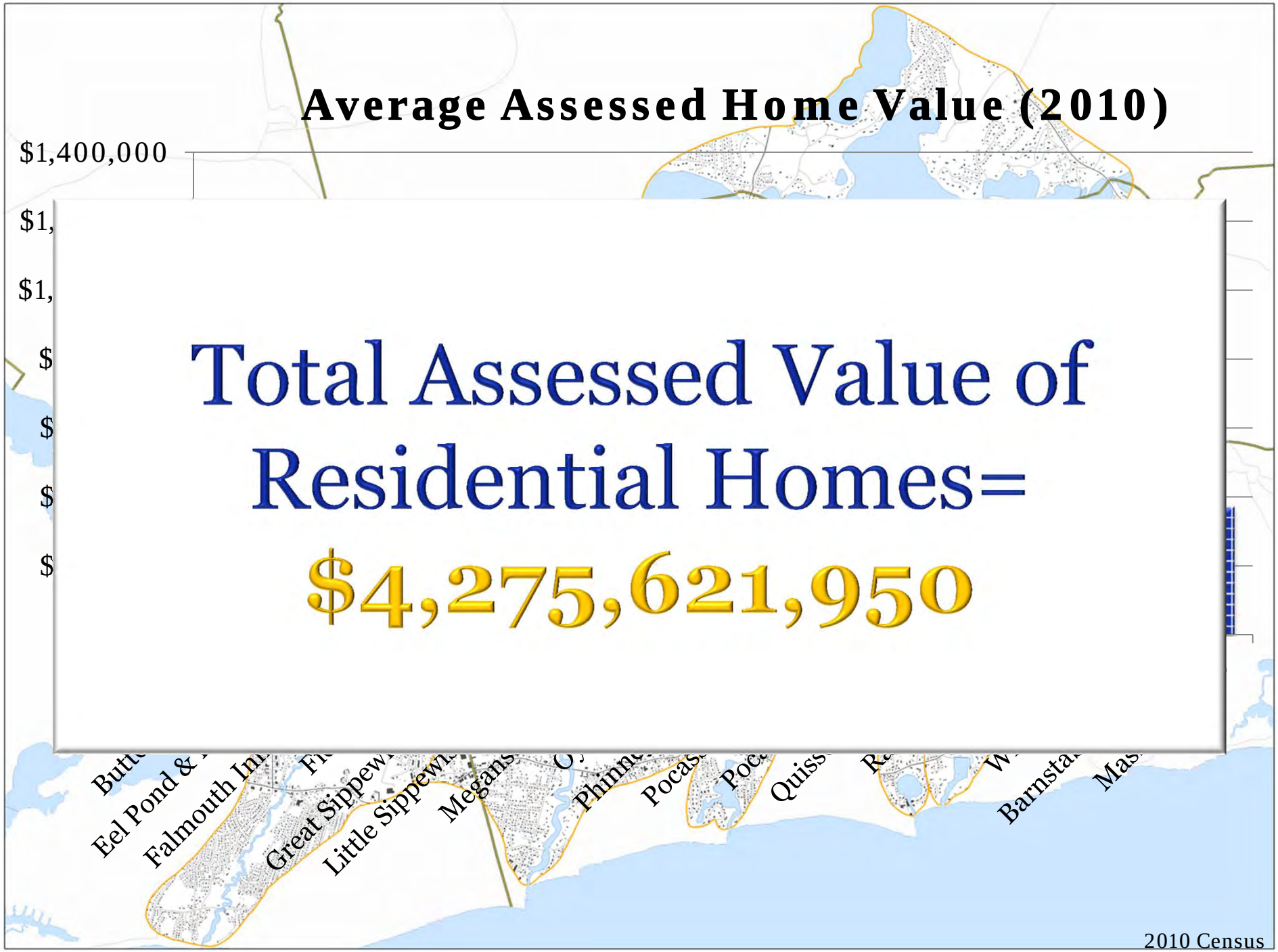
2010 Census


Median Age (2010)
70
60
50
40
30
20
10
0
Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddler Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinneys Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor
Barnstable County
Massachusetts
2010 Census


Median Income (2010)
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$0
Buttermilk Bay
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Eel Pond & Back River
Falmouth Inner Harbor
Fiddler Cove
Oyster Pond
Phinneys Harbor
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor
Pocasset Harbor
Pocasset River
Barnstable County
Massachusetts
American Community Survey

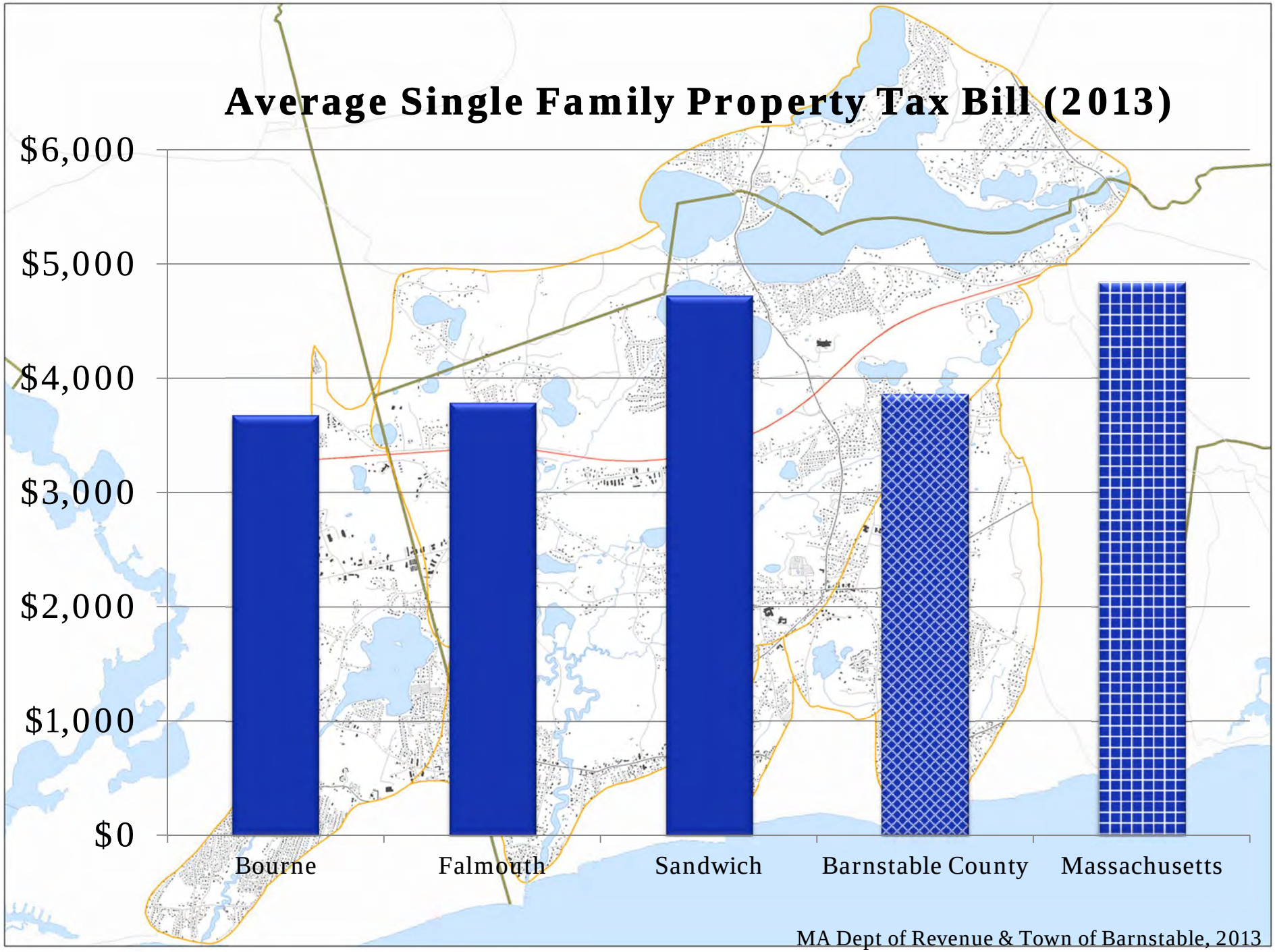

Race - % White (2010)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddler Cove
Great Sippewisset Creek
Little Sippewisset...
Megansett Harbor
Oyster Pond
Phinneys Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor
Barnstable County
Massachusetts
2010 Census

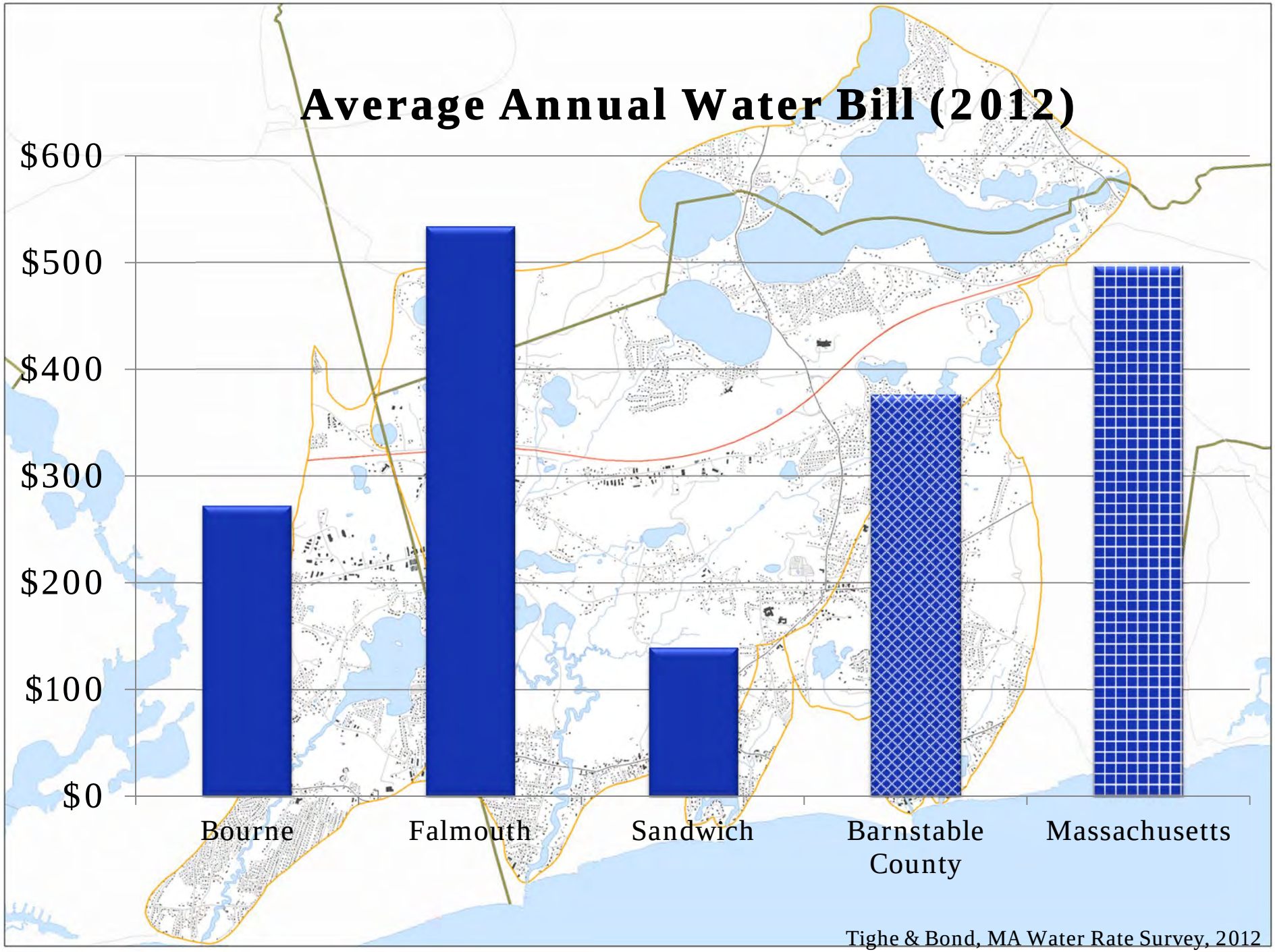

Seasonal vs. Year Round Housing (2010)
Year-Round
Seasonal
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddler Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinneys Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor
Barnstable County
Massachusetts
2010 Census

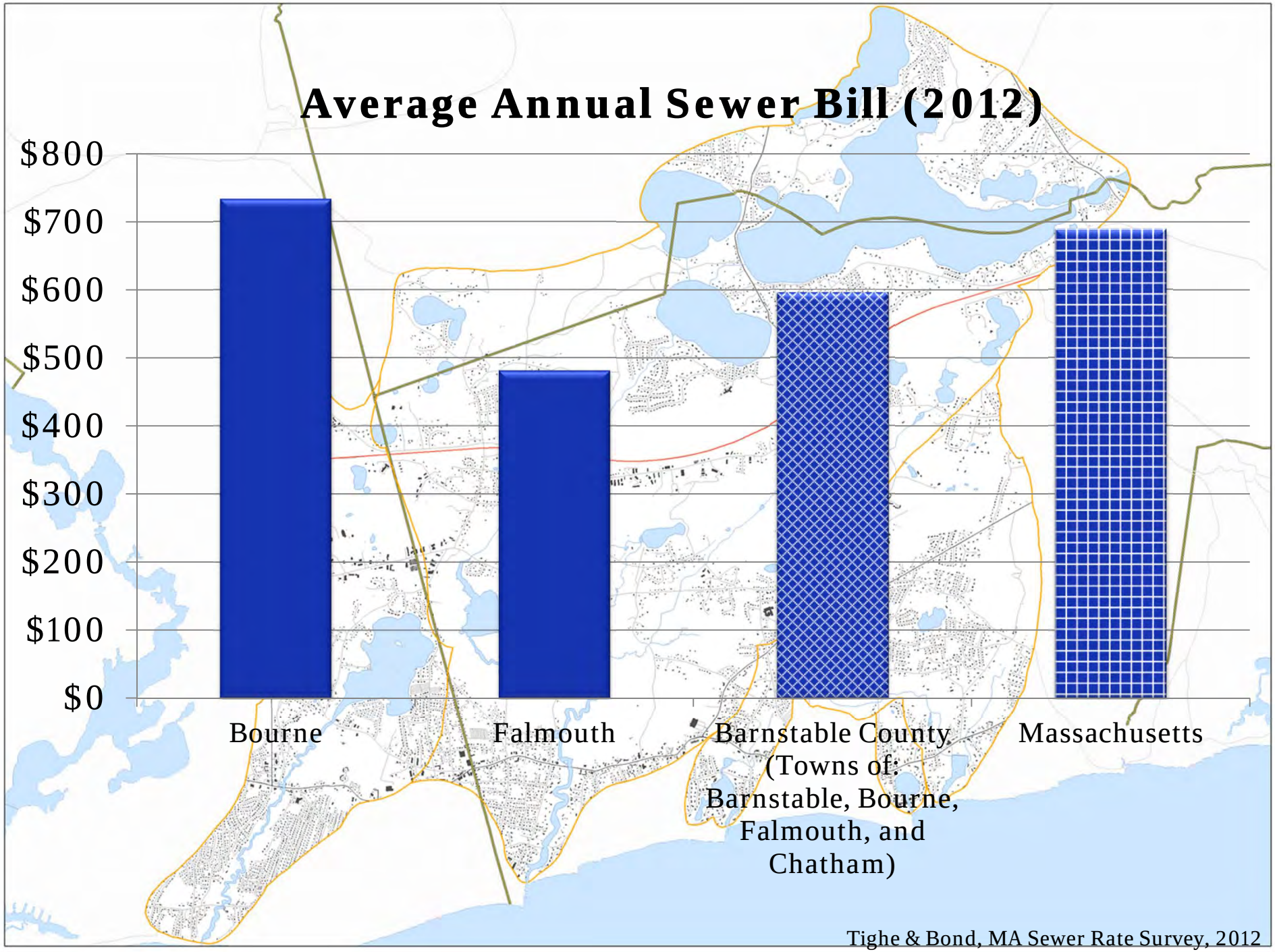

Average Assessed Home Value (2010)
$1,400,000
Total Assessed Value of Residential Homes=
$4,275,621,950
Eel Pond &
Falmouth In
Great Sippew
Little Sippew
Megans
Phinn
Pocas
Poc
Quiss
Barnsta
Mas
2010 Census

Your Government & Taxes

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor

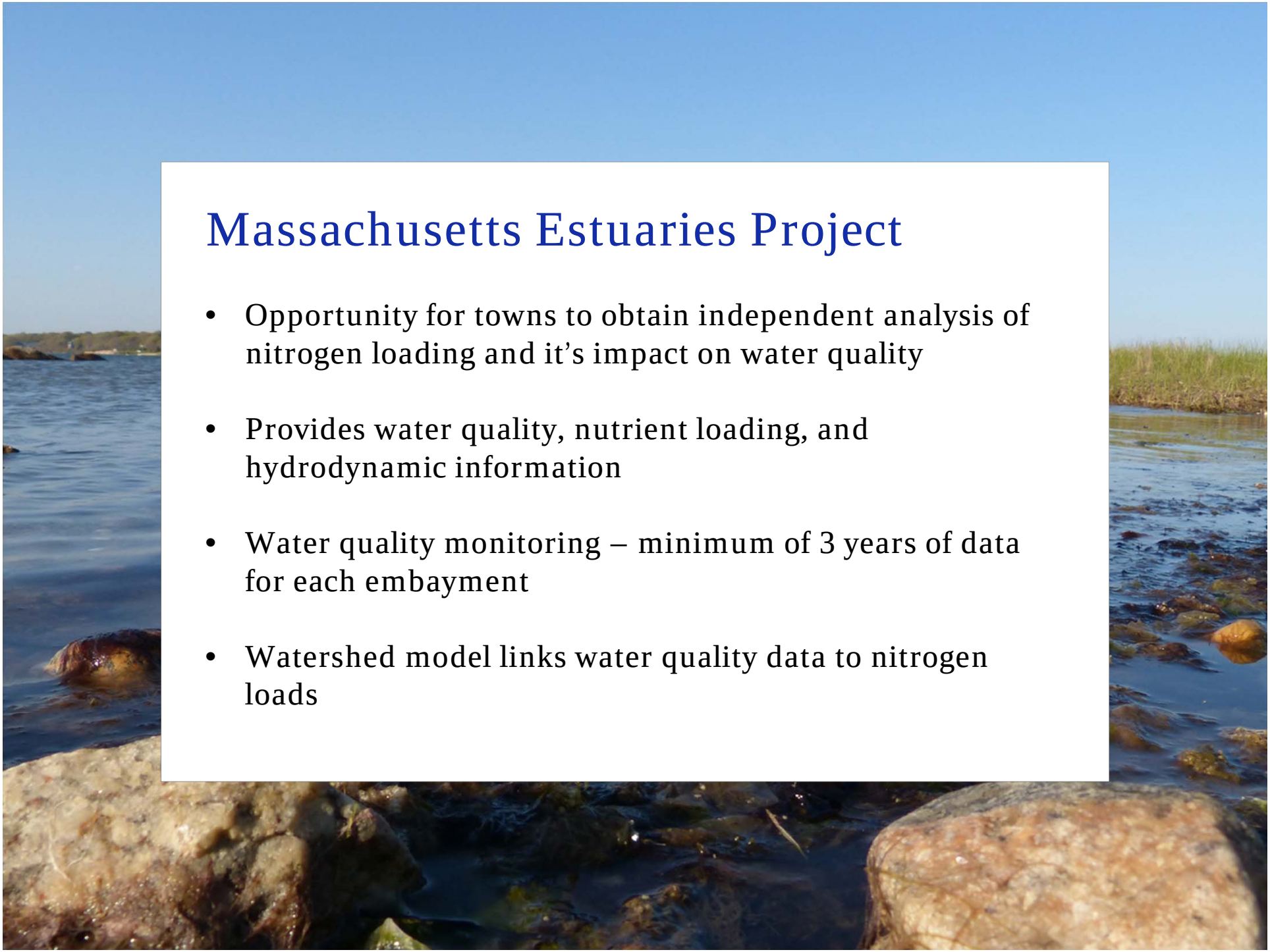

Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Bourne
Falmouth
Sandwich
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013


Average Annual Water Bill (2012)
$600
$500
$400
$300
$200
$100
$0
Bourne
Falmouth
Sandwich
Barnstable County
Massachusetts
Tighe & Bond, MA Water Rate Survey, 2012


Average Annual Sewer Bill (2012)
$800
$700
$600
$500
$400
$300
$200
$100
$0
Bourne
Falmouth
Barnstable County (Towns of: Barnstable, Bourne, Falmouth, and Chatham)
Massachusetts
Tighe & Bond, MA Sewer Rate Survey, 2012

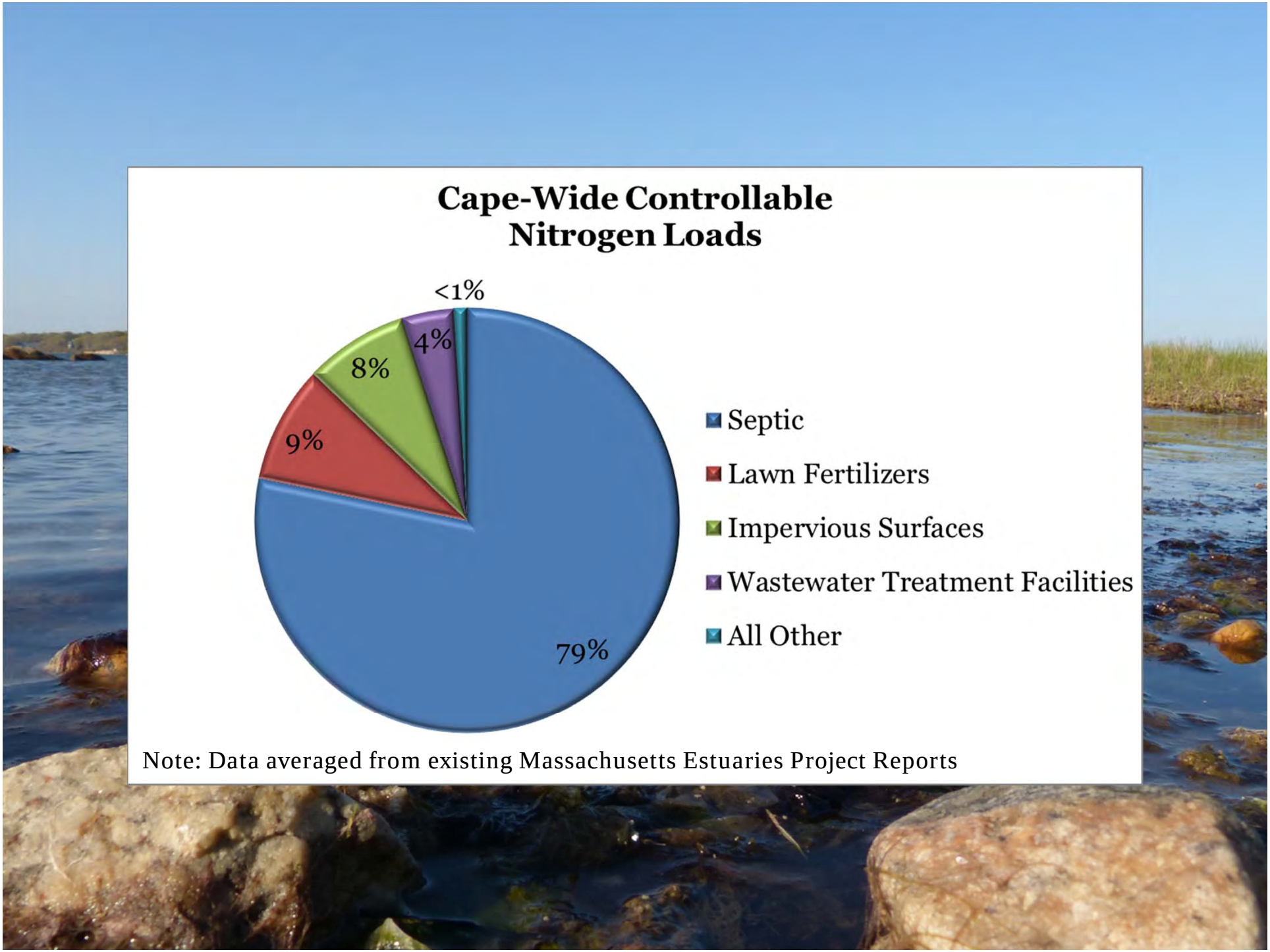
The Problem

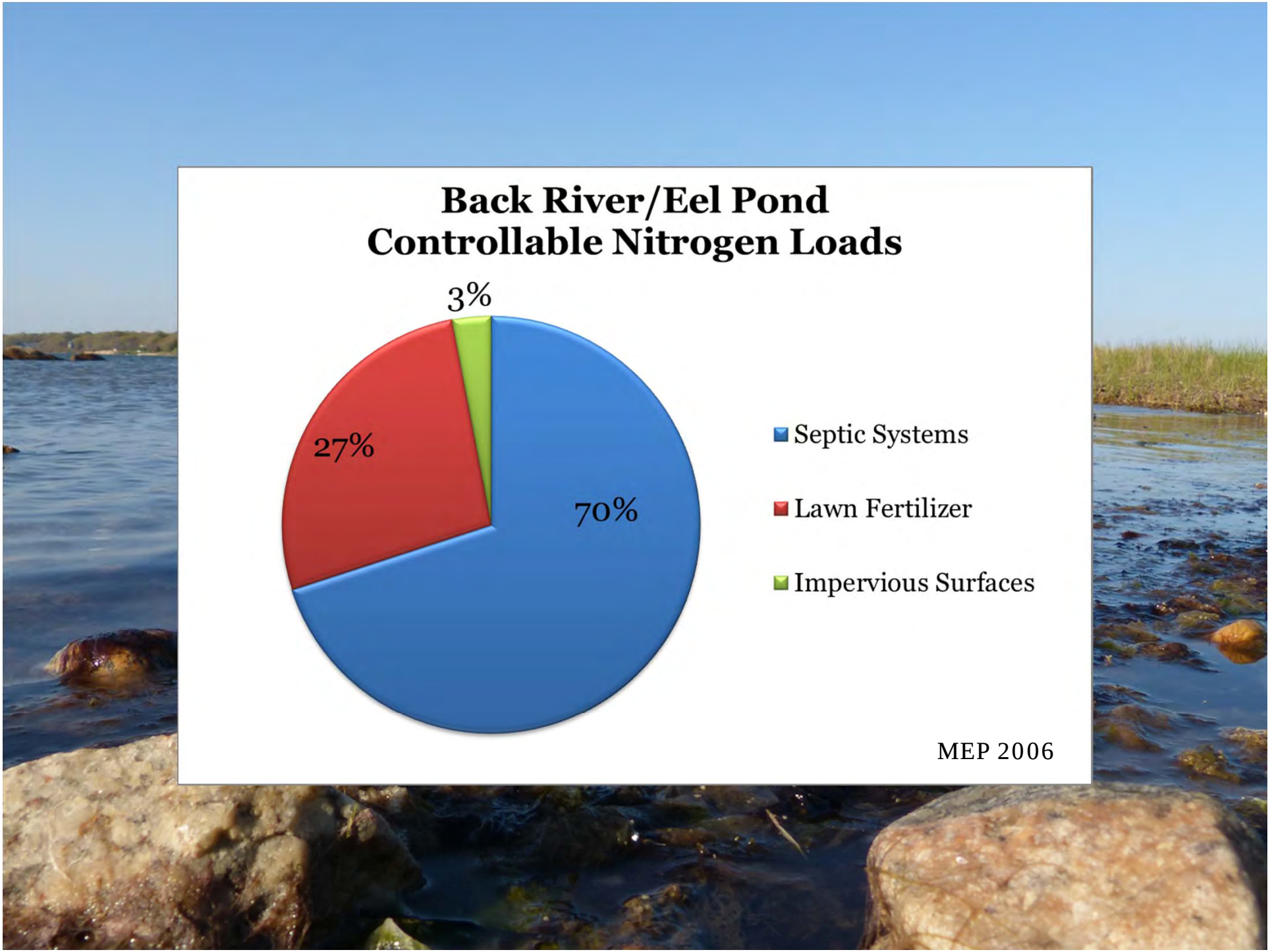
Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor

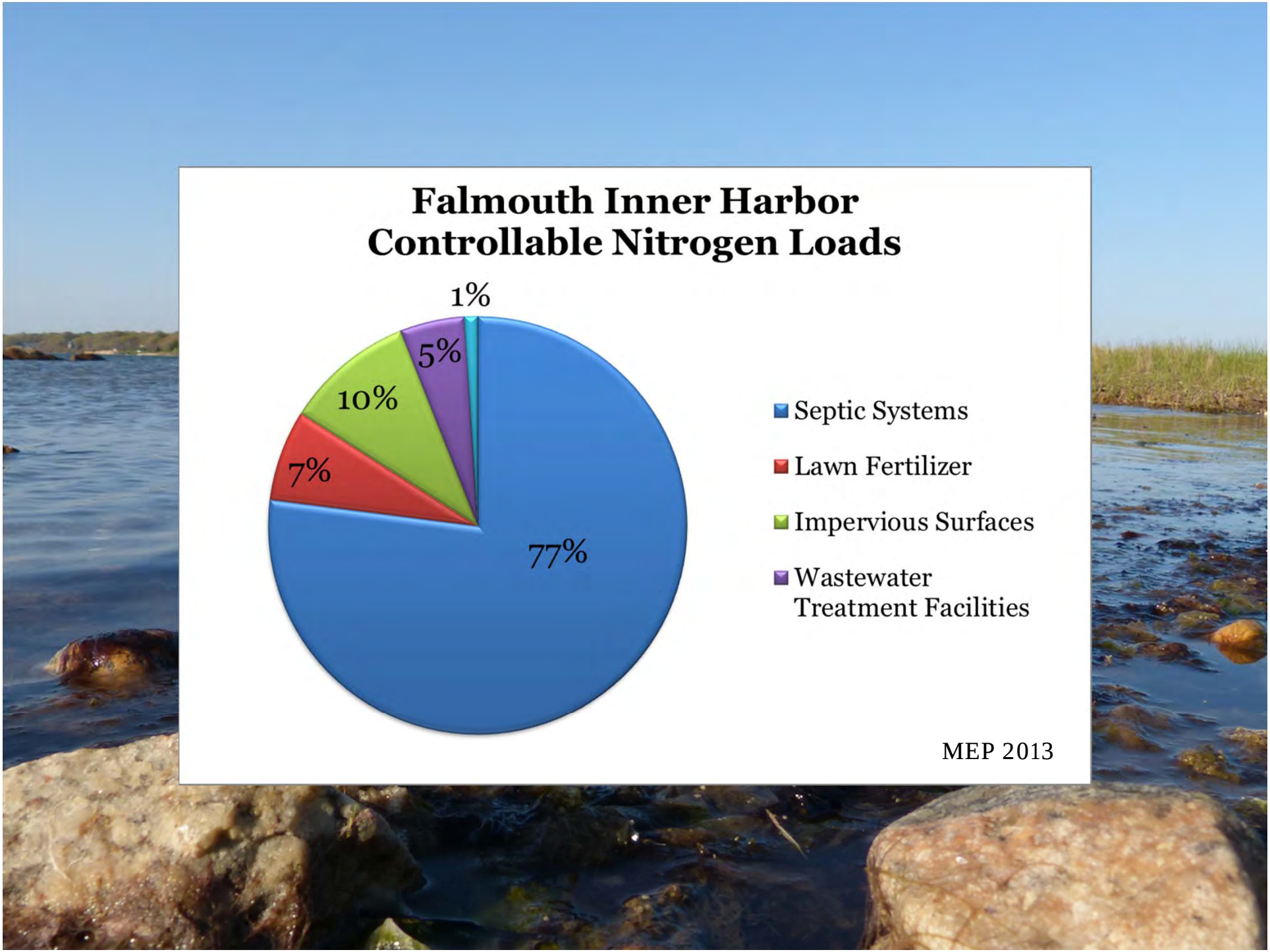


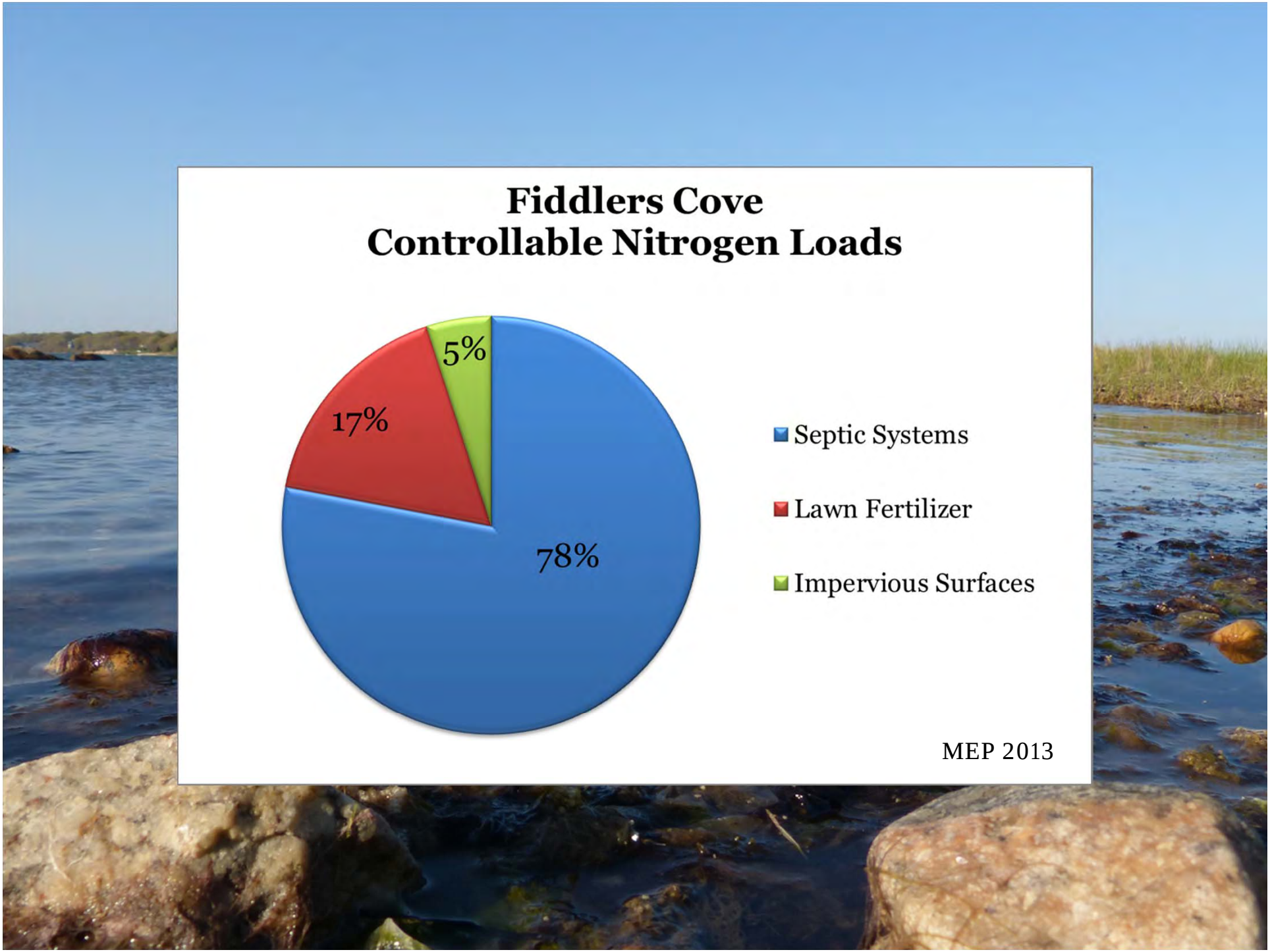
Massachusetts Estuaries Project

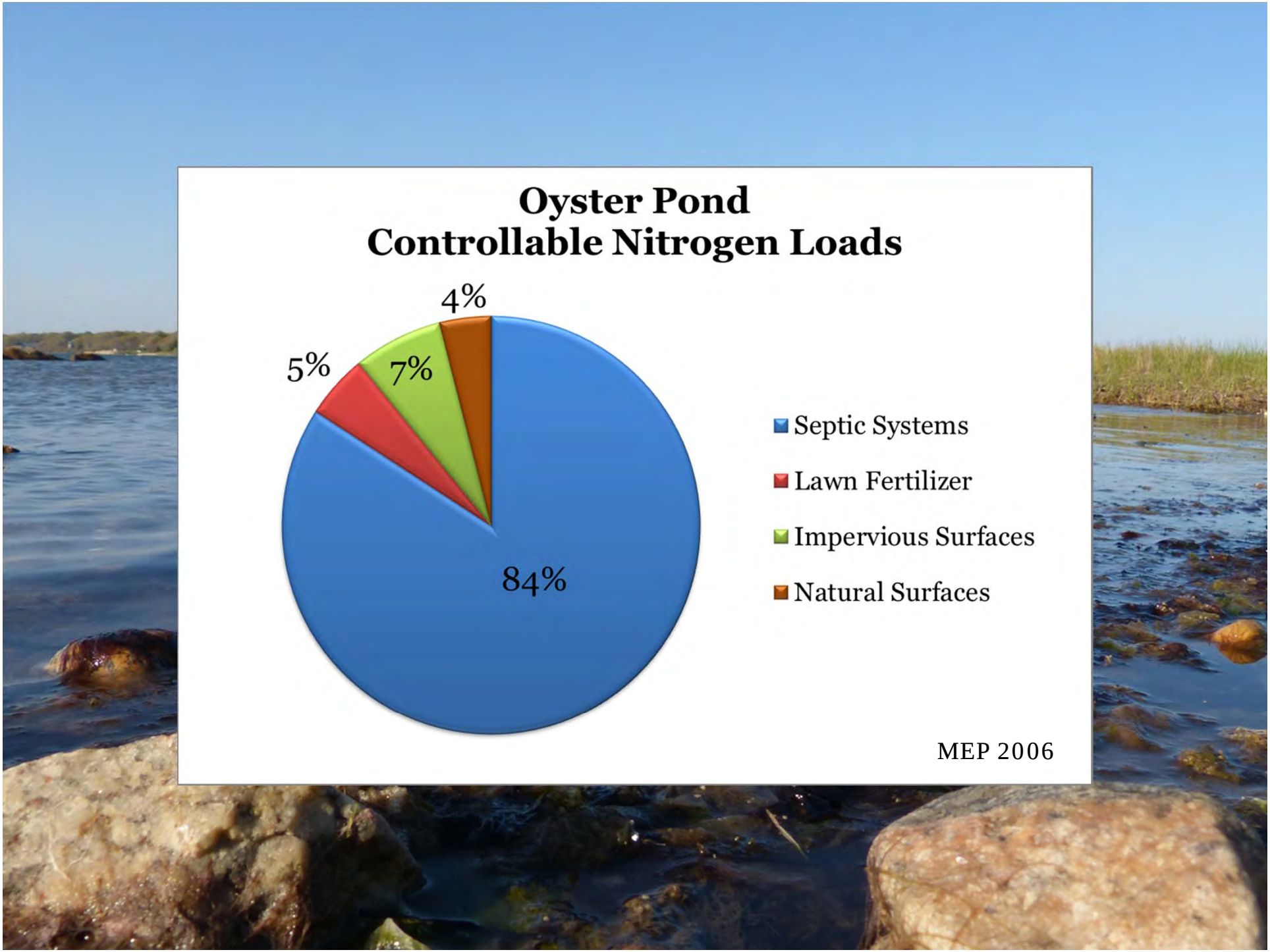
- Opportunity for towns to obtain independent analysis of nitrogen loading and it's impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

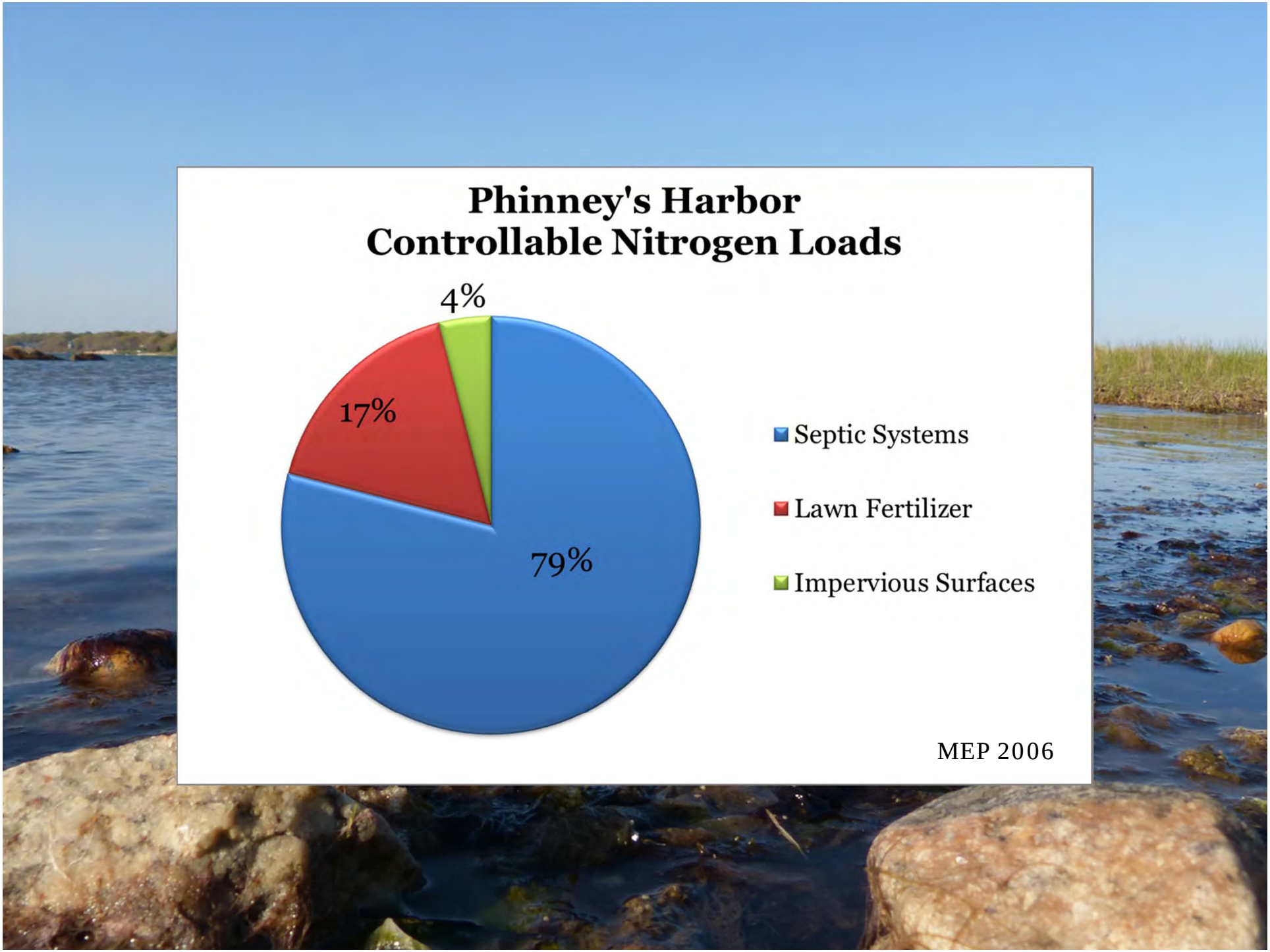

Cape-Wide Controllable Nitrogen Loads
<1%
4%
8%
9%
79%
Septic
Lawn Fertilizers
Impervious Surfaces
Wastewater Treatment Facilities
All Other
Note: Data averaged from existing Massachusetts Estuaries Project Reports

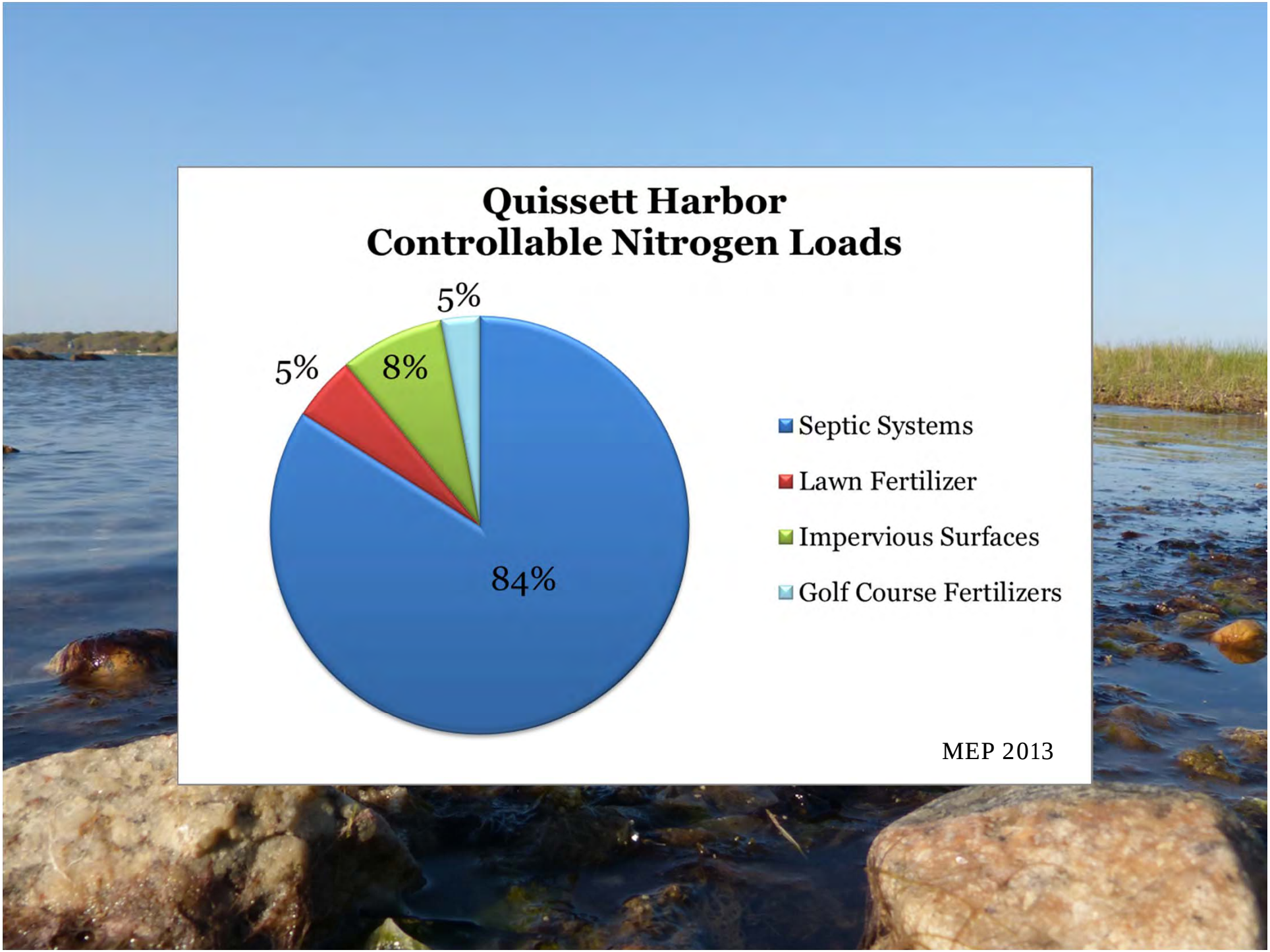

Back River/Eel Pond
Controllable Nitrogen Loads
3%
27%
70%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
MEP 2006

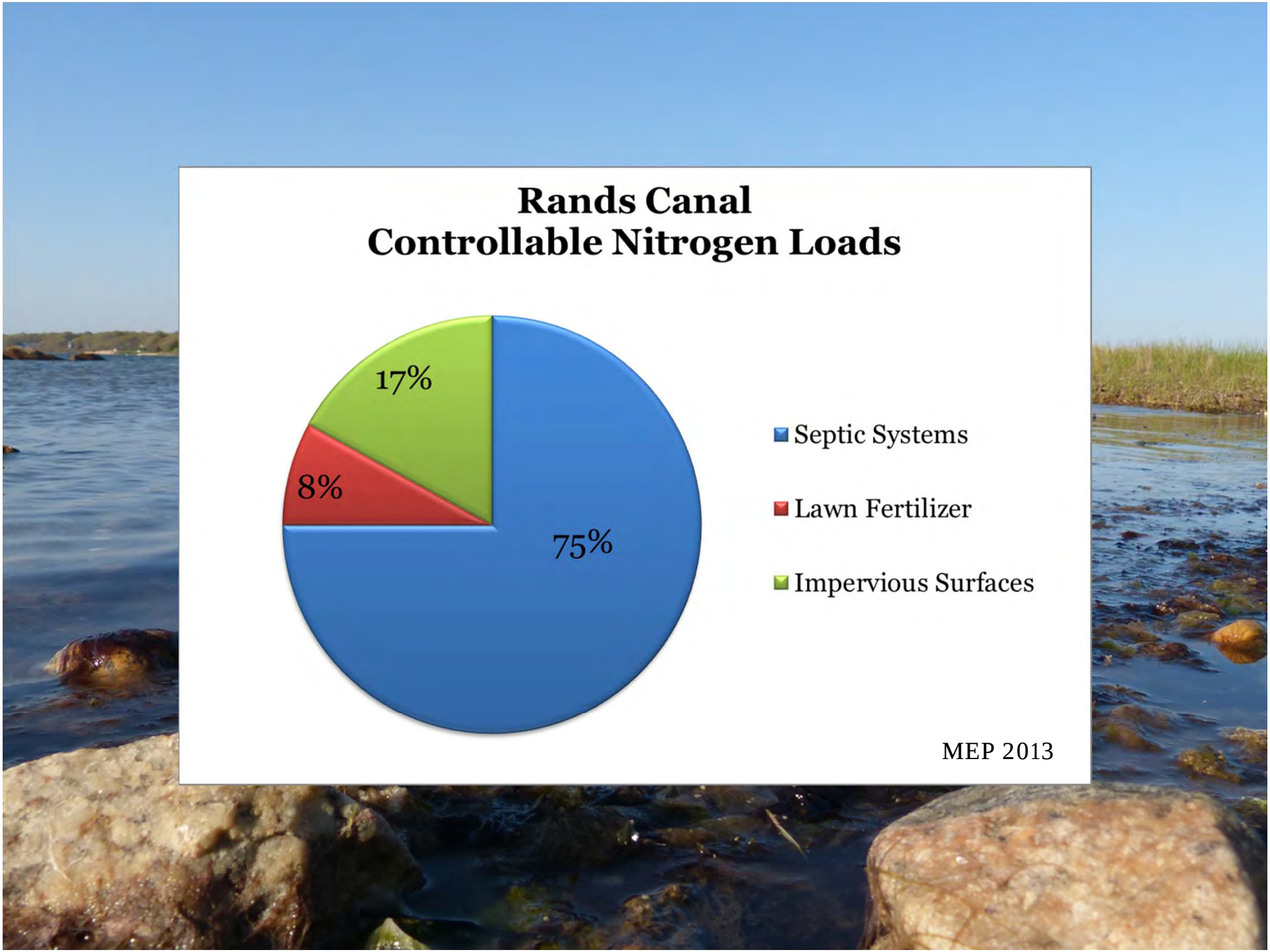

Falmouth Inner Harbor
Controllable Nitrogen Loads
1%
5%
10%
7%
77%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Wastewater Treatment Facilities
MEP 2013

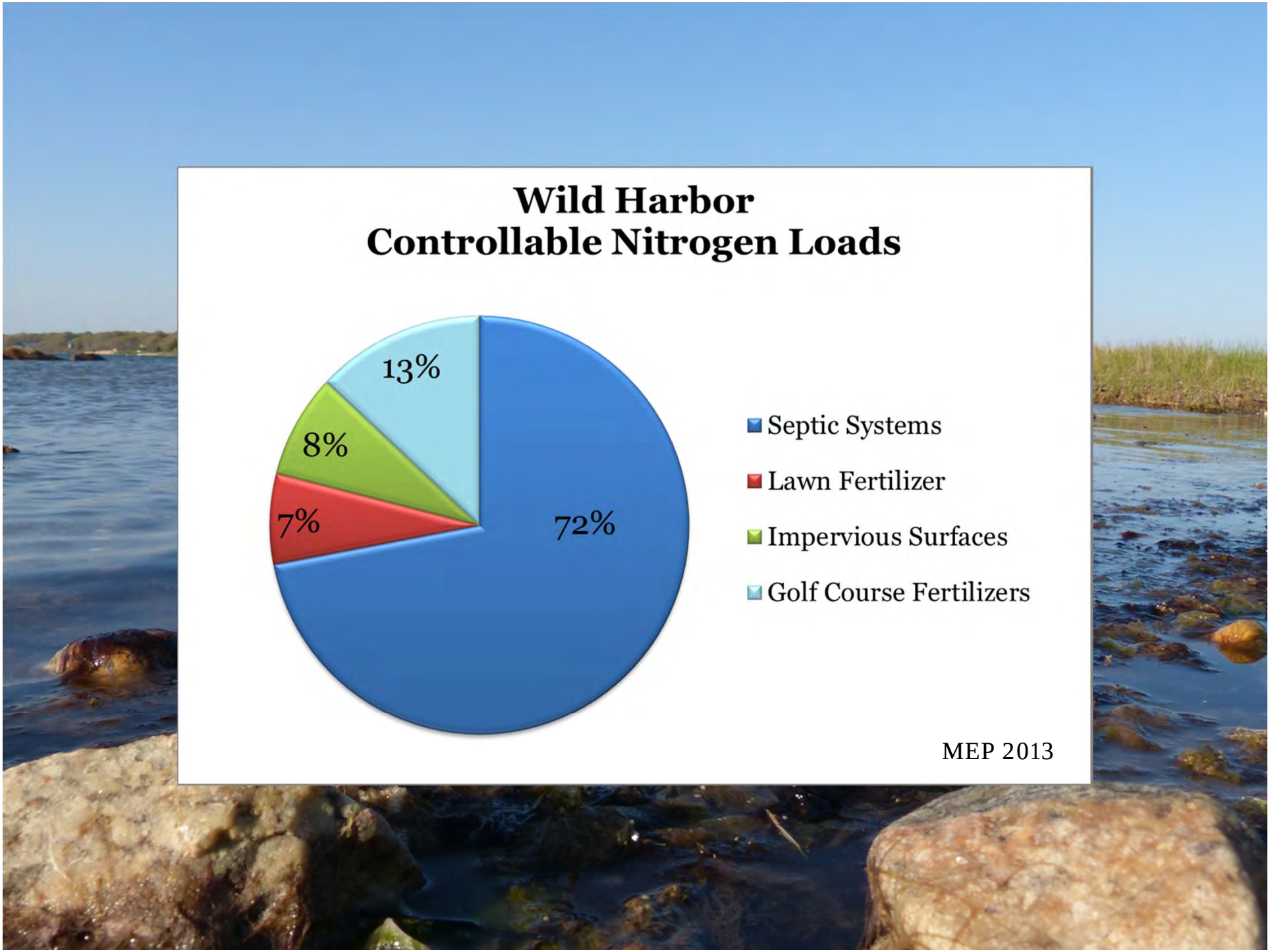

Fiddlers Cove
Controllable Nitrogen Loads
5%
17%
78%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
MEP 2013


Oyster Pond
Controllable Nitrogen Loads
4%
5%
7%
84%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Natural Surfaces
MEP 2006

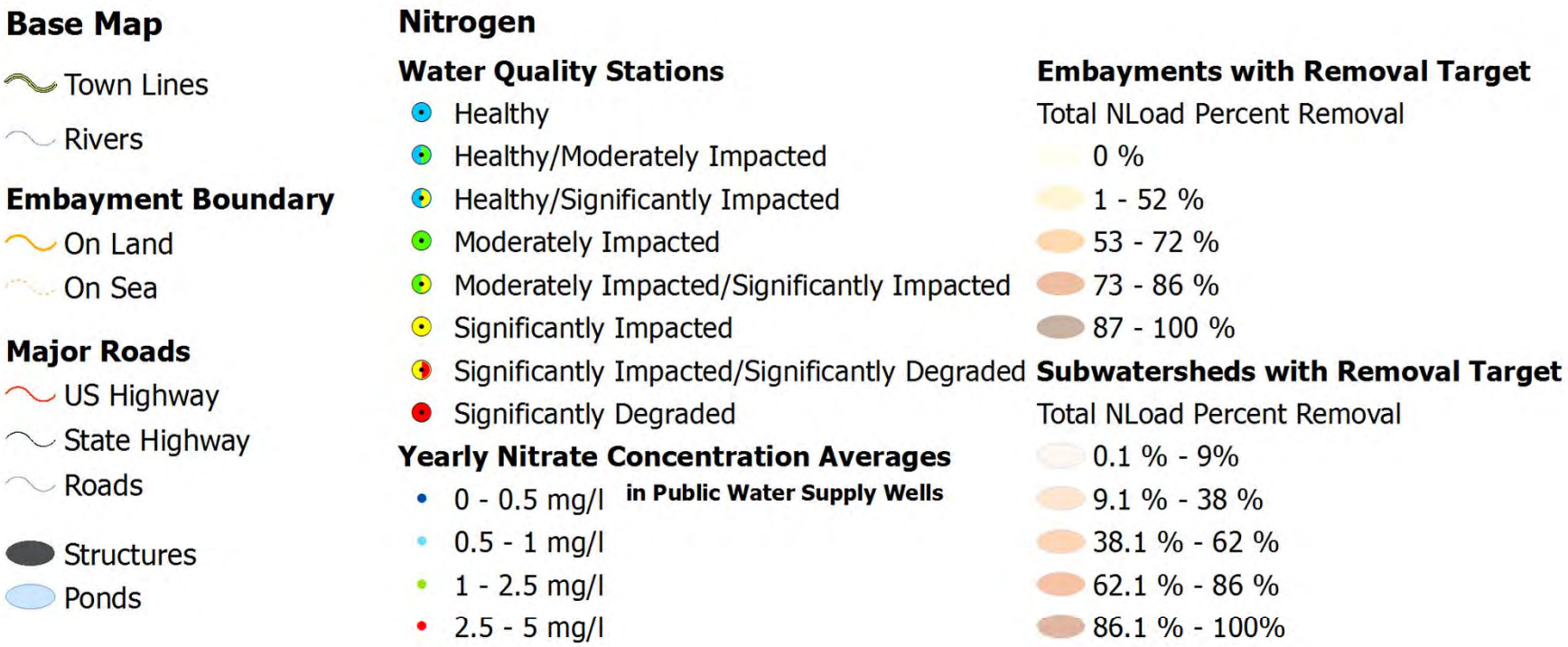

Phinney's Harbor
Controllable Nitrogen Loads
4%
17%
79%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
MEP 2006


Quissett Harbor
Controllable Nitrogen Loads
5%
5%
8%
84%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Golf Course Fertilizers
MEP 2013

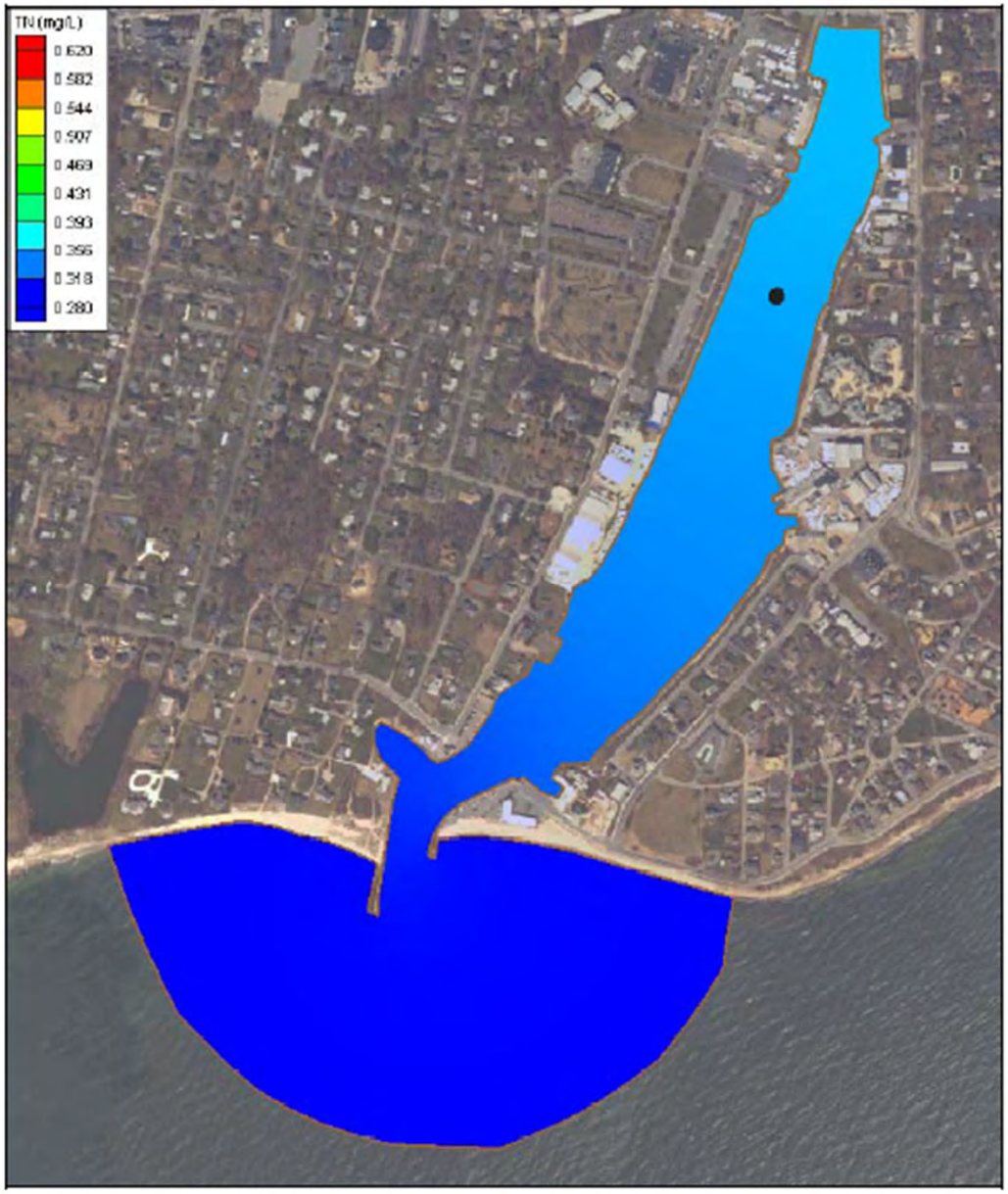

Rands Canal
Controllable Nitrogen Loads
17%
8%
75%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
MEP 2013


Wild Harbor
Controllable Nitrogen Loads
13%
8%
7%
72%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Golf Course Fertilizers
MEP 2013

Nitrogen Problem



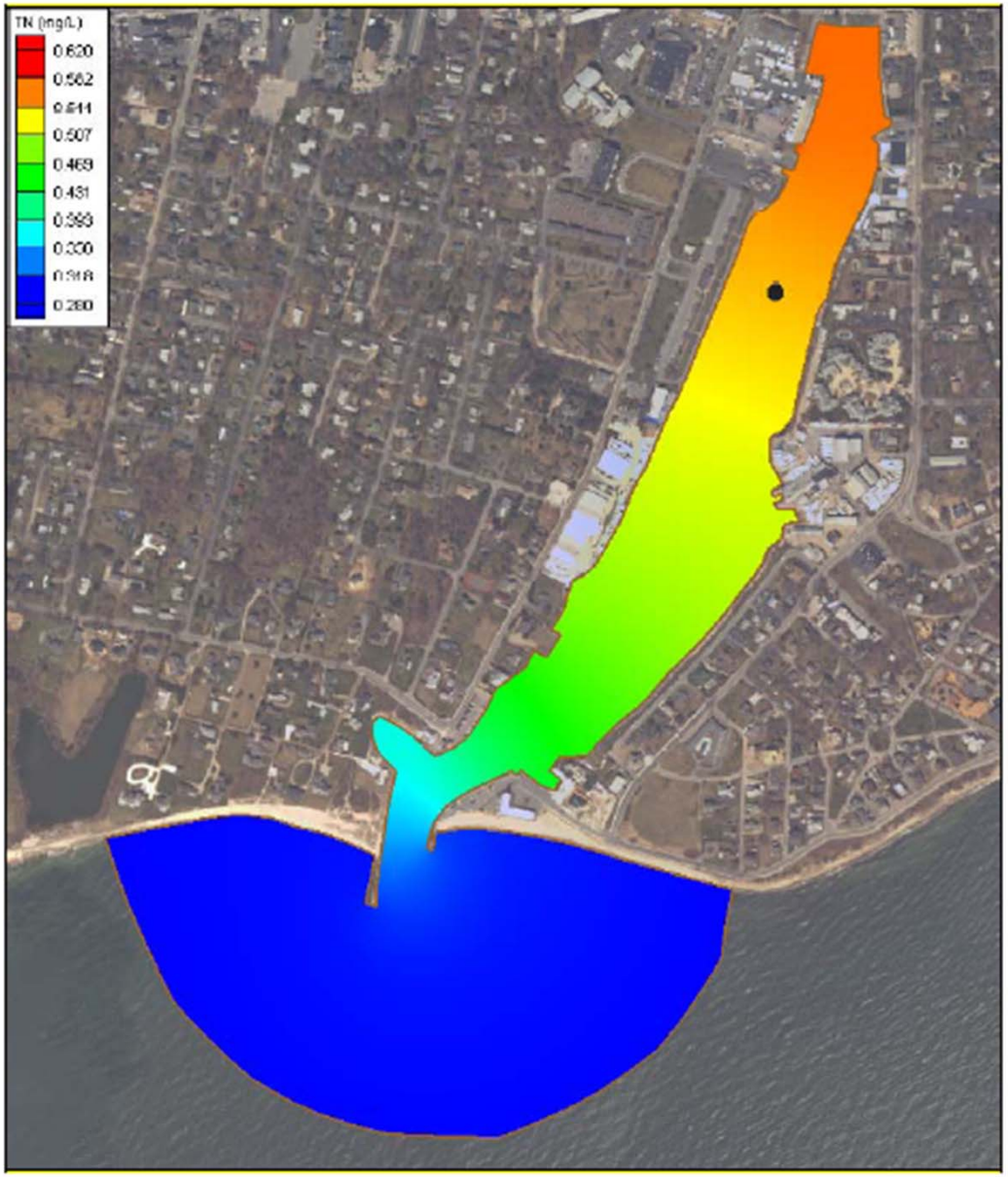
Sources: MassGIS, MEP, CCC



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

(Source: MEP 2013)

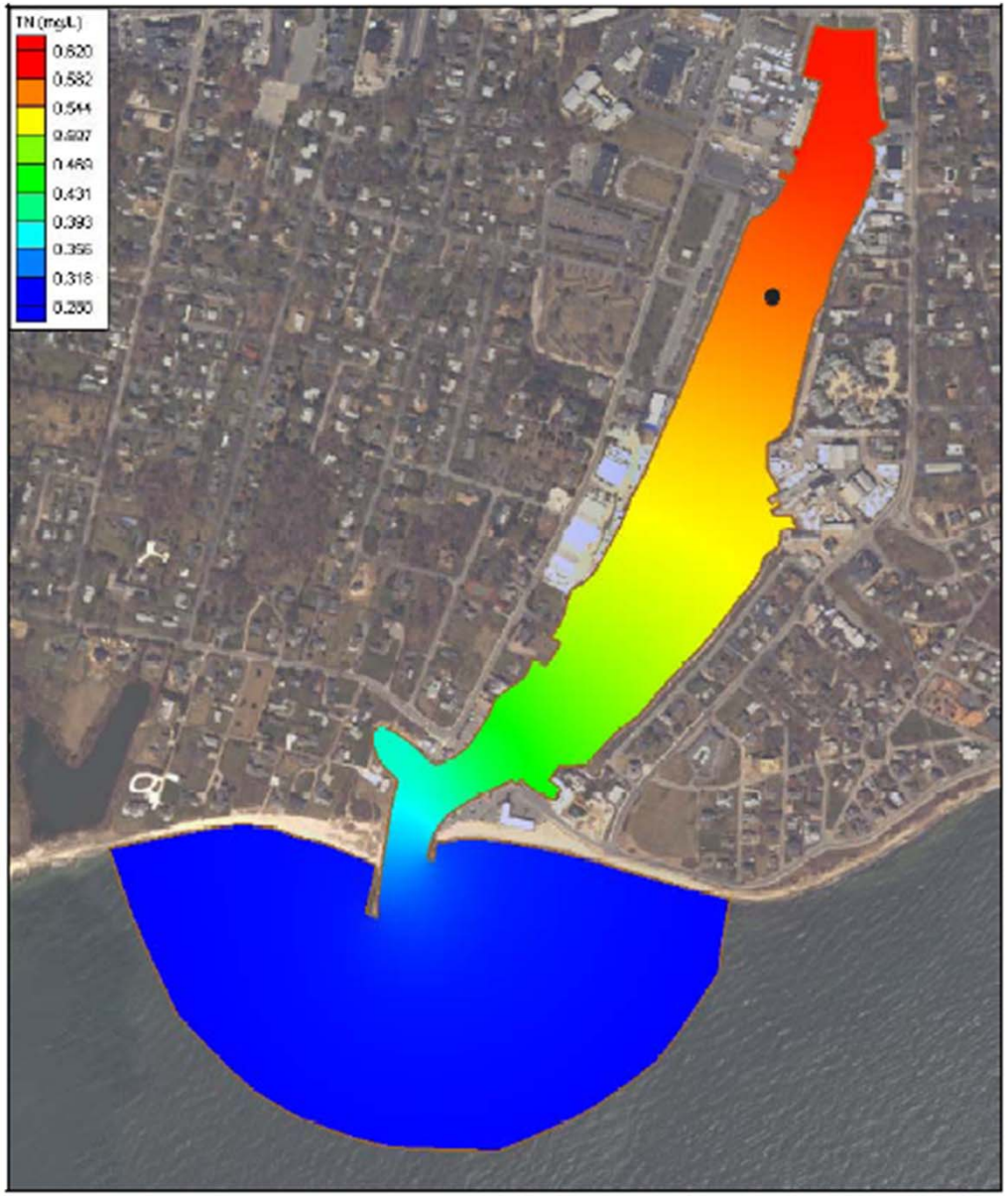
Pre-Colonial Conditions: Falmouth Inner Harbor



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

(Source: MEP 2013)

Present Conditions: Falmouth Inner Harbor



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

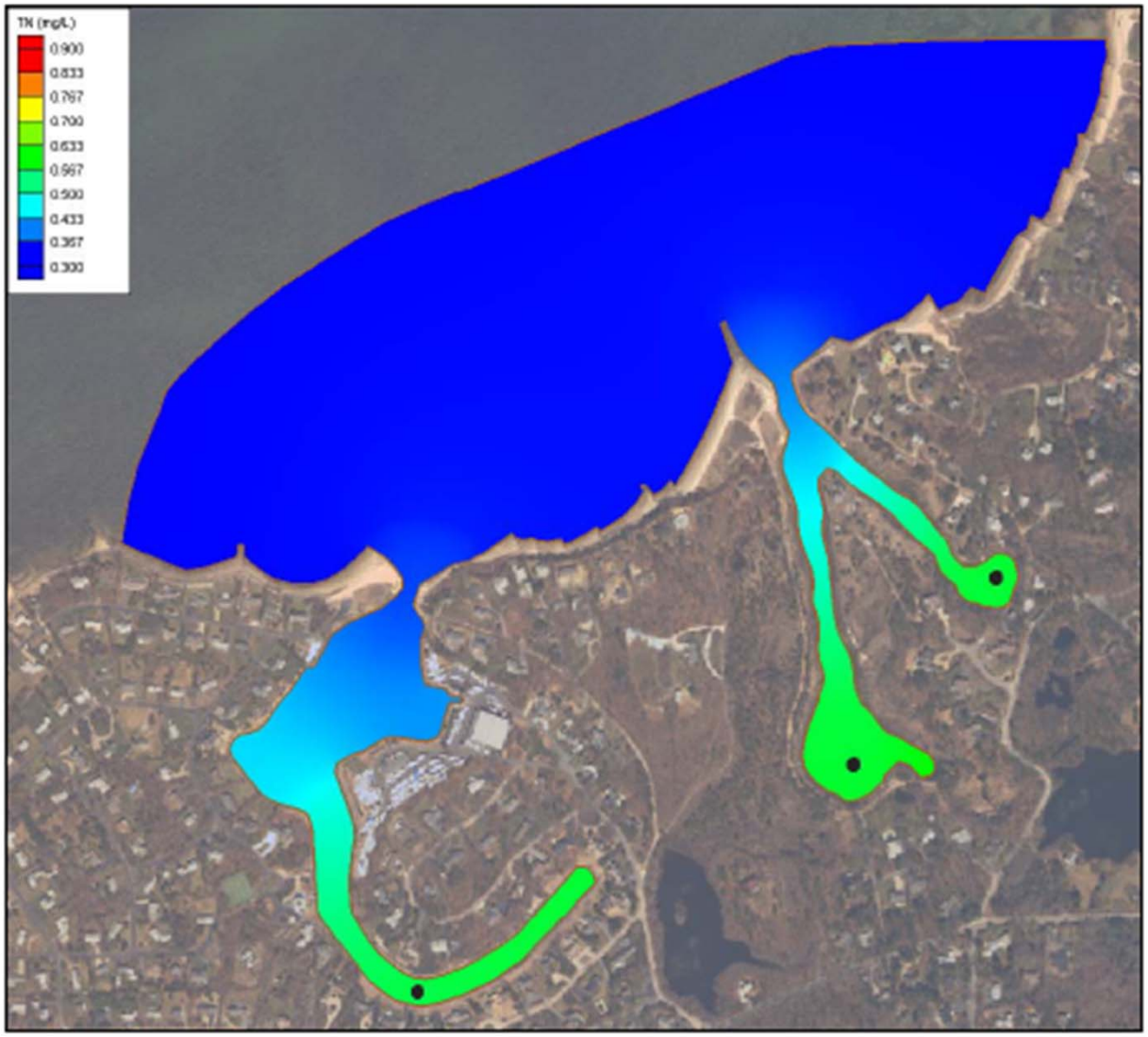
(Source: MEP 2013)

Buildout Conditions: Falmouth Inner Harbor

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

(Source: MEP 2013)

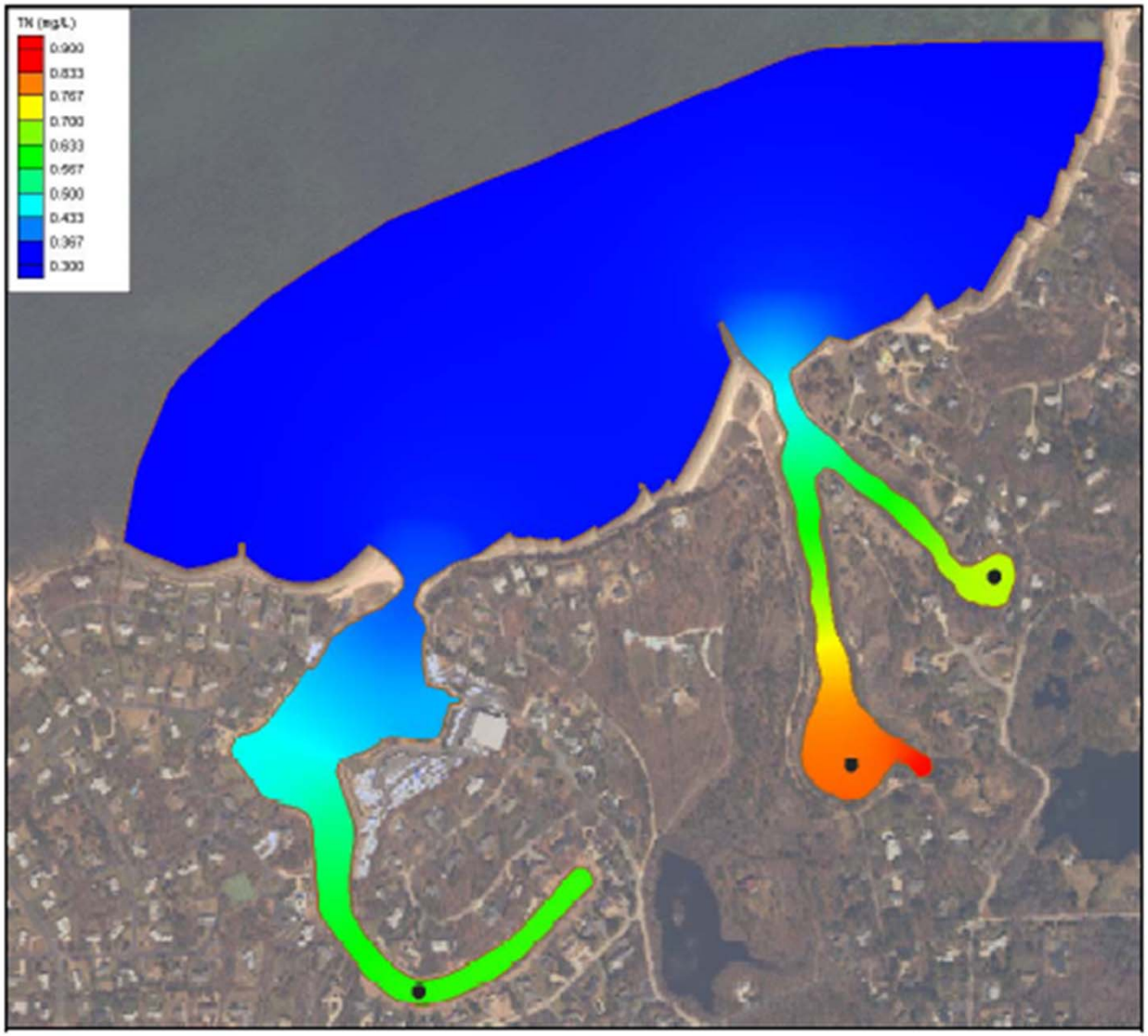
Pre-Colonial Conditions: Fiddler Cove and Rands Harbor



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

(Source: MEP 2013)

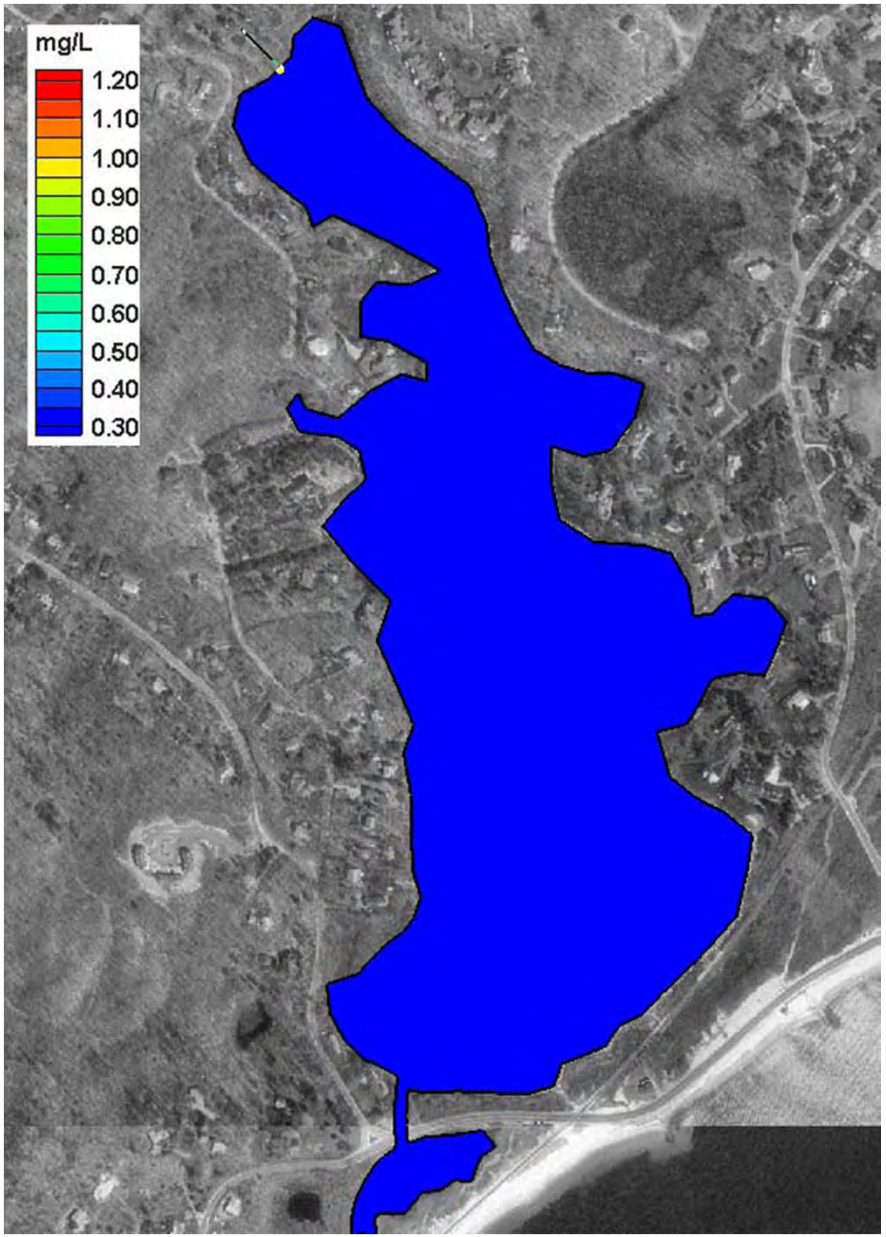
Present Conditions: Fiddler Cove and Rands Harbor



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

(Source: MEP 2013)

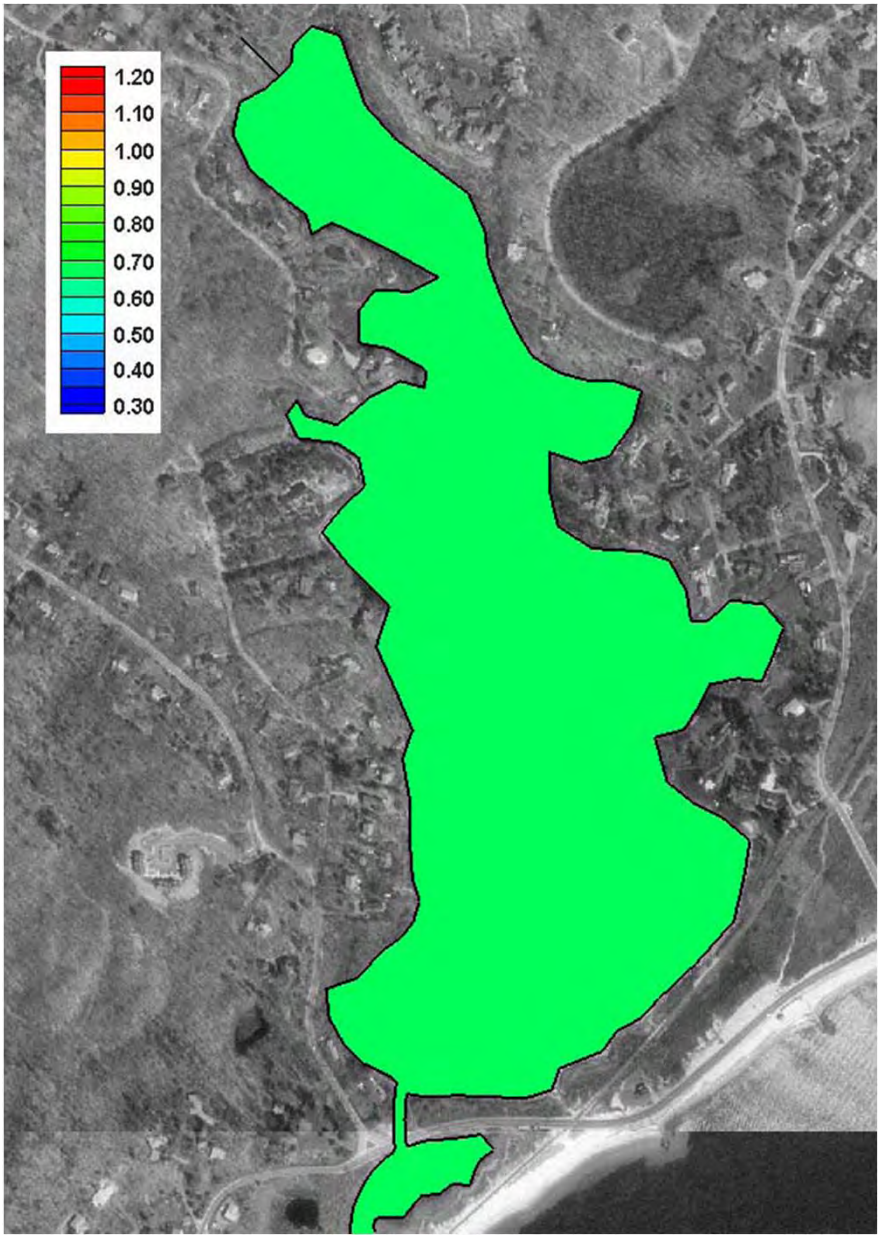
Buildout Conditions: Fiddler Cove and Rands Harbor



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

(Source: MEP 2006)

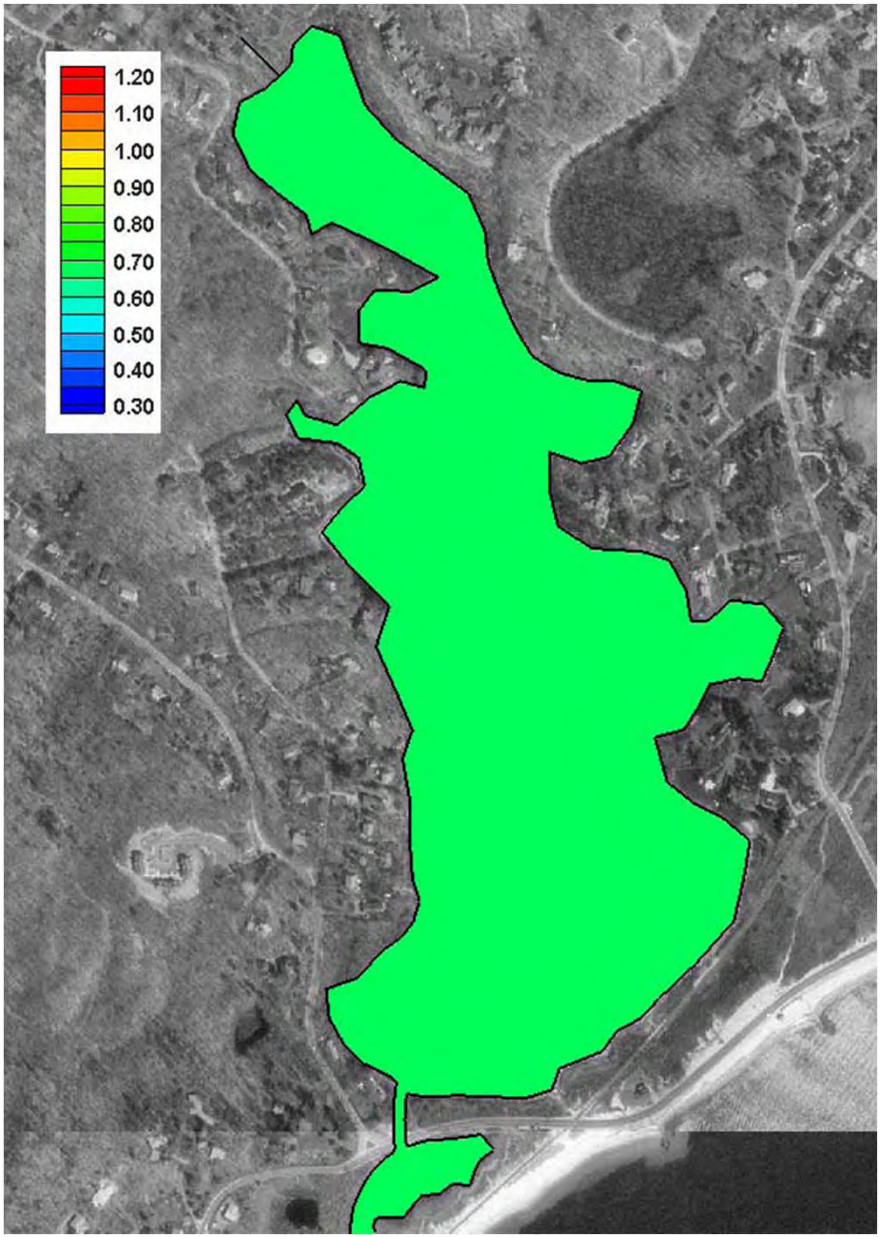
Pre-Colonial Conditions: Oyster Pond



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

(Source: MEP 2006)

Present Conditions: Oyster Pond



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

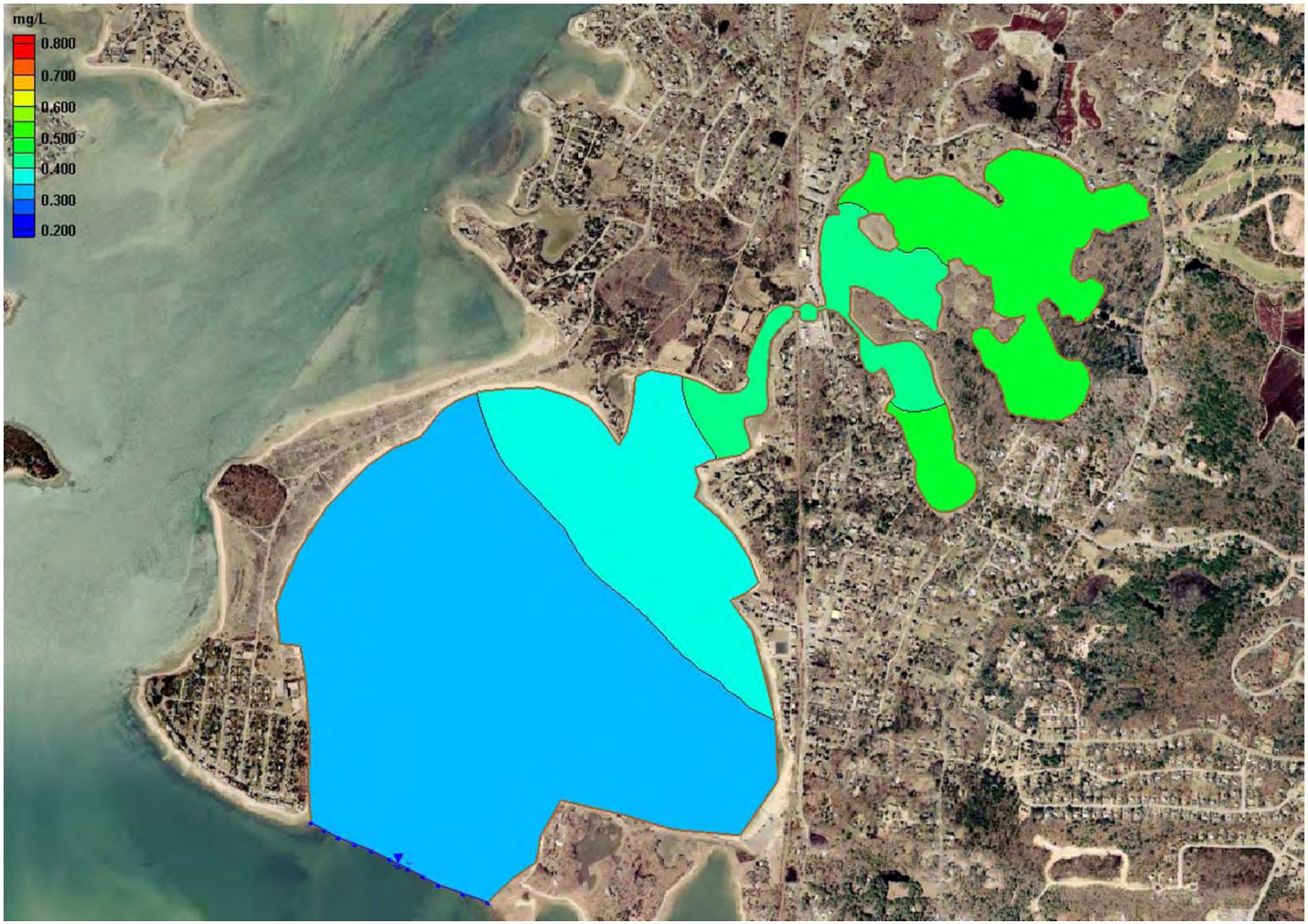
(Source: MEP 2006)

Build-out Conditions: Oyster Pond

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

(Source: MEP 2006)

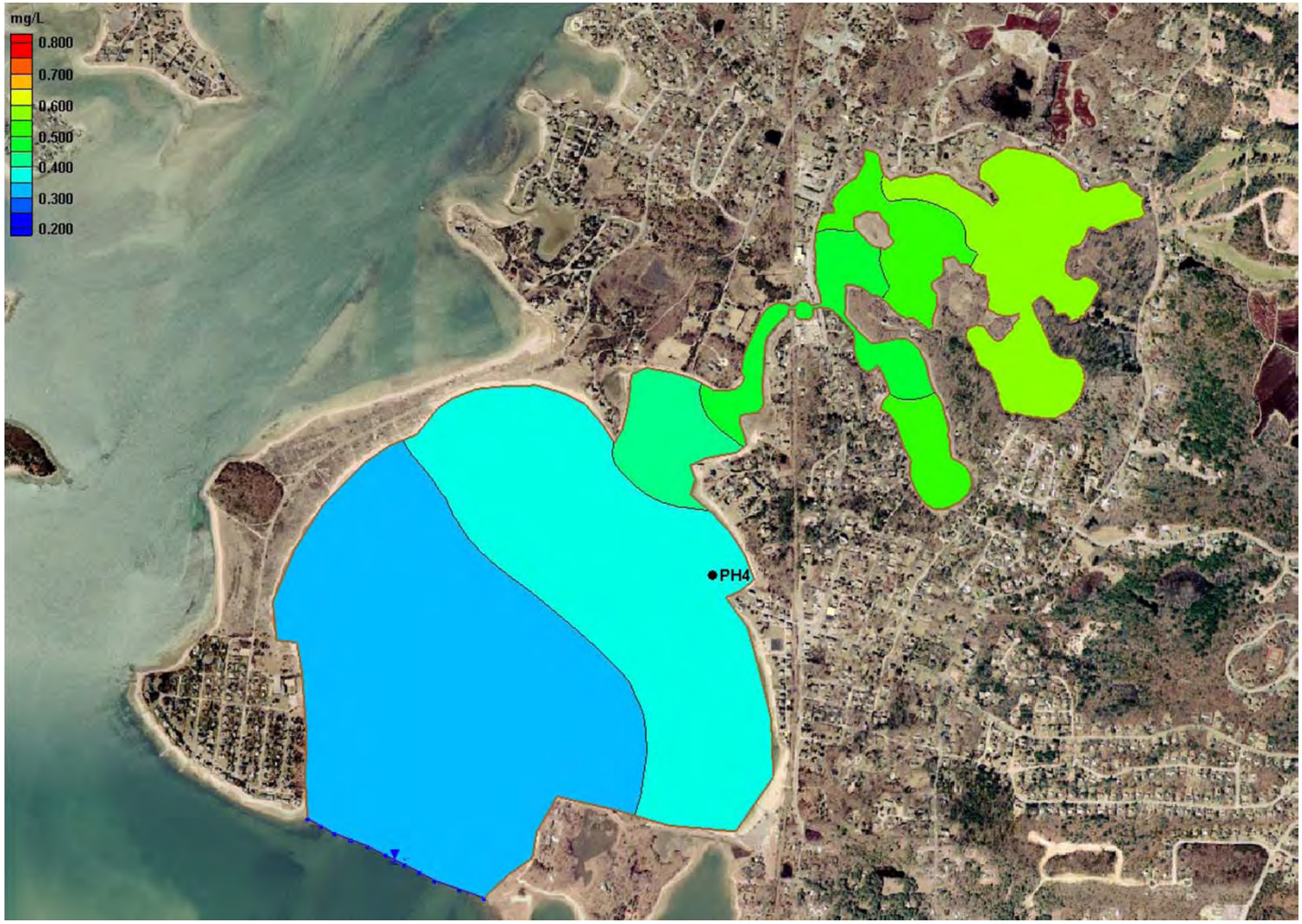
Pre-Colonial Conditions: Phinney's Harbor, Back River & Eel Pond



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

(Source: MEP 2006)

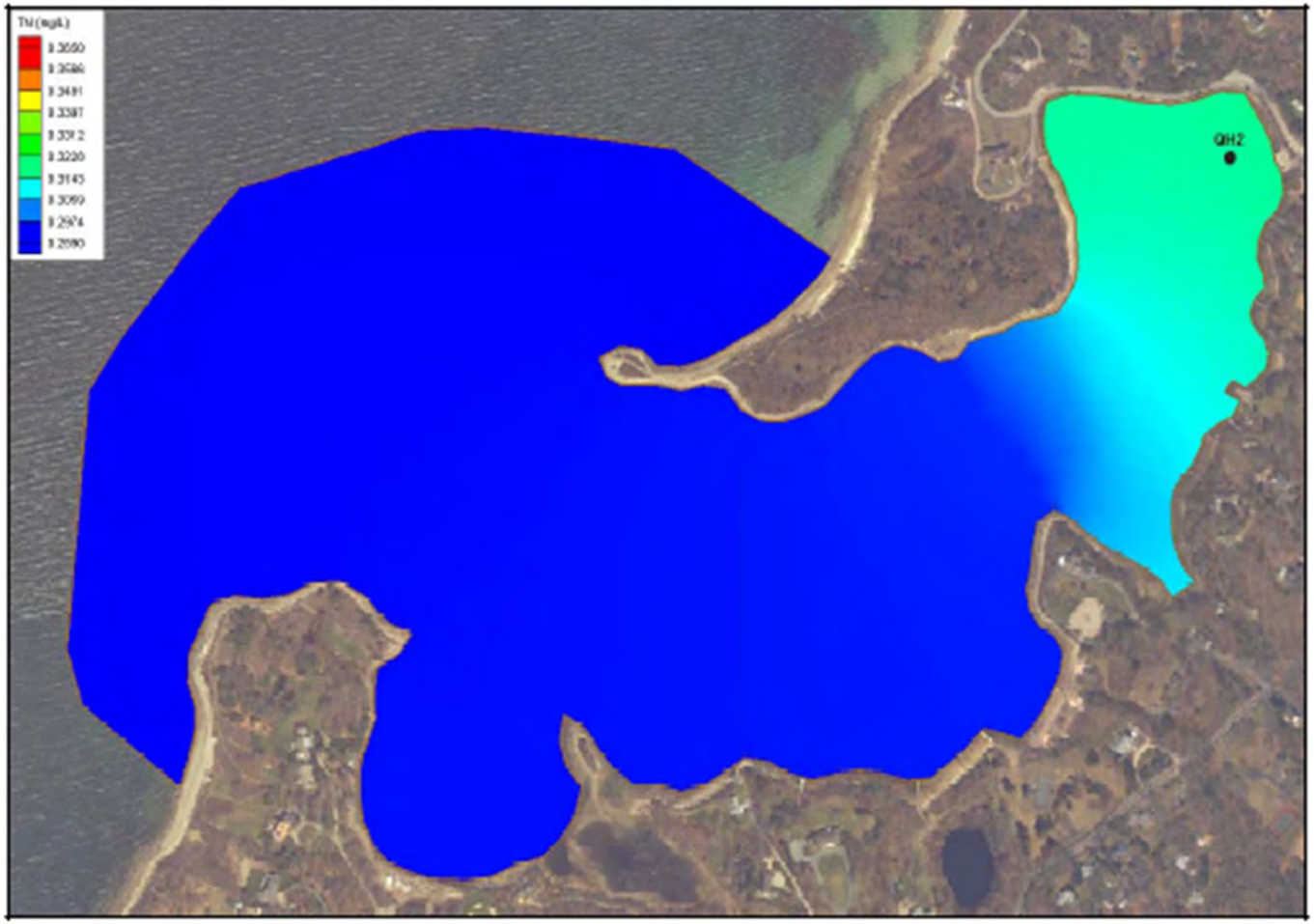
Present Conditions: Phinney's Harbor, Back River & Eel Pond



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

(Source: MEP 2006)

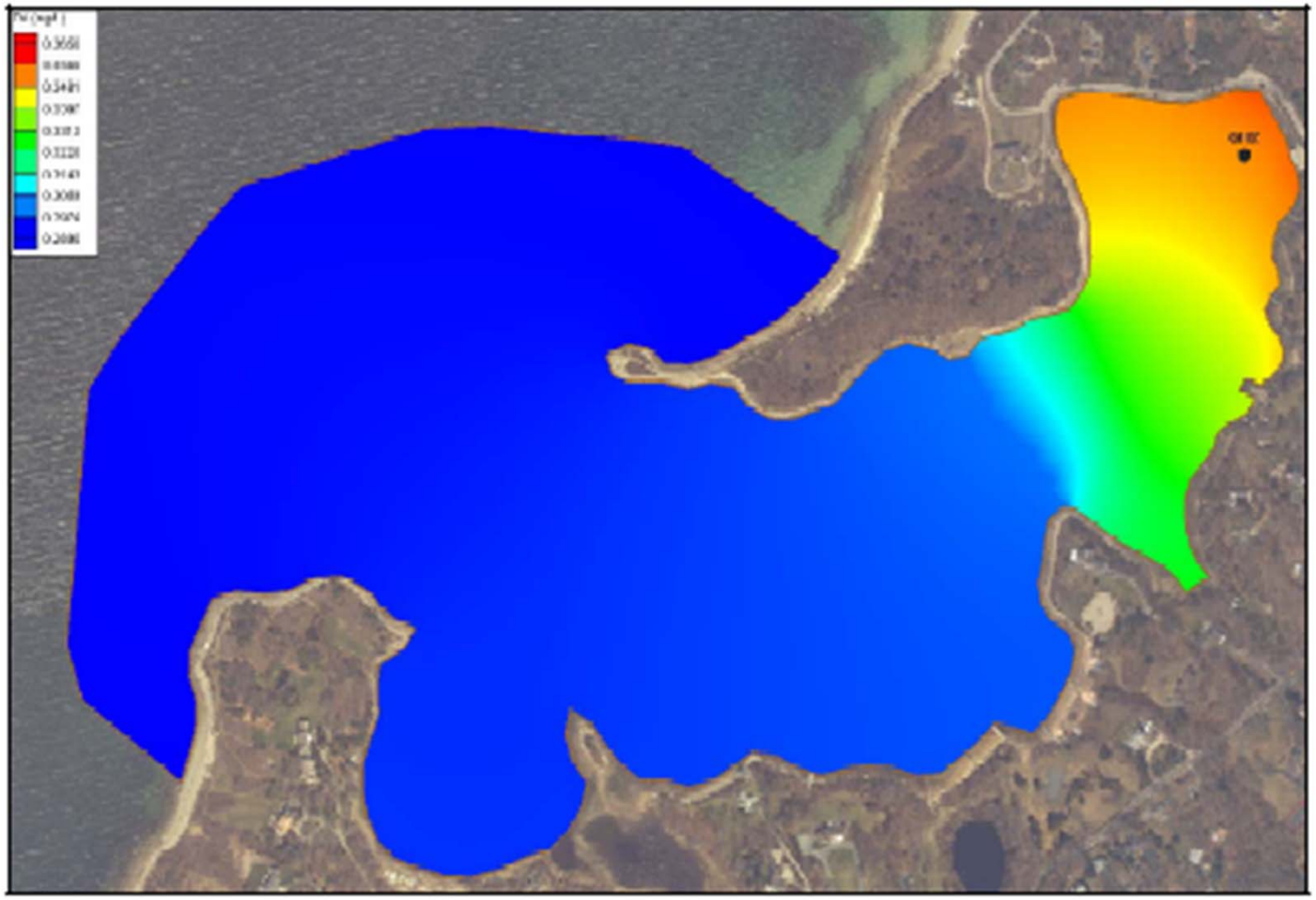
Build-out Conditions: Phinney's Harbor, Back River & Eel Pond



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

(Source: MEP 2013)

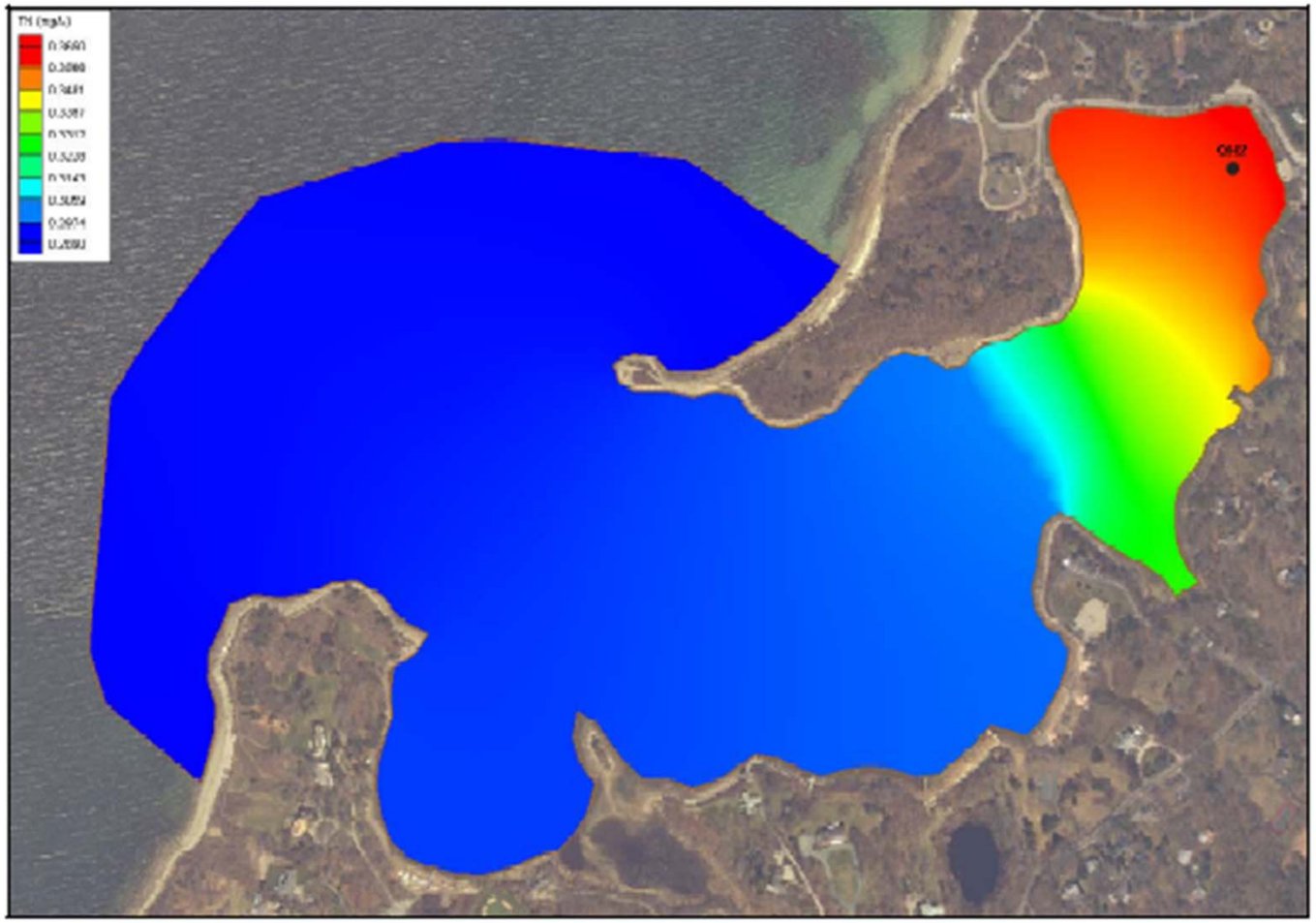
Pre-Colonial Conditions: Quissett Harbor



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

(Source: MEP 2013)

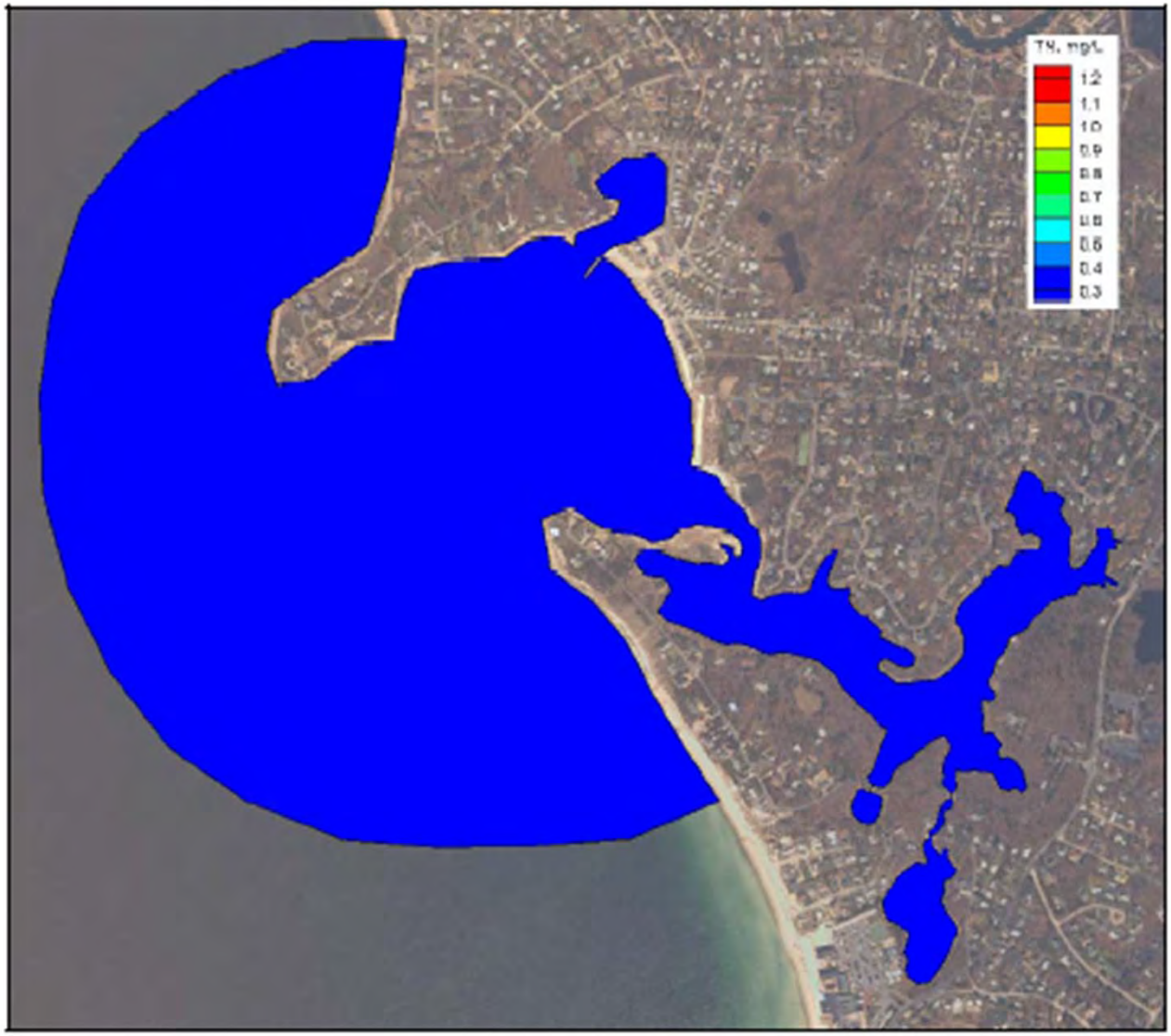
Present Conditions: Quissett Harbor



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

(Source: MEP 2013)

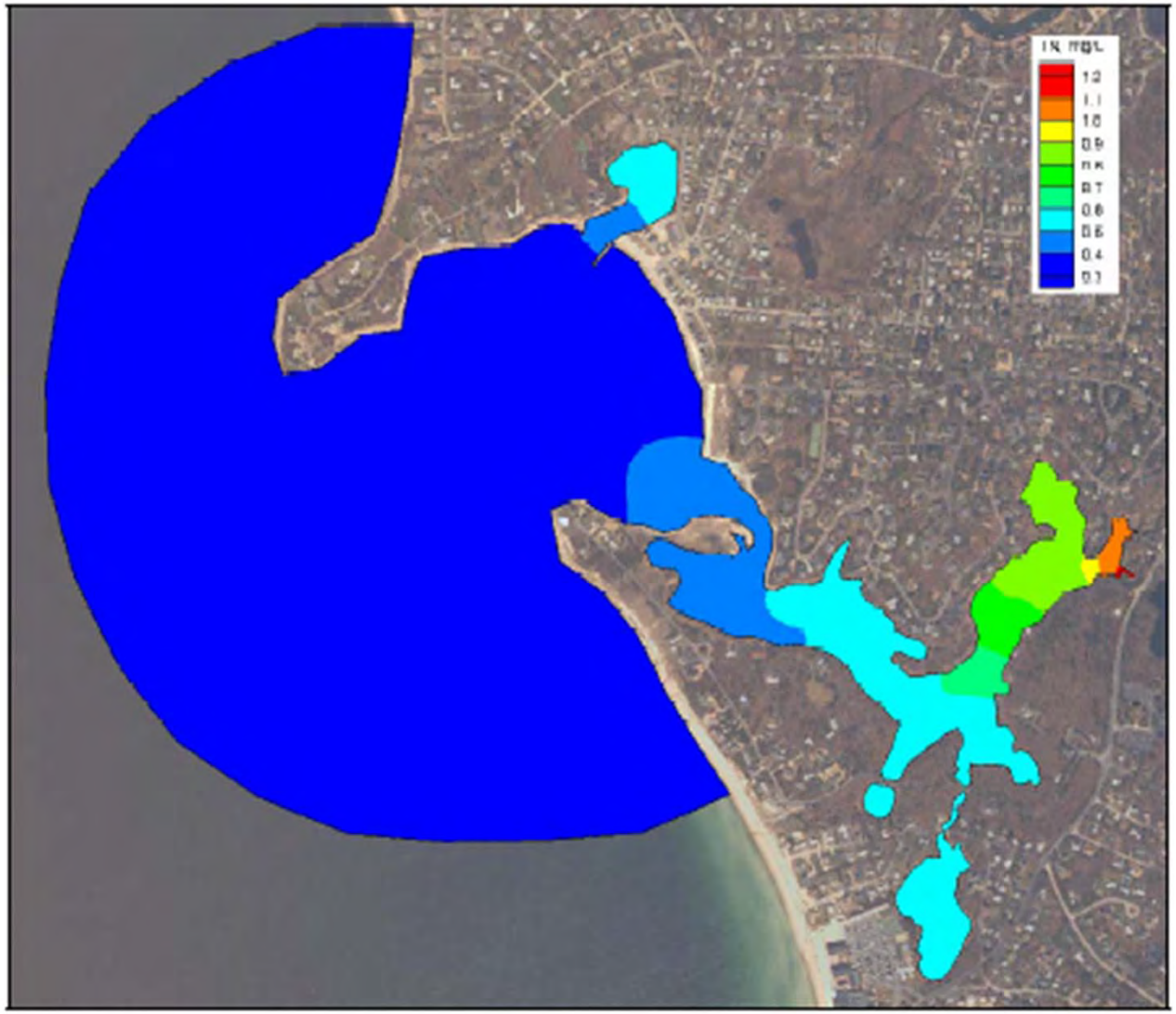
Build-out Conditions: Quissett Harbor



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

(Source: MEP 2013)

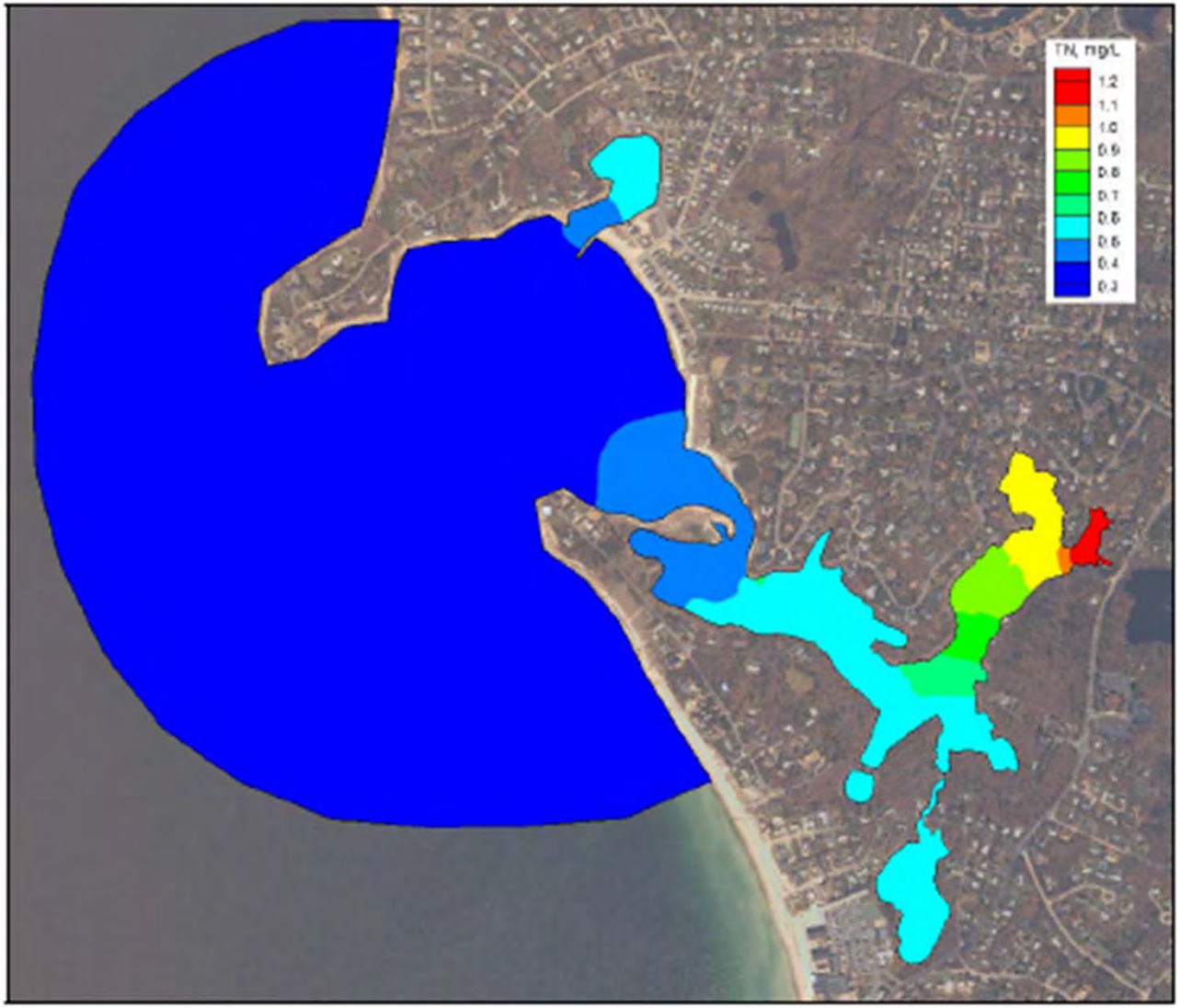
Pre-Colonial Conditions: Wild Harbor



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

(Source: MEP 2013)

Present Conditions: Wild Harbor

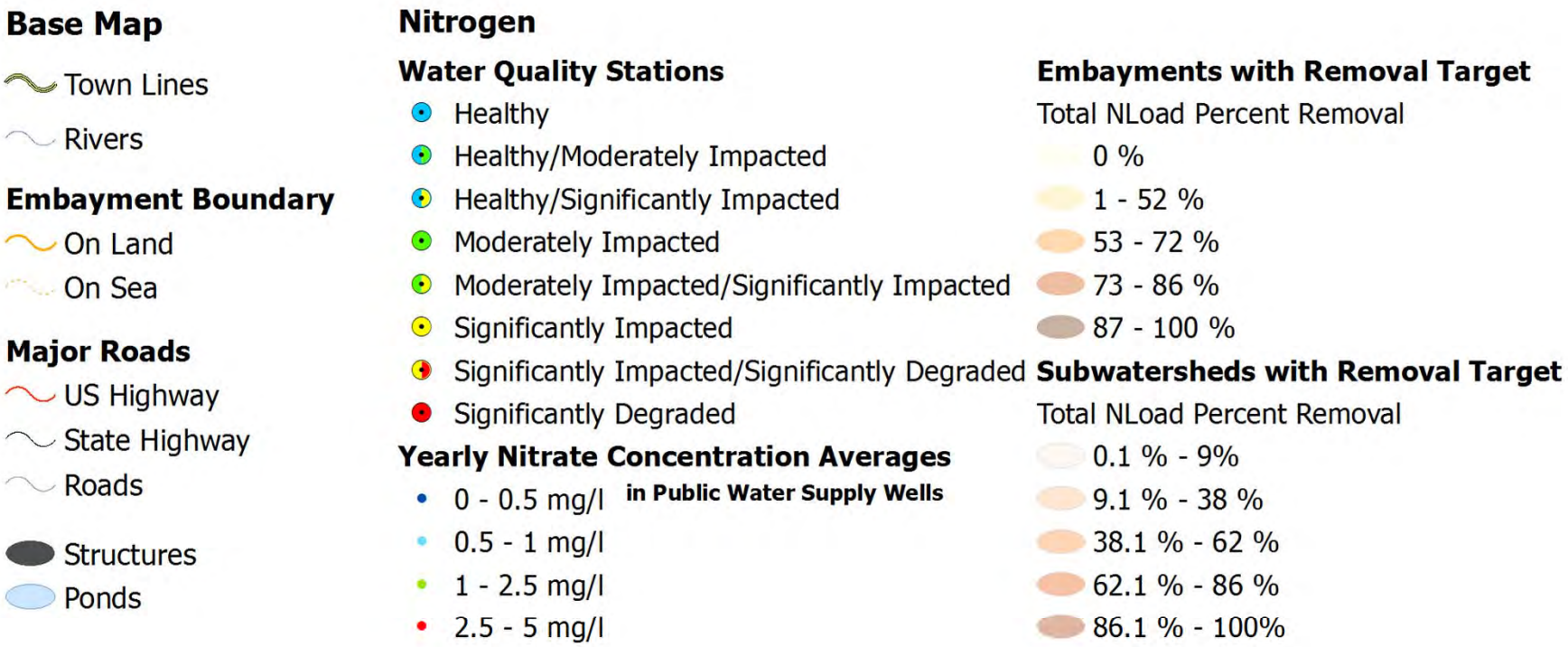


Contour plot of **modeled total nitrogen concentrations (mg/L)** for results of the projected buildout loading scenario, for the Wild Harbor System.

(Source: MEP 2013)

Present Conditions: Wild Harbor

Nitrogen Problem



Sources: MassGIS, MEP, CCC

Eelgrass Extent

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

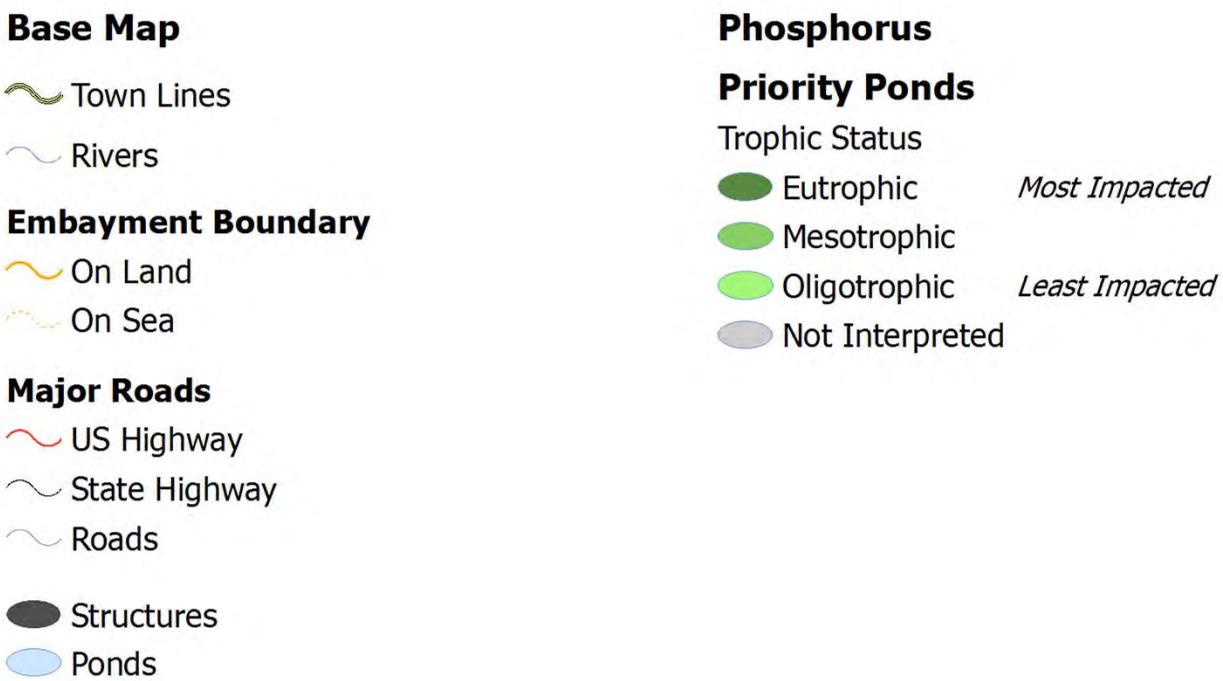
- Structures
- Ponds

Eelgrass

- Eelgrass Extent

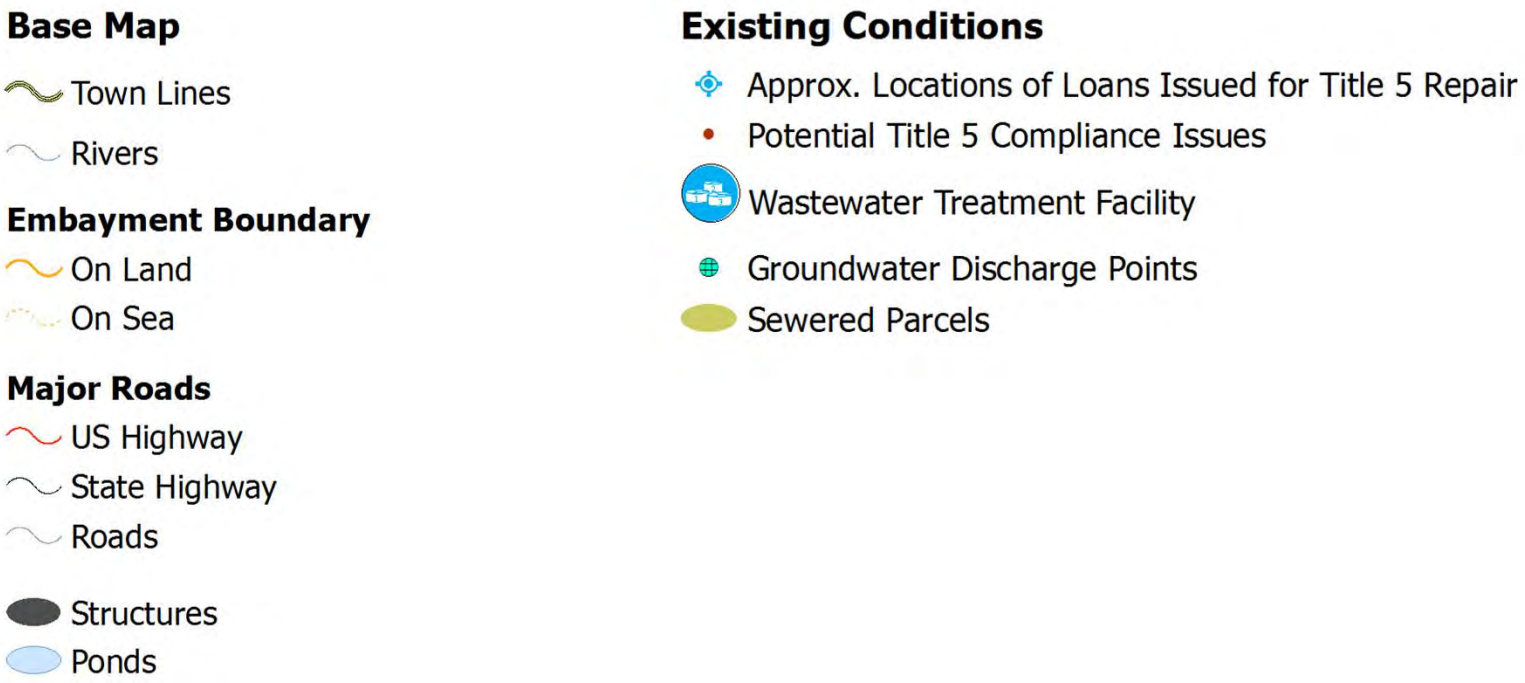
Sources: MassGIS

Phosphorus Problem



Sources: MassGIS, MassDOT, CCC

Title 5 Compliance Issues

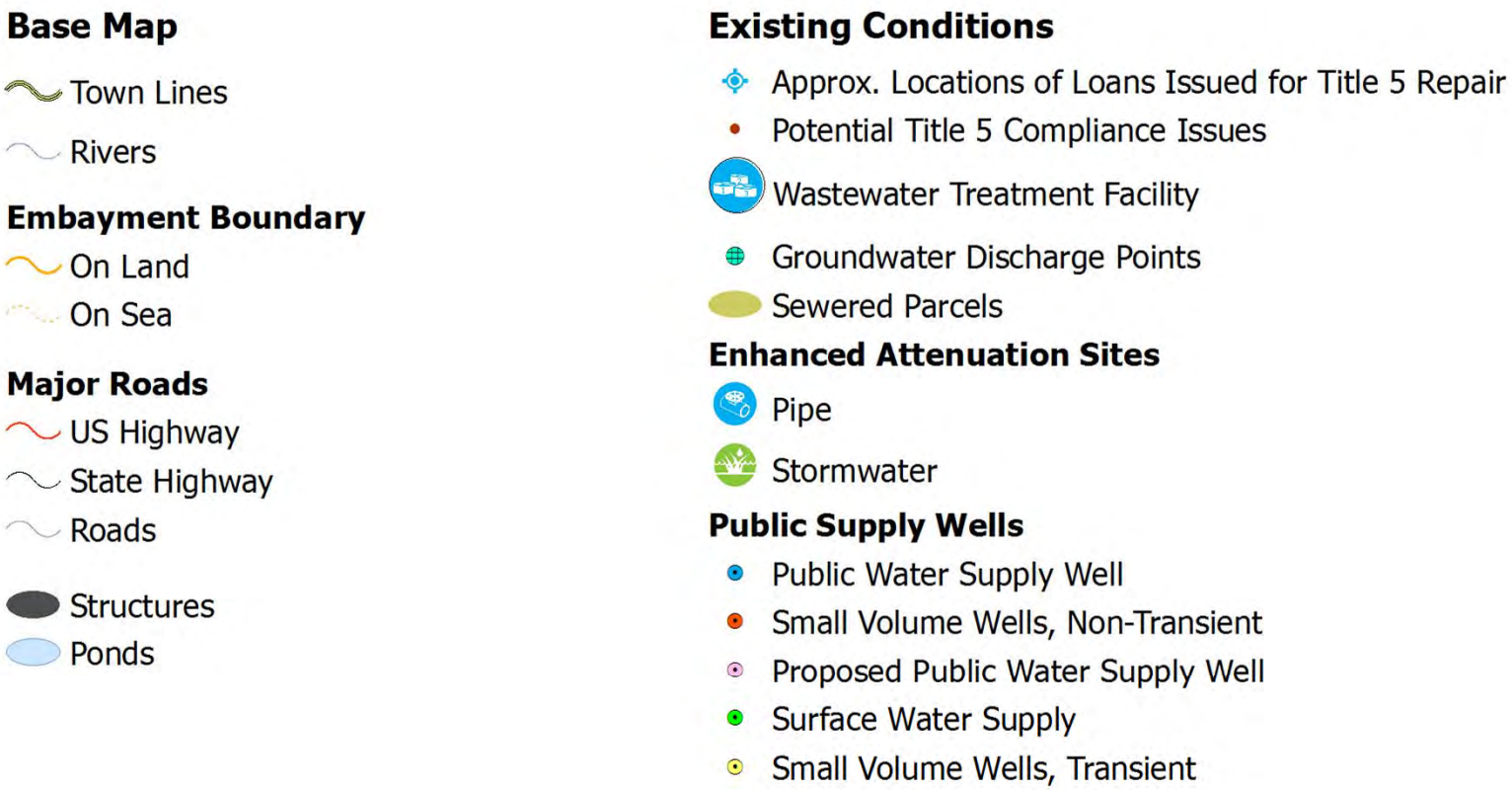


Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor

Existing Infrastructure



Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

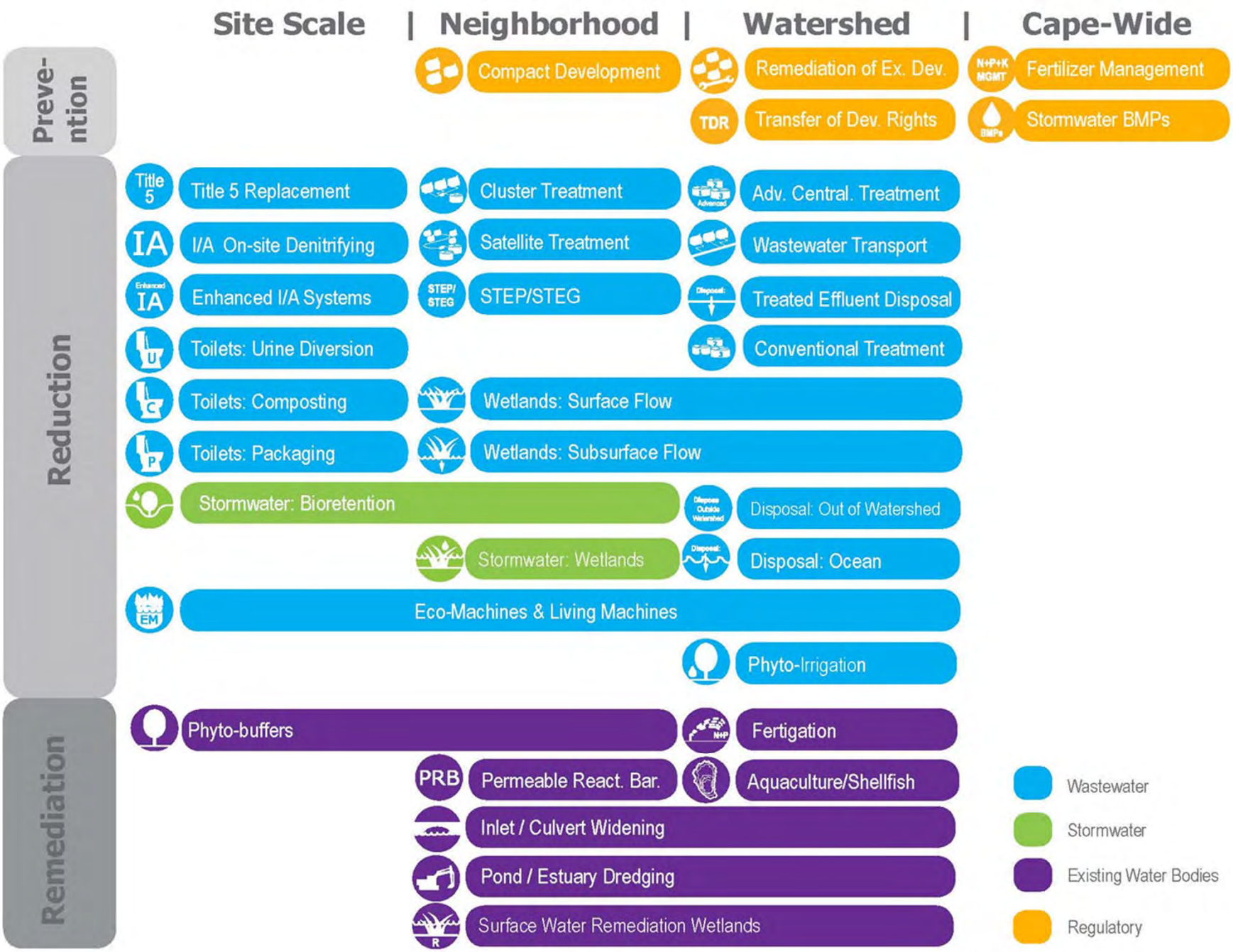
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Reduction
Remediation
Compact Development
Remediation of Ex. Dev.
Fertilizer Management
TDR
Transfer of Dev. Rights
Stormwater BMPs
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/STEG
STEP/STEG
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

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

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

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond
Phinney's Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor

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

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

DRAFT SUMMARY NOTES

ACTION ITEMS

The following action items were captured during the meeting:

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

WELCOME AND INTRODUCTIONS

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

REVIEW OF GOALS AND PROCESS

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

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

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

- July – Goals, Work Plan, and Roles

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

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

LOCAL PROGRESS TO DATE

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

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

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

Further comments on MMR

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

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

BASELINE CONDITIONS

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

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

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

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

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

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

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

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

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

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

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

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

NEXT STEPS

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

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

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

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

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

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

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

OPERATING PROTOCOLS

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

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

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

PUBLIC COMMENTS

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

Appendix A
Attendance

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

Cape Cod 208 Area Water Quality Planning
Herring River Watershed Working Group

Meeting One
Thursday, September 19, 2013
Harwich Community Center, 100 Oak Street, Harwich, MA 02645

Meeting Agenda

8:30 am Welcome – *Cape Cod Commission*

8:35 Introductions, confirm working group membership and participation – *Kate Harvey (Facilitator) and Working Group*

9:00 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

9:15 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Cape Cod Commission*

9:30 Review and add to chronology of work to date – *Working Group*

9:45 Discussion: drawing on past work to move forward – *Kate Harvey (Facilitator) and Working Group*

10:00 Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Patty Daley (Area Manager)*

10:45 Break

11:00 Discussion of Baseline Conditions - *Kate Harvey (Facilitator) and Working Group*

11:30 Review/Discuss Process Protocols - *Kate Harvey (Facilitator) and Working Group*

12:00 Framework for Moving Forward: Preview Meetings 2 and 3 – *Patty Daley (Area Manager)*

12:10 Public Comments

12:30 Adjourn

Herring River Group

Baseline Conditions & Needs Assessment

What is the 208 Plan?

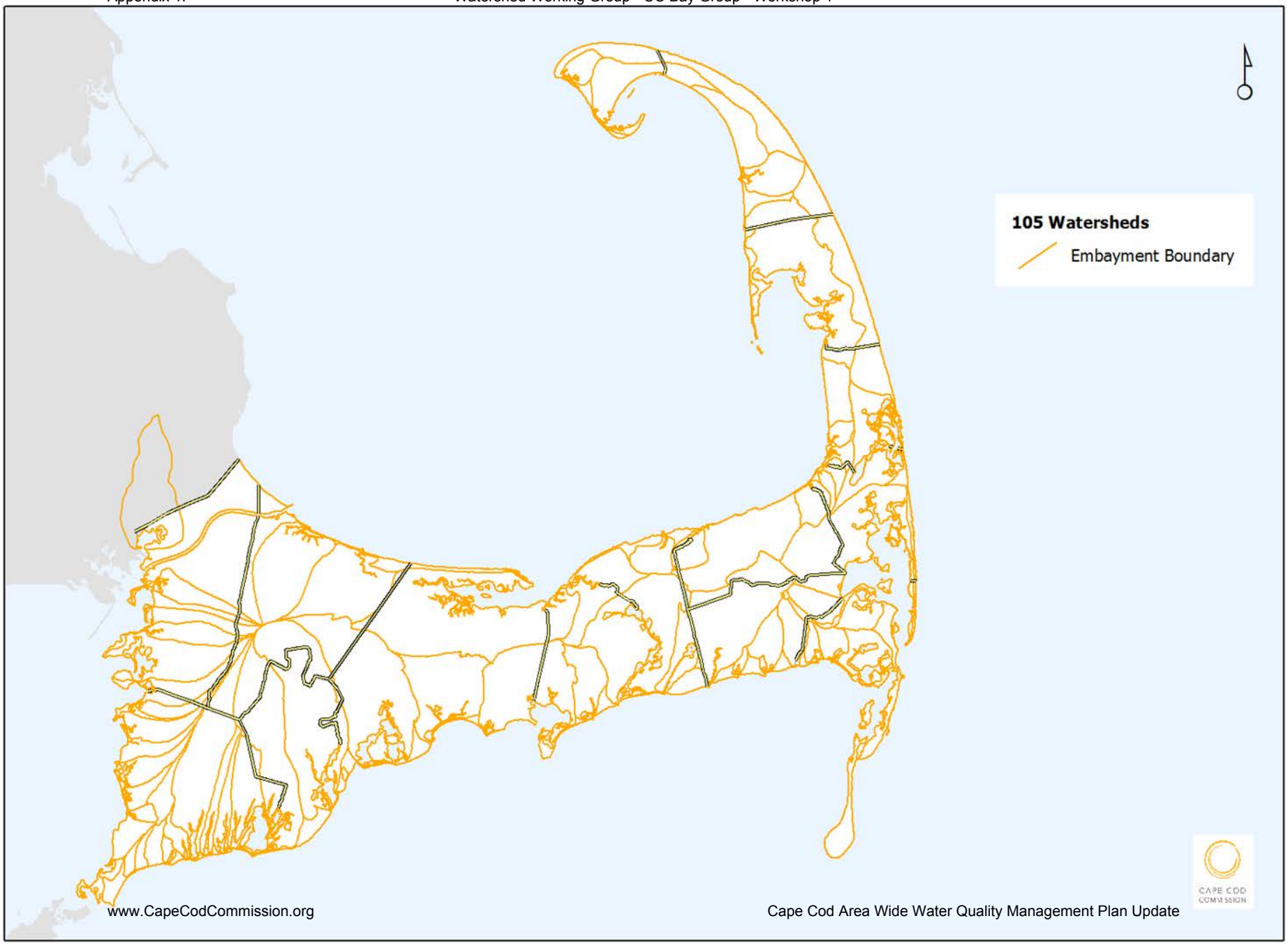
Clean Water Act Section 208

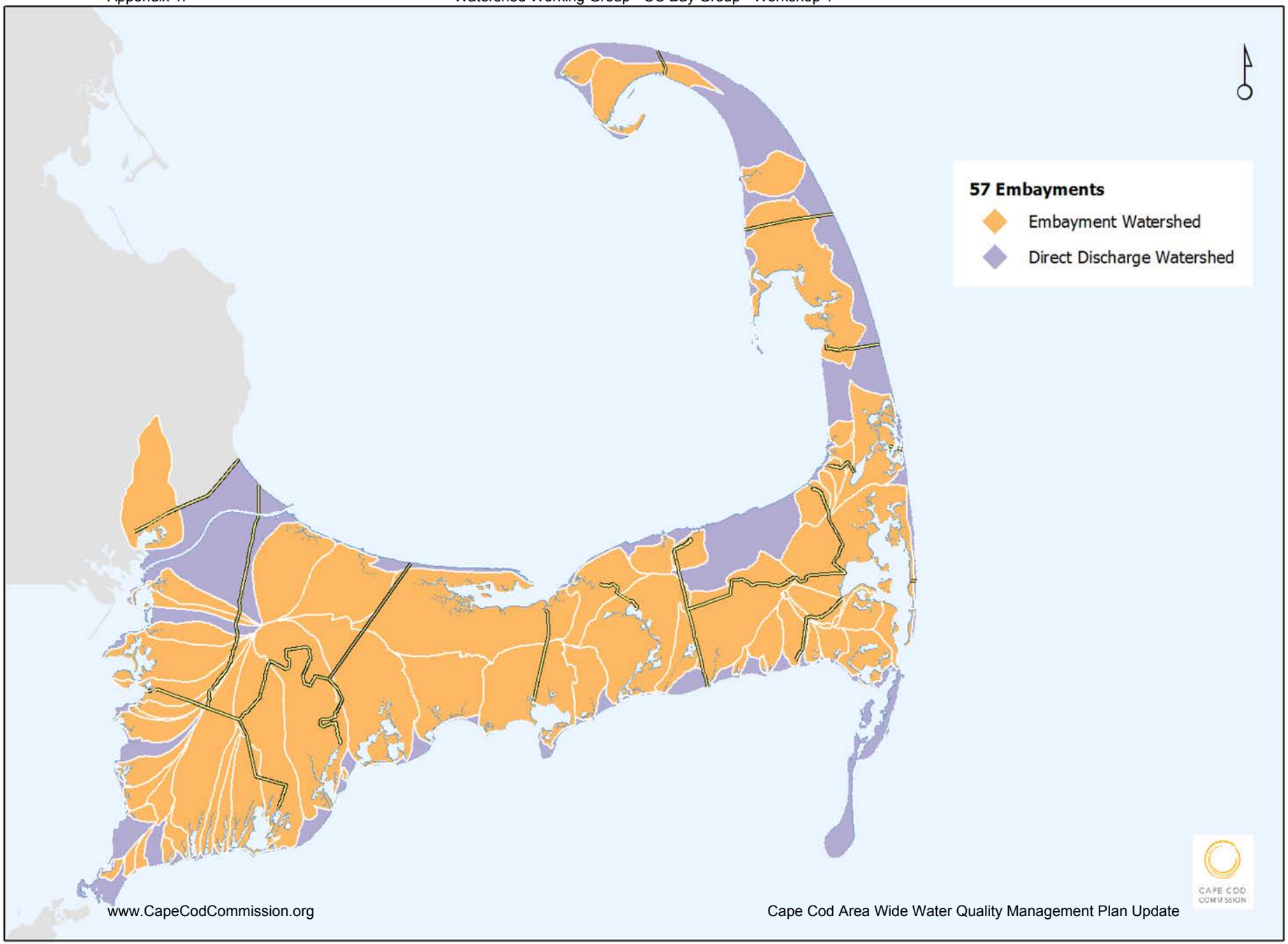
The Commission was directed to update the 1978 Plan

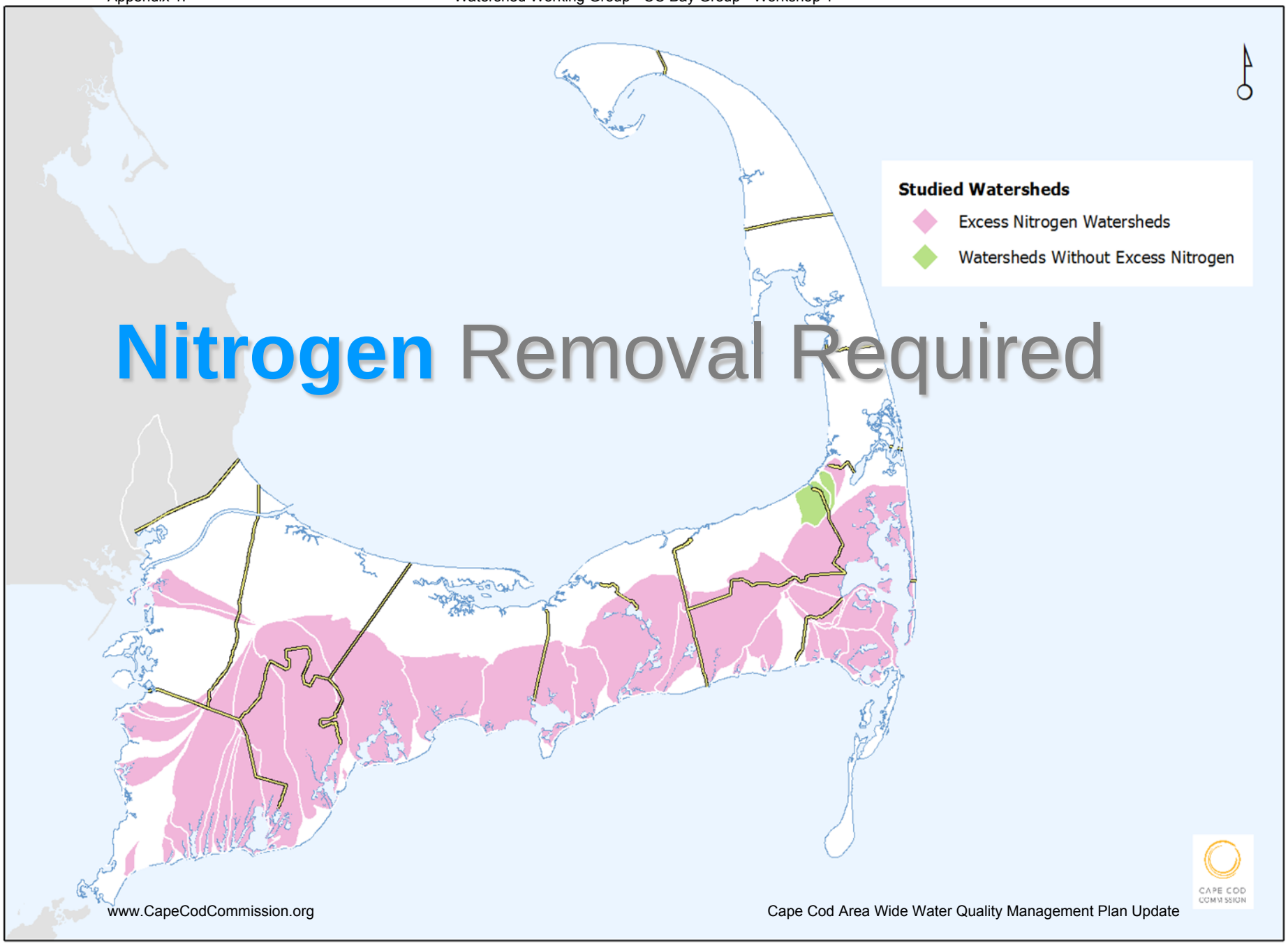
The Commonwealth provided $3 million to fund the project

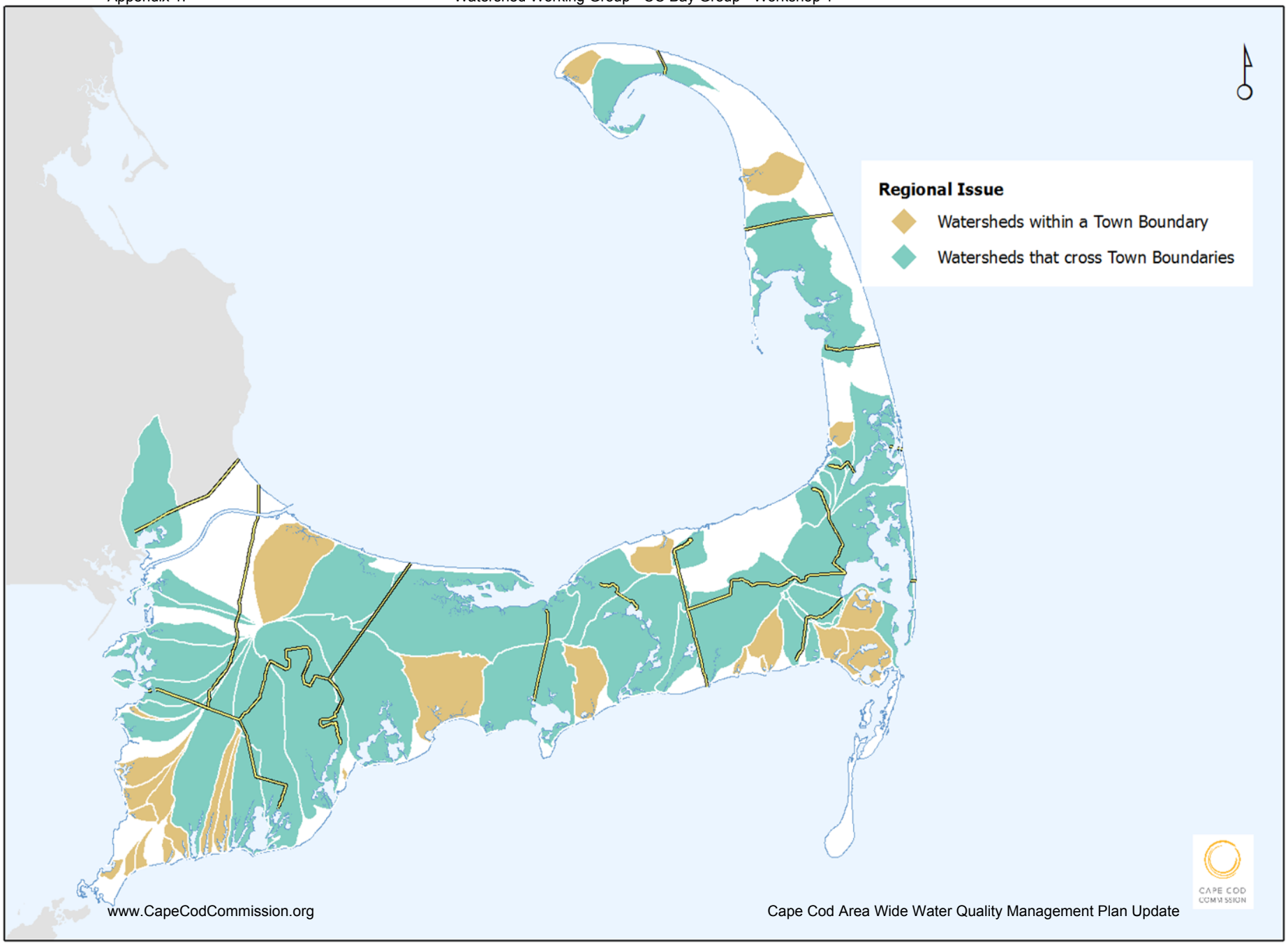
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations


105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

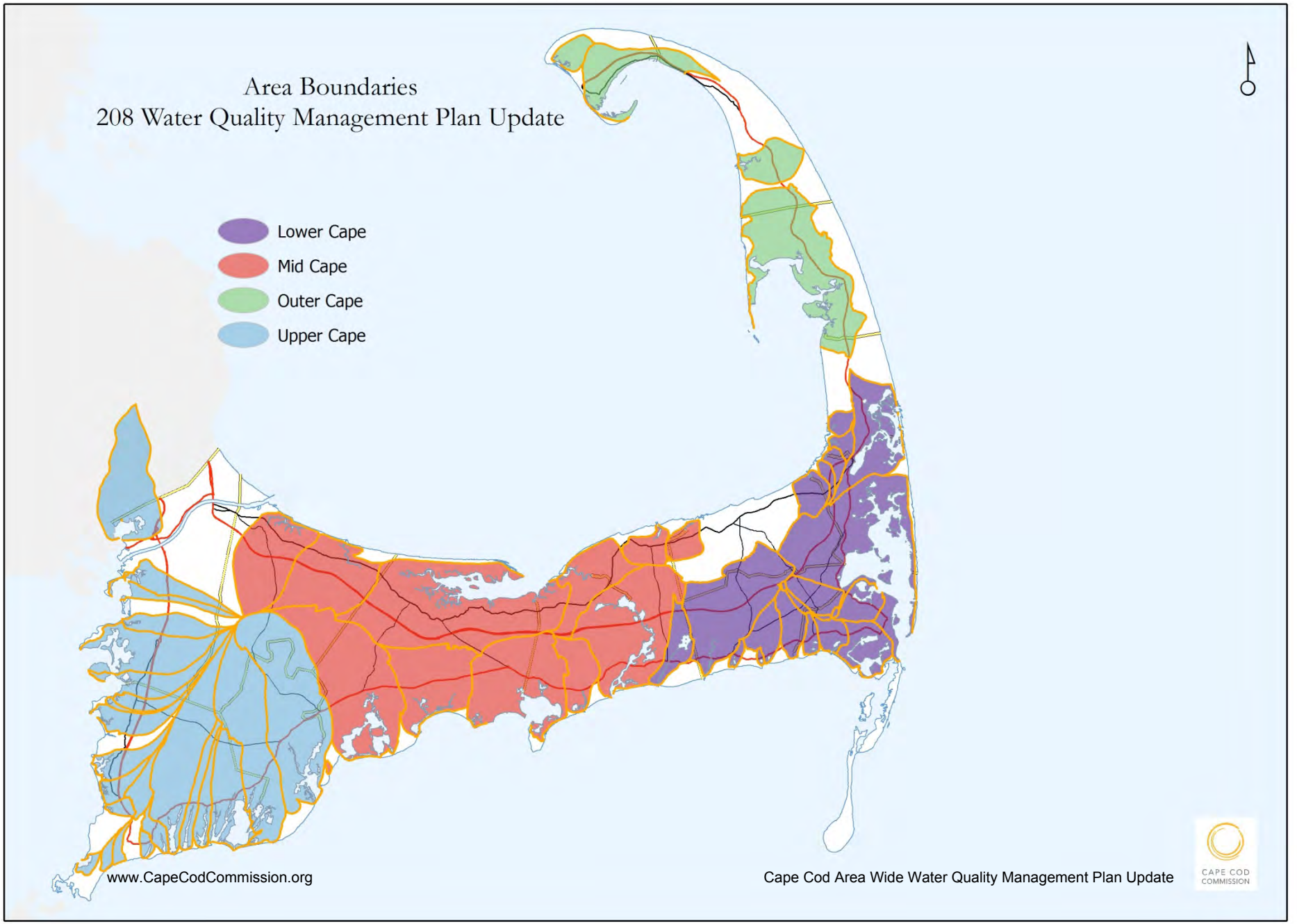

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

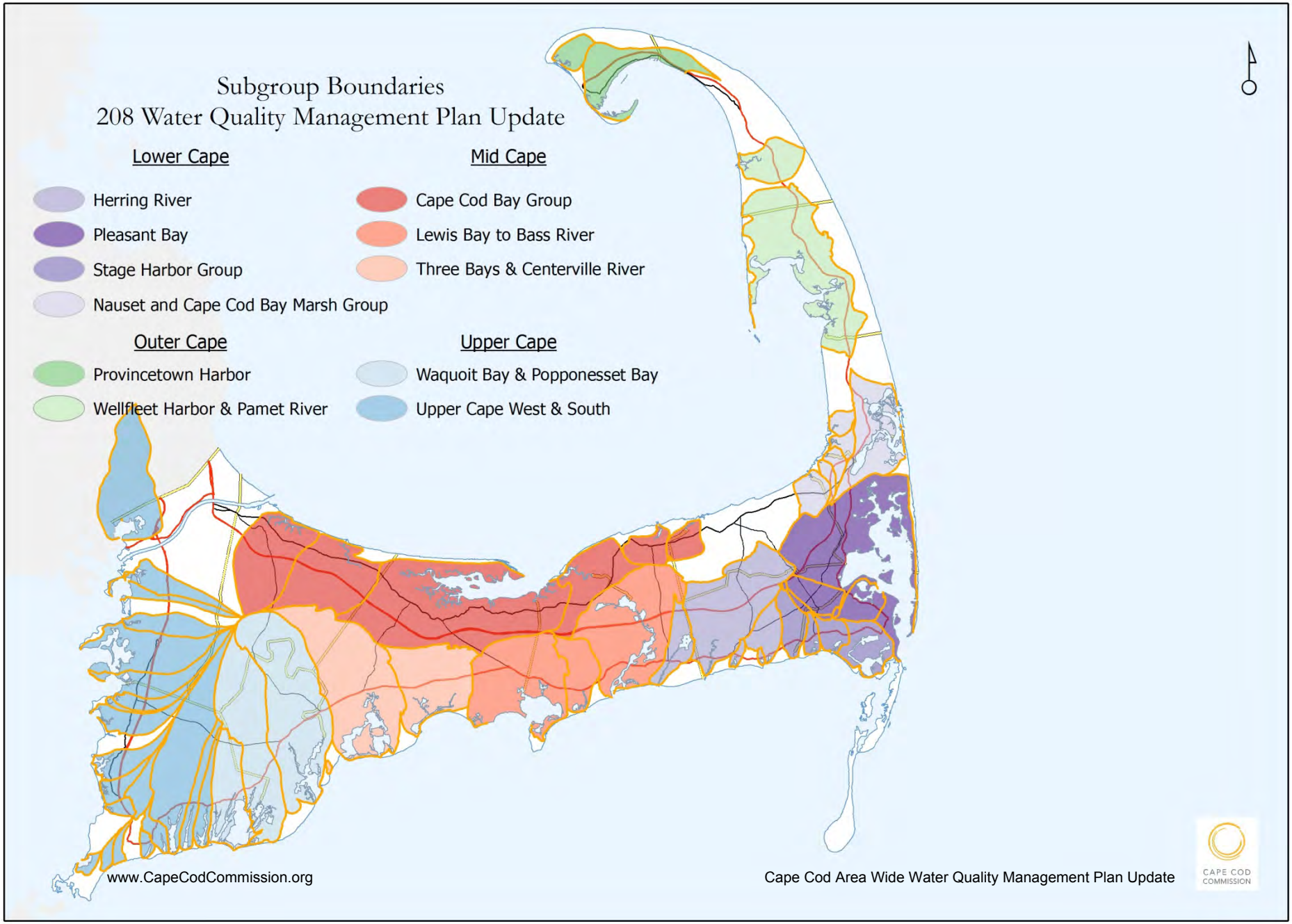

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

- Watershed Based
- Stakeholder Engagement
- Maximize Benefits of Local Planning
- No Optimal Solutions

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

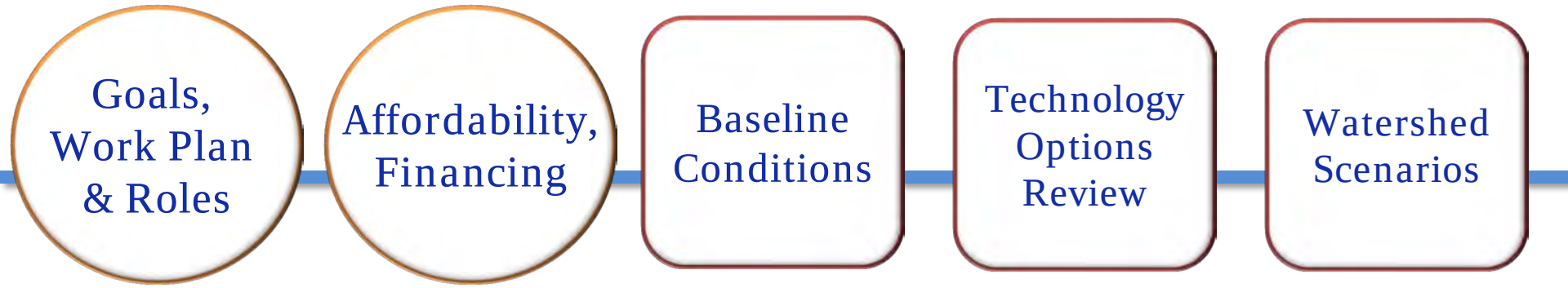

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
www.CapeCodCommission.org
Cape Cod Area Wide Water Quality Management Plan Update
CAPE COD COMMISSION


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
www.CapeCodCommission.org
Cape Cod Area Wide Water Quality Management Plan Update
CAPE COD COMMISSION

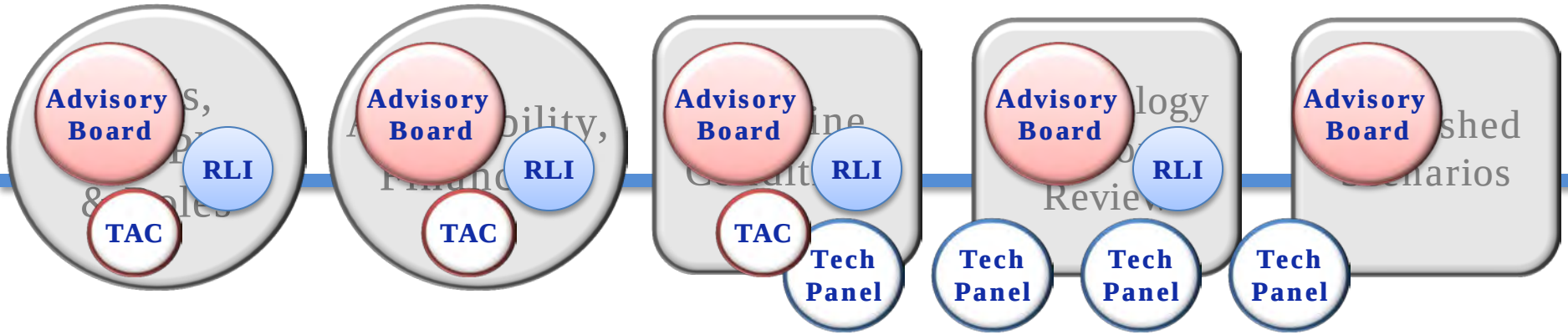
What is the stakeholder process?

Public Meetings

Watershed Working Groups



208 Planning Process



RLI Regulatory, Legal & Institutional Work Group

TAC Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Goals, Work Plan & Roles

Affordability, Financing

Baseline Conditions

Technology Options Review

Watershed Scenarios

4 Public Meetings: July 15-18

4 Public Meetings: Aug 26-29

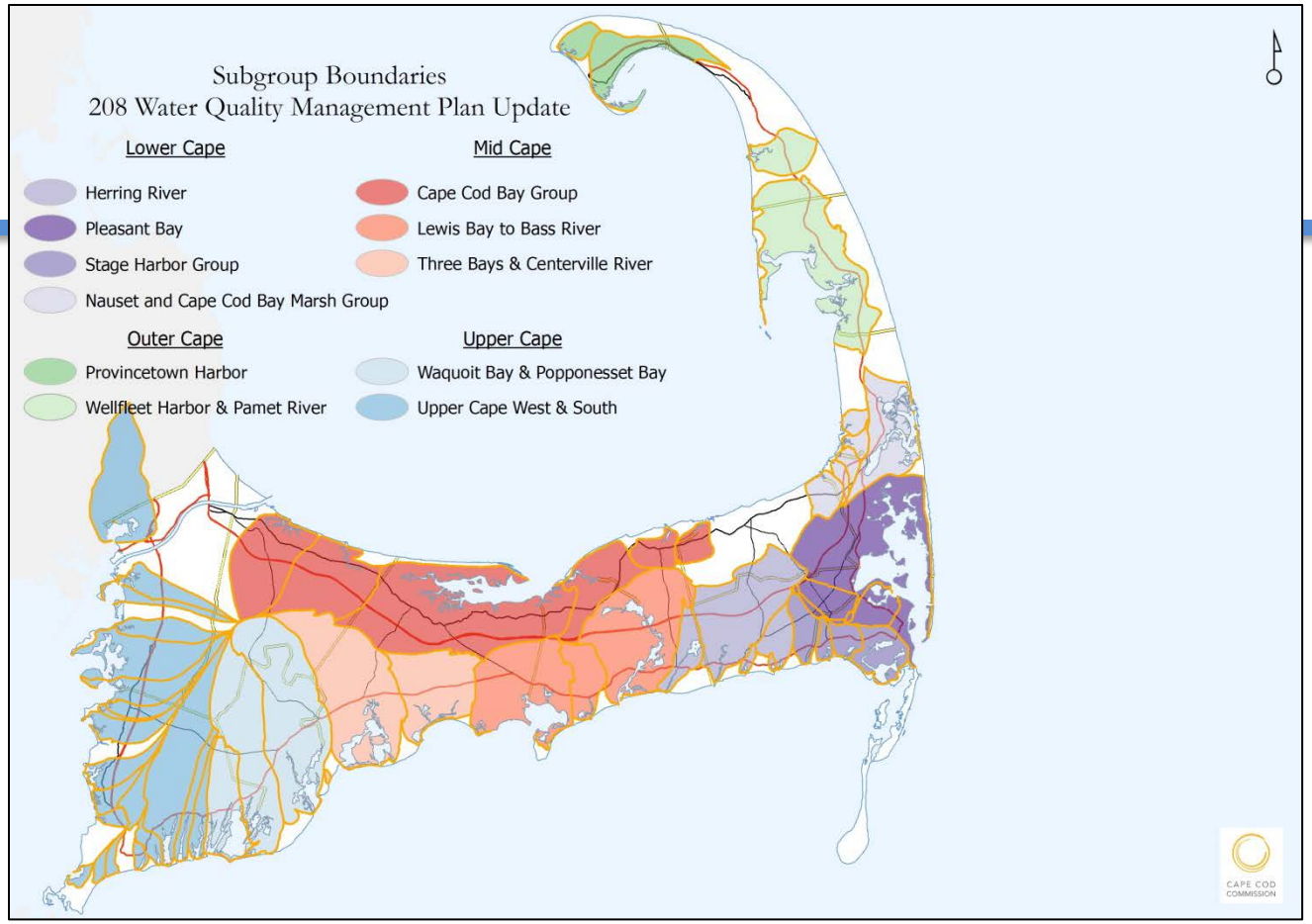
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

Watershed Scenarios



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

208 Planning Process

Baseline Conditions

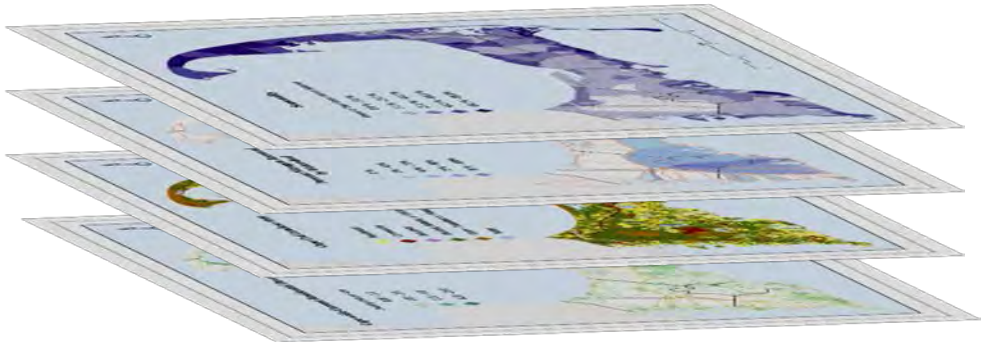
11 Working Group Meetings: Sept 18-27

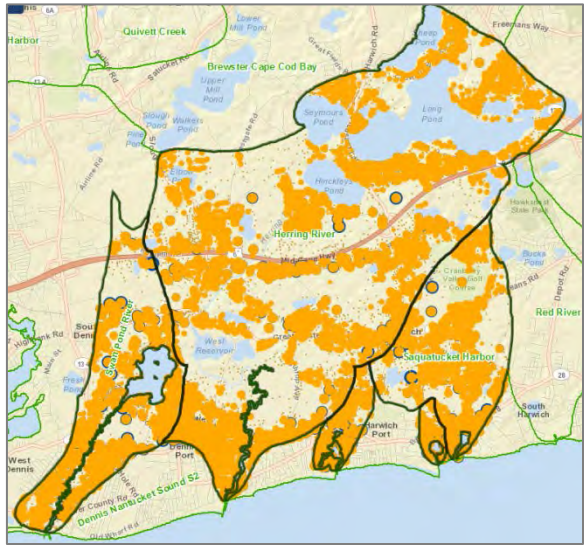
Technology Options Review

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

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.

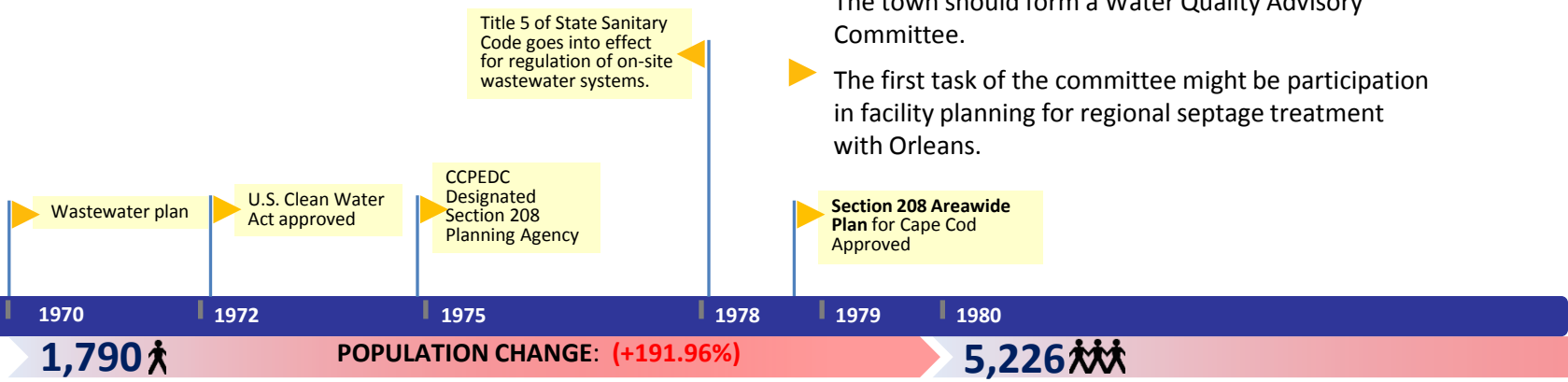
Local Progress to Date

Allen Harbor
Herring River
Saquatucket Harbor
Swan Pond River
Wychmere Harbor

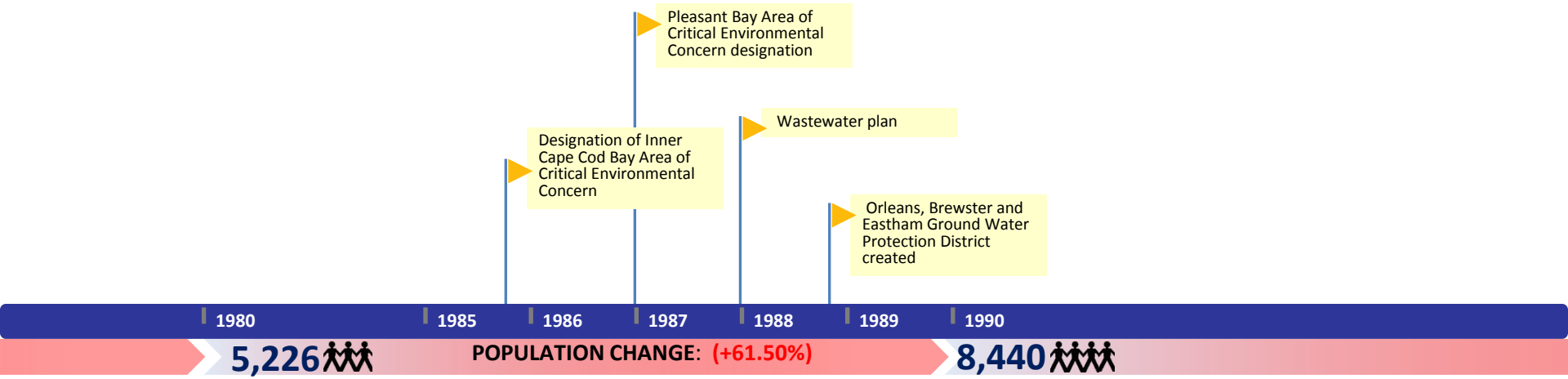
Brewster

From 1978 Section 208 Plan

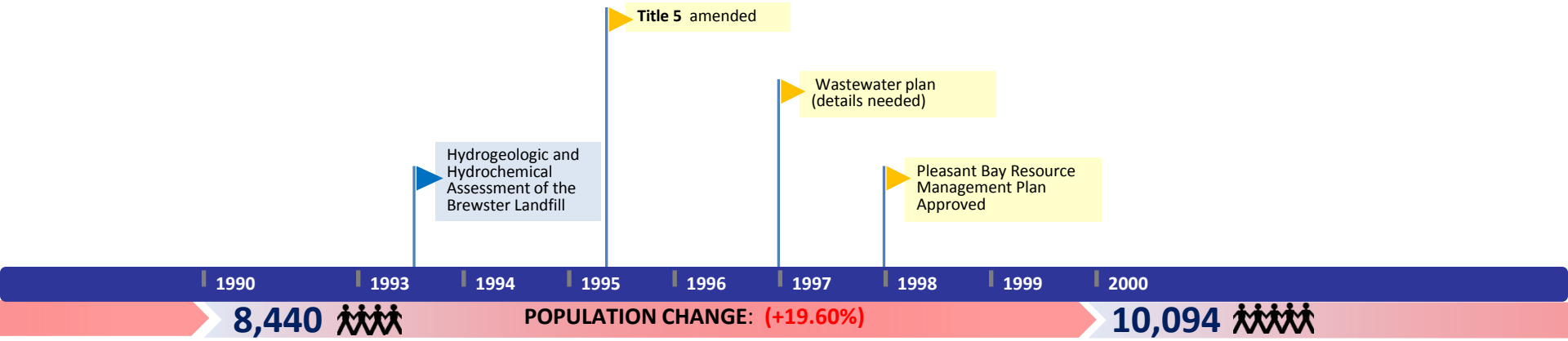
- Present and future town well sites should be protected from the non-point sources resulting from New development by creating Watershed Protection Districts.
- The town should cooperate in regional water supply planning to determine future water supply needs of neighboring towns and whether it can assist.
- 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.



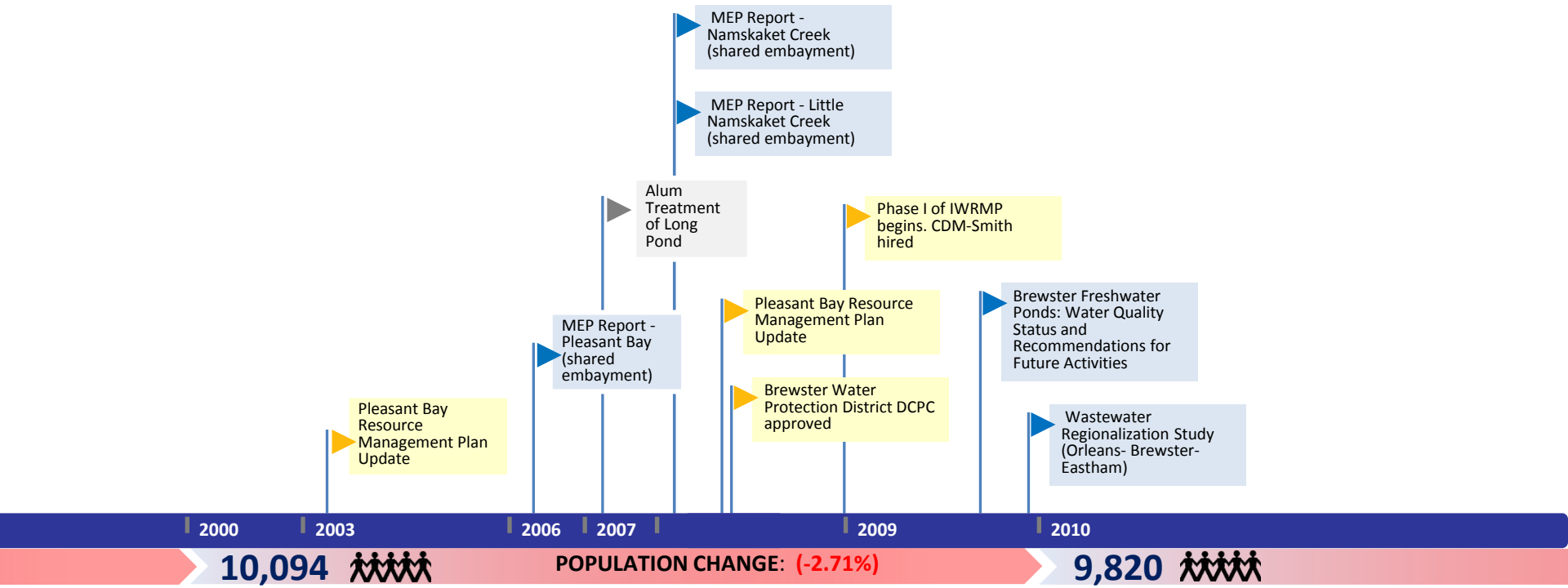
Brewster: 1970-2013



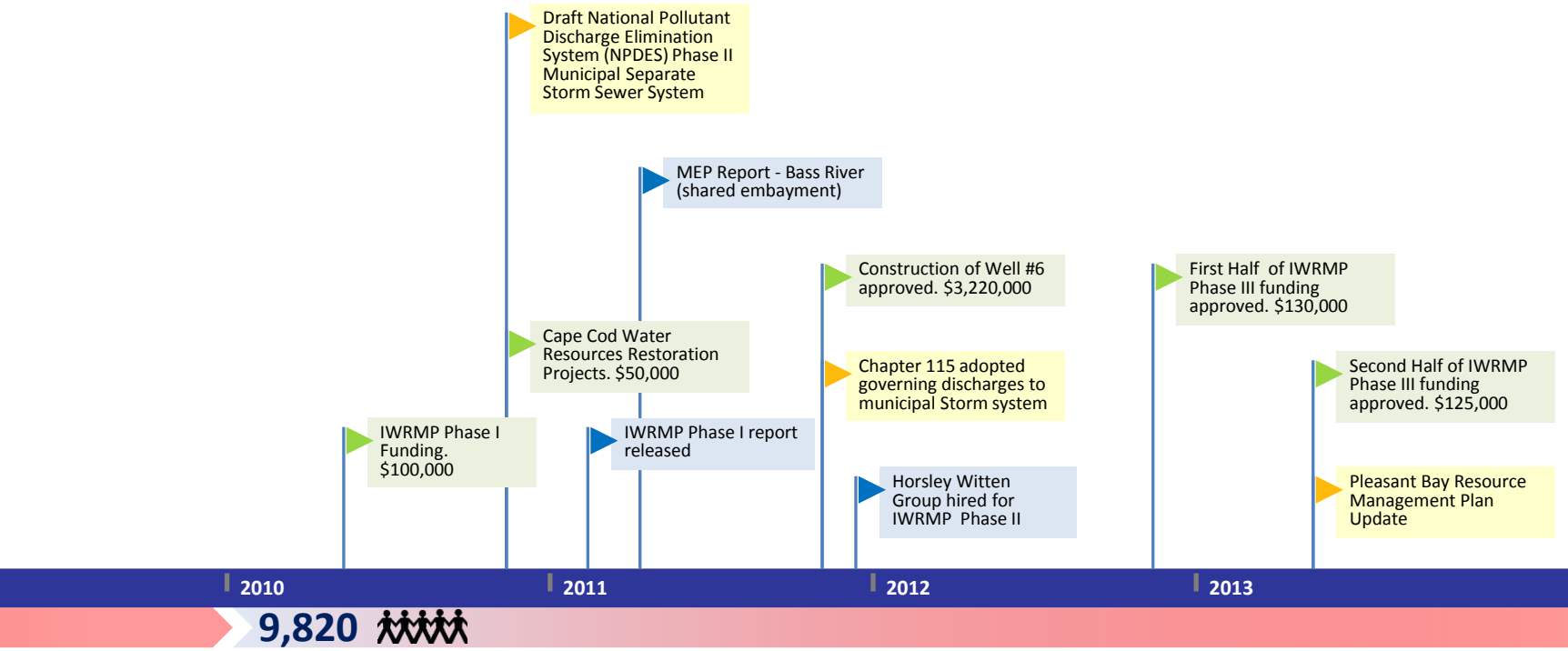
Brewster: 1970-2013



Brewster: 1970-2013



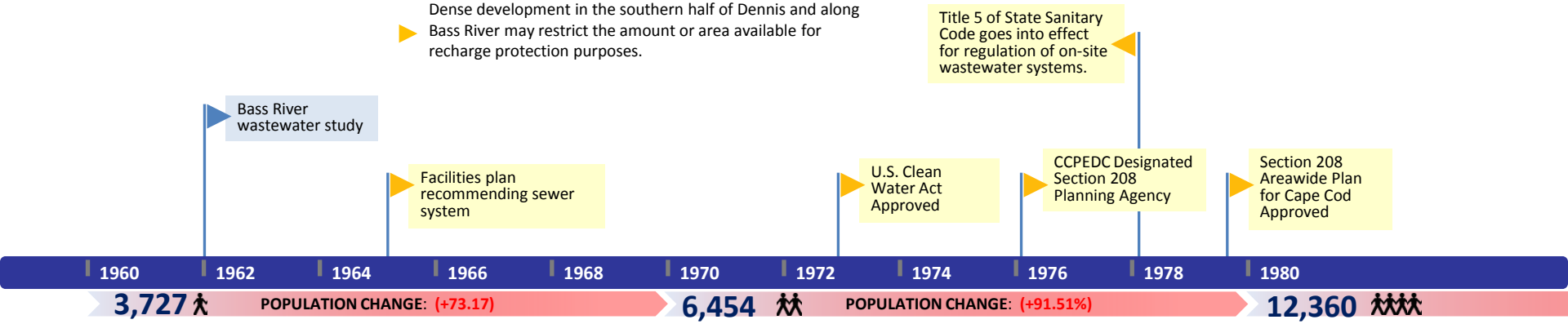
Brewster: 1970-2013



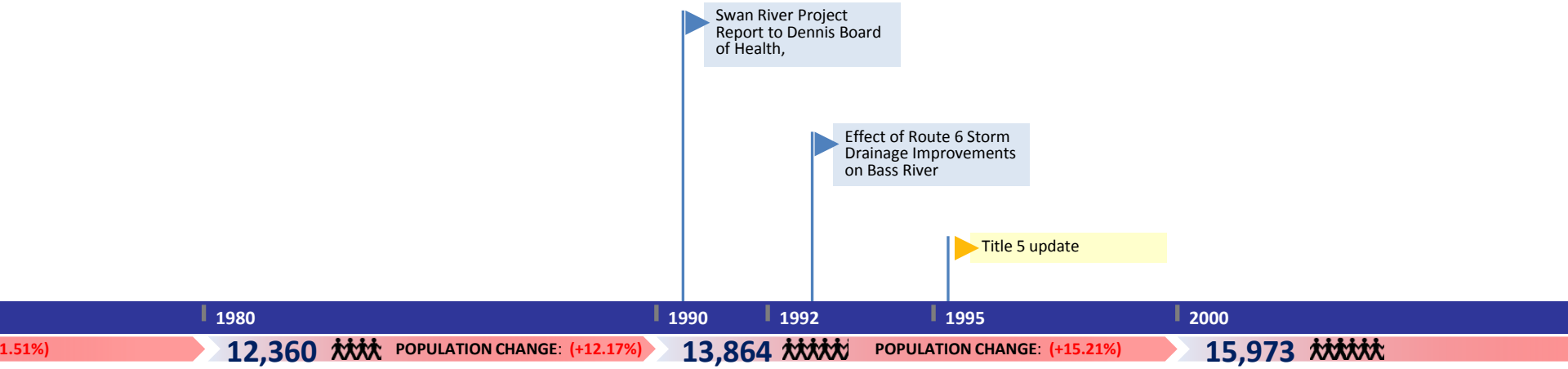
Dennis

From 1978 Section 208 Plan

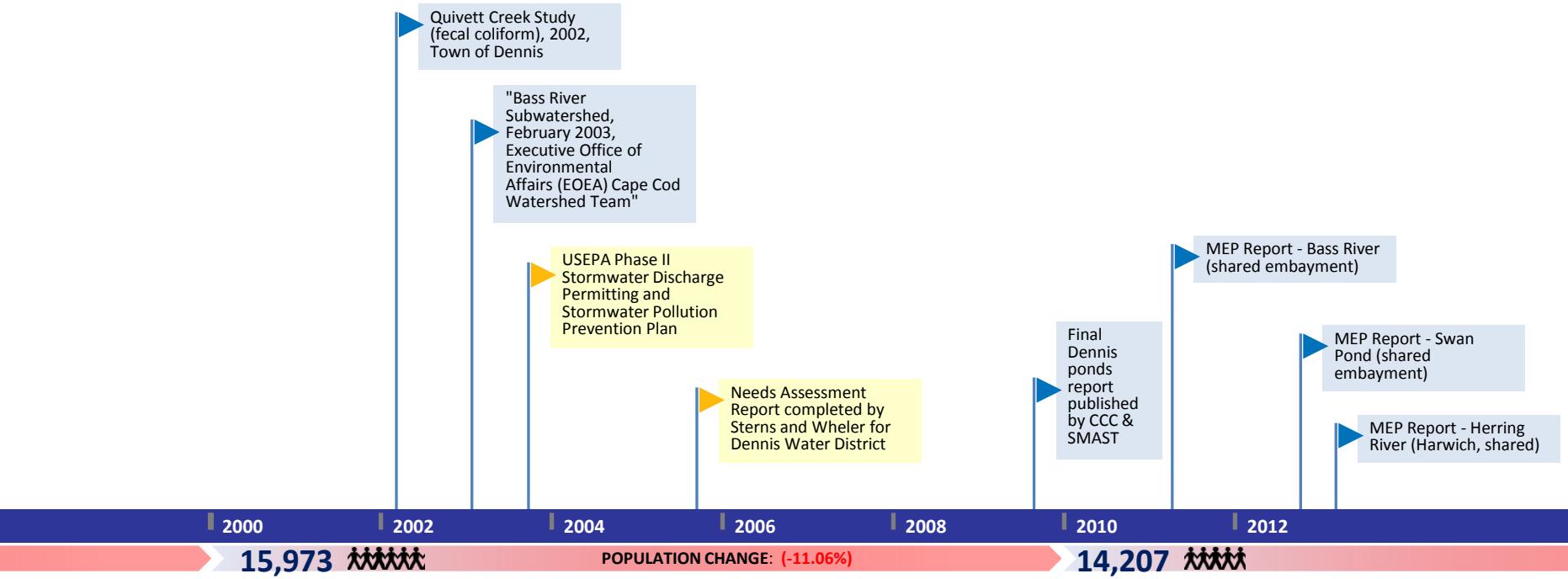
- Dennis has a professional health agent and the town's health regulations already implement many of the 208 plan recommendations.
- It is recommended that the town consider creating a "Seasonal Residential District" in the area south of Lower County Road and carefully control the conversion of seasonal 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



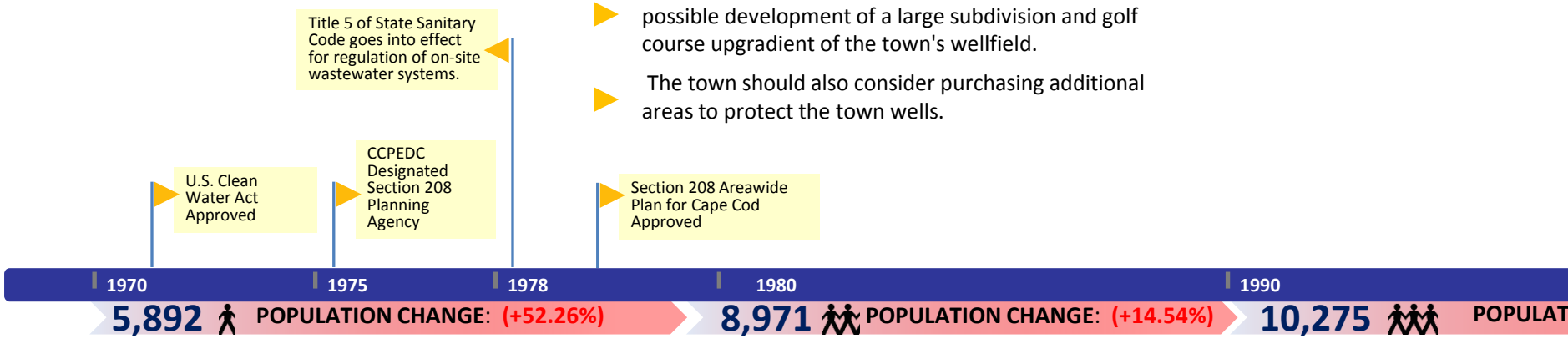
Dennis: 1970-2013



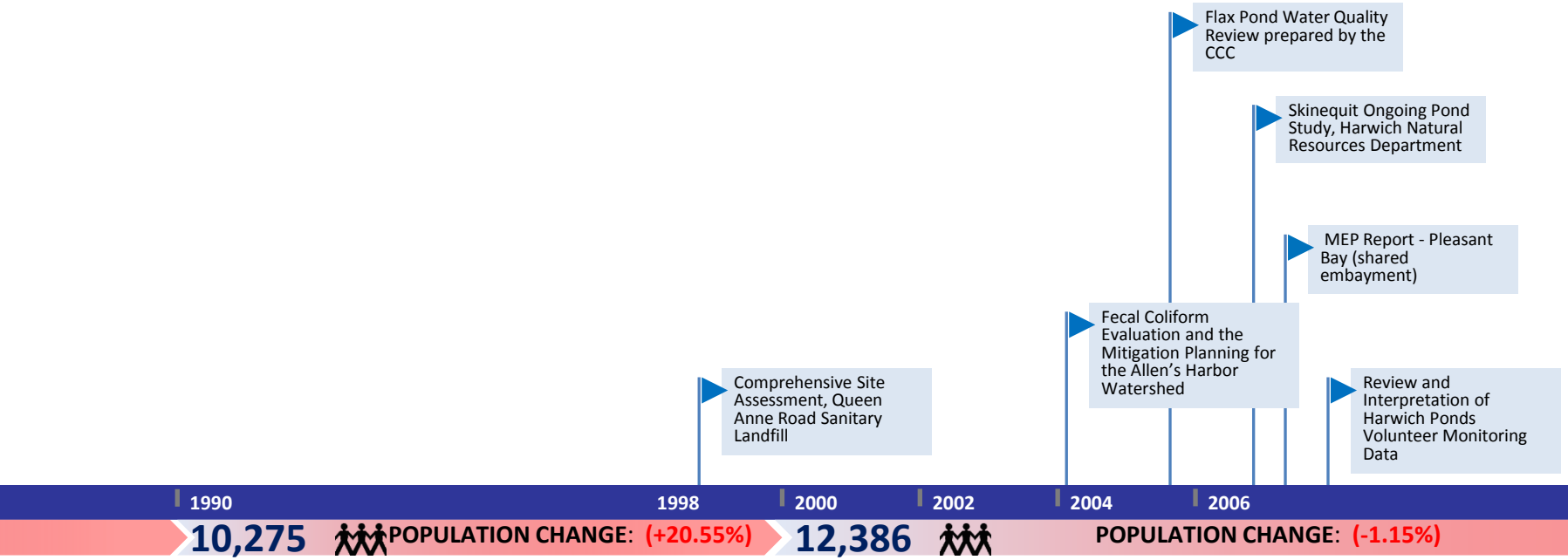
Harwich: 1970-2013

From 1978 Section 208 Plan

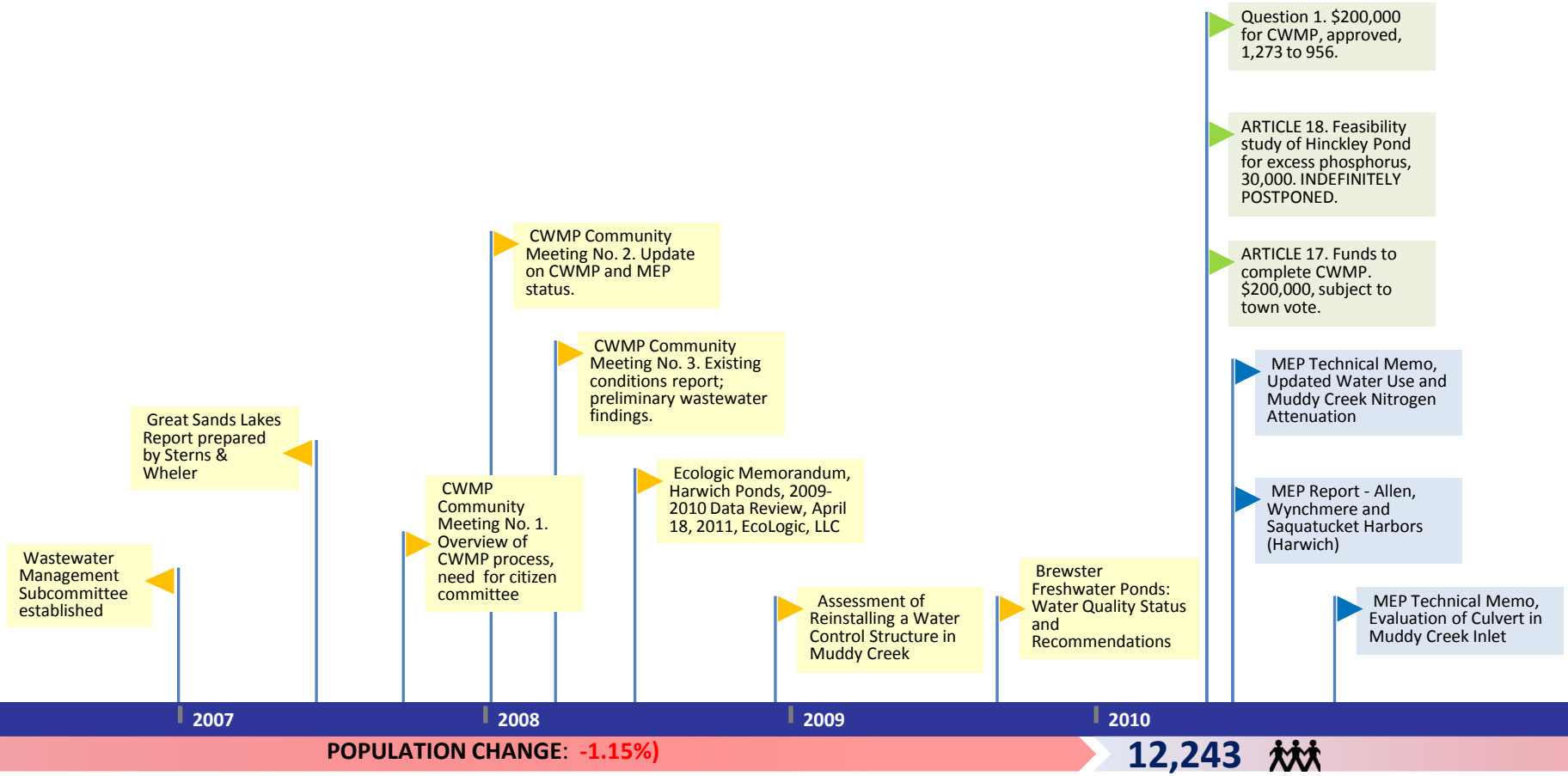
- That the town recognize that the Category 2 problem areas on the south side of town need special attention.
- It is also suggested that the town consider establishing "Seasonal Residential Districts" in this area to control the conversion of seasonal dwellings to year-round occupancy.
- The 208 plan 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.



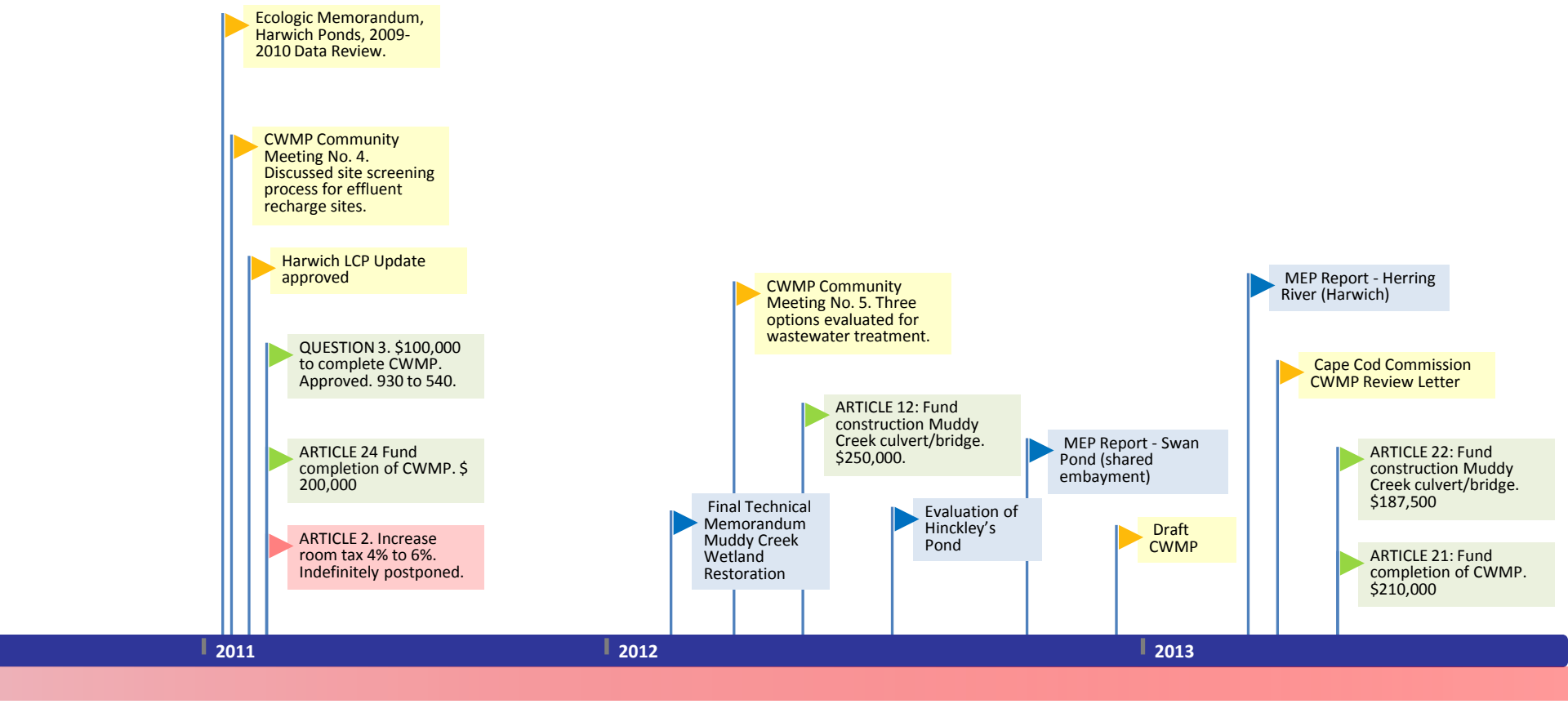
Harwich: 1970-2013



Harwich: 1970-2013



Harwich: 1970-2013



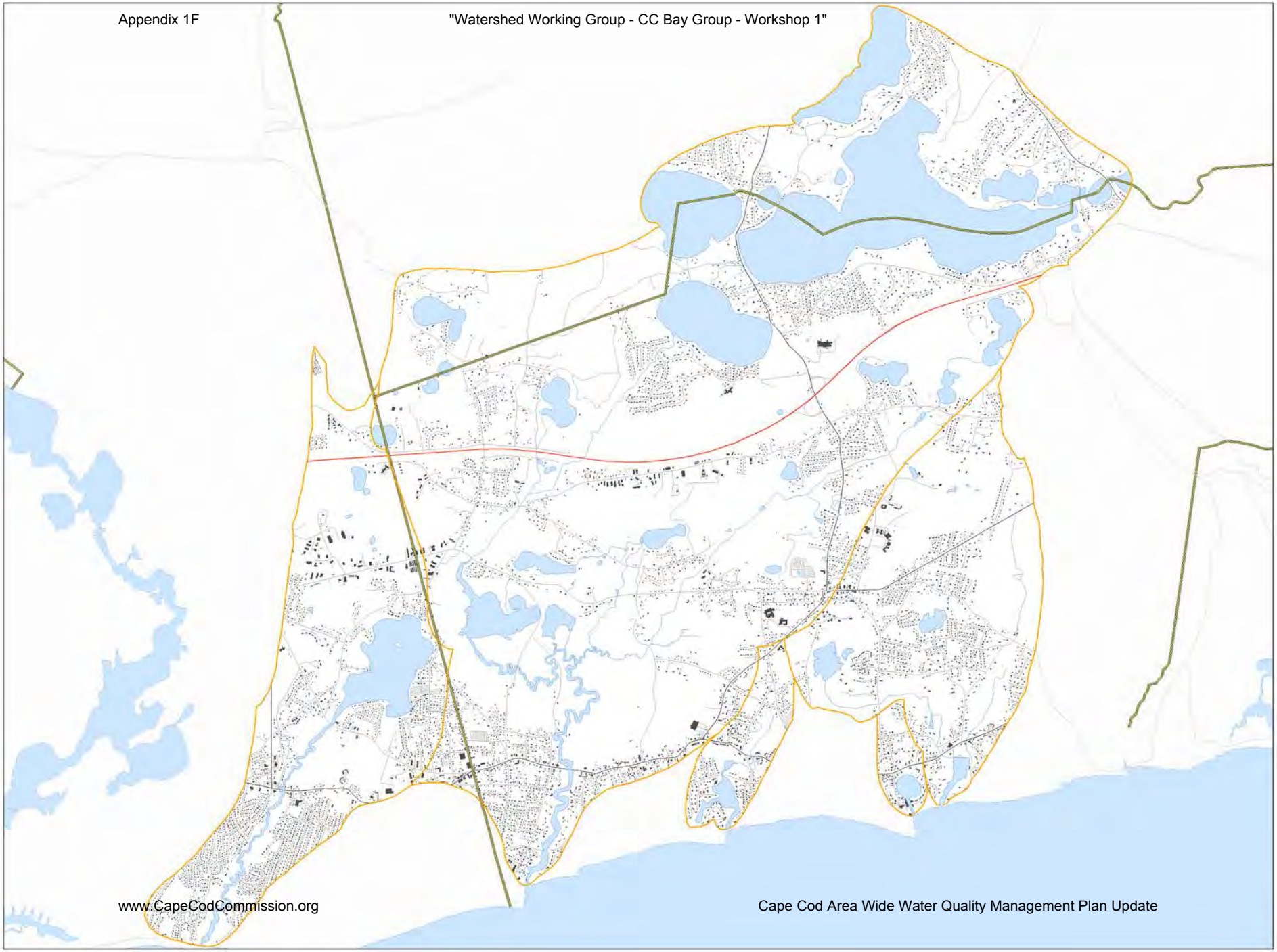
Did we miss anything?

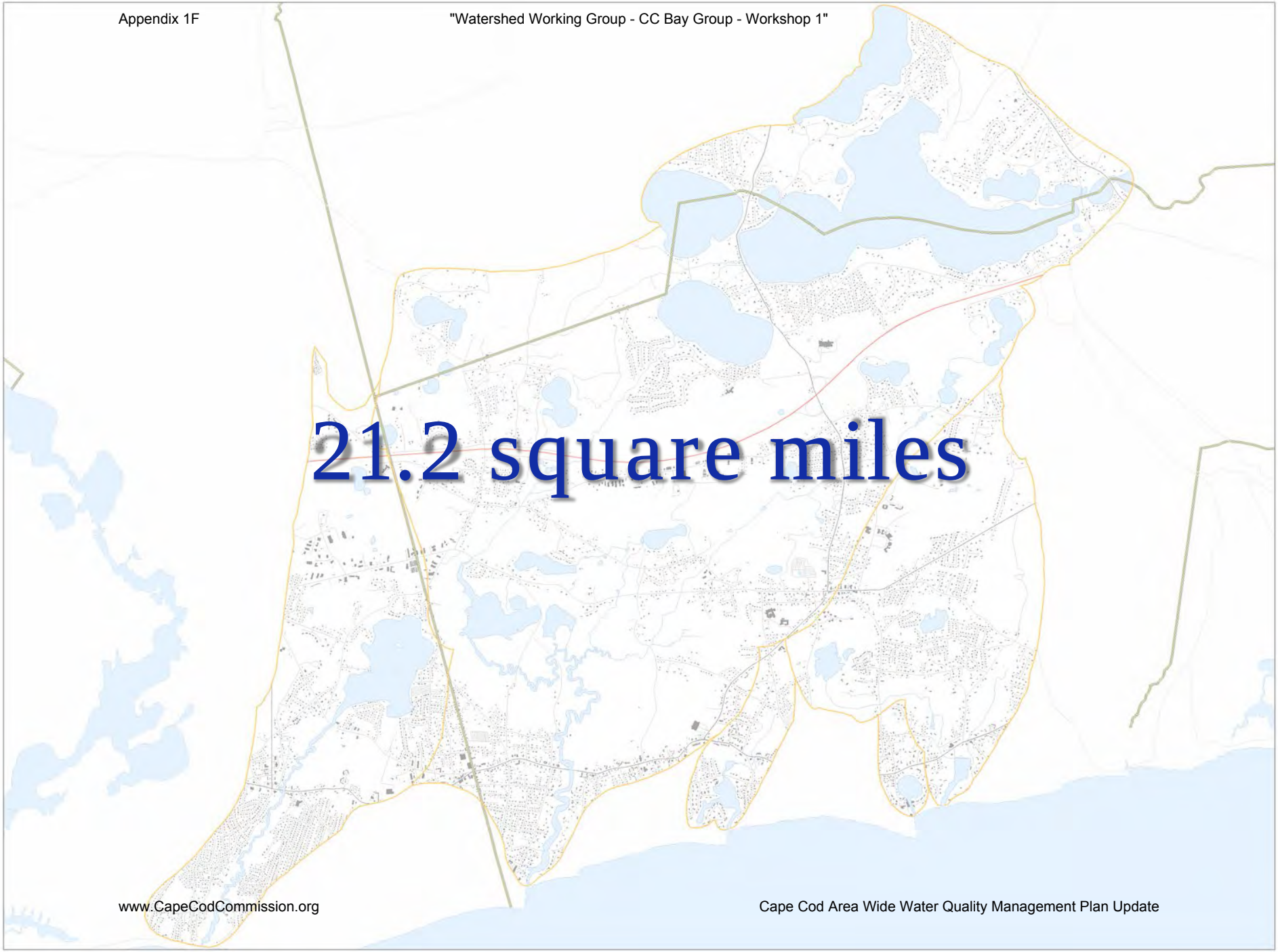
Your Watersheds

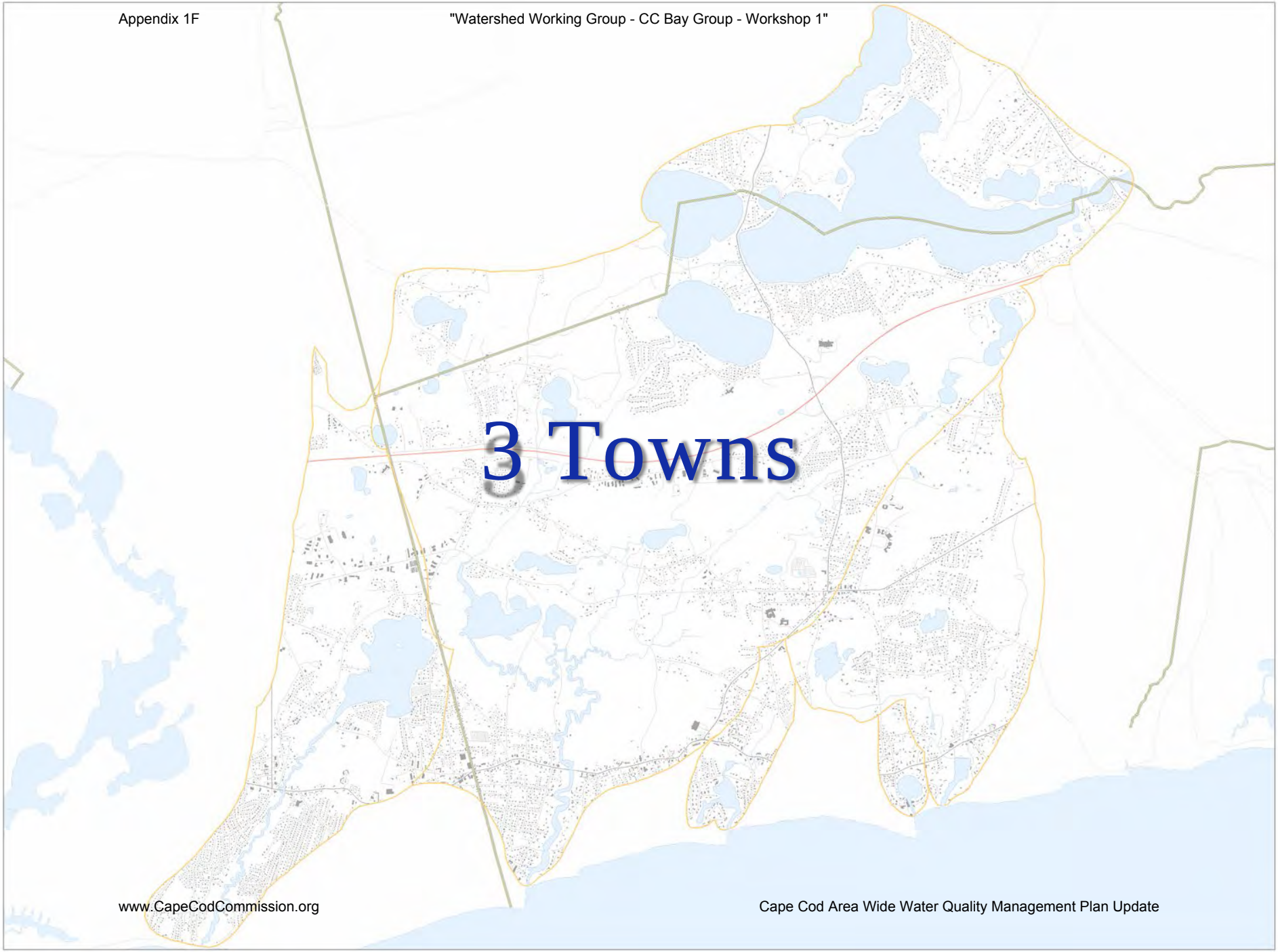
Allen Harbor
Herring River
Saquatucket Harbor
Swan Pond River
Wychmere Harbor

Appendix 1F

"Watershed Working Group - CC Bay Group - Workshop 1"




21.2 square miles


3 Towns

Natural Features

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

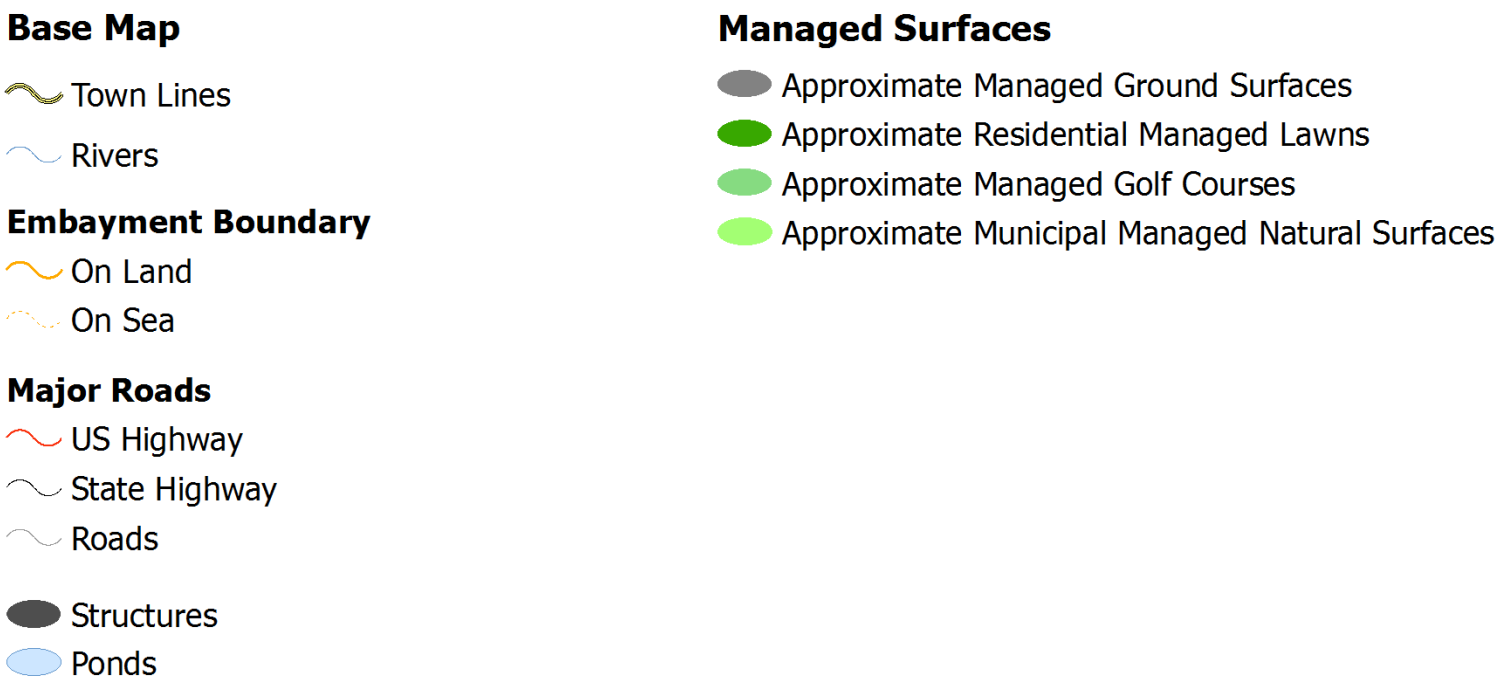
- Structures
- Ponds

Natural Areas

- Natural Heritage & Endangered Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

Managed Surfaces



Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

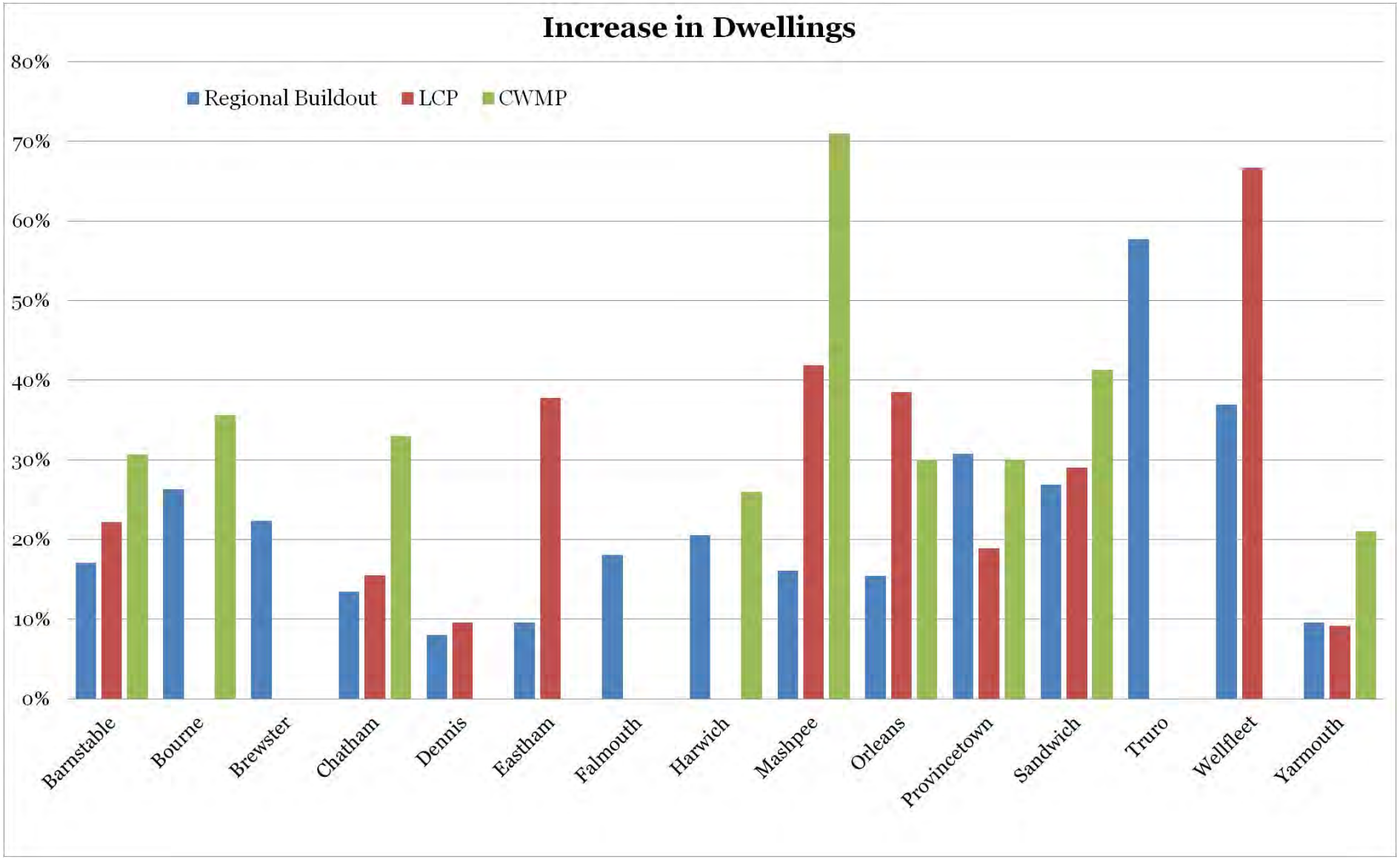
Sources: MassGIS, MassDOT

Density

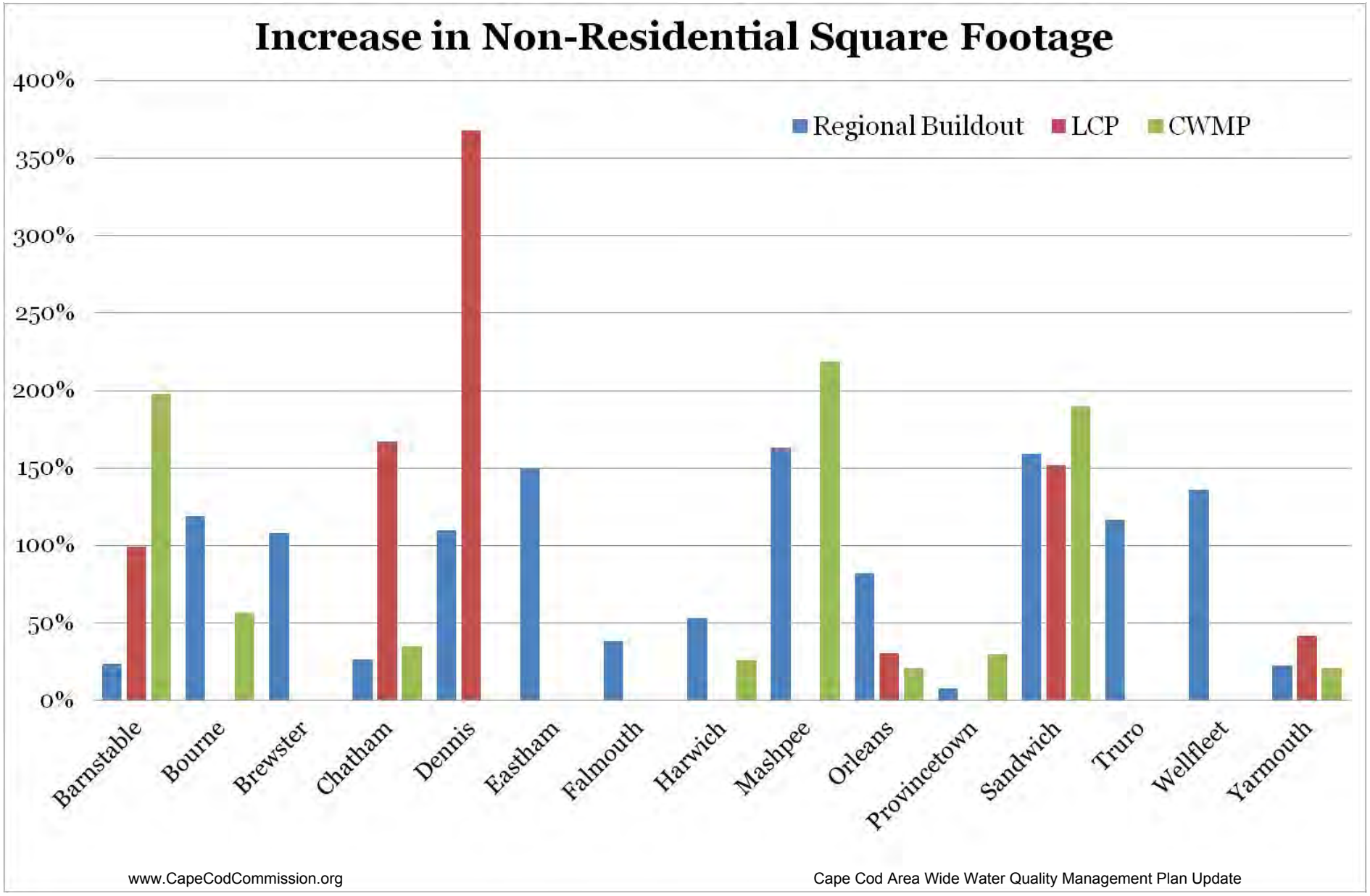
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

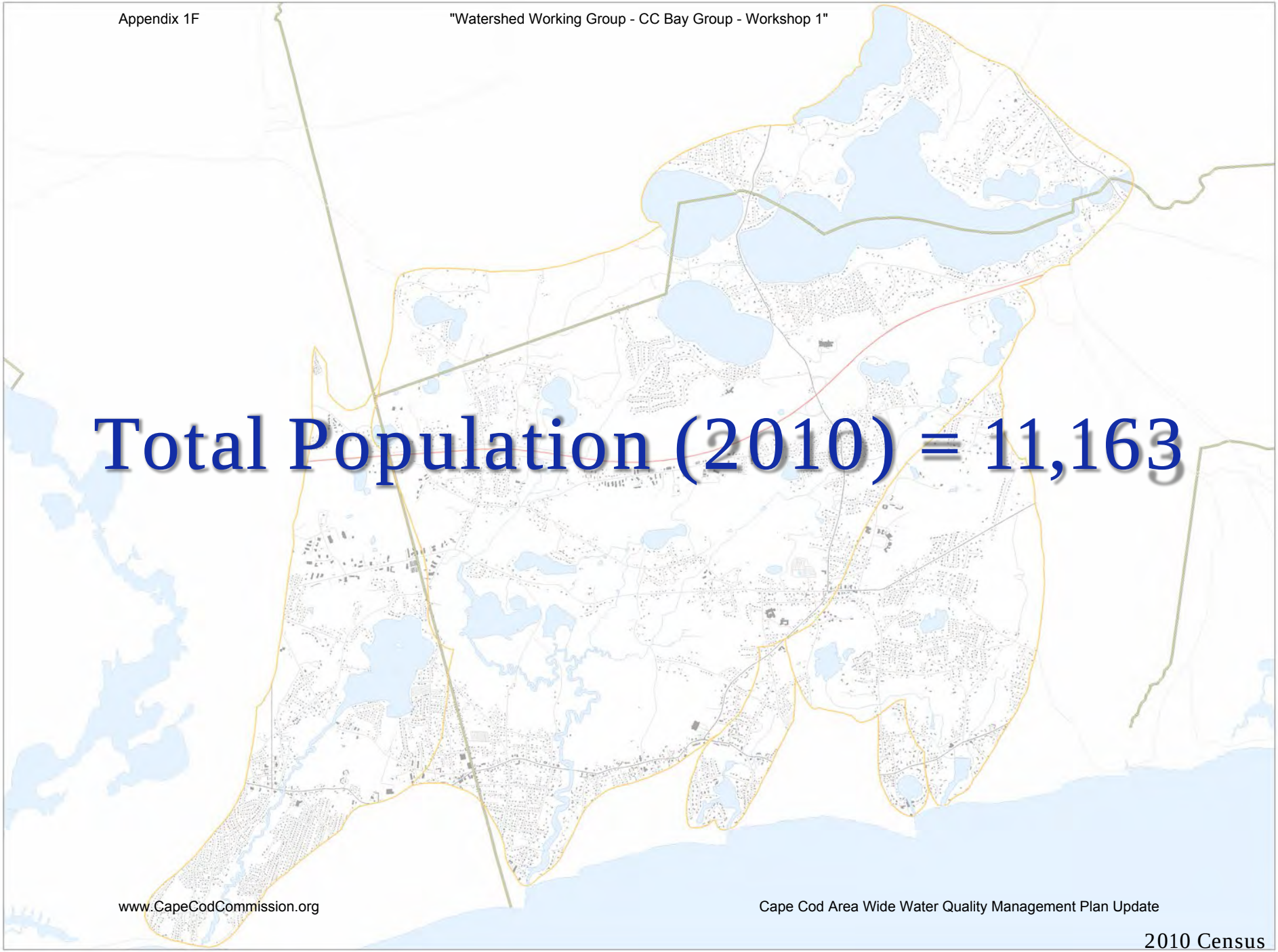

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout


Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

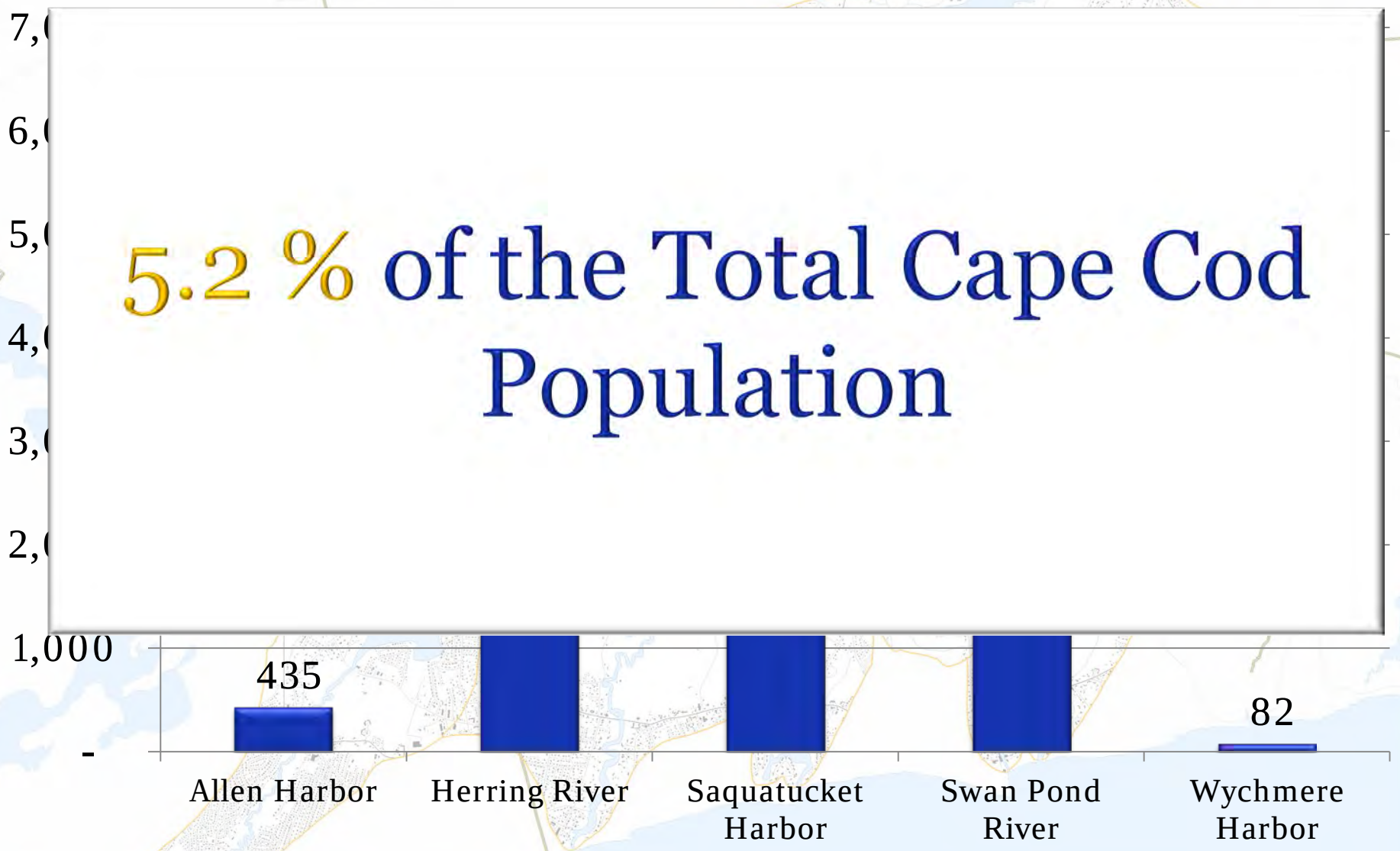
The People

Allen Harbor
Herring River
Saquatucket Harbor
Swan Pond River
Wychmere Harbor



2010 Census

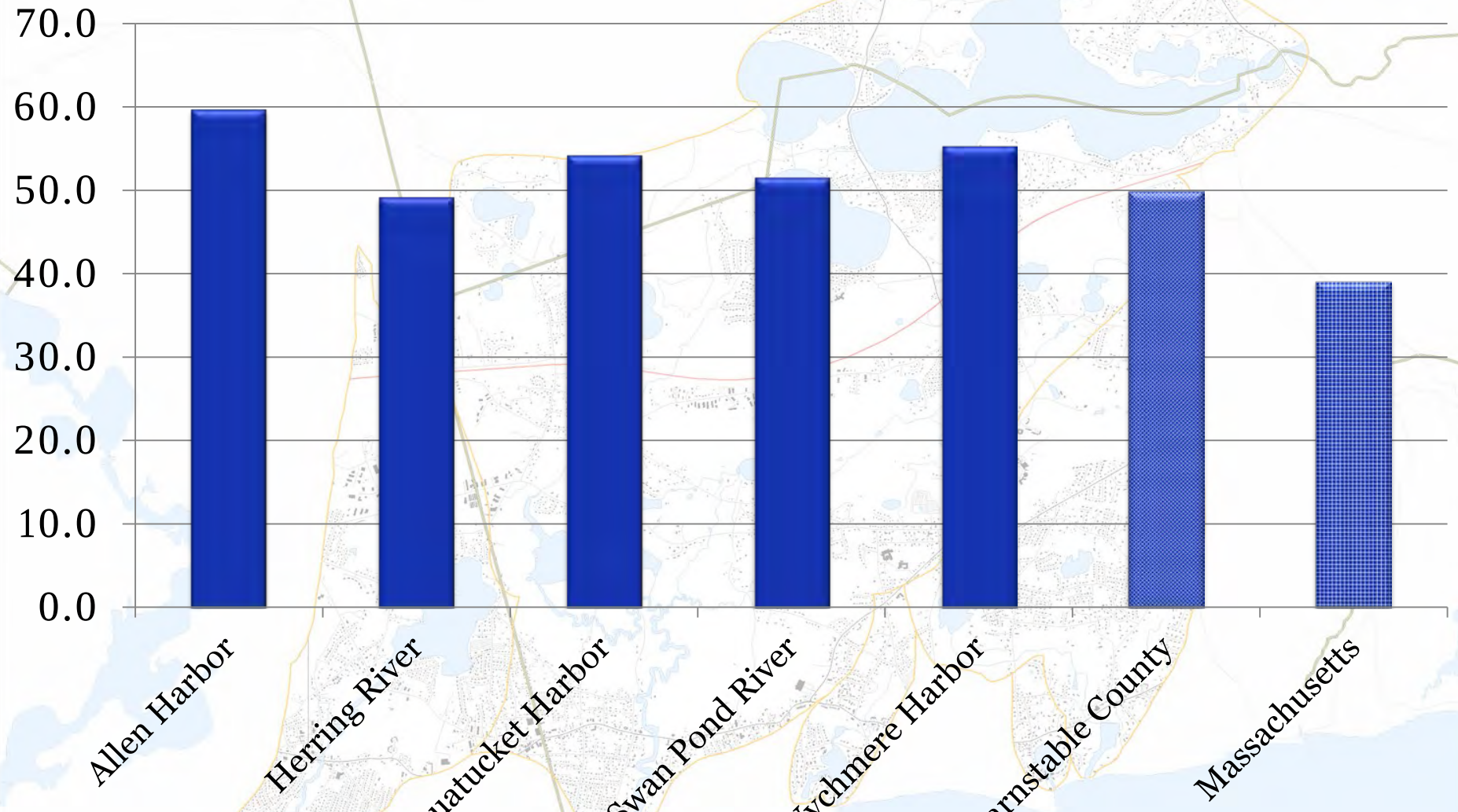
Population (2010)



5.2 % of the Total Cape Cod Population

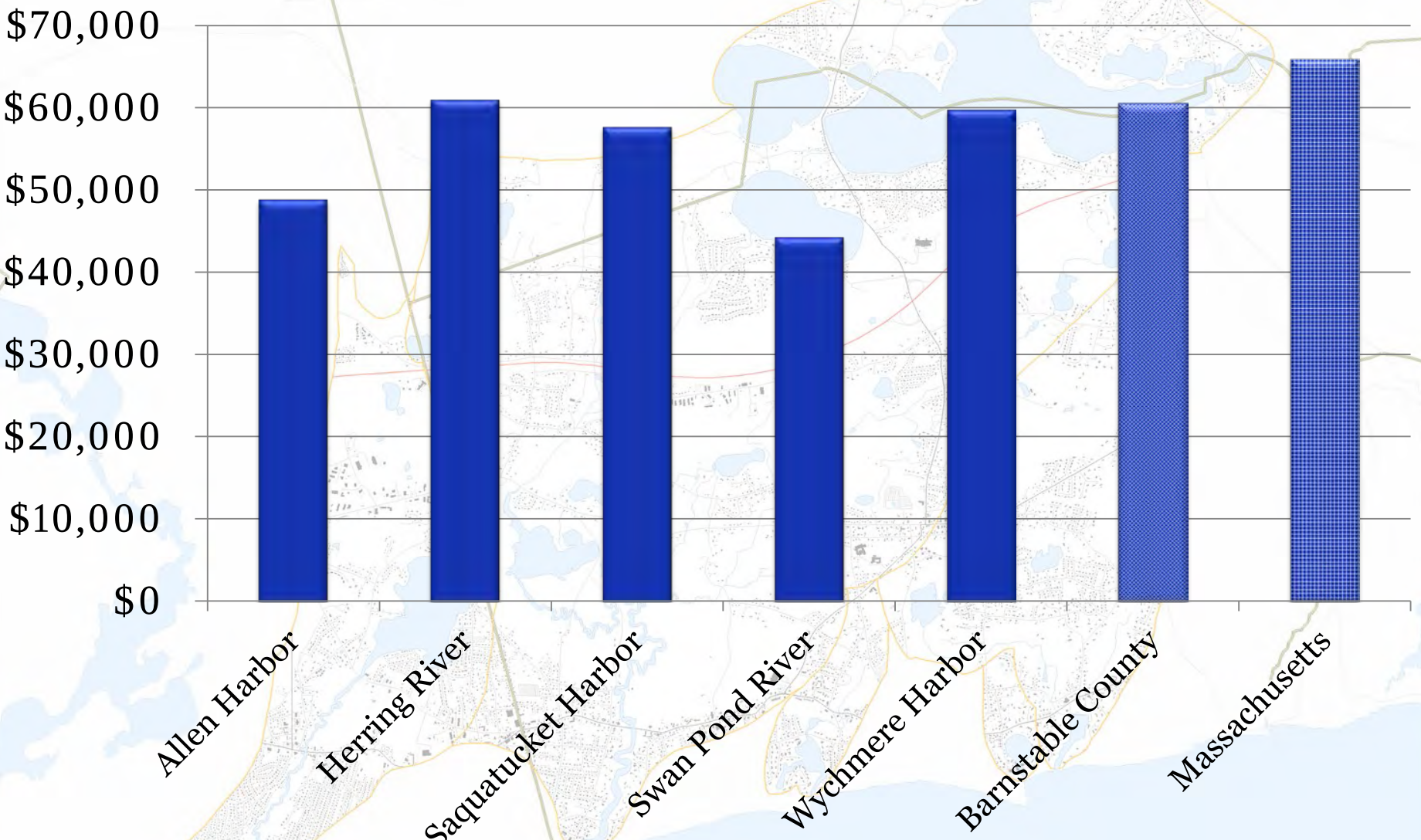
2010 Census

Median Age (2010)



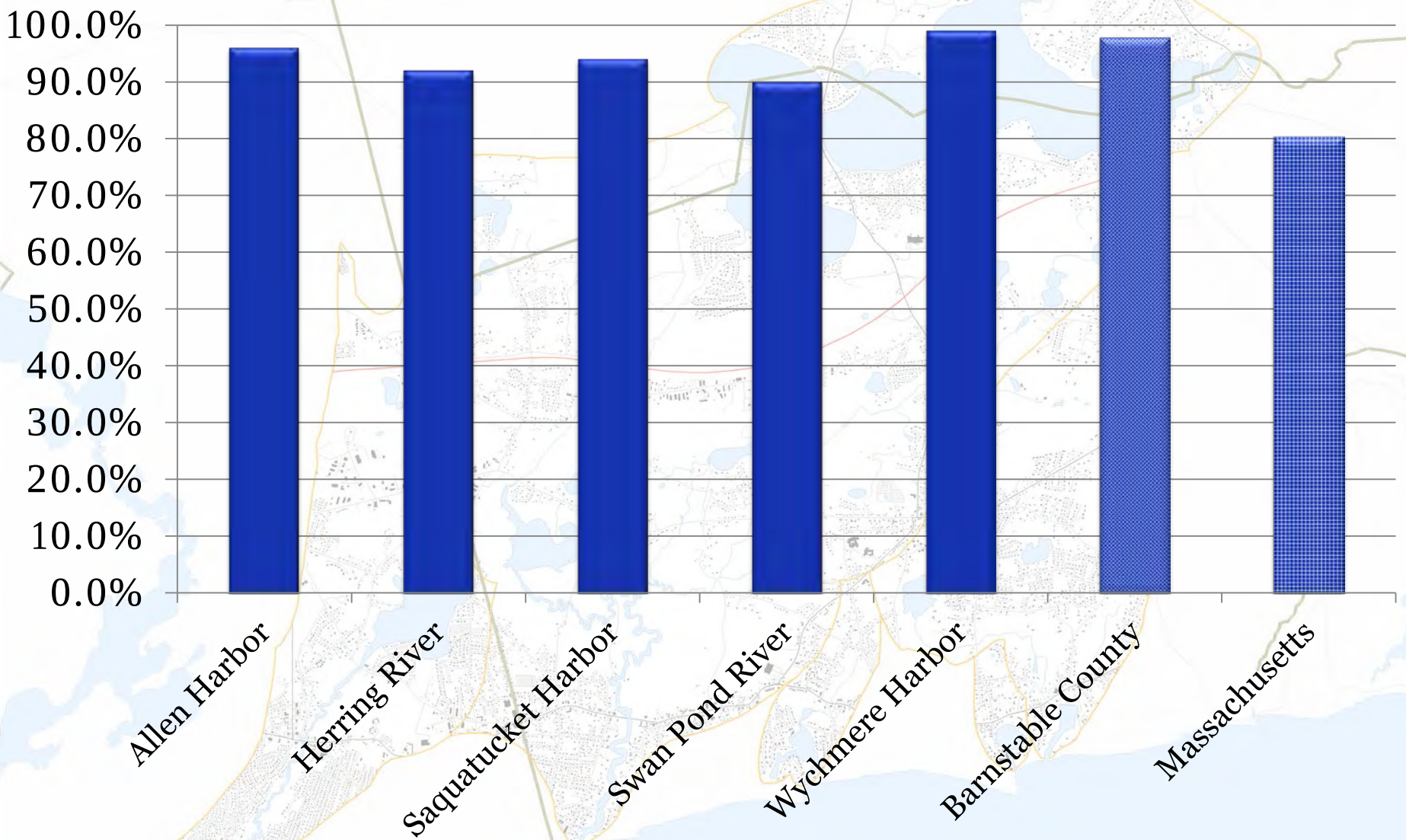
2010 Census

Average Median Income (2010)



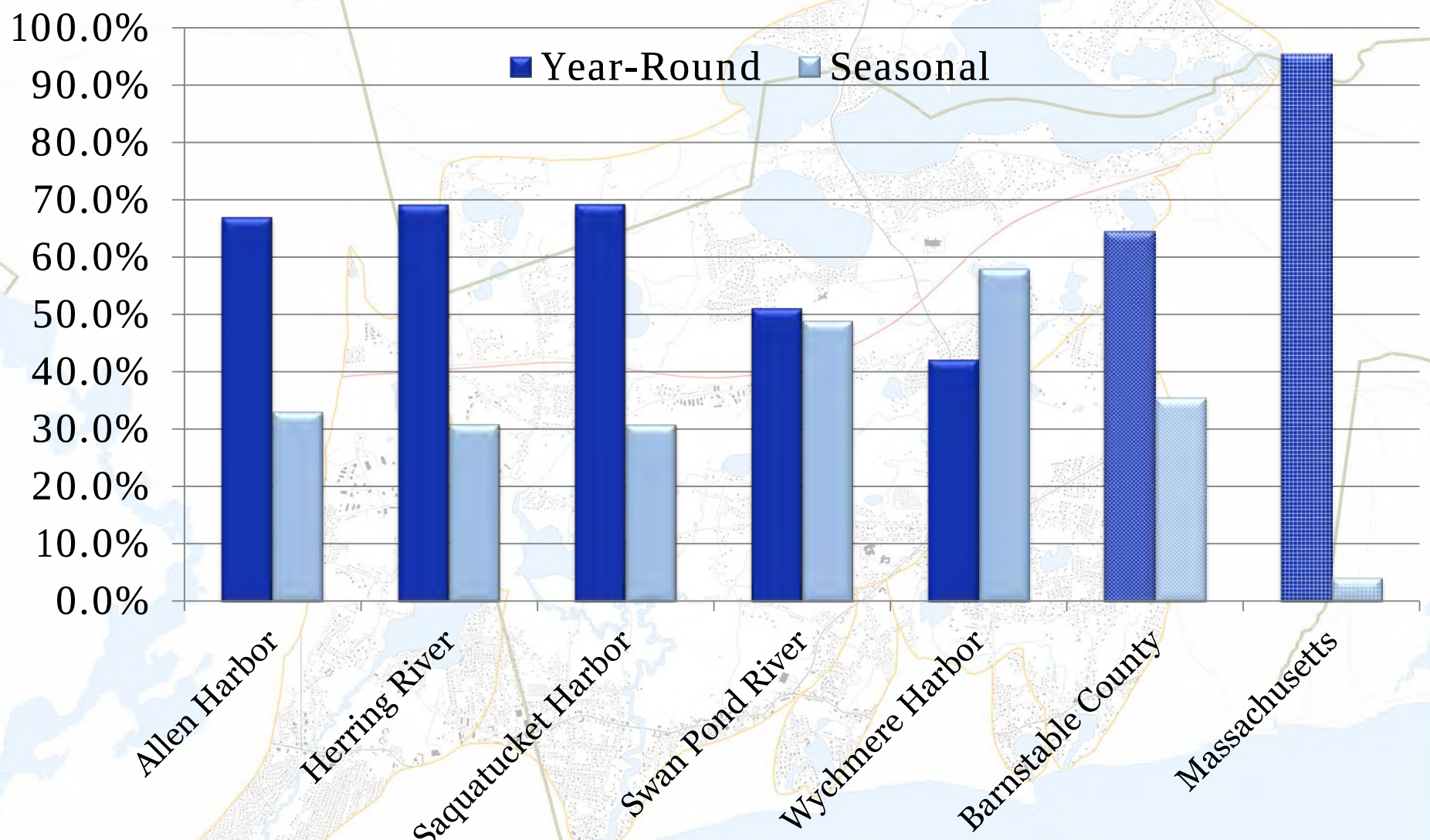
American Community Survey

Race - % White (2010)



2010 Census

Seasonal vs. Year Round Housing (2010)



2010 Census

Average Assessed Home Value (2010)

Total Assessed Value of Residential Homes=

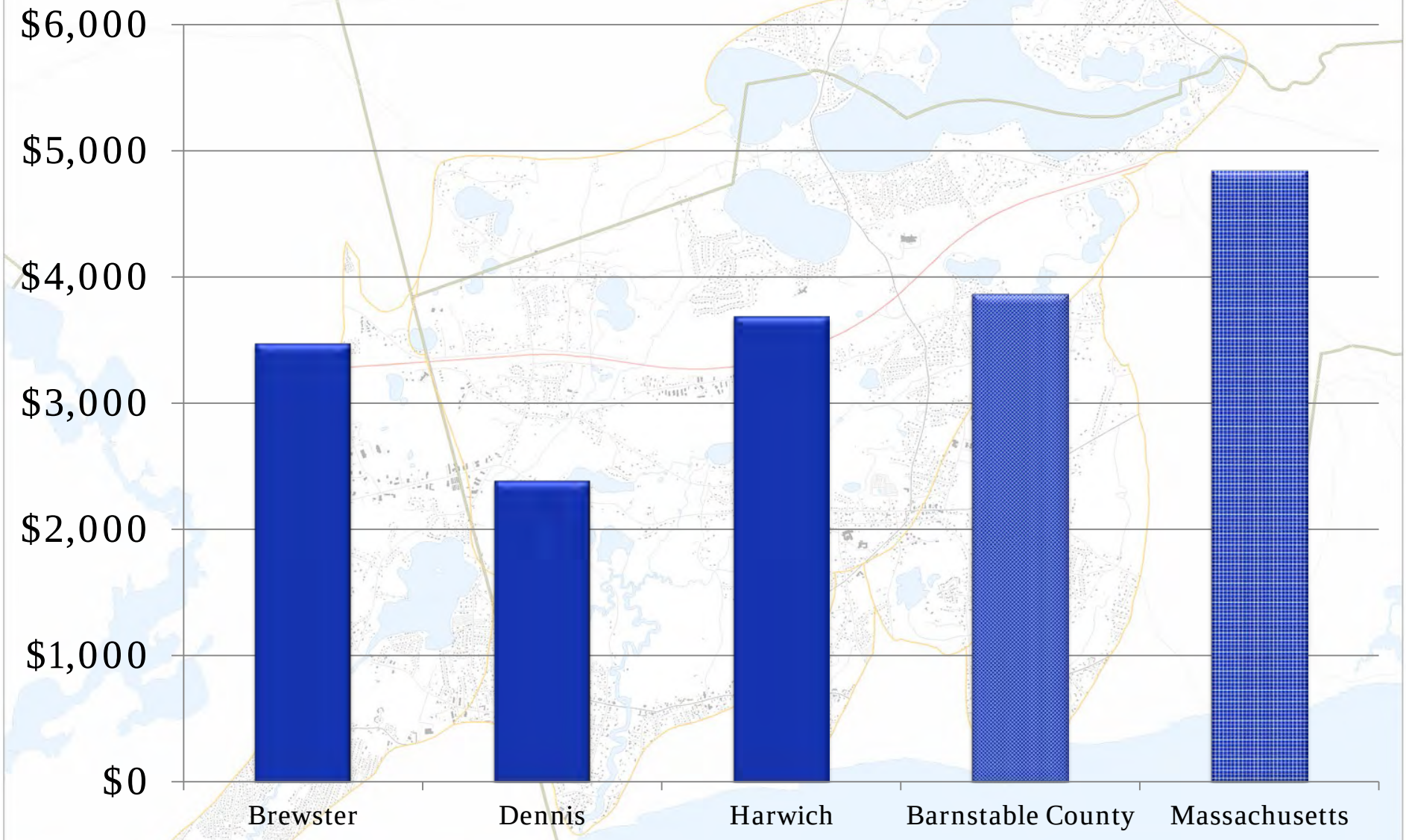
$2,723,874,350

2010 Census

Your Government & Taxes

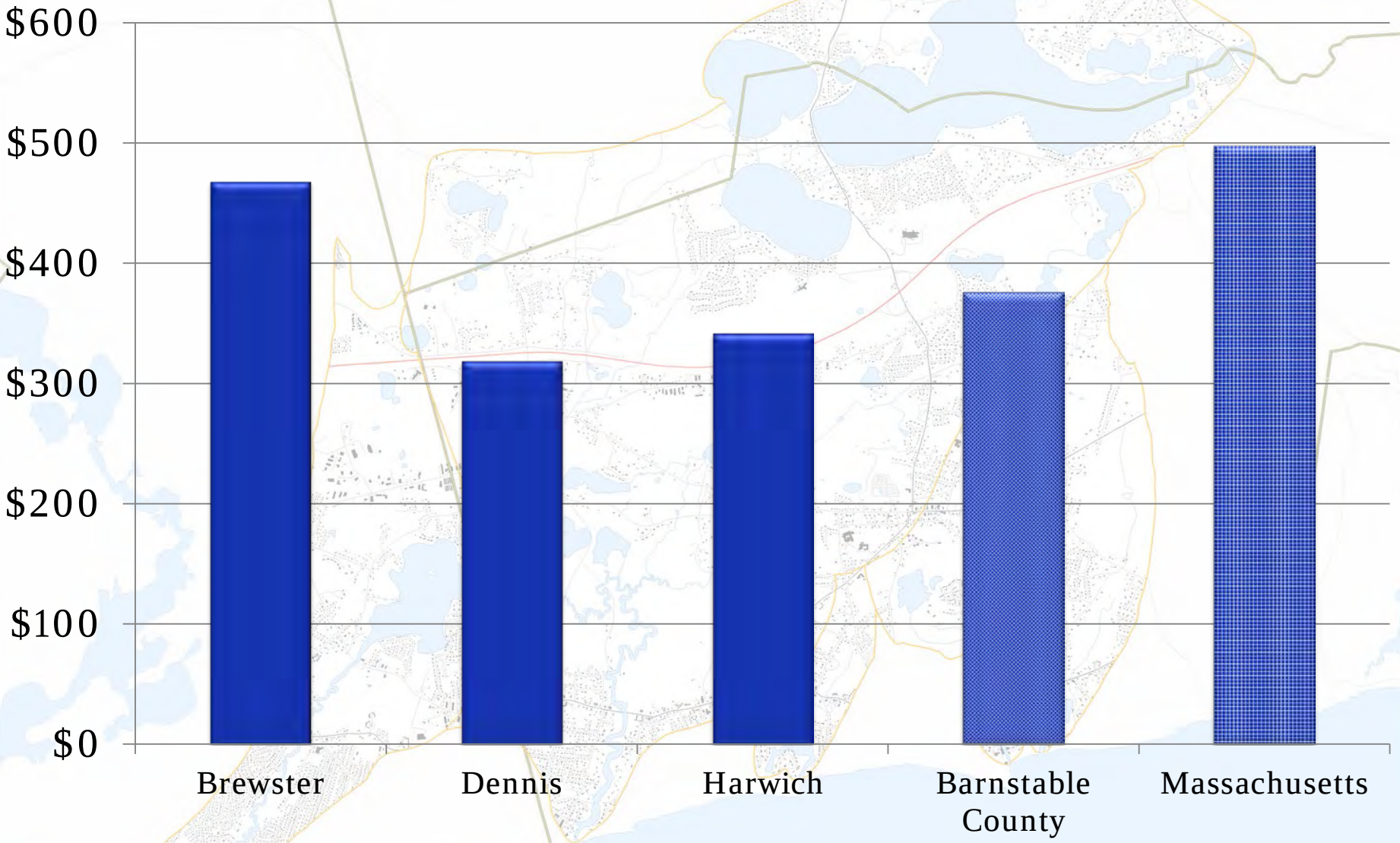
Allen Harbor
Herring River
Saquatucket Harbor
Swan Pond River
Wychmere Harbor

Average Single Family Property Tax Bill (2013)



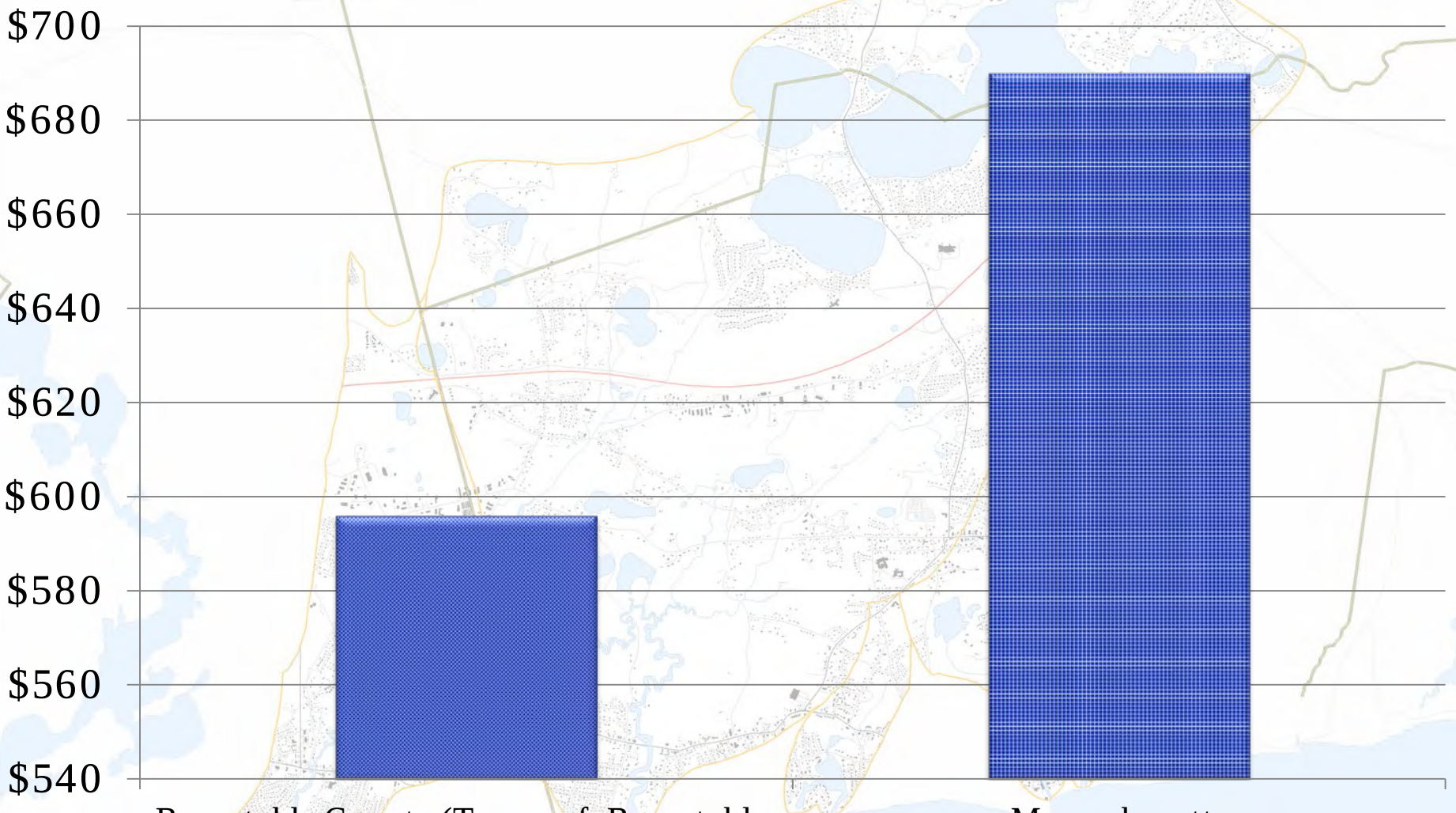
MA Dept of Revenue & Town of Barnstable, 2013

Average Annual Water Bill (2012)



Tighe & Bond, MA Water Rate Survey, 2012

Average Annual Sewer Bill (2012)



Tighe & Bond, MA Sewer Rate Survey, 2012

The Problem

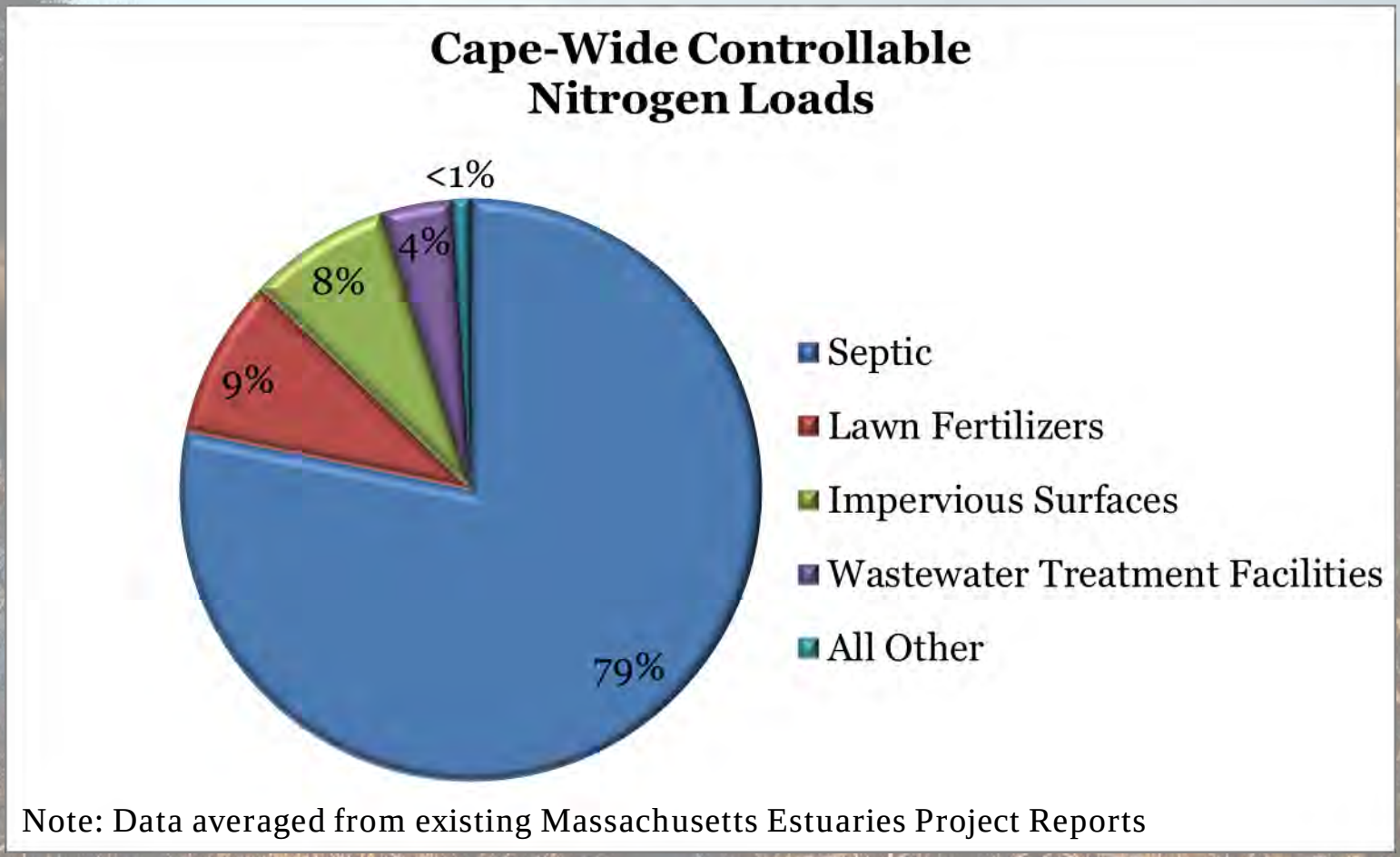
Allen Harbor
Herring River
Saquatucket Harbor
Swan Pond River
Wychmere Harbor

Photo credit: Stephanie Foster, Americorps Cape Cod

Massachusetts Estuaries Project

- Opportunity for towns to obtain independent analysis of nitrogen loading and it's 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

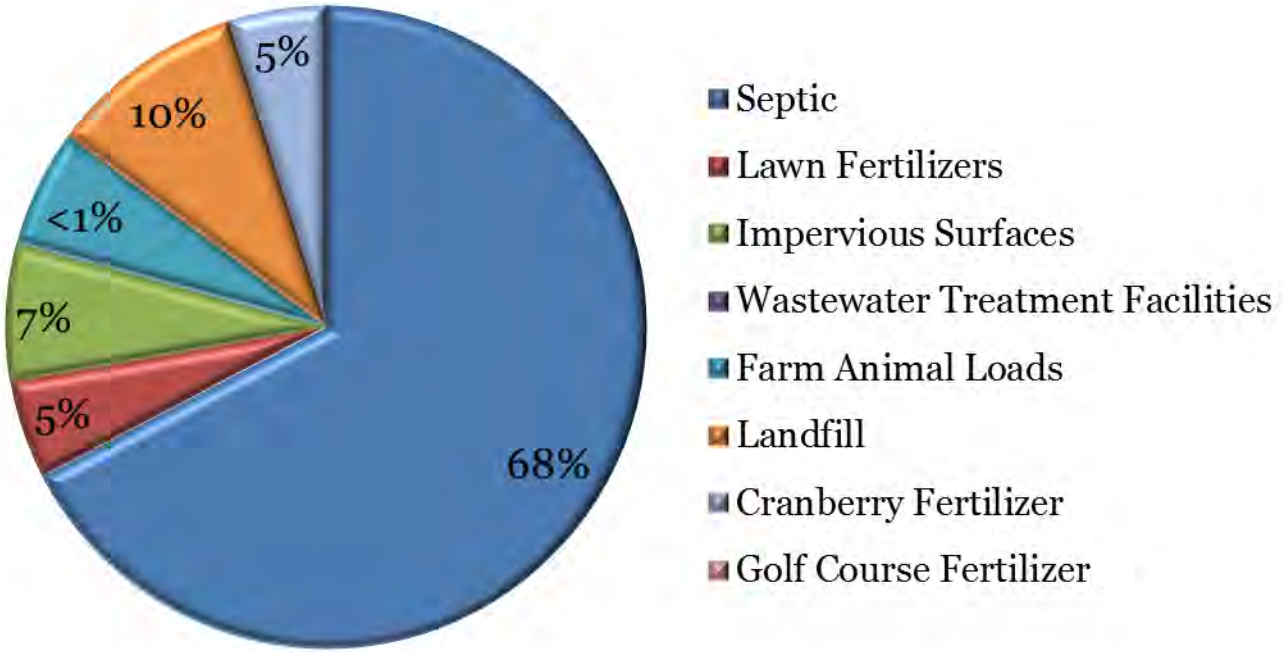
Photo credit: Stephanie Foster, Americorps Cape Cod



Note: Data averaged from existing Massachusetts Estuaries Project Reports

Photo credit: Stephanie Foster, Americorps Cape Cod

Herring River Controllable Nitrogen Loads



Massachusetts Estuaries Project, Mar 2013

Photo credit: Stephanie Foster, Americorps Cape Cod

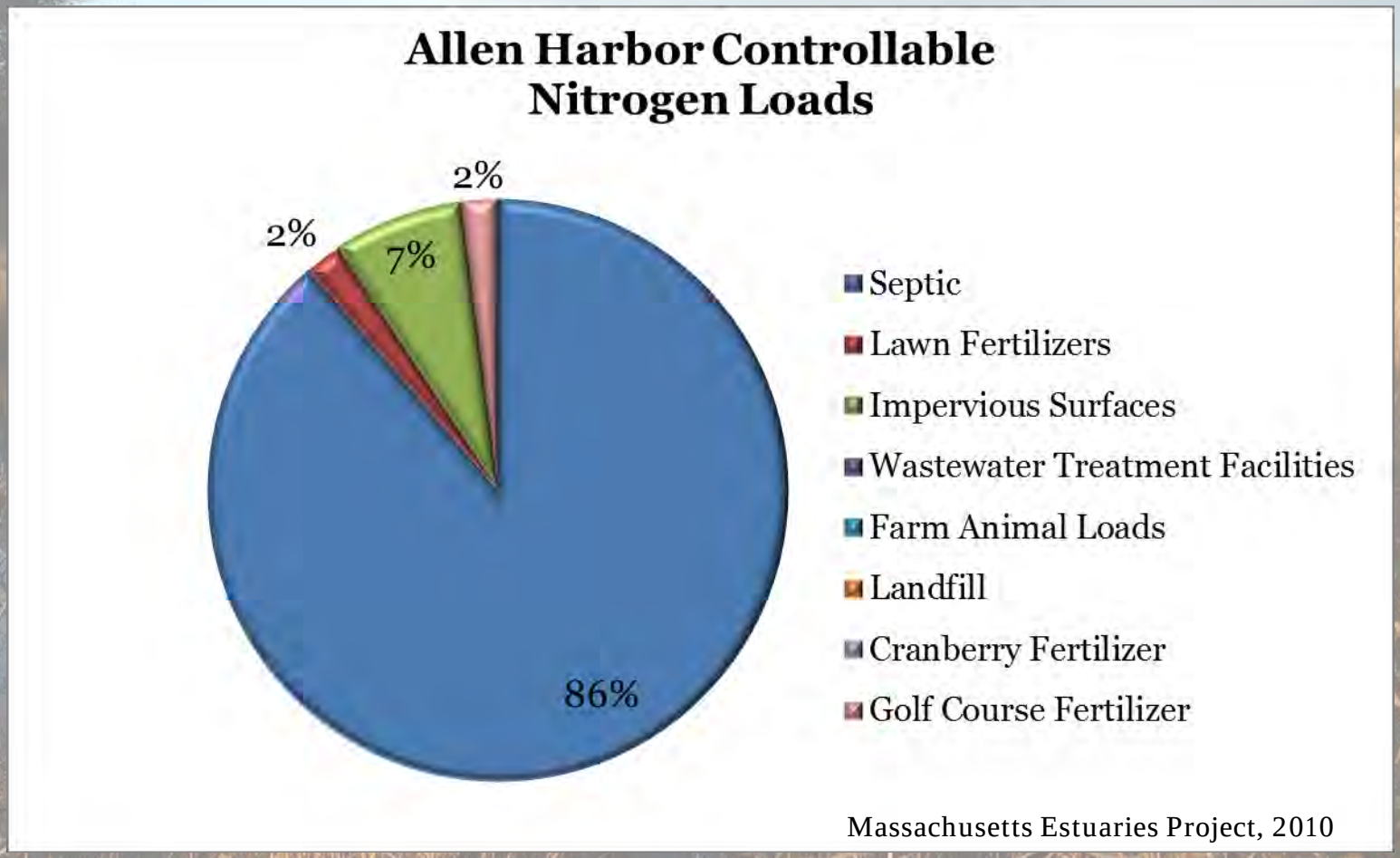
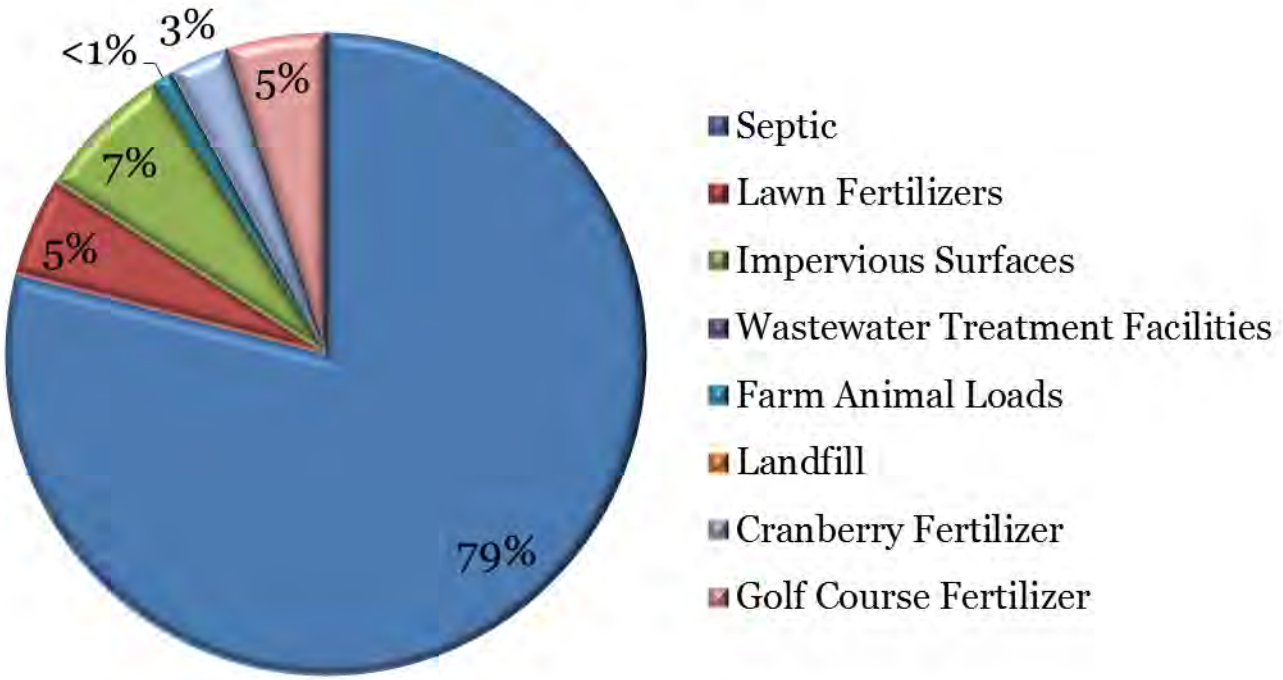


Photo credit: Stephanie Foster, Americorps Cape Cod

Saquatucket Harbor Controllable Nitrogen Loads



Massachusetts Estuaries Project, 2010

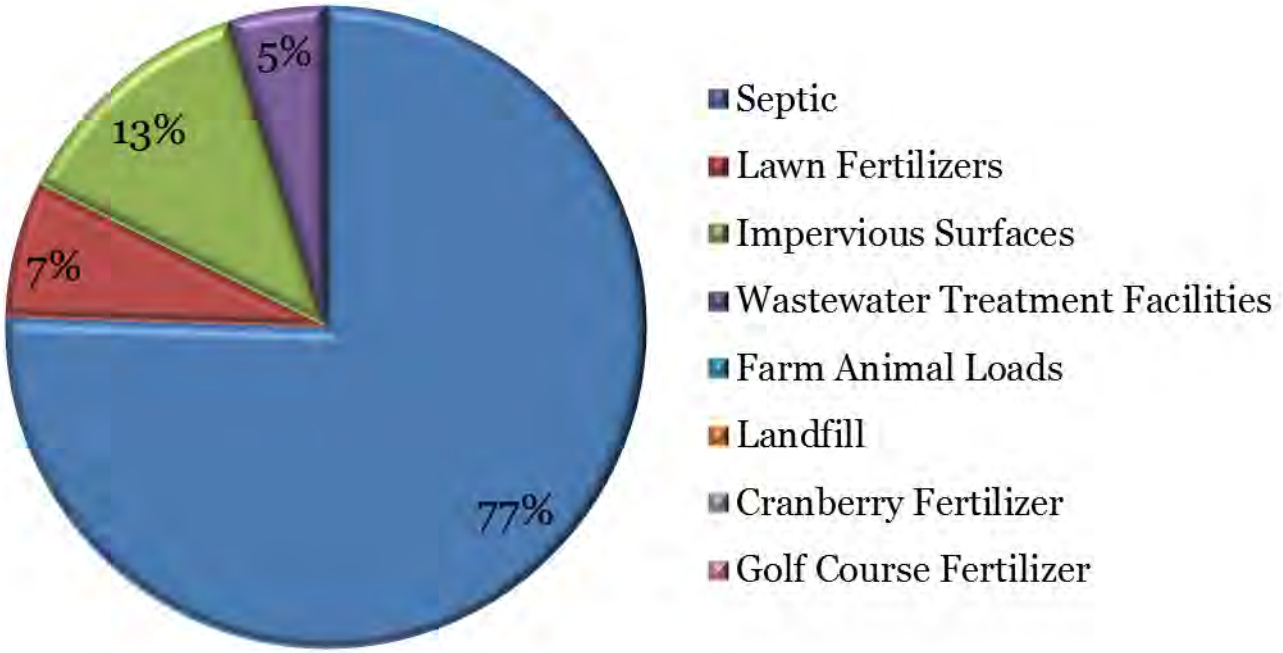
Photo credit: Stephanie Foster, Americorps Cape Cod

Wychmere Harbor Controllable Nitrogen Loads

Massachusetts Estuaries Project, 2010

Photo credit: Stephanie Foster, Americorps Cape Cod

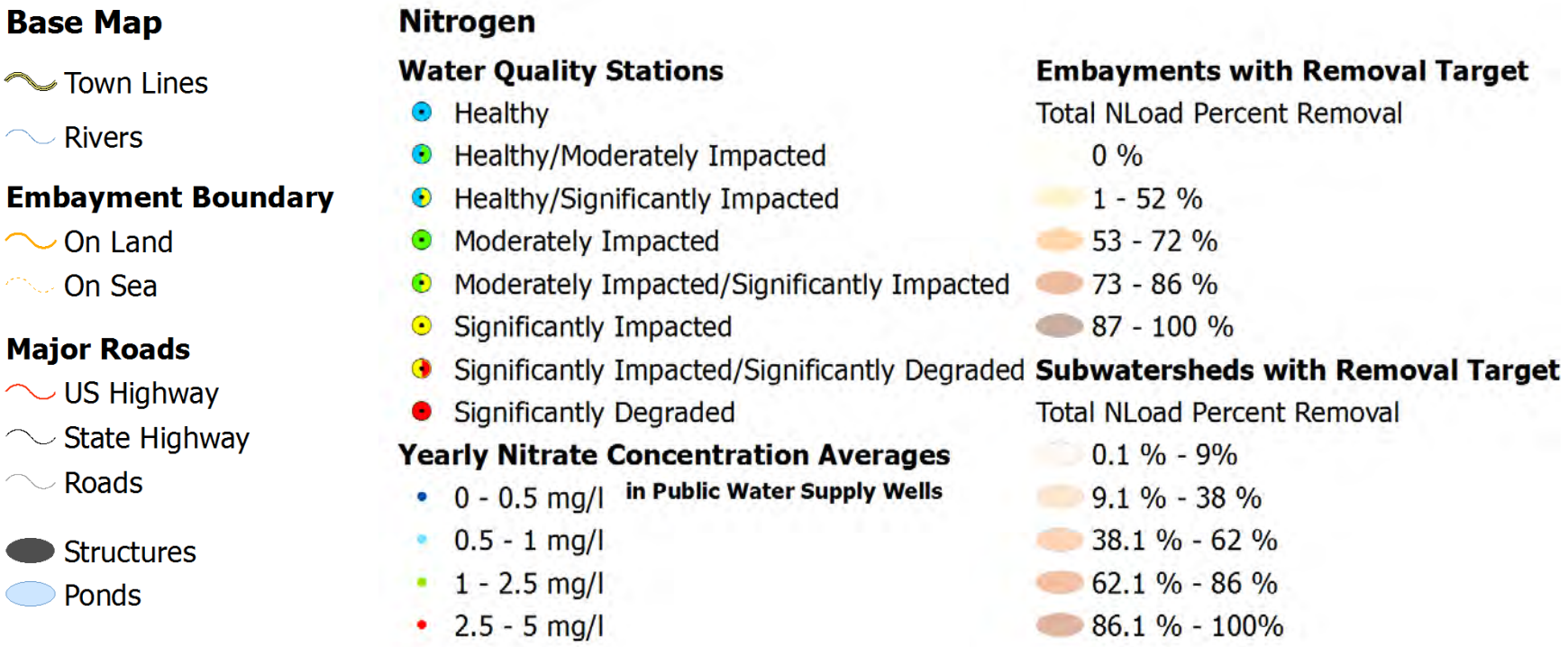
Swan Pond River Controllable Nitrogen Loads



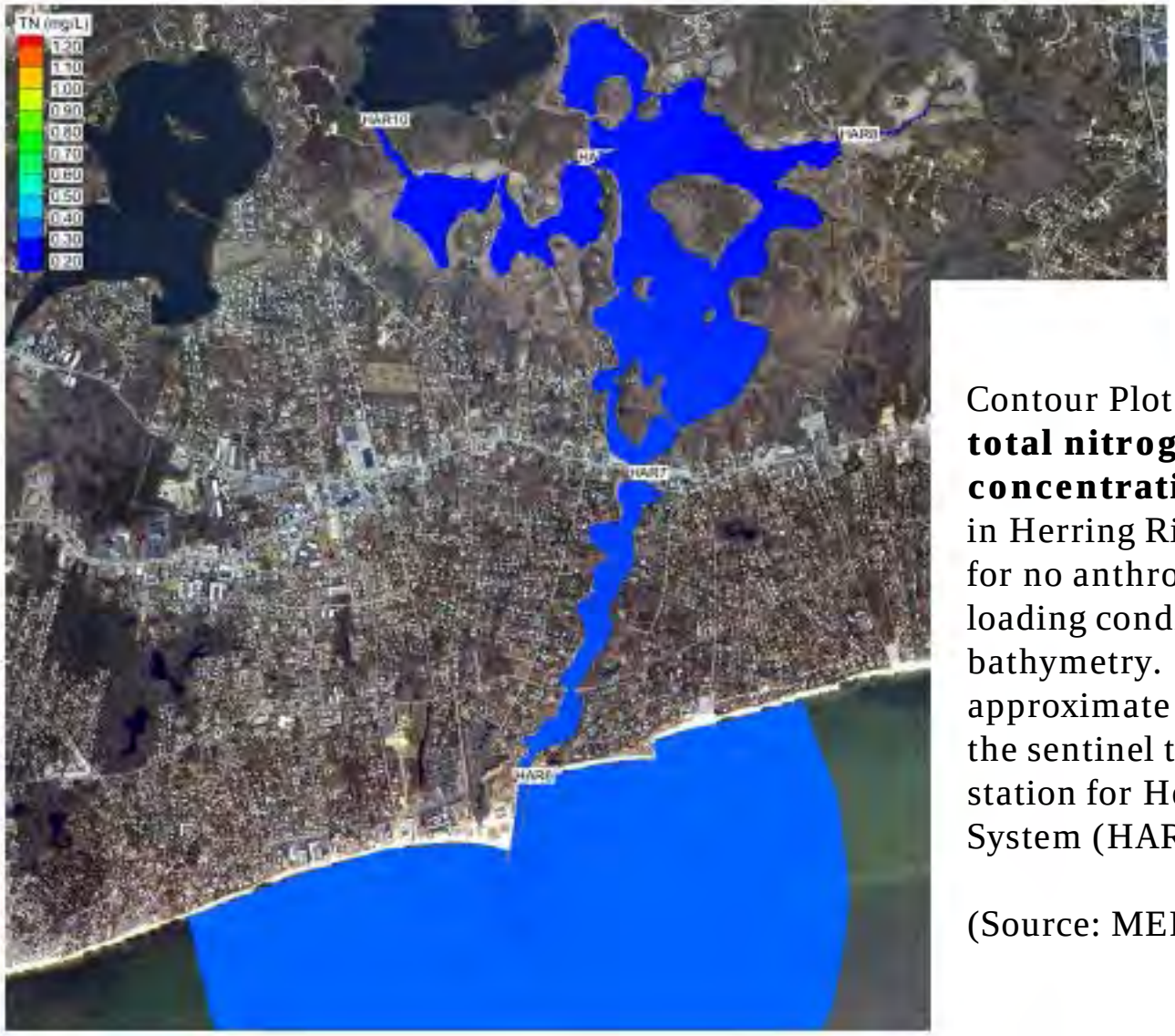
Massachusetts Estuaries Project, 2012

Photo credit: Stephanie Foster, Americorps Cape Cod

Nitrogen Problem



Sources: MassGIS, MEP, CCC



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in Herring River System, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Herring River System (HAR-7) is shown.

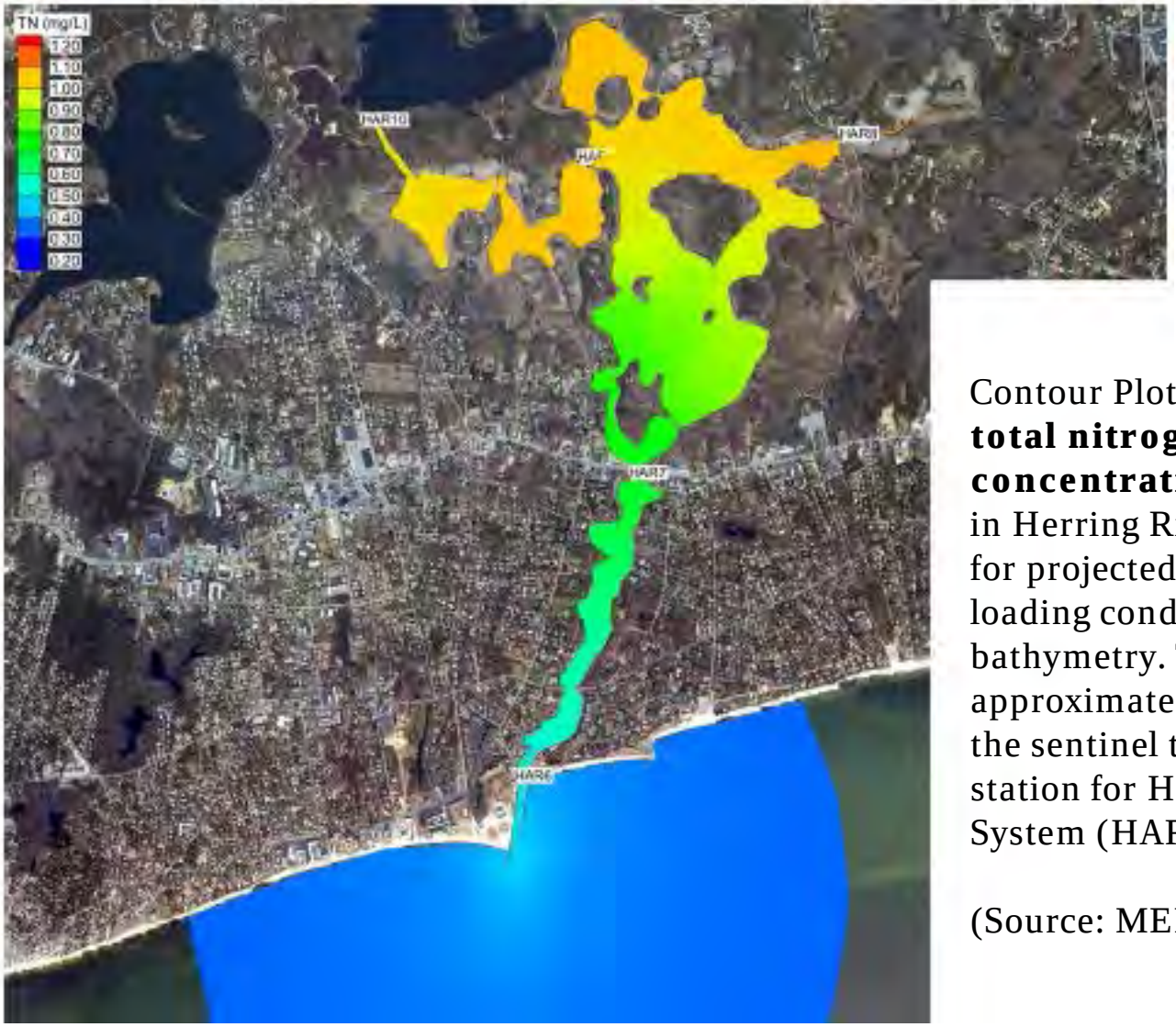
(Source: MEP 2013)

Pre-Colonial Conditions: Herring River

Contour Plot of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Herring River System. The approximate location of the sentinel threshold station for Herring River System (HAR-7) is shown.

(Source: MEP 2013)

Present Conditions: Herring River



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in Herring River System, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Herring River System (HAR-7) is shown.

(Source: MEP 2013)

Build-out Conditions: Herring River

Contour Plots of **modeled total nitrogen concentrations (mg/L)** in the Allen Harbor, Wychmere Harbor and Saquatucket Harbor estuarine systems, for no anthropogenic loading conditions and bathymetry. The approximate location of the sentinel threshold stations for Allen Harbor (HAR-4), Wychmrere Harbor (HAR-3), and Saquatucket Harbor (HAR-2) are shown.

(Source: MEP 2010)

Pre-Colonial Conditions: Allen Harbor, Saquatucket Harbor, & Wychmere Harbor

Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Allen Harbor, Wychmere Harbor and Saquatucket Harbor estuarine systems.

(Source: MEP 2010)

Present Conditions: Allen Harbor, Saquatucket Harbor, & Wychmere Harbor

Contour plots of **modeled total nitrogen concentrations (mg/L)** in Allen Harbor, Wychmere Harbor and Saquatucket Harbor estuarine systems, for projected build-out loading conditions. The approximate location of the sentinel threshold stations for Allen Harbor (HAR-4), Wychmere Harbor (HAR-3), and Saquatucket Harbor (HAR-2) are shown.

(Source: MEP 2010)

Buildout Conditions: Allen Harbor, Saquatucket Harbor, & Wychmere Harbor

Contour Plot of **modeled total nitrogen concentrations (mg/L)** in Swan Pond River system, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Swan Pond River system (SWP-2) is shown.

(Source: MEP 2012)

Pre-Colonial Conditions: Swan Pond River

Contour Plot of **average total nitrogen concentrations (mg/L)** from the results of the present conditions loading scenario, for Swan Pond River system. The approximate location of the sentinel threshold station for Swan Pond River system (SWP-2) is shown.

(Source: MEP 2012)

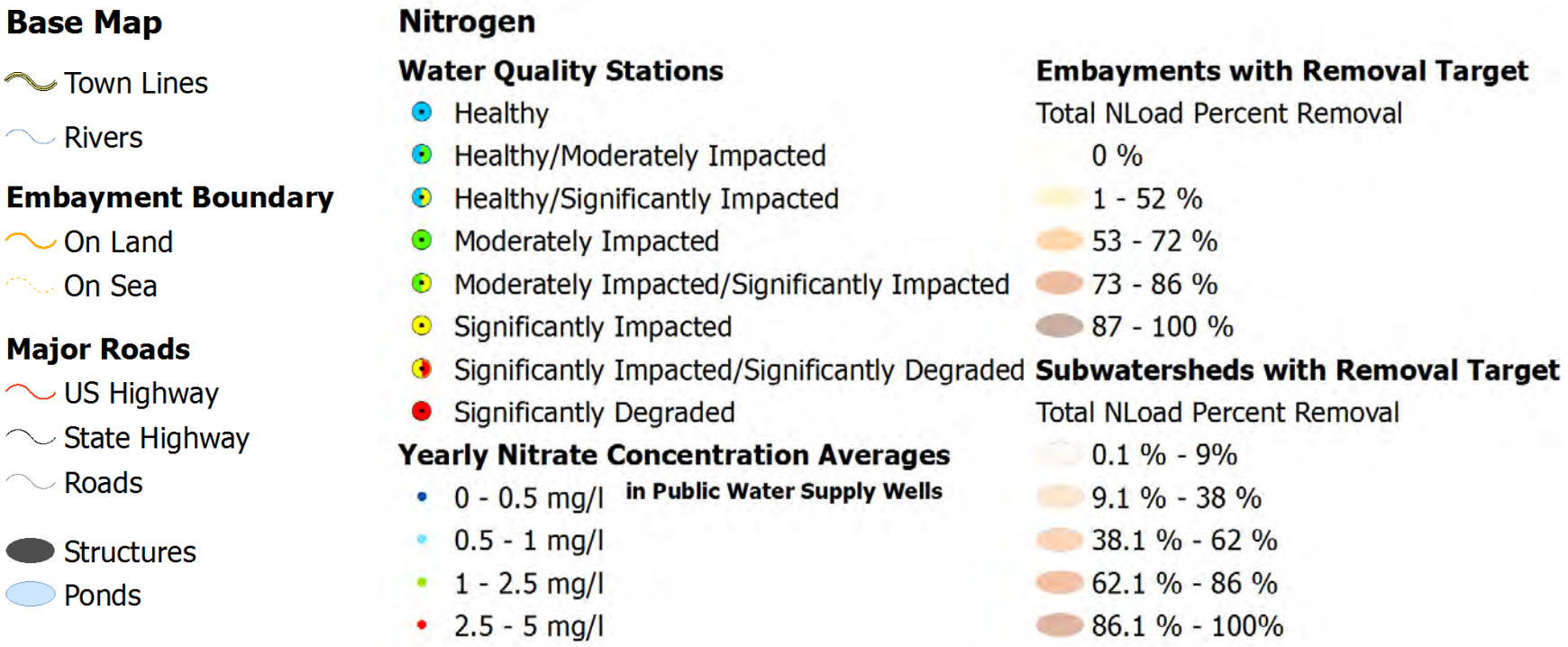
Present Conditions: Swan Pond River

Contour plots of **modeled total nitrogen concentrations (mg/L)** in Swan Pond River system, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Swan Pond River System (SWP-2) is shown.

(Source: MEP 2012)

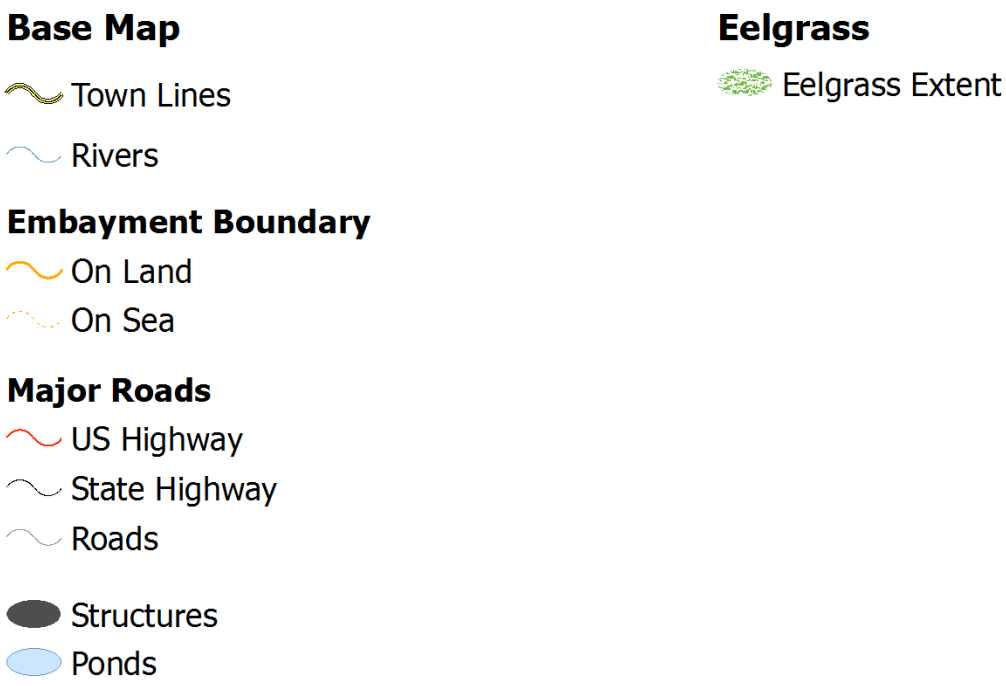
Build-out Conditions: Swan Pond River

Nitrogen Problem



Sources: MassGIS, MEP, CCC

Eelgrass Extent



Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Allen Harbor
Herring River
Saquatucket Harbor
Swan Pond River
Wychmere Harbor

Existing Infrastructure

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

- Structures
- Ponds

Existing Conditions

- Approx. Locations of Loans Issued for Title 5 Repair
- Potential Title 5 Compliance Issues
- Wastewater Treatment Facility
- Groundwater Discharge Points
- Sewered Parcels

Enhanced Attenuation Sites

- Pipe
- Stormwater

Public Supply Wells

- Public Water Supply Well
- Small Volume Wells, Non-Transient
- Proposed Public Water Supply Well
- Surface Water Supply
- Small Volume Wells, Transient

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

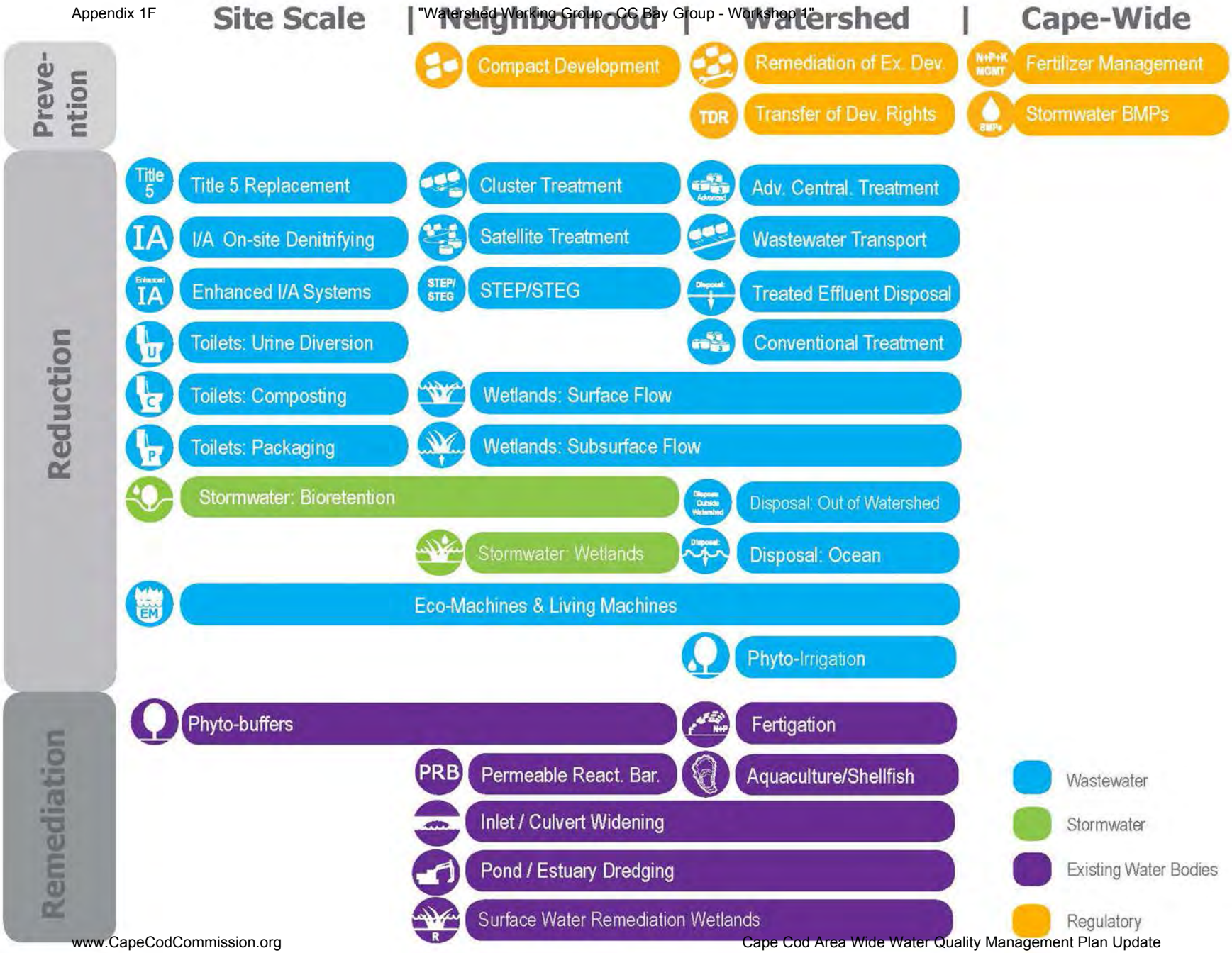
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Allen Harbor
Herring River
Saquatucket Harbor
Swan Pond River
Wychmere Harbor


Site Scale
Neighborhood
Watershed
Cape-Wide
Preve-ntion
Reduction
Remediation
Compact Development
Remediation of Ex. Dev.
Fertilizer Management
TDR
Transfer of Dev. Rights
Stormwater BMPs
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced I/A Systems
STEP/STEG
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
Eco-Machines & Living Machines
Phyto-Irrigation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
Wastewater
Stormwater
Existing Water Bodies
Regulatory

Wastewater Existing Water Bodies Regulatory

Alternatives: Screening Method

1 2 3 4 5 6 7

Targets/ Goals

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

Composite Target Areas

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

Low Barrier to Implementation

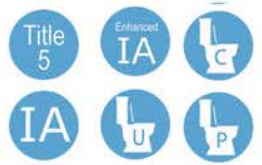
A. Fertilizer Management
B. Stormwater Mitigation

Watershed/Embayment Options

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

Alternative On-Site Options

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



Priority Collection/High-Density Areas

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

Supplemental Sewering

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

http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/herring-river

Allen Harbor
Herring River
Saquatucket Harbor
Swan Pond River
Wychmere Harbor

Cape Cod 208 Area Water Quality Planning
Herring River Working Group

Meeting One Summary[1]
Thursday, September 19, 2013
Harwich Community Center, 100 Oak Street, Harwich, MA 02645

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

Next Meeting: Monday, October 21, 2013
8:30 am- 12:30 pm
Harwich Town Hall, Selectmen's Meeting Room *** note new location for this meeting*
732 Main Street Harwich, MA 02645

The following action items came out of the Working Group meeting:

- Working Group members:
  - Send concrete suggestions for encouraging public participation to Erin Perry.
  - 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. Please provide comments to: wastewater@capecodcommission.org
  - Review technology fact-sheets in advance of the October 31 meeting. (Technology fact sheets will be distributed in early October)
- Cape Cod Commission:
  - Update the timelines for Brewster, Dennis, and Harwich to reflect the efforts that the towns made under the original Section 208 Area-wide planning process.
  - Update information about Brewster, Dennis, and Harwich of various kinds, including:
    - Dennis Vision Mapping,
    - Harwich planning documents,

[1] Meeting summary prepared by the Consensus Building Institute

- Alum treatment efforts made by Brewster in 2007-2008,
- Diagnostic study of the Herring River,
- Land banking for all three towns,
- Update Title 5 and cesspool data for all three towns,
- Update information about current and proposed stormwater projects and culvert data for all three towns,
- Include information about the proposed work on Route 28 / Cold Brook Road,
- Include information about owners unknown land in Harwich – information about this is available in Figure 5 of the Harwich OpenSpace and Recreation Study,
- Include information about turf and leaching from golf courses – information about this is available in Barnstable County health data from the 1990s,
- Include information about onsite nitrogen reduction systems – Barnstable County has data about these,
- Include information from geologists about inlets and culvert openings as these interventions may have detrimental secondary effects.
- Information about potential future buildout scenarios, pending different changes to zoning regulations.

  - Share the GIS layers showing land use changes over time with Working Group members.

- Consensus Building Institute (CBI)
  - Distribute the link to the slides and notes from the Cape Cod Commission's affordability/financial presentation.
  - Distribute September meeting summary, PowerPoint, and GIS data layers link.
  - Distribute meeting materials for October meeting: fact sheets and agendas.
  - Follow up with Working Group member Paula Miller regarding 208 Plan development history.

WELCOME AND INTRODUCTIONS

The Cape Cod Commission opened the meeting and welcomed those in attendance. An attendance list can be found in Appendix A. All meeting documents and presentations for the Herring River Watershed Working Group are located here: http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/herring-river

REVIEW OF GOALS AND PROCESS

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

The meeting facilitator, Ms. Kate Harvey, Consensus Building Institute, noted that the Herring River Working Group covers the watershed that encompasses the municipalities of Brewster, Harwich, and Dennis. She explained that, over the course of the Section 208 Water Quality Planning process, the Working Group will examine different options and will explore how to evaluate those different options. She added that the role of the Working Group would be to provide information and insight into the exploration and evaluation of those options.

Ms. Erin Perry, Cape Cod Commission, reviewed the structure and timeline of the 208 Planning Process. She explained that the current process is designed to bring Cape Cod communities into compliance with Section 208 of the Clean Water Act, with a focus on nitrogen loads in saline waters, phosphorus loads in fresh waters, and address challenges posed by future growth and Title 5 limitations. She noted that the Cape has 105 watersheds and 57 embayments. The Massachusetts Estuaries Project (MEP) has found that almost all of the embayments that it has studied on the Cape require nitrogen removal. She said that, since 32 of the 57 embayment watersheds cross a town boundary, water quality concerns on the Cape are really a regional issue. Ms. Perry explained that the goal of the 208 Update Process is to "generate a series of approaches in each watershed that will meet water quality standards." The process is watershed-based, includes a focus on both stakeholder engagement and technical work, seeks to maximize the benefits of local planning, and favors allowing local stakeholders to decide which of a range of options to pursue instead of mandating a single "optimal" solution. Ms. Perry noted that the 208 Update Planning Process is occurring simultaneously in 11 subgroups across the Cape, with the Herring River subgroup being one of these 11.

Ms. Perry reviewed the timeline of the 208 Planning Process. Public meetings were held in July and August, and the Watershed Working Groups will meet in September, October, and early December. The current, September, meetings are focused on baseline conditions, with the October meetings focused on technology options and the December meetings focused on reviewing different scenarios for the local watersheds covered by the Working Group. The efforts of each Working Group will be supported by an Advisory Board; a Regulatory, Legal and Institutional Work Group (RLI); the Technical Advisory Committee of the Cape Cod Water

Protection Collaborative (TAC); and a Technology Panel. 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 municipal technical staff comprise the TAC, which is a committee of the Cape Cod Water Protection Collaborative. The Technology Panel consists of local, regional, national and international academic and research institutions, state watershed managers, and consultants. The mission statements and membership of advisory boards, committees and groups can be found at http://watersheds.capecodcommission.org/index.php/208-plan

LOCAL PROGRESS TO DATE

Ms. Patty Daley, Cape Cod Commission and Herring River Working Group Area Manager, provided an overview of efforts made across the Cape, and in the municipalities of Brewster, Dennis, and Harwich, to address water pollutants. She stated that, since Title 5 of the Massachusetts Sanitary Code for the regulation of on-site wastewater systems went into effect (1975) and the Section 208 Area-wide Plan for Cape Cod was approved in 1978, most Cape Cod municipalities have worked hard to address point-source pollutants. Many Cape Cod towns hired health agents in the late 1970s to implement Title 5 programs and systems. Since that time, however, non-point-source pollutants have become more of a concern and these need to be addressed today. Ms. Daley also noted that Brewster, Dennis, and Harwich have worked hard to clean and protect their ponds.

Working Group members were given time to examine timelines of water-quality developments for the three Herring River towns (Brewster, Dennis, and Harwich) and to provide input about amendments and additions that should be made to the timelines. Working Group members provided the following input:

- The towns of Brewster, Dennis, and Harwich performed significantly more work under the original Section 208 Area-wide planning process than is reflected on the timelines. The timelines should acknowledge the efforts that the towns have already made.
- The Dennis Water and Sewer District no longer exists.
- The results of the Vision Mapping process performed by Dennis will need to be reconciled with the recommendations made under the current Section 208 planning process. Dan Fortier is the contact person for the Dennis Vision Mapping process.
- Brewster and Dennis have cooperated on water protection measures.

- Harwich has a number of planning documents which should be taken into account when considering the Section 208 planning process, including the Harwich Heritage Report, a report titled "Moving Toward the River," and an open space and recreation plan.
- More information should be included about the alum treatment efforts made by Brewster in 2007-2008.
- A diagnostic study of the Herring River was conducted during late 1990s. This study could serve as a resource for the Section 208 planning efforts. Mike Lach has more information about this study.
- Various sorts of information need to be included for Dennis. Diane Chamberlain has more information about these items.
- Information about land banking should be included for all three towns.
- Add Dennis town meeting votes
- Add Dennis land purchase in Brewster for drinking water protection

Ms. Kate Harvey, the facilitator, asked the Working Group to reflect on what stood out to them as they reviewed the chronology. She asked the group to identify some "lessons learned" from the past that should be applied going forward. Working Group members identified the following lessons learned and key insights:

Comments about collaboration between the Towns of Brewster, Dennis, and Harwich:

- The three towns need to work together and collaborate.
    - There is some history of the towns successfully working together on septage.
    - Harwich has collaborated with Brewster on alum treatment.
    - Harwich has collaborated with Brewster on Muddy Creek.
    - Harwich has collaborated with both Brewster and Dennis on communication and information sharing.
    - The water district in Dennis bought land in the Town of Brewster and this was the first time that land was bought across town borders for water.
    - Collaboration over Pleasant Bay can serve as a model.

Comments about public participation:

- In many ways, Section 208 Planning is really a messaging and a branding exercise. We need to improve our communication strategies and really focus on selling the final results that we are looking for.
- Public awareness and interest in these issues is lacking. We need to do more and better to get the general public engaged.

- Public libraries and transfer stations can be good places for conducting public outreach and having presentations about the Section 208 planning efforts.
- *Comments from Cape Cod Commission personnel:* The Section 208 Working Group meetings are public and are advertised, but more public outreach could be conducted to encourage attendance. The Cape Cod Commission is also working to engage citizens through an online game called Cape 2.0 and around the affordability issue. The Commission is also developing an online tool called Cape Cod H_2O that allows people to click on different geographic areas and find out more about what the different watershed issues are in those areas.
    - *In response to these comments from Cape Cod Commission personnel, Working Group members made the following comments:*
        - While the online tools sound promising, the Cape's population is getting older and these people are less likely to be online and using online tools. *A Commission staff member noted that more than 70% of people playing Cape 2.0 were over 50 years old*.
        - Older residents are often less willing to vote to invest for the future.
        - When people are not informed about the issues, they are less willing to vote in favor of raising taxes to pay for infrastructure and investments, and so it is critical that the Section 208 process educate the broader public.
        - The conventional wisdom holds that older people will not support education, but Harwich has shown that this is not always true. The key to generating support from older residents is to frame the issues well and to illustrate for people what the final goals and outcomes will look like.
        - Section 208 Working Group meetings are scheduled during the day and so business owners and working people cannot attend. These people also are not going to play video games at night.

Other comments:

- The Town of Dennis has worked really hard and has spent a lot of money protecting its water and has a very independent spirit. The idea, presented in the 1978 208 Plan summary, that Dennis has water resources to share and the assumptions built into that sort of language will set people in Dennis against this whole effort.

BASELINE CONDITIONS

Ms. Patty Daley, Area Manager, presented a number of slides and GIS maps illustrating the water quality challenges the Cape faces as well as some of the data the Commission uses for its modeling and analysis. Working Group members were asked to identify anything they believed was missing from the data, as well as any differences of opinion they had with the Commissions' analysis or approach.

Ms. Daley noted that the Herring River watershed group covers five watersheds across three towns.

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. In response to a question from a working group member, Cape Cod Commission personnel explained that the new FIRM map expands those areas in flood zones because it uses more detailed, 2 foot contours, as opposed to the less precise, 10 foot contours that were previously used. In response to a question from a Working Group member asking about the focus on embayments areas (to the exclusion of the areas adjacent to embayments), a Commission employee clarified that the focus is currently on embayments because greater data exists for these areas. The Commission suggested that it could devote additional resources in the future to examine areas adjacent to embayments.

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. Landuse Vision Map data delineates economic centers; industrial and service trade areas, village boundaries, resource protection areas, other designations, and undesignated lands. Ms. Daley noted that the amount of open space shown on the map attests

to the good work that Brewster, Dennis and Harwich have done in purchasing and protecting open spaces. She explained that Land Use Vision Maps guide how the Cape Cod Commission applies its regulations when a project with a regional impact is considered and, in response to a question as to why the Town of Harwich has not adopted a Land Use Vision Map, responded that each Town decides independently whether to create a Land Use Vision Map.

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. The Herring River watershed group map illustrated that while the area of commercial coverage has generally remained constant, the area of residential coverage has expanded significantly. In response to a request from a Working Group member, the Commission agreed to share the GIS layers showing land use changes over time.

Density and Buildout Layers – Ms. Daley proceeded to display information about the density of development in the Herring River watershed group. She explained that density is an important variable because the proximity of homes to each other makes a big difference in terms of the economic feasibility of installing a wastewater collection system. A collection system could mean a traditional sewer system or alternative systems such as constructed wetlands or eco machines. The design of a collection system would have to consider both existing units and likely buildout in the future. Ms. Daley stated that the communities will need to consider how they are going to grow, as it is much more expensive to grow in a more sprawled out fashion rather than compactly. Cape-wide, 30% growth is anticipated to increase capital costs of sewering by 40%. Working group participants discussed the causes and implications of growth and recent population decline, noting that many homes in Harwich are owned by elderly people and are increasingly being turned into second homes when they turn over, that a single-family home on a large plot of land is a housing model that does not provide for the most affordable mode of living for lots of people, and that even with a recent decline in population, the built infrastructure (including buildings) remain in place.

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. The Herring River

watershed group includes the locales of Allen Harbor, Herring River, Saquatucket Harbor, Swan Pond River, and Wychmere Harbor. The total population of the watershed group is 11,163 residents, according to the 2010 U.S. Census, which represents 5.2% of Cape Cod's population. The median age of the Herring River watershed group is older, whiter, has a lower average median income, and consists of more seasonal housing than Barnstable County and than the state of Massachusetts as a whole. The total assessed value of homes is $2.7 billion for this watershed group. In response to a question from a Working Group member, Ms. Daley explained that the demographic data came from the U.S. Census and that the Commission is also attempting to supplement the Census data with more fine-grained data based on water and electricity usage. Ms. Daley also showed information indicating that the average single family property tax bill in Brewster, Dennis, and Harwich is lower than in Barnstable County and than in Massachusetts; the average annual water bill in Dennis and Harwich being lower than in Barnstable County and than in Massachusetts (with Brewster being somewhat higher); and the average annual sewer bill in Barnstable County being lower than in Massachusetts. Ms. Daley noted that Cape Cod is anomalous as compared to the rest of the state in generally lackingwastewater infrastructure. In response to a question from a Working Group member, Cape Cod Commission personnel clarified that the data for water and sewer bills reflect these two categories separately, not combined water and sewer bills.

THE PROBLEM

Ms. Daley proceeded to describe the key challenges facing Cape Cod and the Herring River watershed group with regards to wastewater treatment and water quality. She explained that the MEP provides water quality, nutrient loading, and hydrodynamic information, thereby providing Cape Cod towns with the opportunity to obtain independent analysis of nitrogen loading and its impact on water quality. She recounted that, Cape-wide, 79% of controllable nitrogen load is from septic systems, while in the Herring River watershed group, 68% of controllable nitrogen load is from septic systems, with the balance coming from landfills, impervious surfaces, cranberry and golf course fertilizers, and farm animals. In response to a question from a Working Group member, a Commission staff member reported that the Commission would be pursuing an adaptive management strategy to address issues like surface runoff. In addition, a Working Group member stated that strong turf produces minimal runoff and golf courses have committed to eliminating the use of phosphorous in fertilization. A Commission staff member noted that towns have an opportunity to adopt good fertilizer management practices and doing so may allow them to reduce the amount of treatment infrastructure that has to be built and the amount of land that would have to be brought under treatment facilities.

Ms. Daley explained that the MEP report focuses on the health of embayments. Swan Pond and the harbor mouths all have significantly elevated nitrogen levels. Ms. Daley proceeded to present a series of maps and diagrams illustrating past, current, and anticipated future nitrogen loads in the Herring River, Allen Harbor, Saquatucket Harbor, Wychmere Harbor, and Swan Pond River. Working Group members discussed the positive impact that the dredging of Swan Pond may have had on reducing nitrogen loads, with a working group member suggesting that the dredging should have had a significant impact while another Working Group member responded that, while the dredging may have precluded algae blooms, it has not fundamentally altered nitrogen levels since the hydrology of Swan Pond greatly slows clearance and flow from the Pond. A Cape Cod Commission staff member also noted that the level of flushing from Nantucket Sound is also much lower (approximately 3 feet) than the level of flushing from Cape Cod Bay (approximately 10 feet). A Working Group member suggested that the Commission strive to show conditions in the areas adjacent to embayments so that members of the public understand impacts on eel grass.

Ms. Daley next showed maps with target nitrogen load removal levels from embayments and watersheds, noting that many areas within the watershed group have removal targets of between 80% and 100% for new nitrogen sources. The upshot of this information is that it can help to guide where it may be best to place nitrogen-removal infrastructure to have the greatest impact. Noting that many of the areas with the highest targets are in the southern part of the watershed group, nearer to Nantucket Sound, Ms. Daley suggested that nitrogen-removal efforts could be more heavily focused in these areas. Ms. Daley also showed maps of eelgrass distribution, noting that eelgrass is an indicator species for water health. A Working Group member commented that older residents remember water quality conditions in the past based on the presence and extent of eelgrass. Next, Ms. Daley displayed maps showing phosphorus levels in freshwater ponds, with ponds that are more heavily impacted by fertilizer being eutrophic (that is, supporting heavy plant growth) and therefore unhealthy. Hinckley's Pond is the most eutrophic pond in the Herring River watershed group. Ms. Daley noted that freshwater ponds store nitrogen and mitigate nitrogen loads before water flows to the ocean. Finally, Ms. Daley displayed a map showing various types of Title 5 compliance issues, including groundwater discharge points, locations of loans issued by the County for Title 5 repairs, and areas with potential Title 5 compliance issues. A Working Group member pointed out that many older properties have cesspools and do not fall under Title 5 and inquired as to whether the Cape Cod Commission was assuming that all properties have Title 5 systems installed. In response, a Commission staff member answered that the Commission has no data regarding

cesspools and is currently in the process of contacting municipalities to locate properties that have cesspools and/or Title 5 compliance issues.

Finally, Ms. Daley displayed maps showing various types of existing and proposed solutions for handling wastewater. In the Herring River watershed group, existing infrastructure includes public water supply wells, a wastewater treatment facility, and loans issued for conducting Title 5 repairs in different sites. Proposed infrastructure includes enhanced attenuation systems (such as culvert openings and stormwater projects). Working Group members added that a stormwater project has been proposed for Route 124, a restoration project has been proposed for Cold Brook Road, and that a sewage treatment plant may be sited near the landfill in Harwich.

What data should be added to the baseline conditions?
Working Group members proposed that the following types of information be added to the survey of baseline conditions:

- Update Title 5 and cesspool date for all three towns,
- Update information about current and proposed stormwater projects and culvert data for all three towns,
- Include information about the proposed work on Route 28 / Cold Brook Road,
- Include information about the owners unknown properties in Harwich – information about this is available in Figure 5 of the Harwich OpenSpace and Recreation Study,
- Include information about turf and leaching from golf courses – information about this is available in Barnstable County health data from the 1990s,
- Include information about onsite nitrogen reduction systems – Barnstable County has data about these,
- Include information from geologists about inlets and culvert openings as these interventions may have detrimental secondary effects.
- Information about potential future buildout scenarios, pending different changes to zoning regulations.

Working Group members identified the following areas of priority:

- The Harwich comprehensive plan indicates that looking at land use patterns and potential future land uses would be very important,
- Ponds do not seem to be an area of focus, and these are especially important for the Town of Brewster,

- The ponds in the Herring River watershed seem like they could have a big impact on what happens further down the watershed,
- Changing fertilization practices could be low-hanging fruit in that these sorts of behavioral changes are arguably cheaper than building infrastructure to treat wastewater,
- Maintenance dredging, for example for Swam Pond,
- Runoff from state highways,
- Smart Growth options and Land Use Vision Maps,
    - In response to questions and comments, Cape Cod Commission staff members said that they are hoping to use tools such as scenario-based cost estimates, graphics, and heat maps to illustrate different growth patterns and their associated costs in terms of infrastructure construction. Especially in relation to fulfilling requirements under Title 5, zoning can have a significant impact.
- Land management options, including fertilizer bans, smart management of lawns and turf, creation of a fertilizer-free buffer around ponds, and education and outreach around effective and environmentally-conscious fertilization practices.

OPERATING PROTOCOLS

Ms. Kate Harvey, the facilitator, reviewed a Draft Process Protocols document with Watershed Working Group members, covering topics such as the scope of the effort, the constituency of membership in the Working Group, membership roles and responsibilities, responsibilities of the Cape Cod Commission, the role of the facilitator, expectations around communication, the process around meeting summaries, meeting notification, public comment, and the presence and conduct of members of the media and Working Group meetings.

Working Group members suggested that it would be beneficial to involve more Town Selectmen and a representative from the Fisherman's Association in the meetings of the Working Group.

NEXT STEPS

Ms. Patty Daley, Cape Cod Commission, provided an overview of the work that the Working Group will be tacking in coming months. She explained that there are many different technologies and options on the table for the group to consider, and that these range in both the type of approach – preventative efforts using regulatory tools, wastewater and stormwater reduction efforts, and remediation of existing water bodies – and in the scale at which the intervention would take place – at the site-level, neighborhood-level, watershed-level, or Cape-

wide. Ms. Daley explained that the Commission would provide more information to Working Group members about the technologies and other interventions, including visual representations as much as possible, to facilitate understanding of the options on the table. The Commission is hoping to get feedback from Working Group members about what options they are interested in and which ones are acceptable or unacceptable. The CCC will do some background research to learn more about which options would, and would not, work in different places, including the Herring River watershed group, to make it easier for Working Group members to understand the relevant details. Ms. Daley also laid out a seven-step screening process for consideration of different options that begins with considering targets and goals for the intervention and proceeds progressively from low-cost / low-barrier options to higher-cost options. Ultimately, the Cape Cod Commission will synthesize input received from the eleven Watershed Working Groups and create a regional plan for the Cape that offers a series of options for localities to choose between.

In response to questions from Working Group members, Commission staff members reported that they are working with AECOM, the TAC, and the Panel on Technologies to create cost ranges and cost efficiencies with regards to different interventions for nitrogen reduction. Staff members also said that they are hoping to create between 3 and 5 scenarios for the December Watershed Working Group meetings for Working Group members to provide feedback on. Commission staff members also lauded a comment from a Working Group member suggesting that an opportunity to grow shellfish could create buy-in among local residents and added that the Cape Cod Commission is hoping to work with the U.S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection to implement adaptive management approaches that would allow for the implementation of innovative and alternative interventions that could, among other effects, create a sense of investment and ownership among residents.

A Working Group member added that language about the beneficial impact that sewering can have for businesses could raise red flags for some people as they may balk at funding infrastructure investments for the benefit of businesses.

PUBLIC COMMENTS

No public comments were given.

Appendix A
Attendance

Name	Affiliation
Larry Ballantine	Selectman, Harwich
Diane Chamberlain	Comprehensive Wastewater Management Task Force, Dennis
Steve Kleinberg	Emergency Sheltering Branch Director (attending as an observer)
Jason Klump	Planning Board, Brewster
Joan Kozar	Planning Board, Harwich
Michael Lach	Harwich Conservation Trust
Paula Miller	Comprehensive Water Planning Committee, Brewster
Ed Nash	Golf Course Superintendents of Cape Cod
Russell Schell	Brewster Comprehensive Water Planning Committee
Steve Swain	Citizen
David Spitz	Planner, Harwich
Brooke Williams	Harwich Civic Association
Staff	
Patty Daley	Cape Cod Commission
Scott Michaud	Cape Cod Commission
Erin Perry	Cape Cod Commission
Kate Harvey	Consensus Building Institute
Tushar Kansal	Consensus Building Institute

Cape Cod 208 Area Water Quality Planning
Lewis Bay to Bass River Watershed Working Group

Meeting One
Thursday, September 19, 2013
Board of Realtors, 22 Mid Tech Drive, W. Yarmouth, MA

Meeting Agenda

8:30 am Welcome – *Cape Cod Commission*

8:35 Introductions, confirm working group membership and participation – *Carri Hulet (Facilitator) and Working Group*

9:00 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

9:15 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Cape Cod Commission*

9:30 Review and add to chronology of work to date – *Working Group*

9:45 Discussion: drawing on past work to move forward – *Carri Hulet and Working Group*

10:00 Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Scott Horsely (Area Manager)*

10:45 Break

11:00 Discussion of Baseline Conditions – *Carri Hulet and Working Group*

11:45 Review/Discuss Process Protocols – *Carri Hulet and Working Group*

12:00 Framework for Moving Forward: Preview Meetings 2 and 3 – *Scott Horsely*

12:10 Public Comments

12:30 Adjourn

Lewis Bay to Bass River

Baseline Conditions & Needs Assessment

What is the 208 Plan?

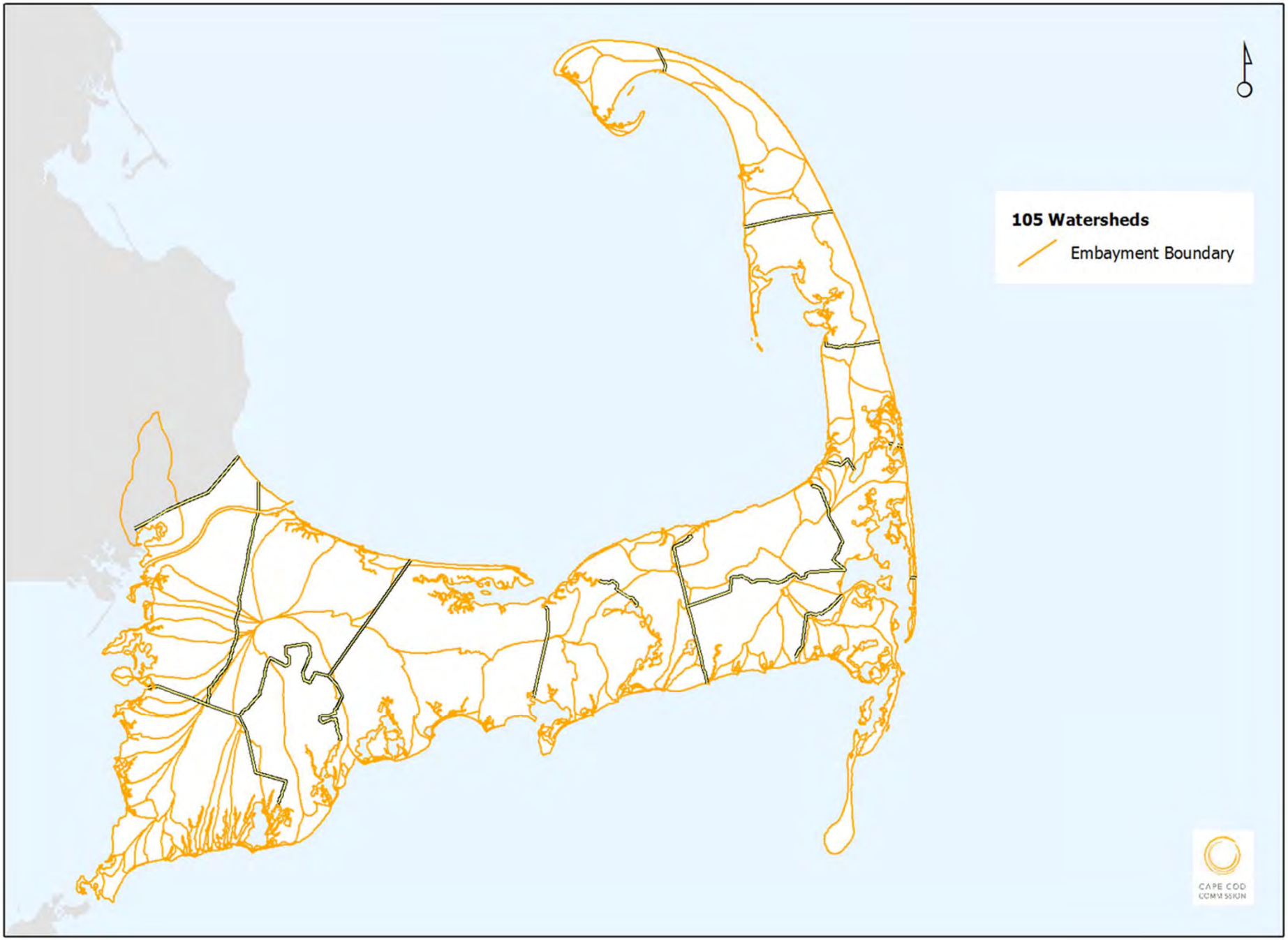
Clean Water Act Section 208

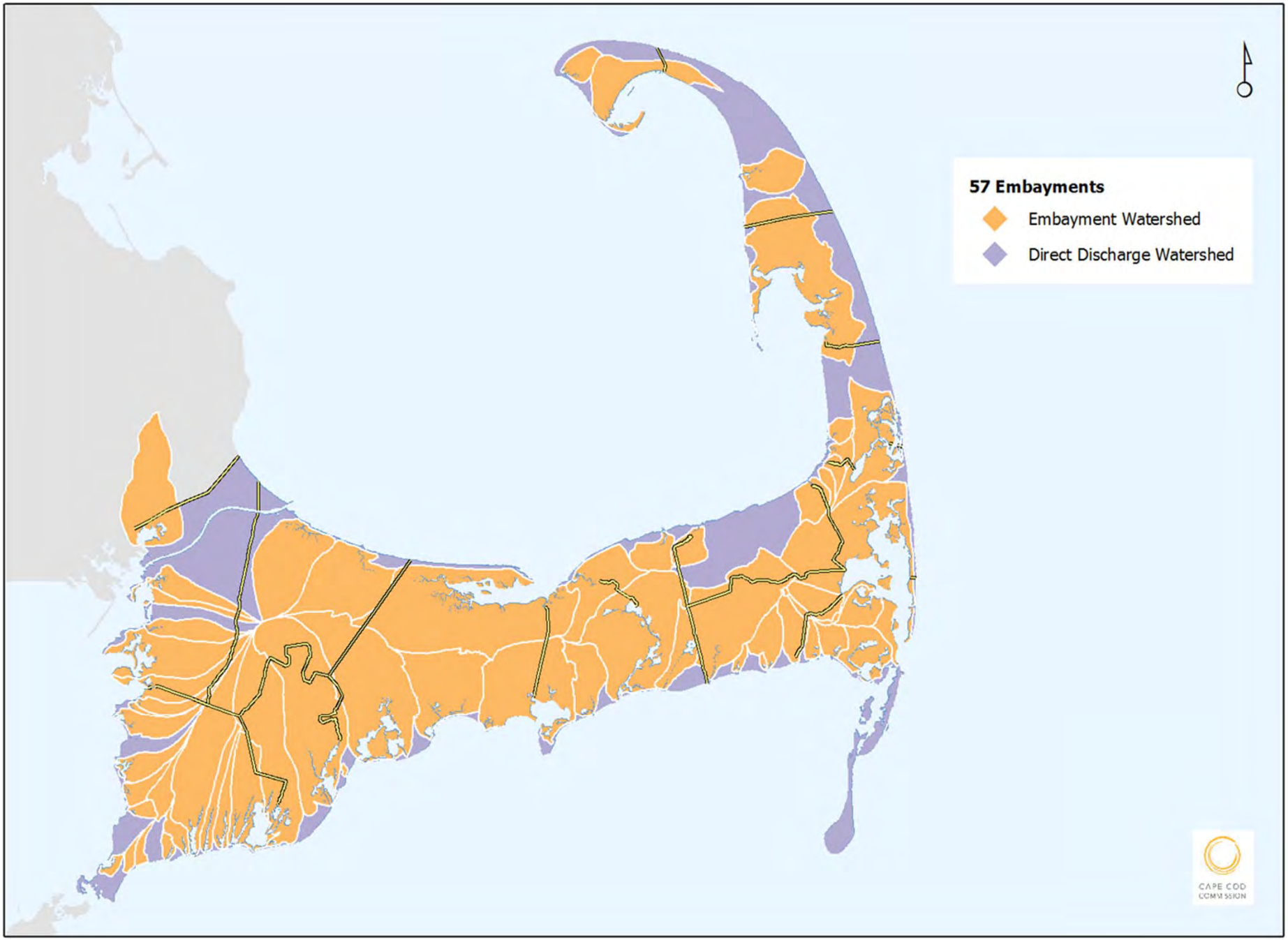
The Commission was directed to update the 1978 Plan

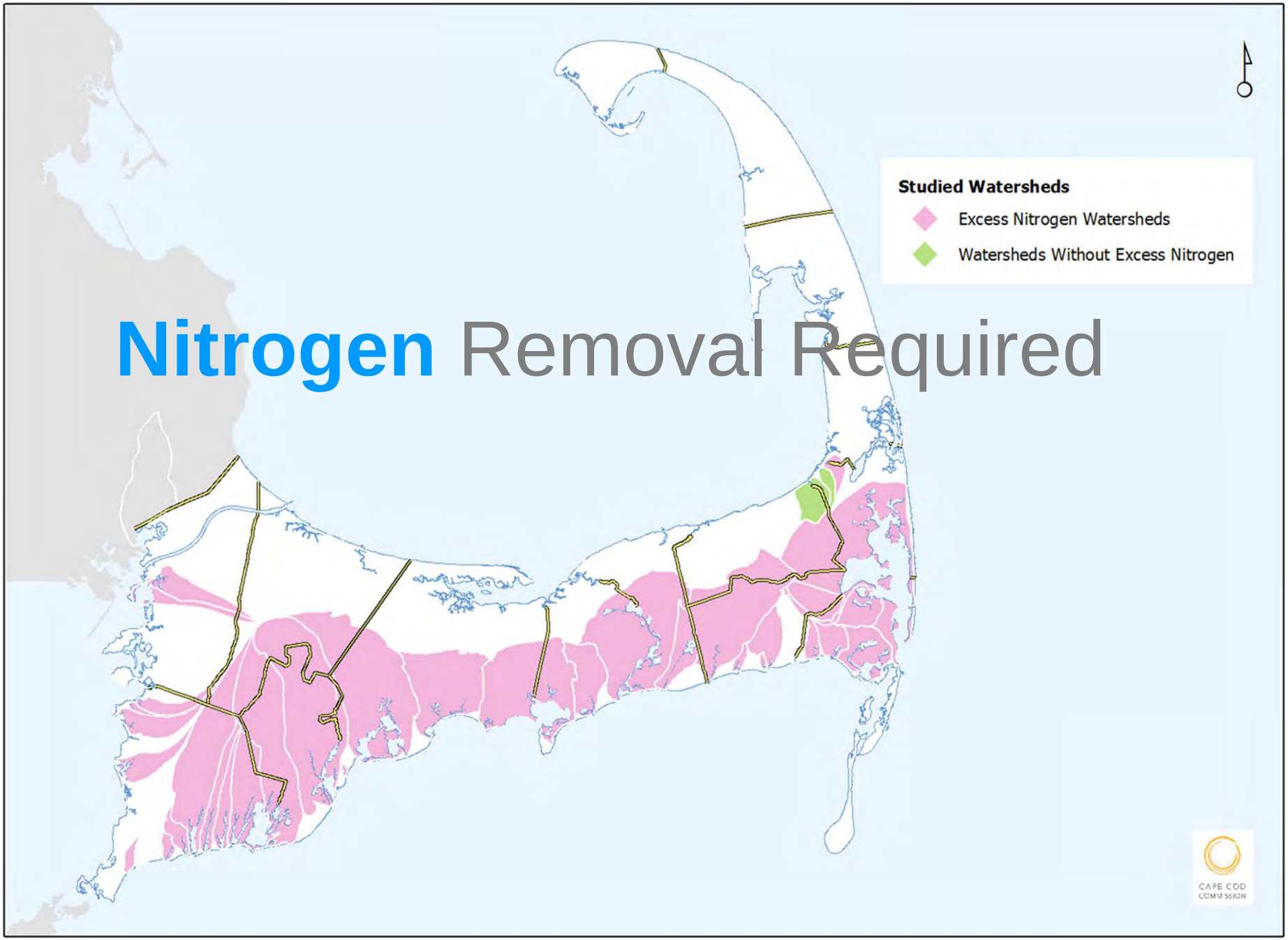
The Commonwealth provided $3 million to fund the project

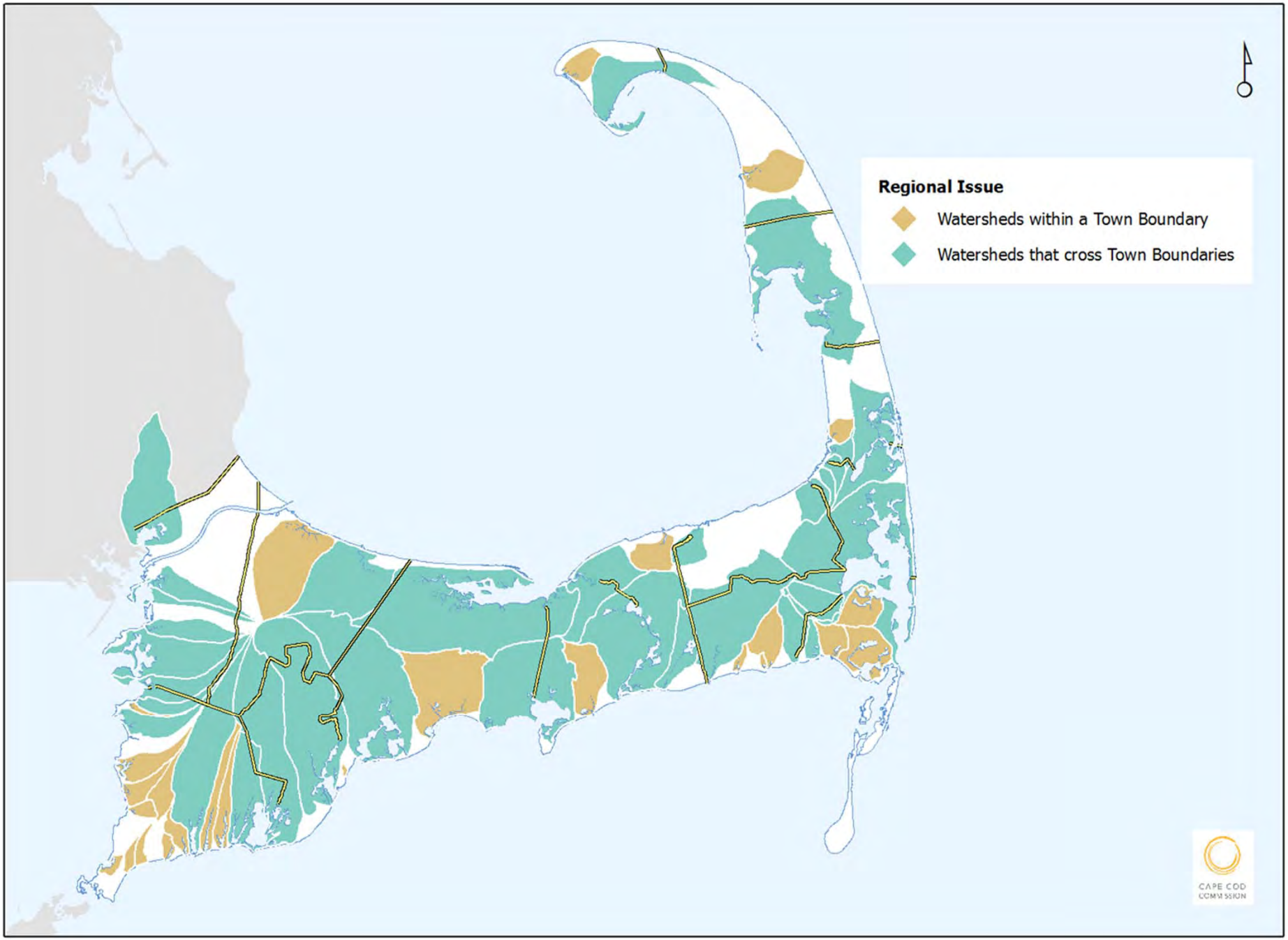
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

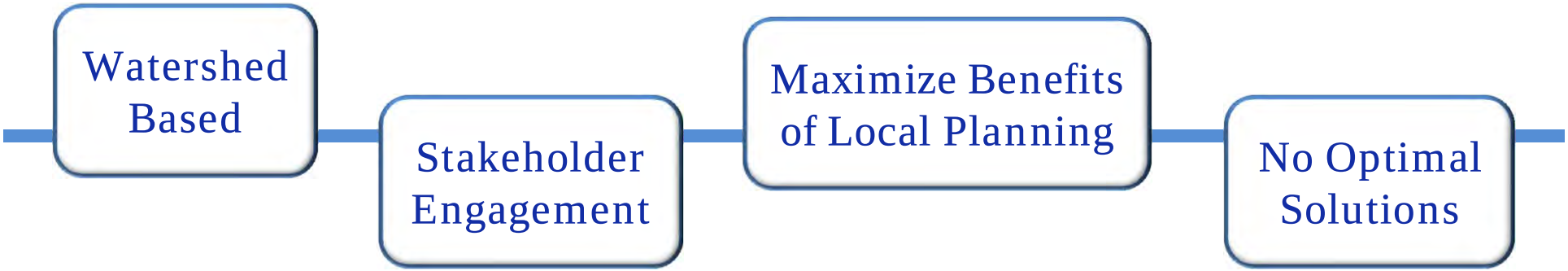

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

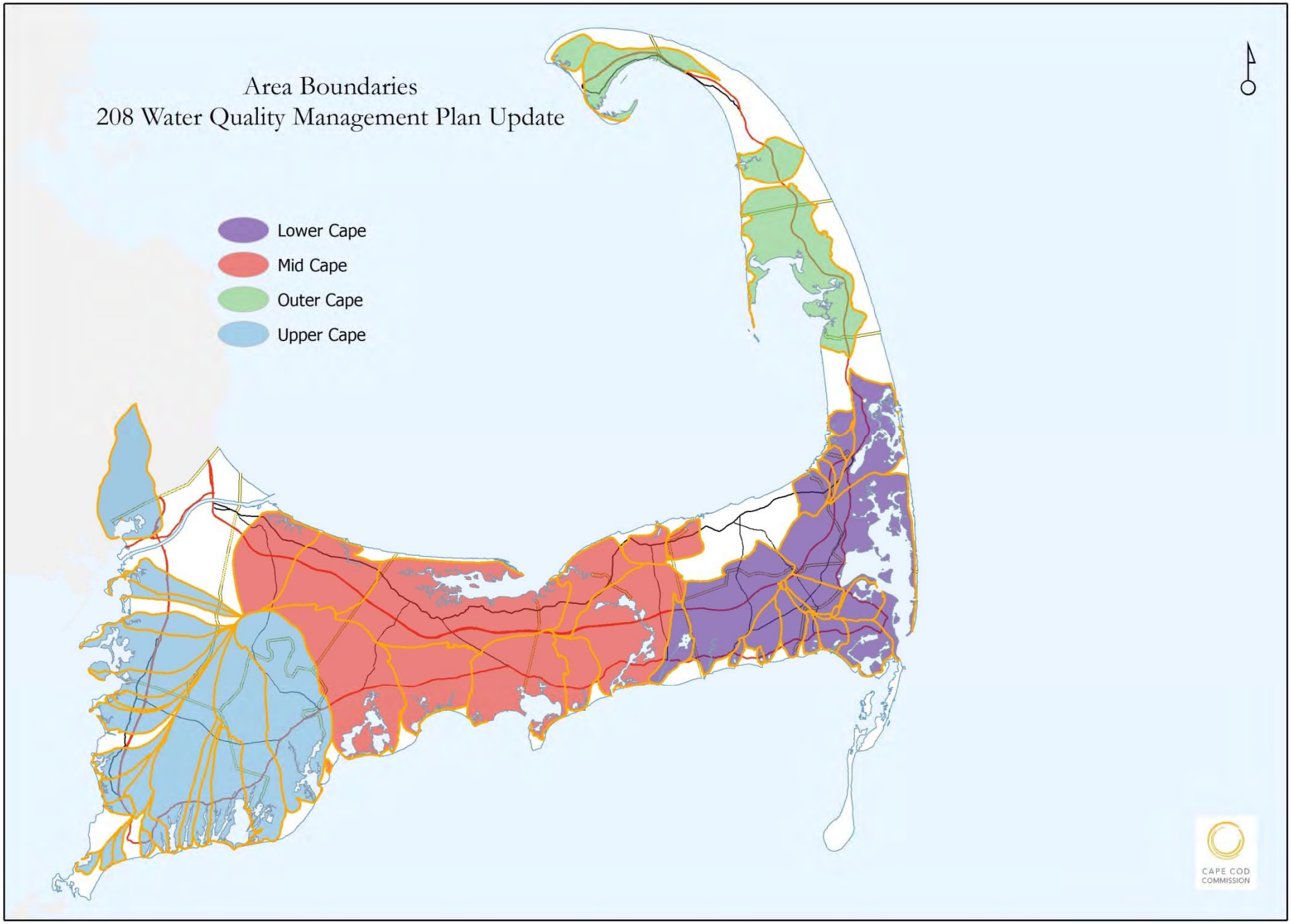

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

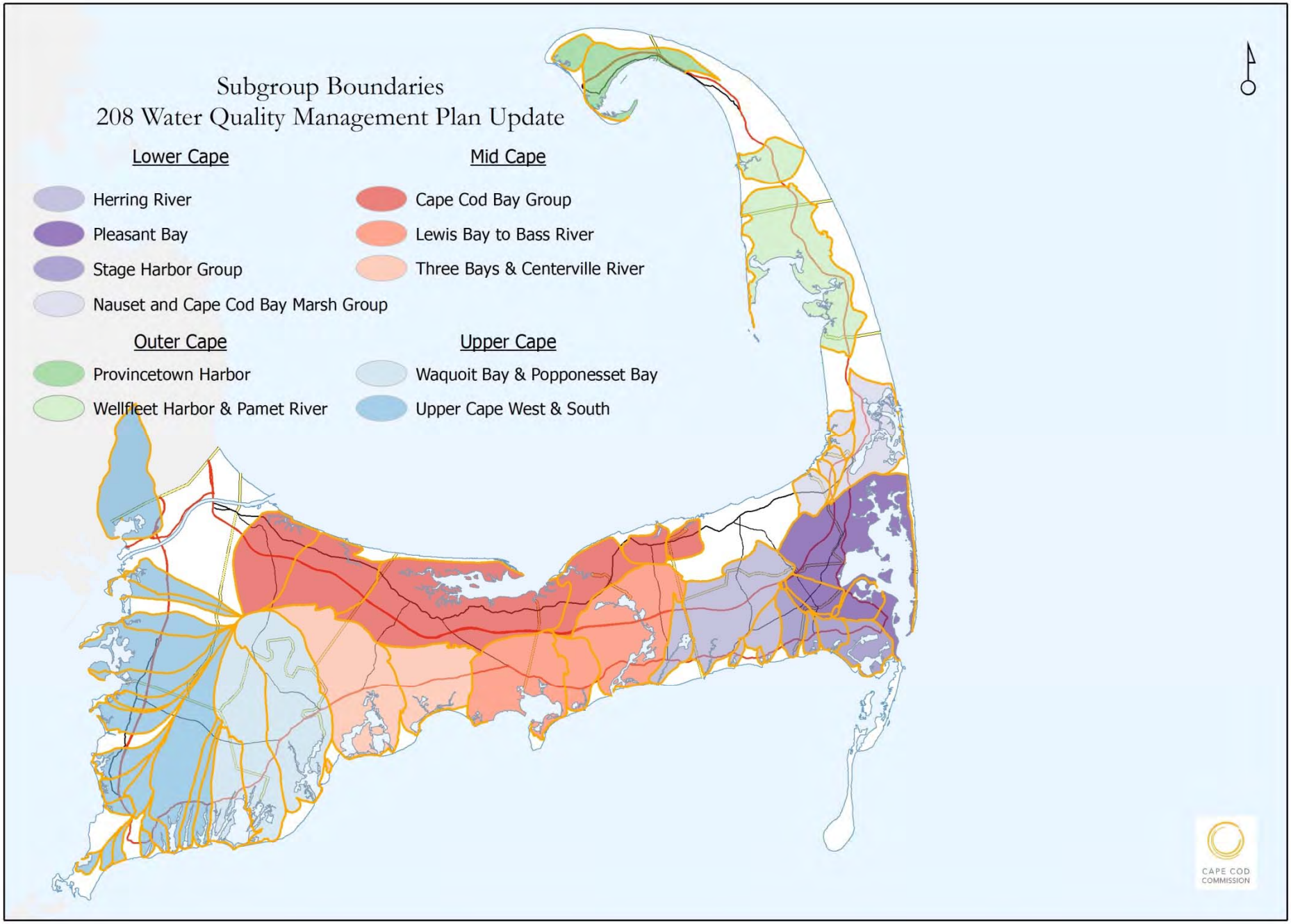

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update



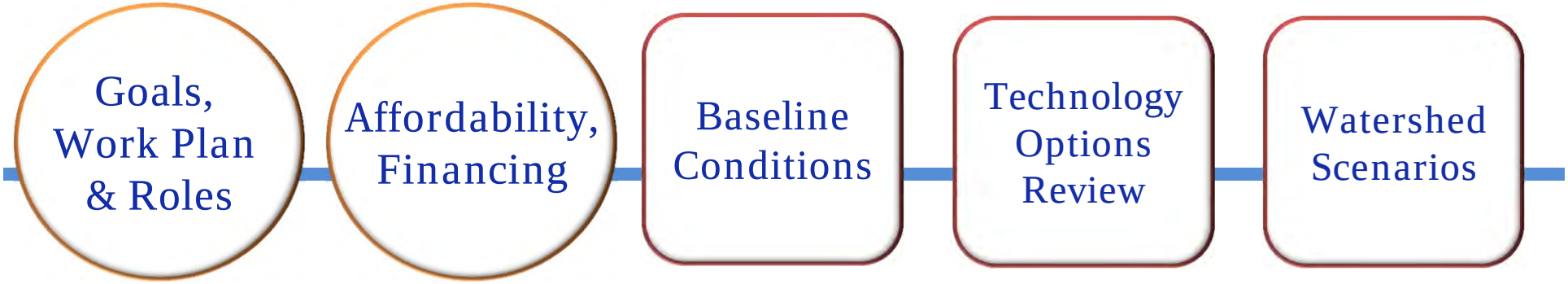
Goal:
To generate a series of approaches in each watershed that will meet water quality standards


Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

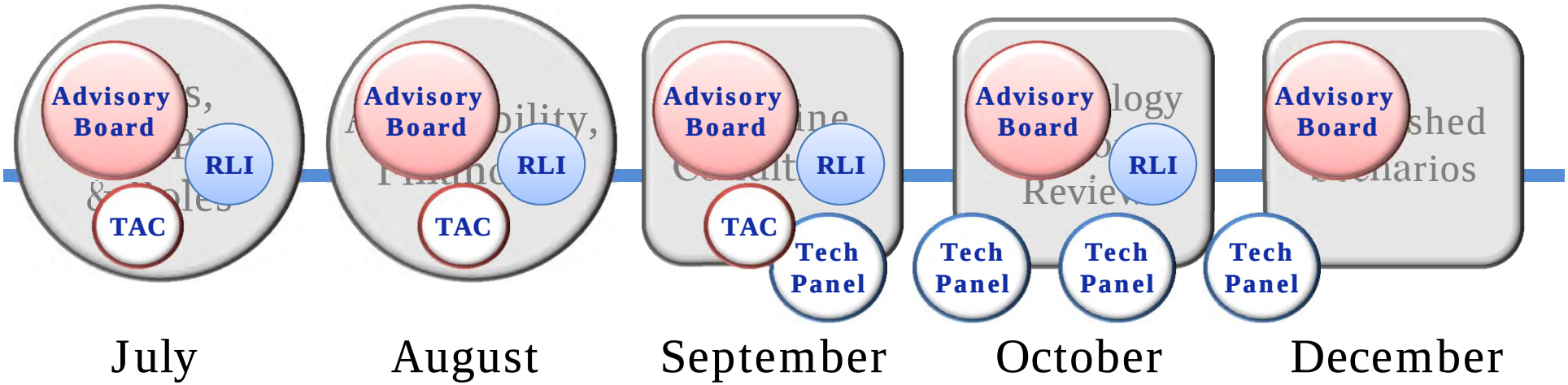
What is the stakeholder process?

Public Meetings Watershed Working Groups



July August September October December

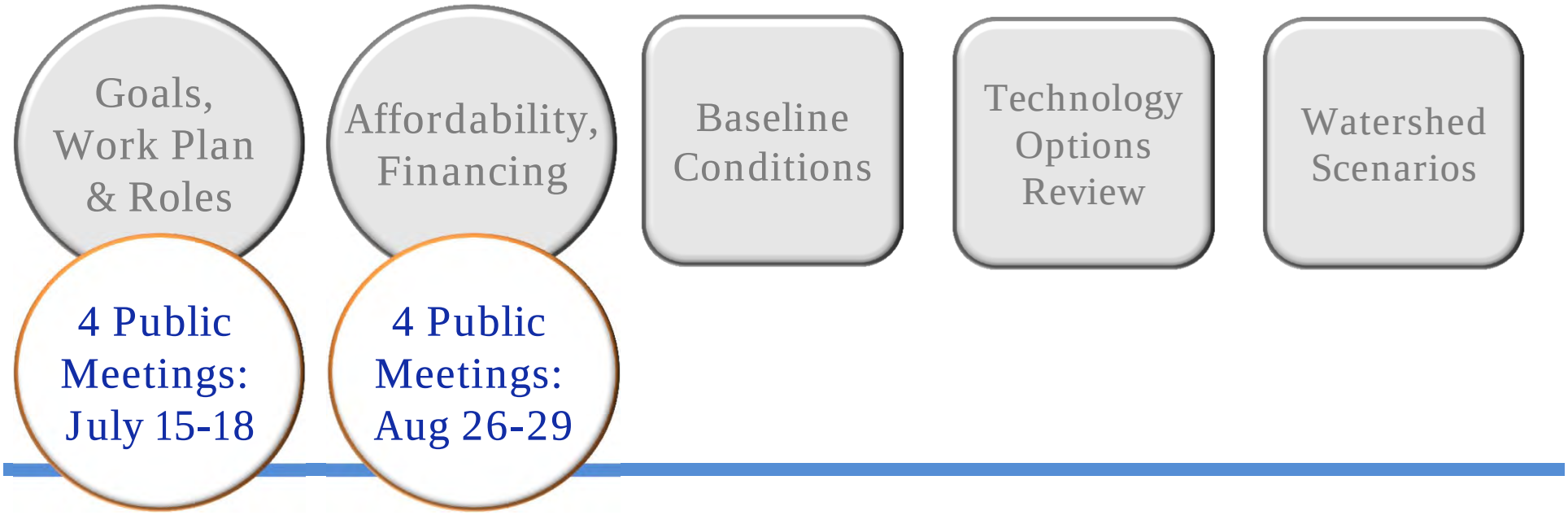
208 Planning Process



RLI Regulatory, Legal & Institutional Work Group

TAC Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process



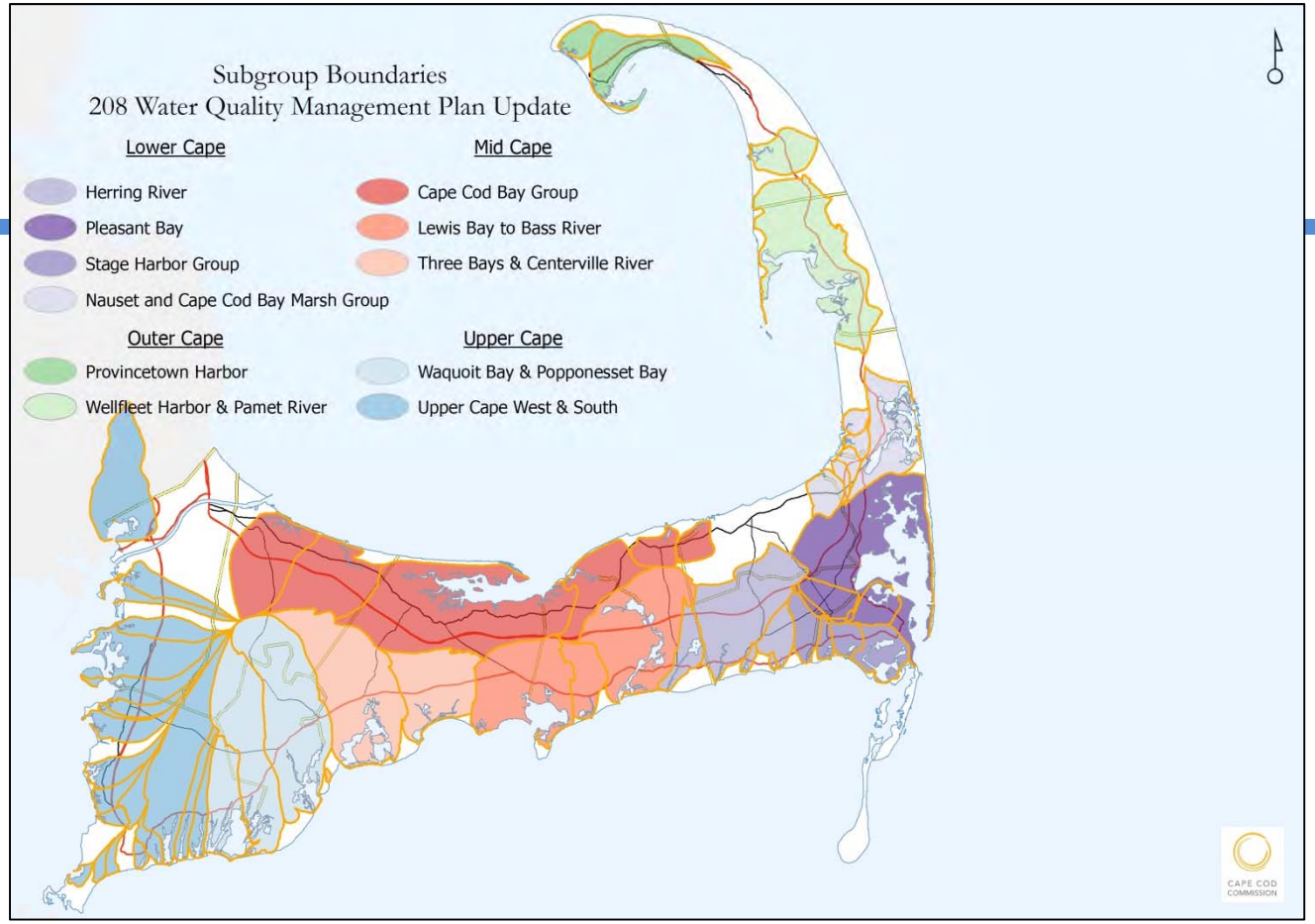
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

Watershed Scenarios



208 Planning Process

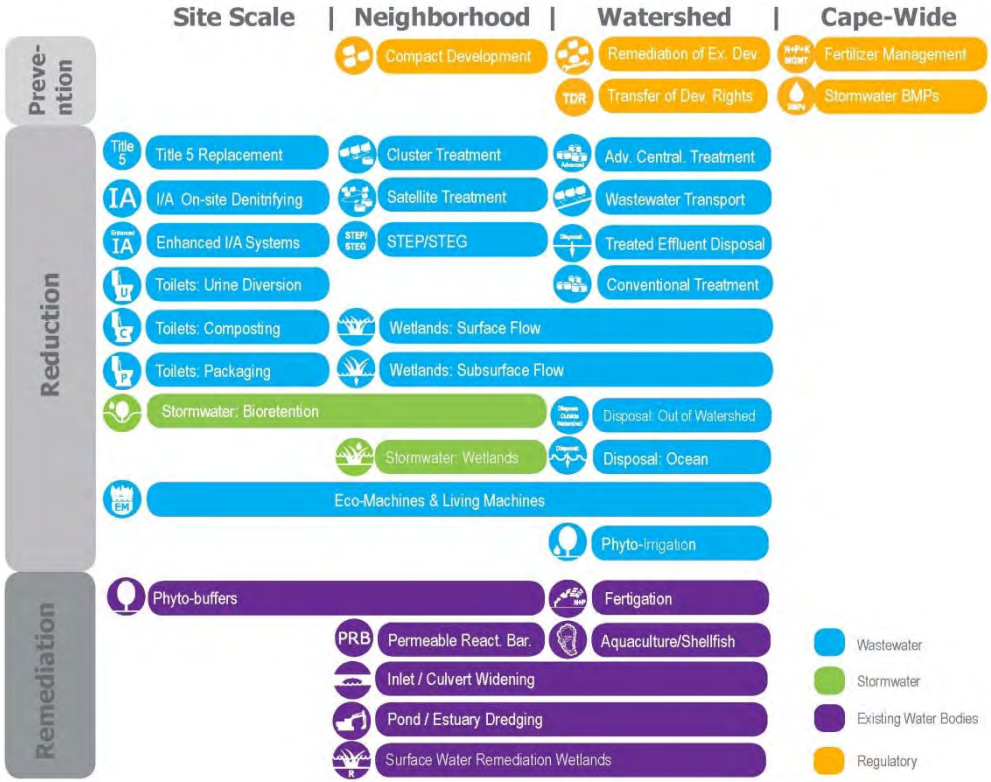
Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios



208 Planning Process

Baseline Conditions

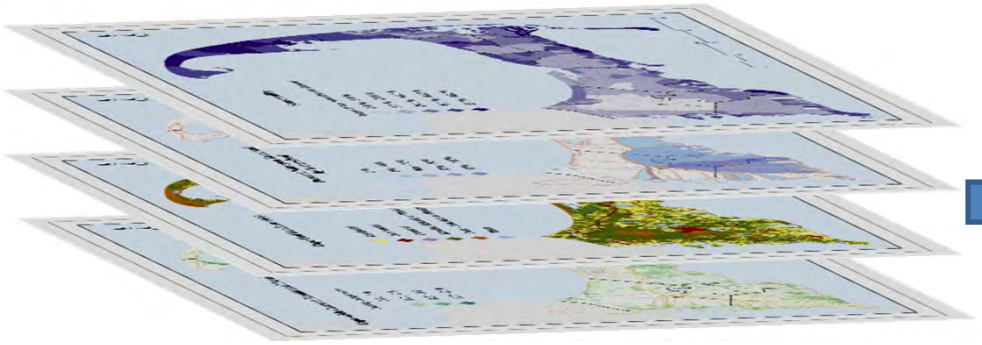
11 Working Group Meetings: Sept 18-27

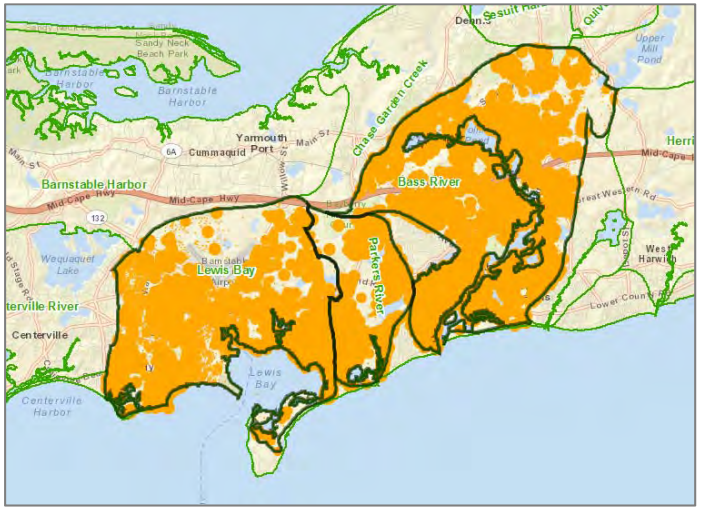
Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11





208 Planning Process

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

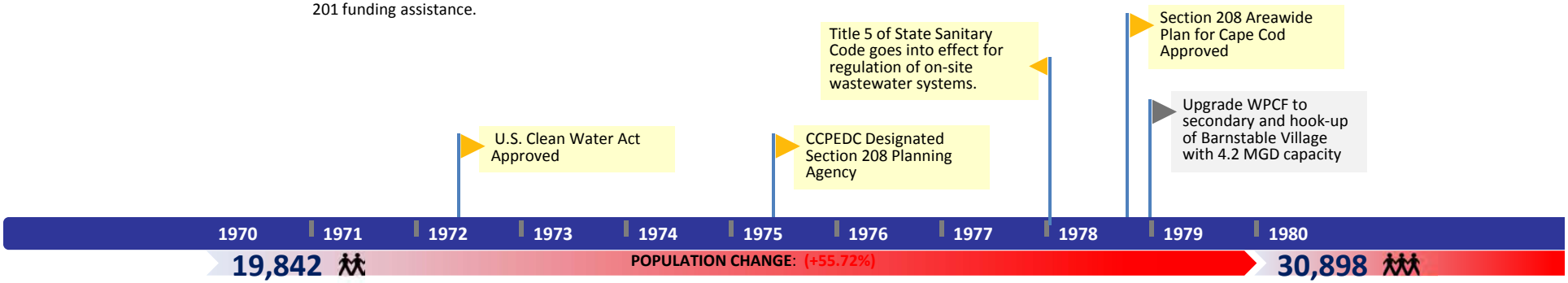
Local Progress to Date

Bass River
Lewis Bay
Parkers River

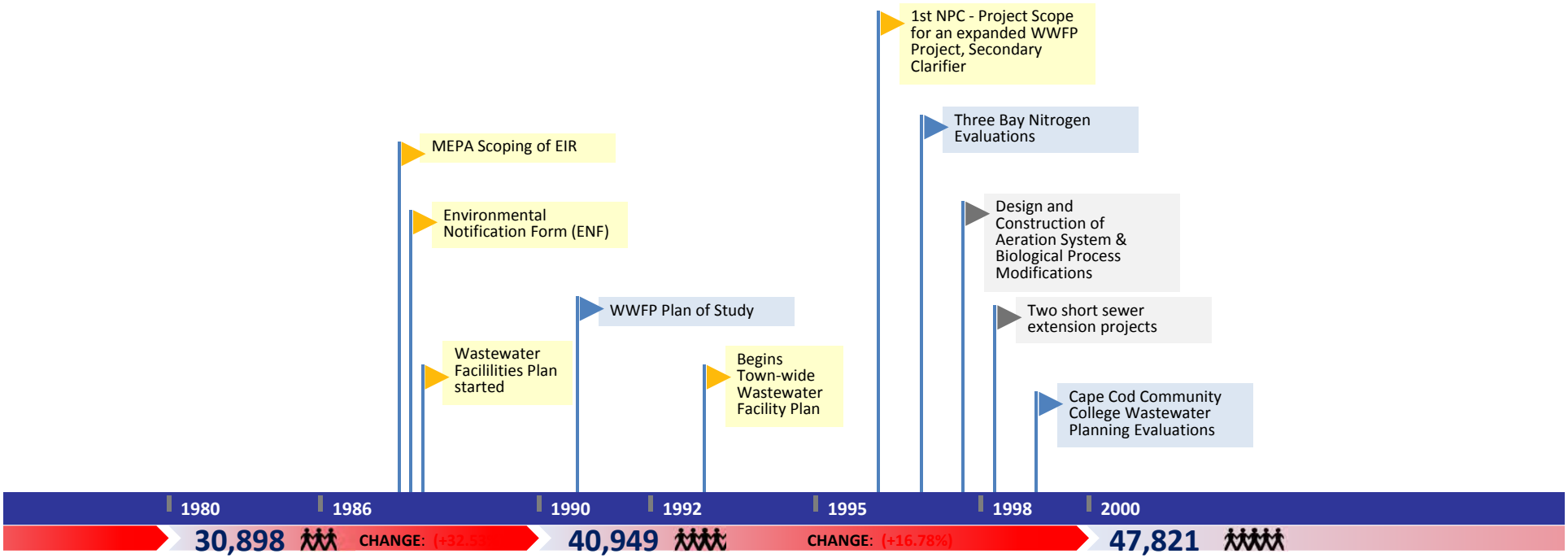
Barnstable: 1970-2013

From 1978 Section 208 Plan

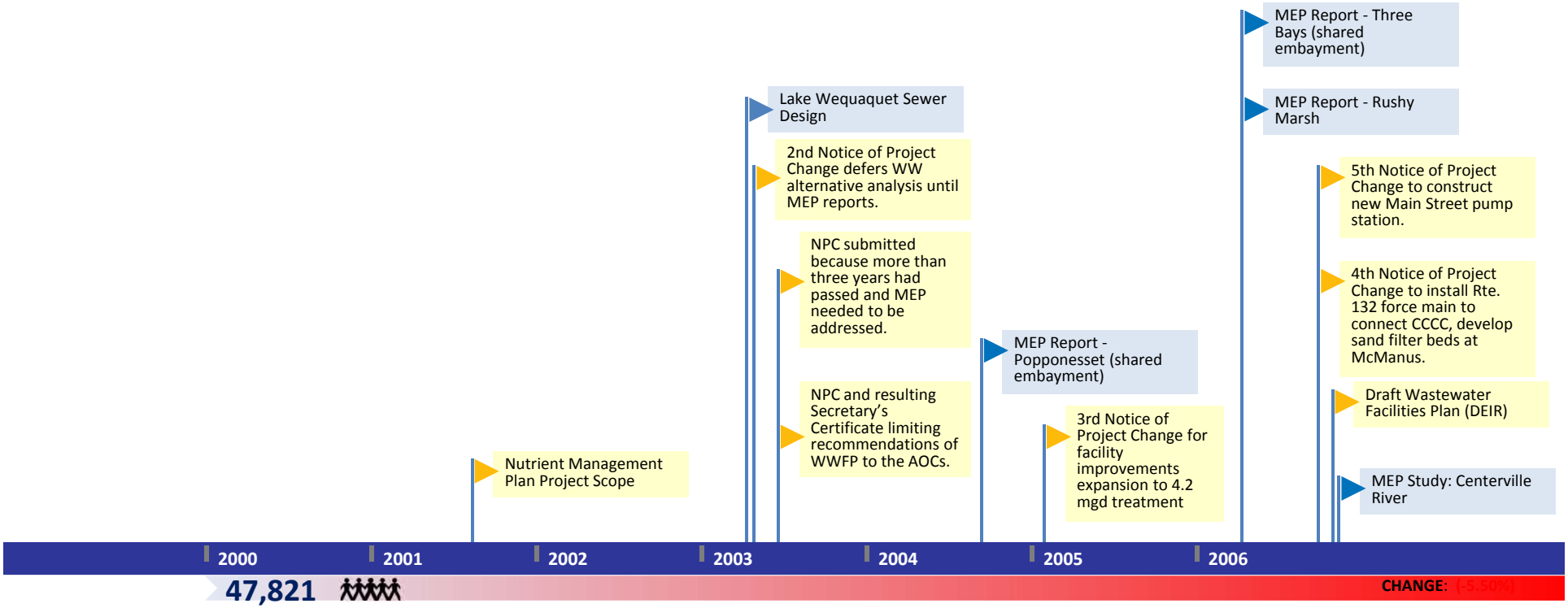
- The major 208 concern for Barnstable is the protection of its public water supply wells.
- The Planning Board appears to be interested in water supply protection as indicated by its recent zoning proposals. The coordination of town boards and the water utilities is essential to the success of this effort in Barnstable.
- Possible consolidation of the water utilities or some formal coordinative mechanism should be seriously considered to insure efficient and effective protection of the town's water resources.
- While the town is presently constructing an expansion of the sewage treatment plant and collection system with EPA 201 funds, it has not addressed all of the wastewater management problem areas in the town. Additional 201 facilities planning must be carried out to demonstrate a sewer need exists under present EPA criteria.
- Certain problem areas are included as future phases of the sewer collection system expansion in the "Sewer Service Areas" delineated in the 208 plan and would be eligible for 201 funding assistance.
- The present Hyannis treatment plant has the necessary capacity to handle all sewer service area needs in Hyannis. Should the town want to expand the collection system beyond these sewer service areas, 201 funds will not be available for these expansions or for an additional treatment plant.
- The need for collection system expansion in the Hyannis area should be carefully considered in assessing the plant's ability to accept wastewater from Yarmouth since the Hyannis treatment plant cannot be expanded beyond its present capacity.
- The town should consider, in the near future, entering into a 201 facilities plan to resolve the present Category 2 problem areas possibly through decentralized solutions.
- The 201 study and efforts of town board should address the coastal water quality problems of the town, particularly Lewis Bay.



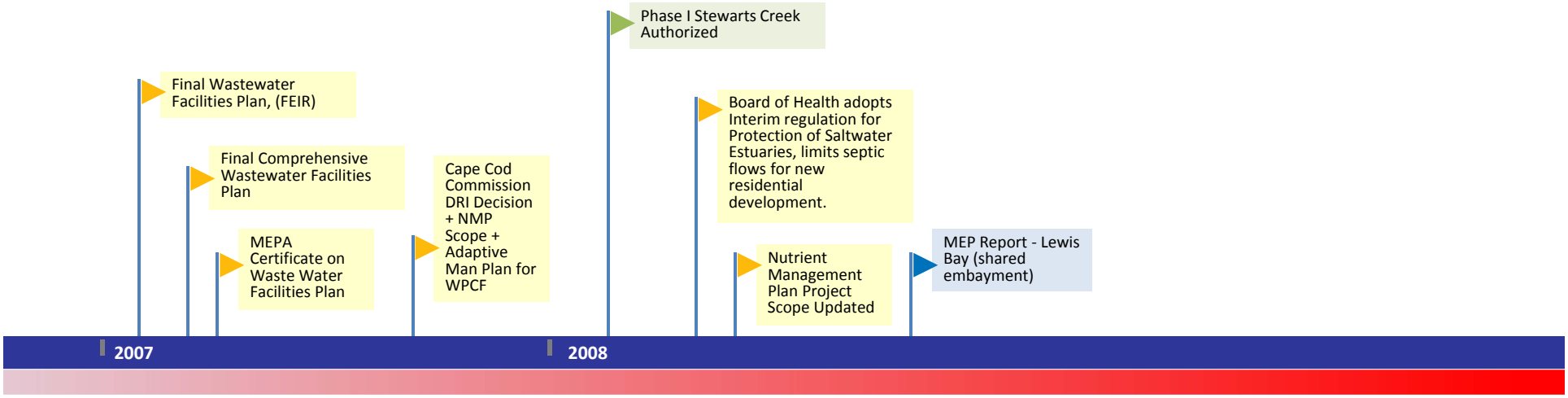
Barnstable: 1970-2013



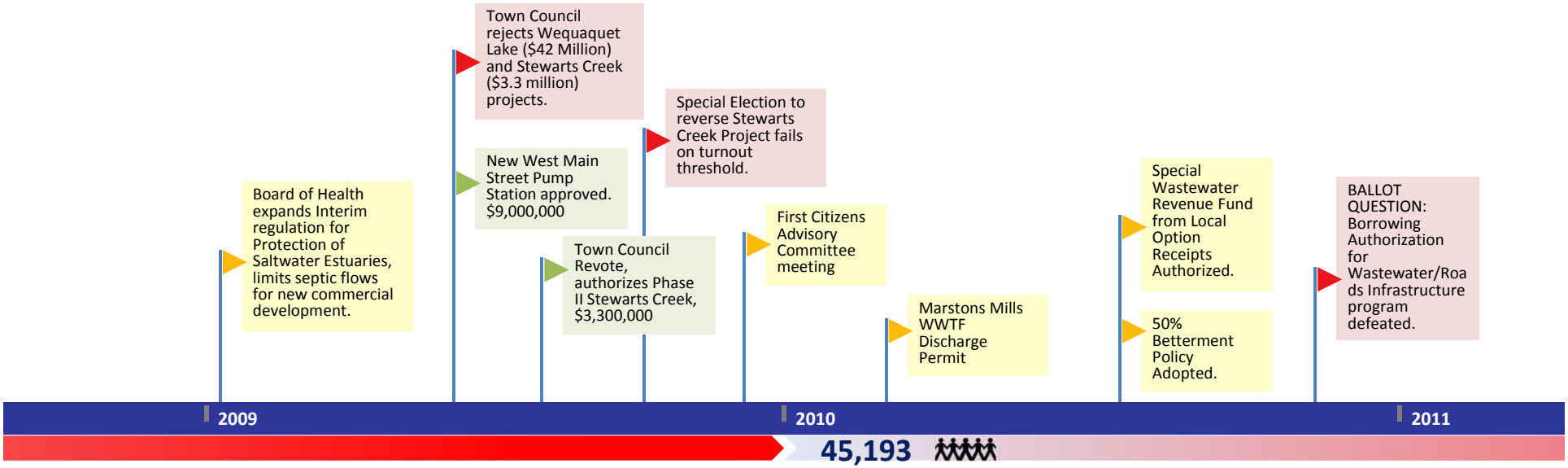
Barnstable: 1970-2013



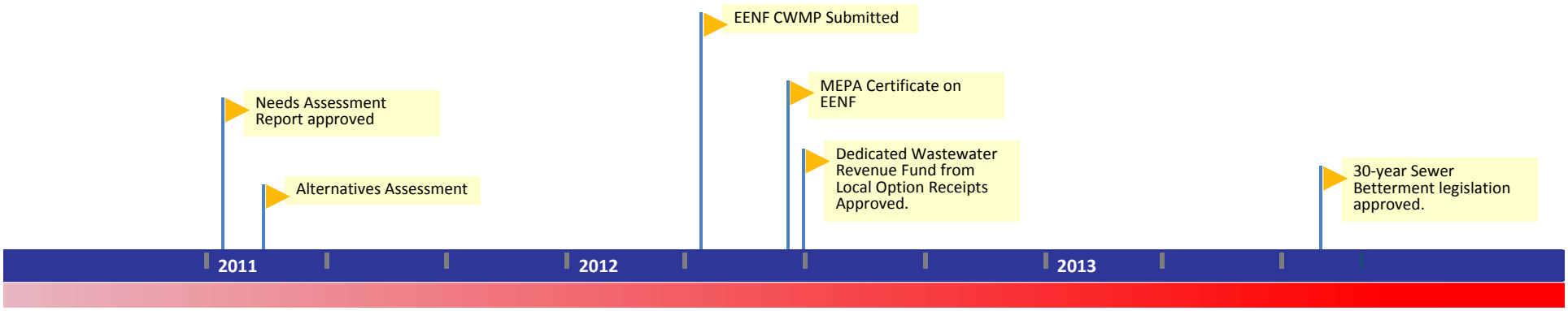
Barnstable: 1970-2013



Barnstable: 1970-2013



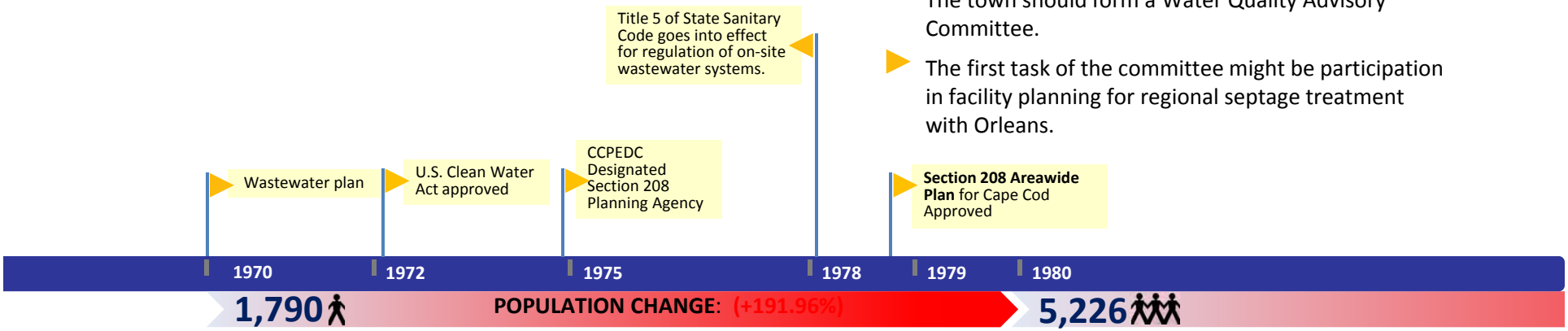
Barnstable: 1970-2013



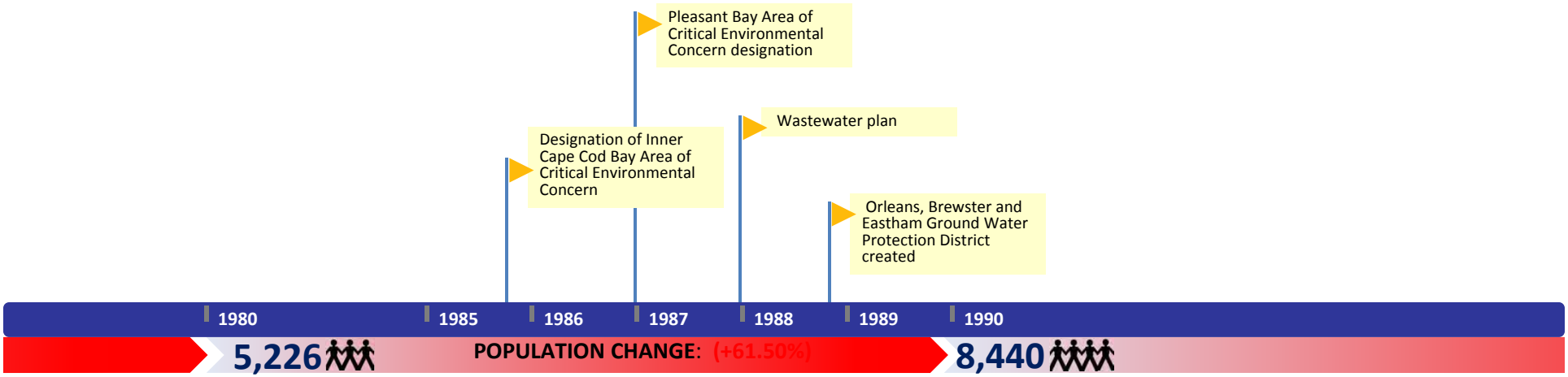
Brewster

From 1978 Section 208 Plan

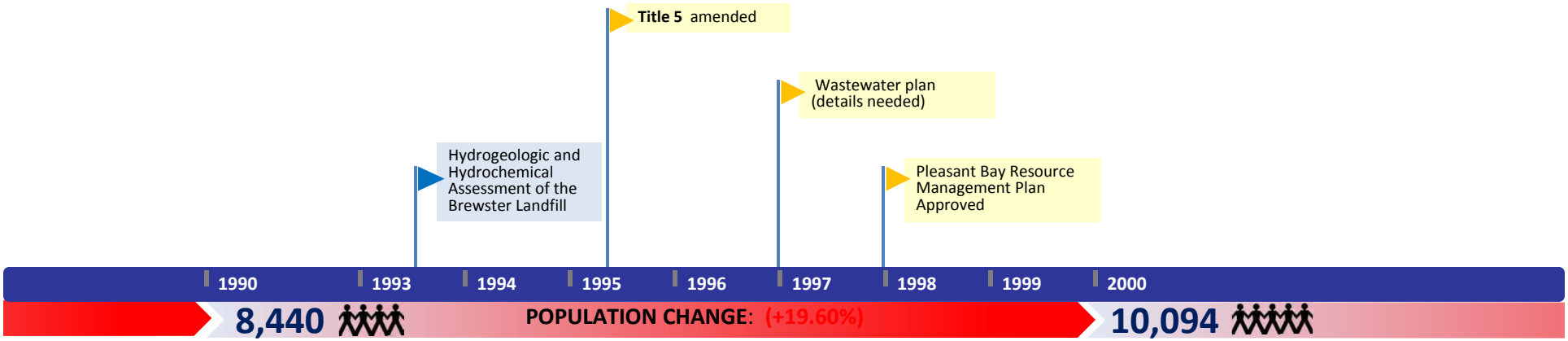
- Present and future town well sites should be protected from the non-point sources resulting from New development by creating Watershed Protection Districts.
- The town should cooperate in regional water supply planning to determine future water supply needs of neighboring towns and whether it can assist.
- 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.



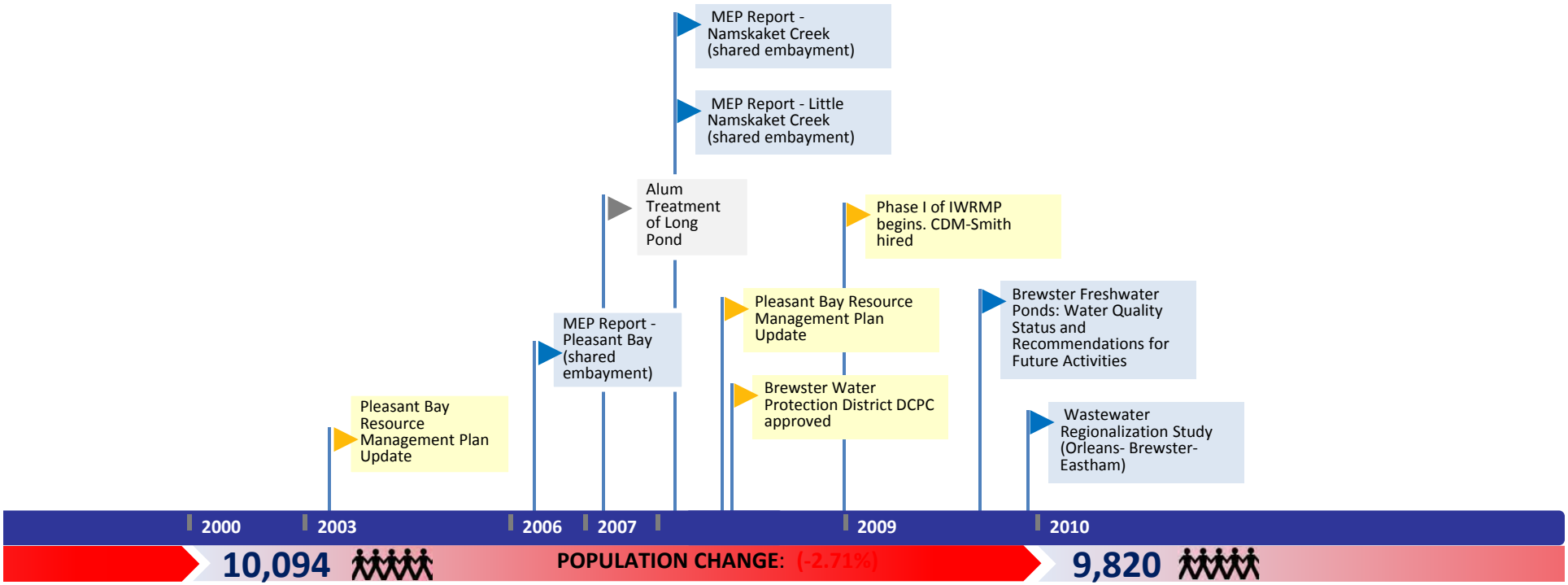
Brewster: 1970-2013



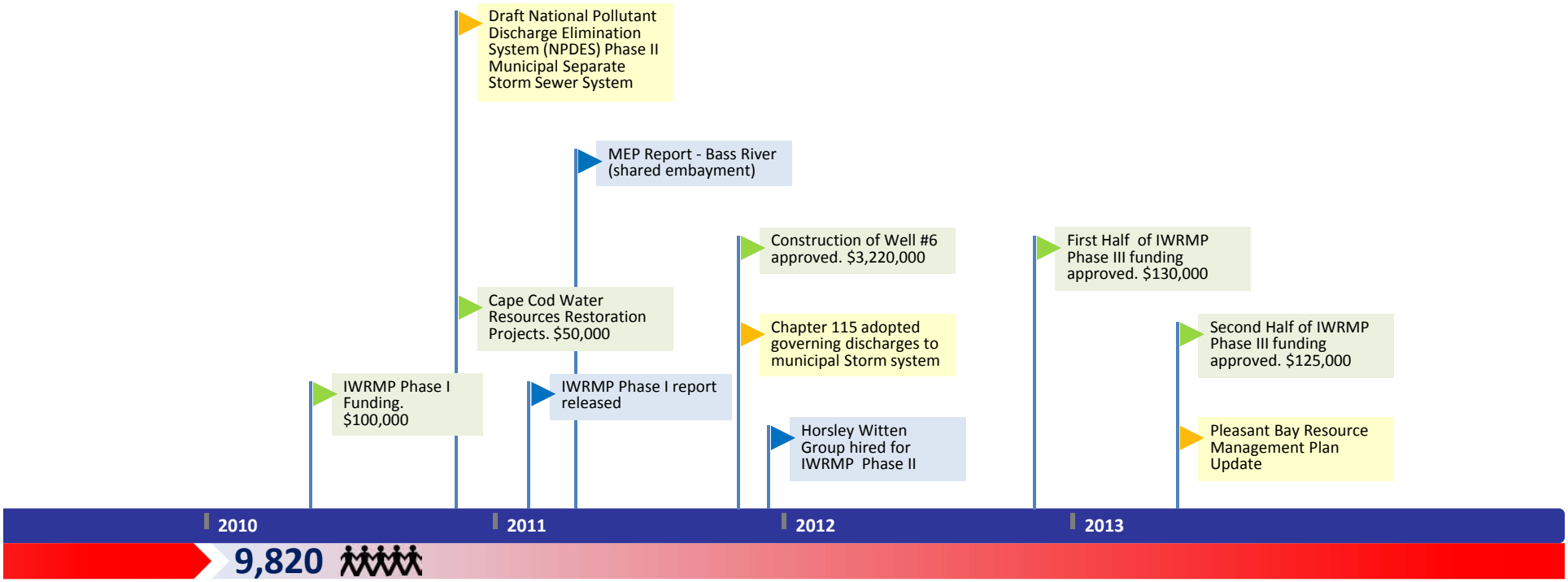
Brewster: 1970-2013



Brewster: 1970-2013



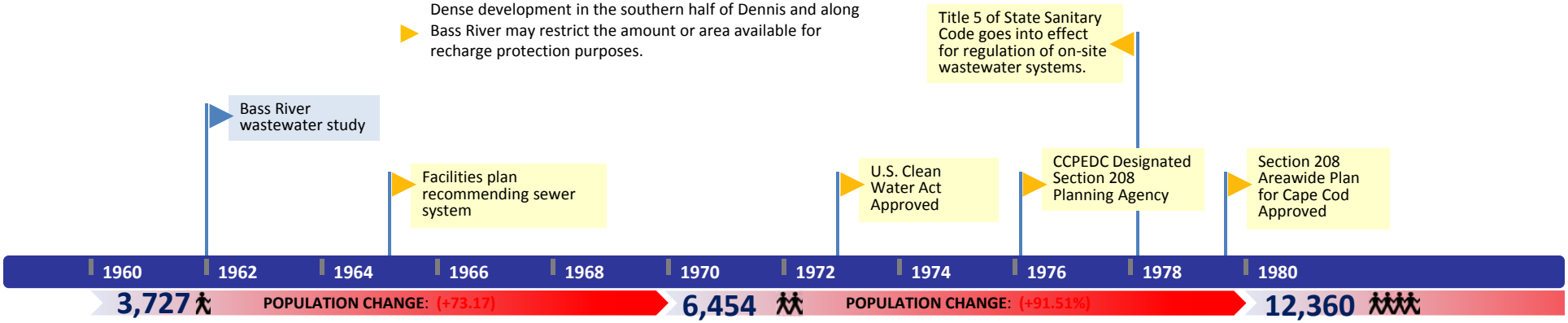
Brewster: 1970-2013



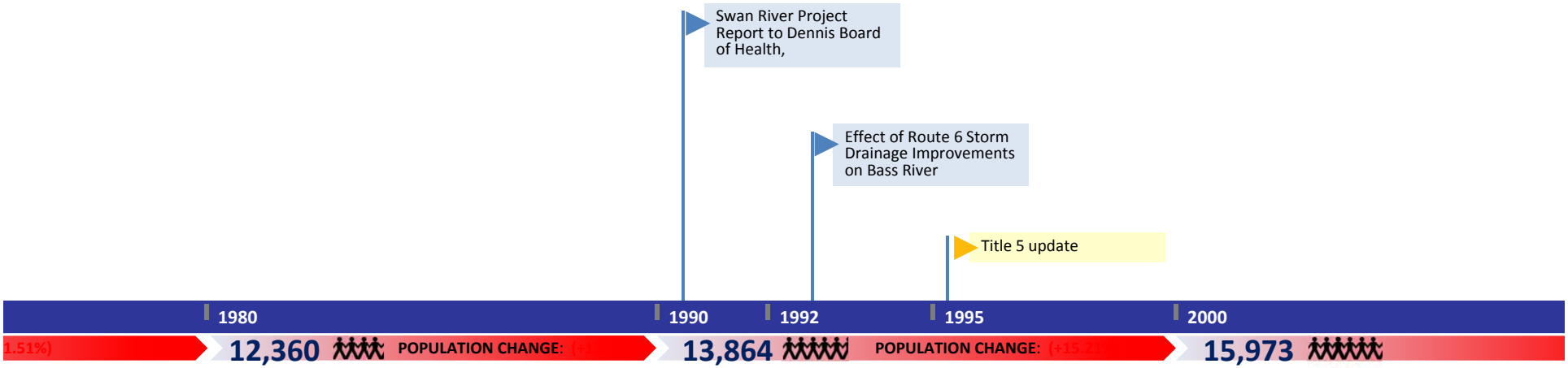
Dennis

From 1978 Section 208 Plan

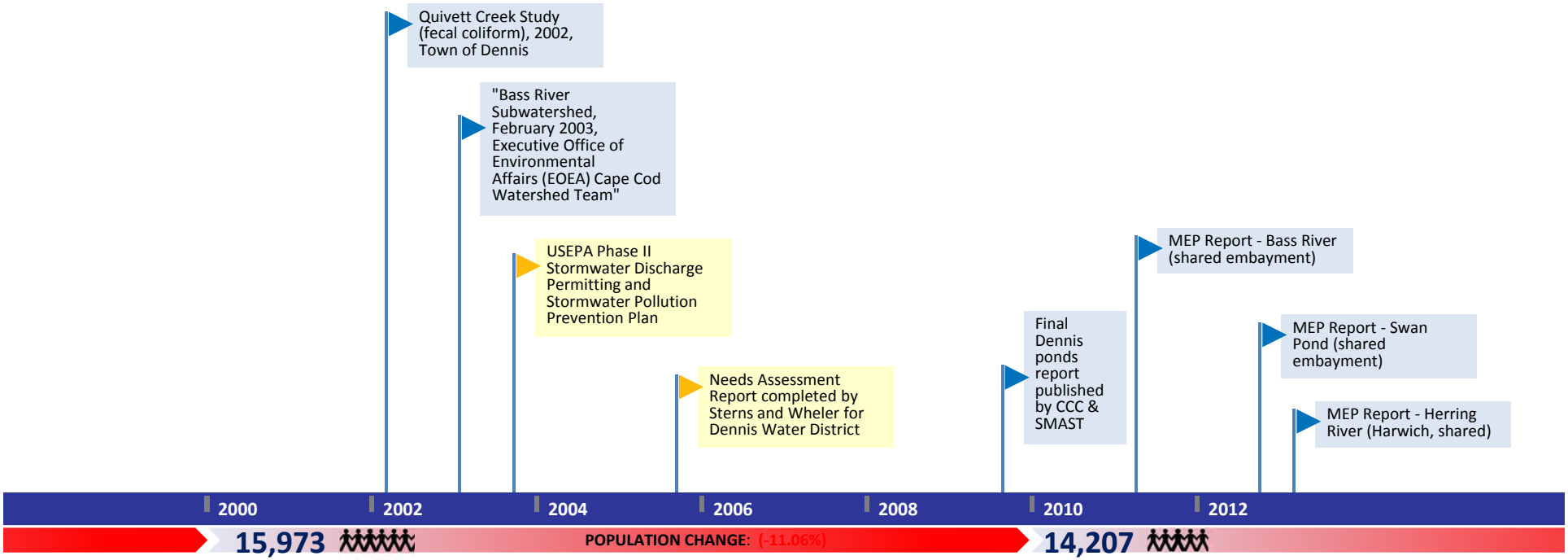
- Dennis has a professional health agent and the town's health regulations already implement many of the 208 plan recommendations.
- It is recommended that the town consider creating a "Seasonal Residential District" in the area south of Lower County Road and carefully control the conversion of seasonal 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



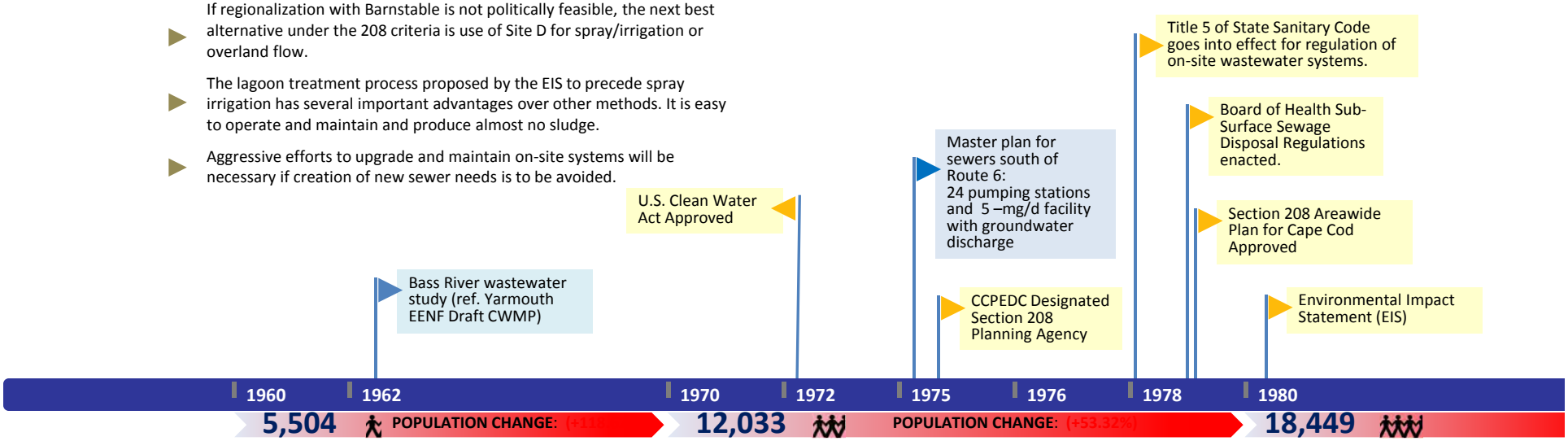
Dennis: 1970-2013



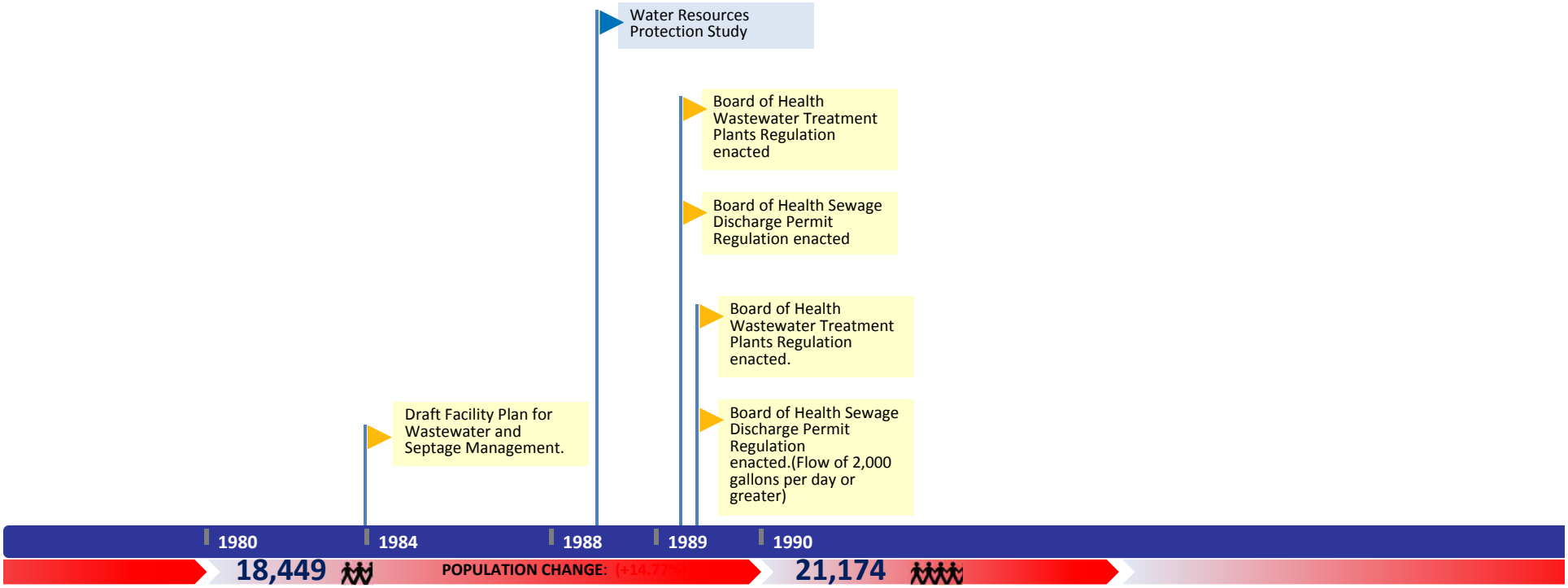
Yarmouth: 1960-2013

From 1978 Section 208 Plan

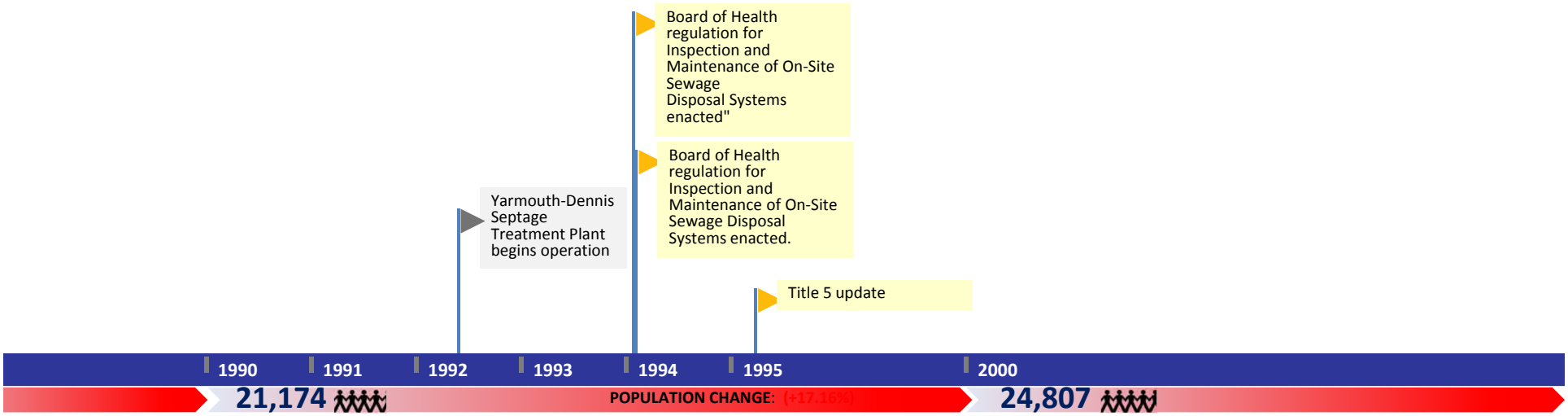
- The Wastewater management problems are reported to be severe in the commercial zone along Route 28. Water supply protection is also of critical concern to the town since development is rapidly encroaching upon existing and future wellfield areas.
- On-site system rehabilitation in problem areas is 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.



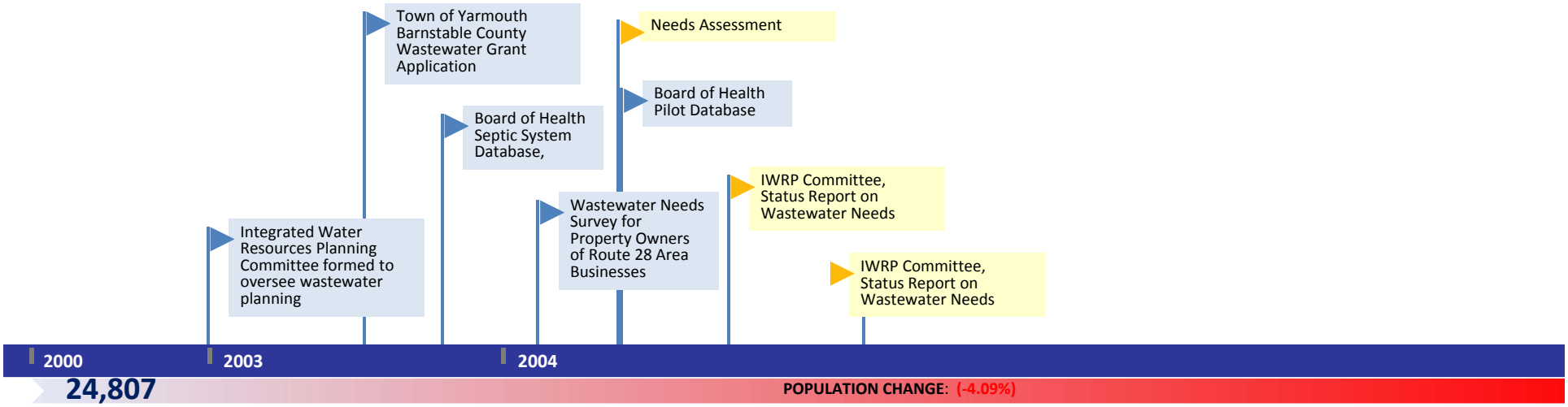
Yarmouth: 1960-2013



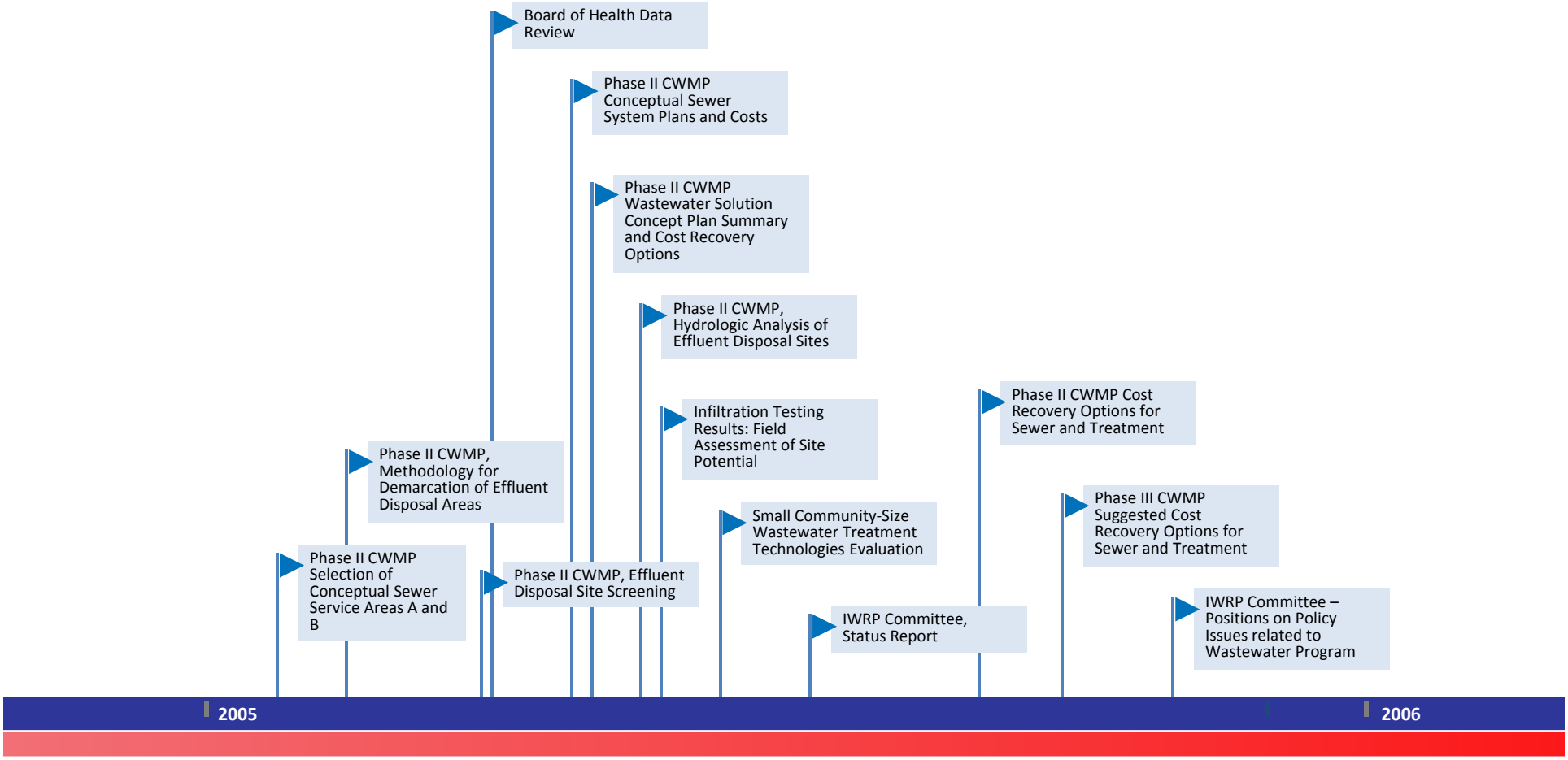
Yarmouth: 1960-2013



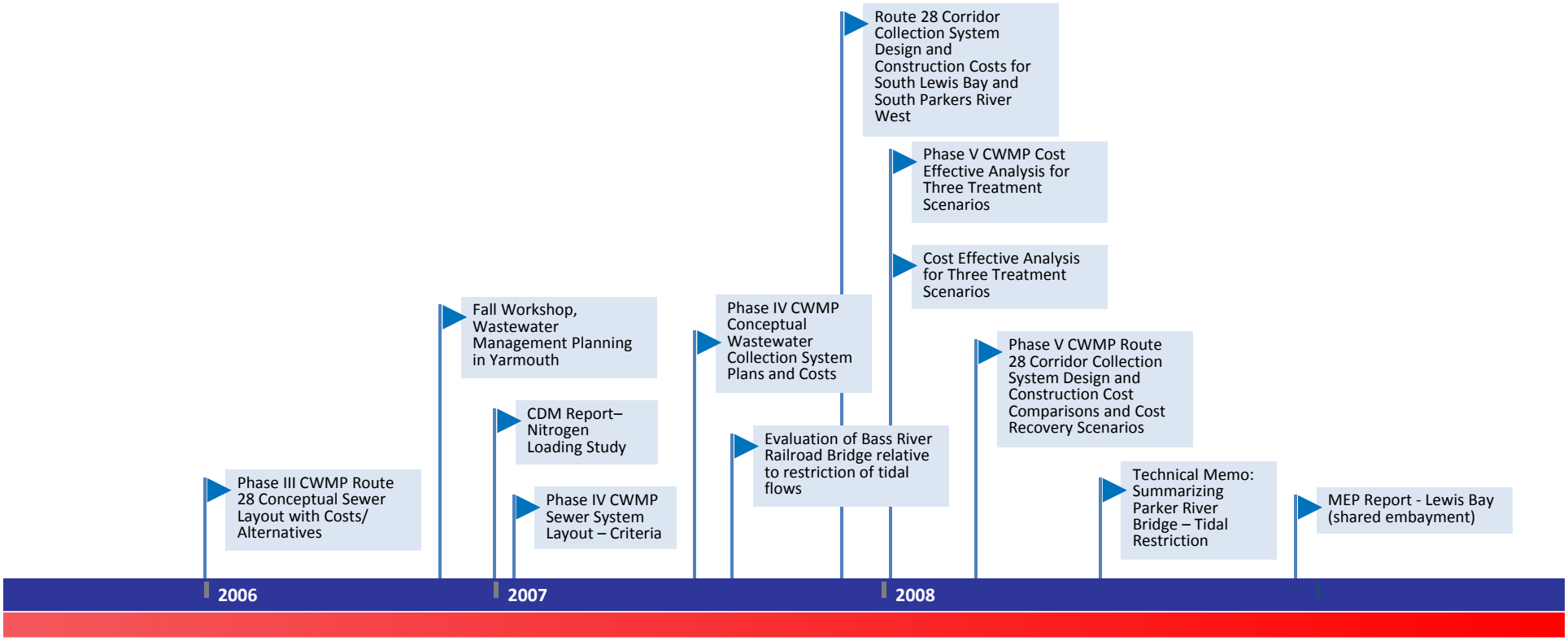
Yarmouth: 1960-2013



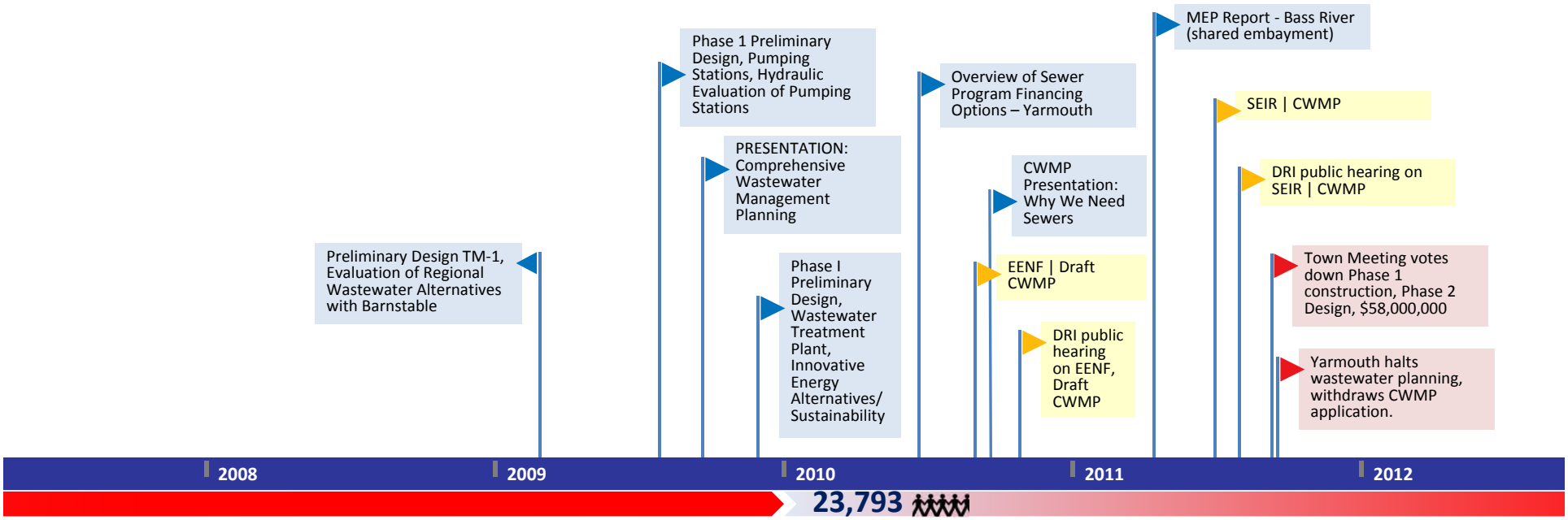
Yarmouth: 1960-2013



Yarmouth: 1960-2013



Yarmouth: 1960-2013

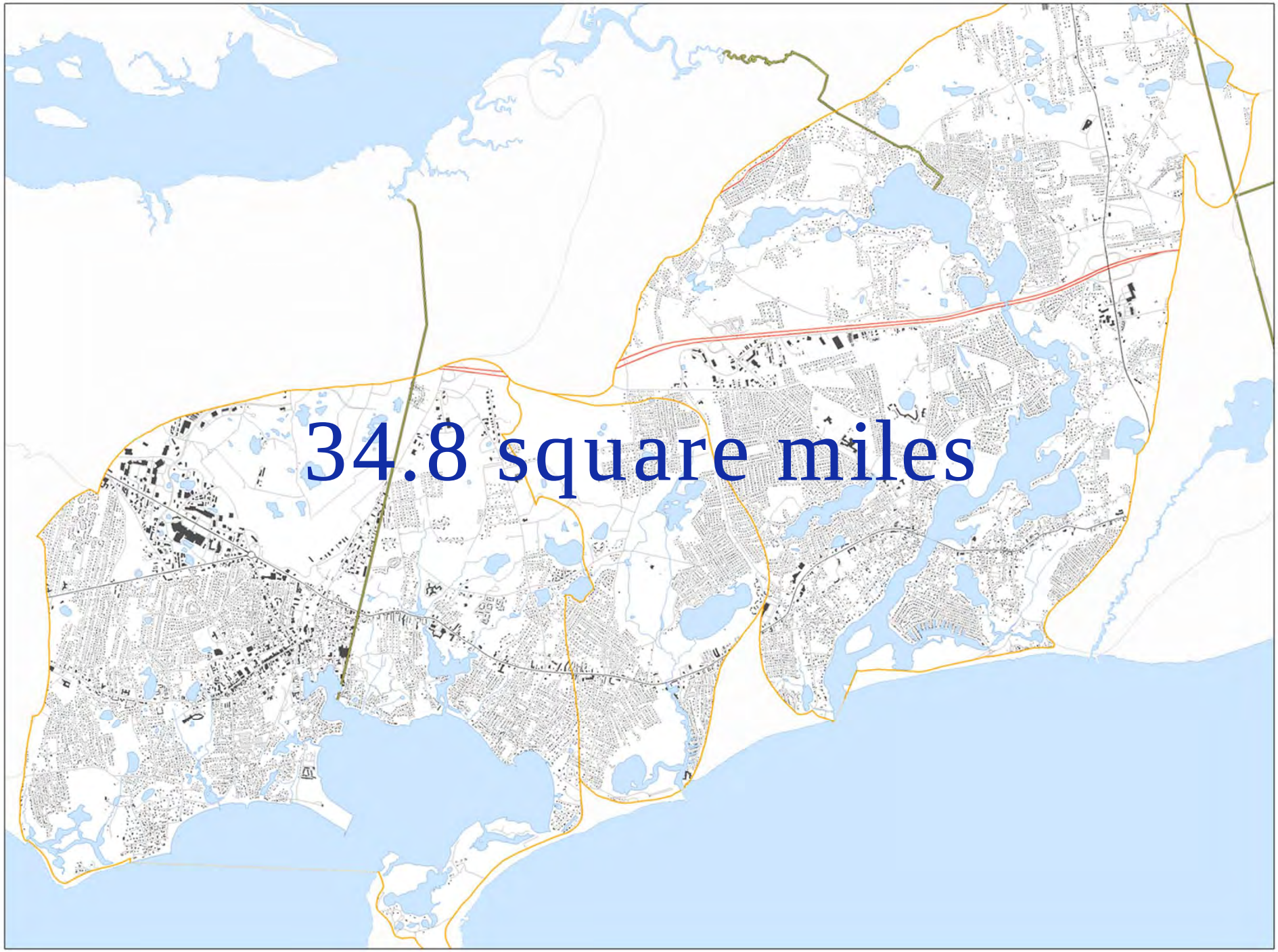


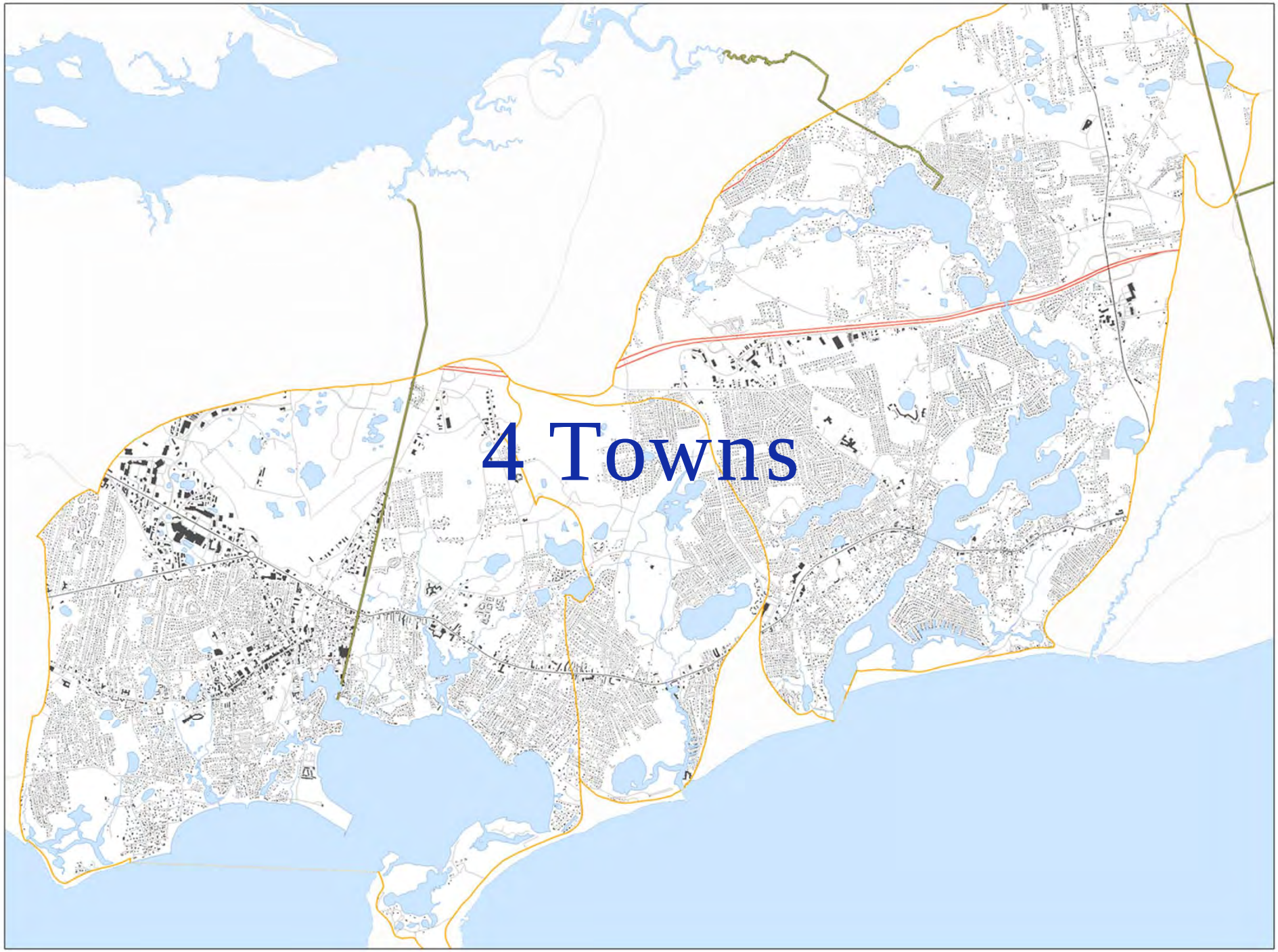
POPULATION: 23,793
(-4.09%)

Did we miss anything?

Your Watersheds

Bass River
Lewis Bay
Parkers River


34.8 square miles


4 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 Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

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 Golf Course Managed Lawns
- Approximate Municipal Managed Lawns

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

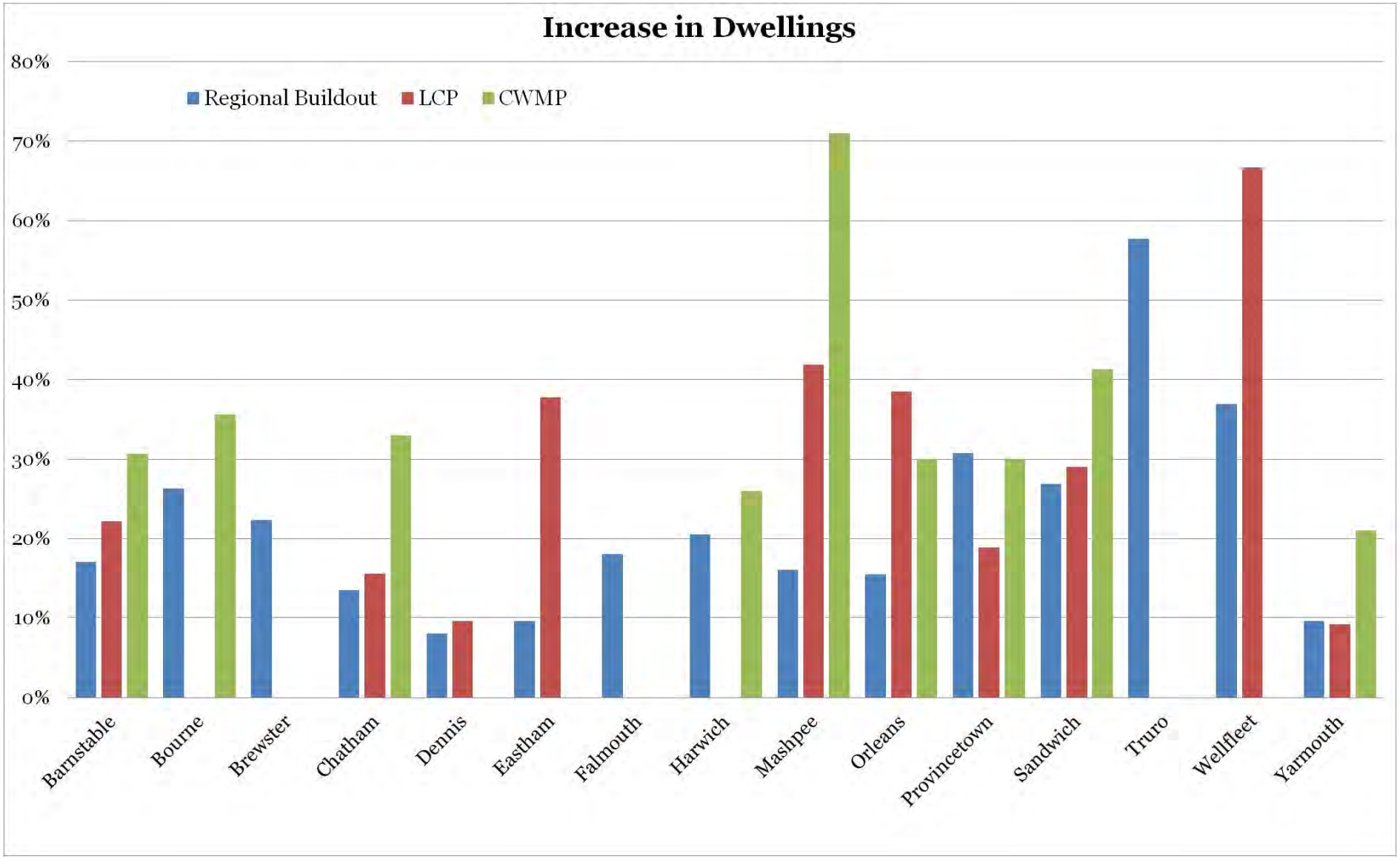
Sources: MassGIS, MassDOT

Density

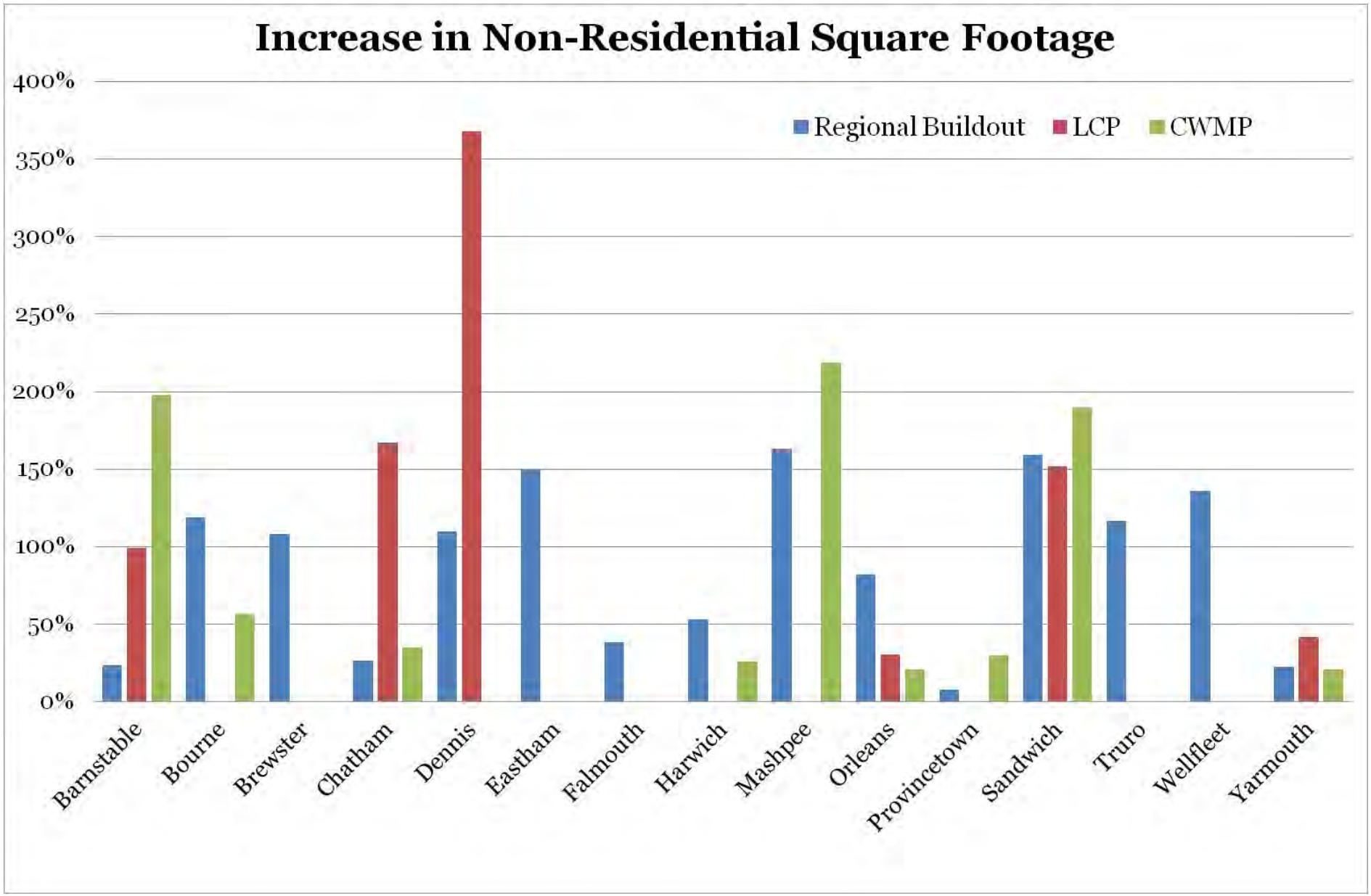
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

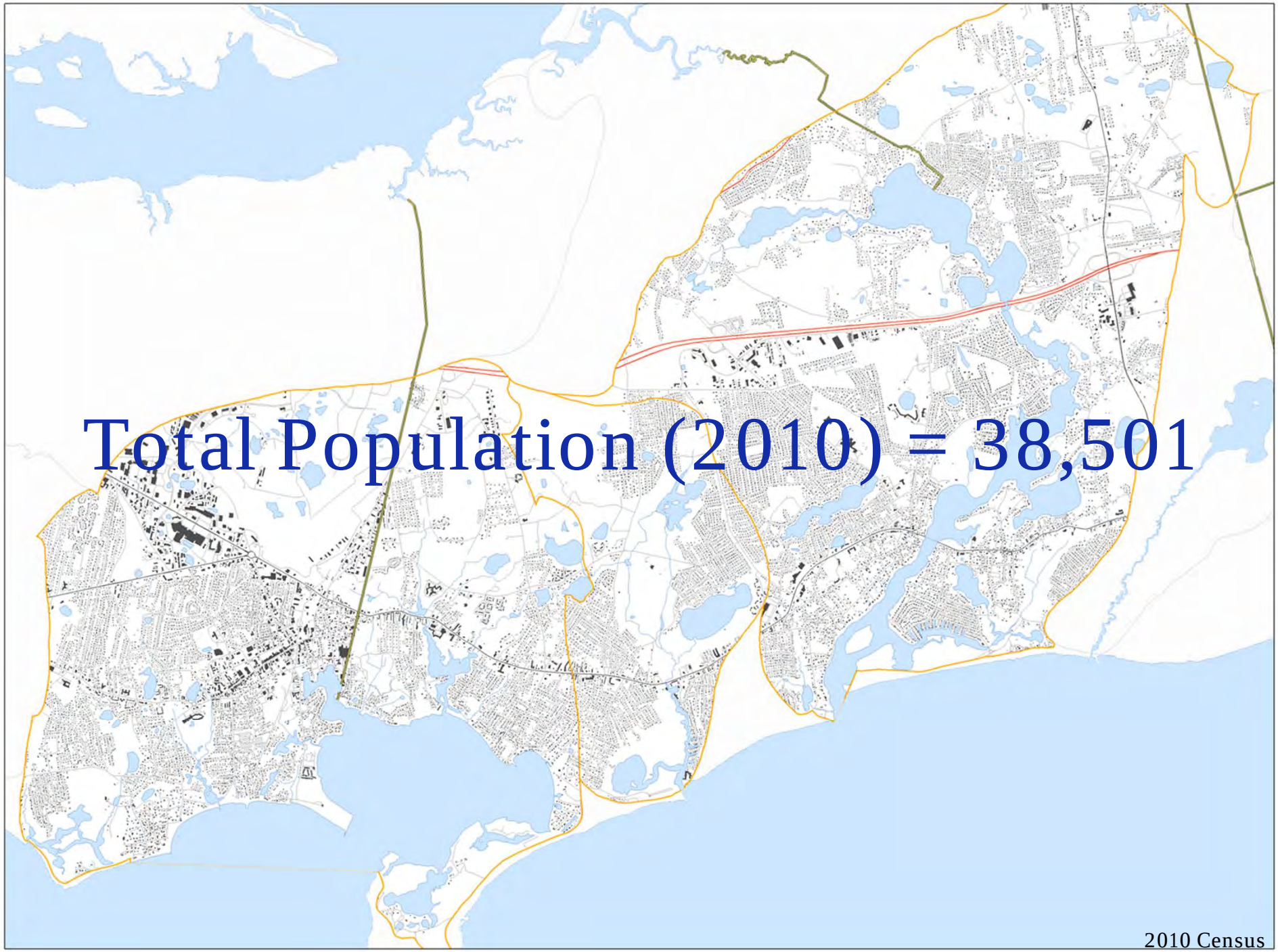

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout

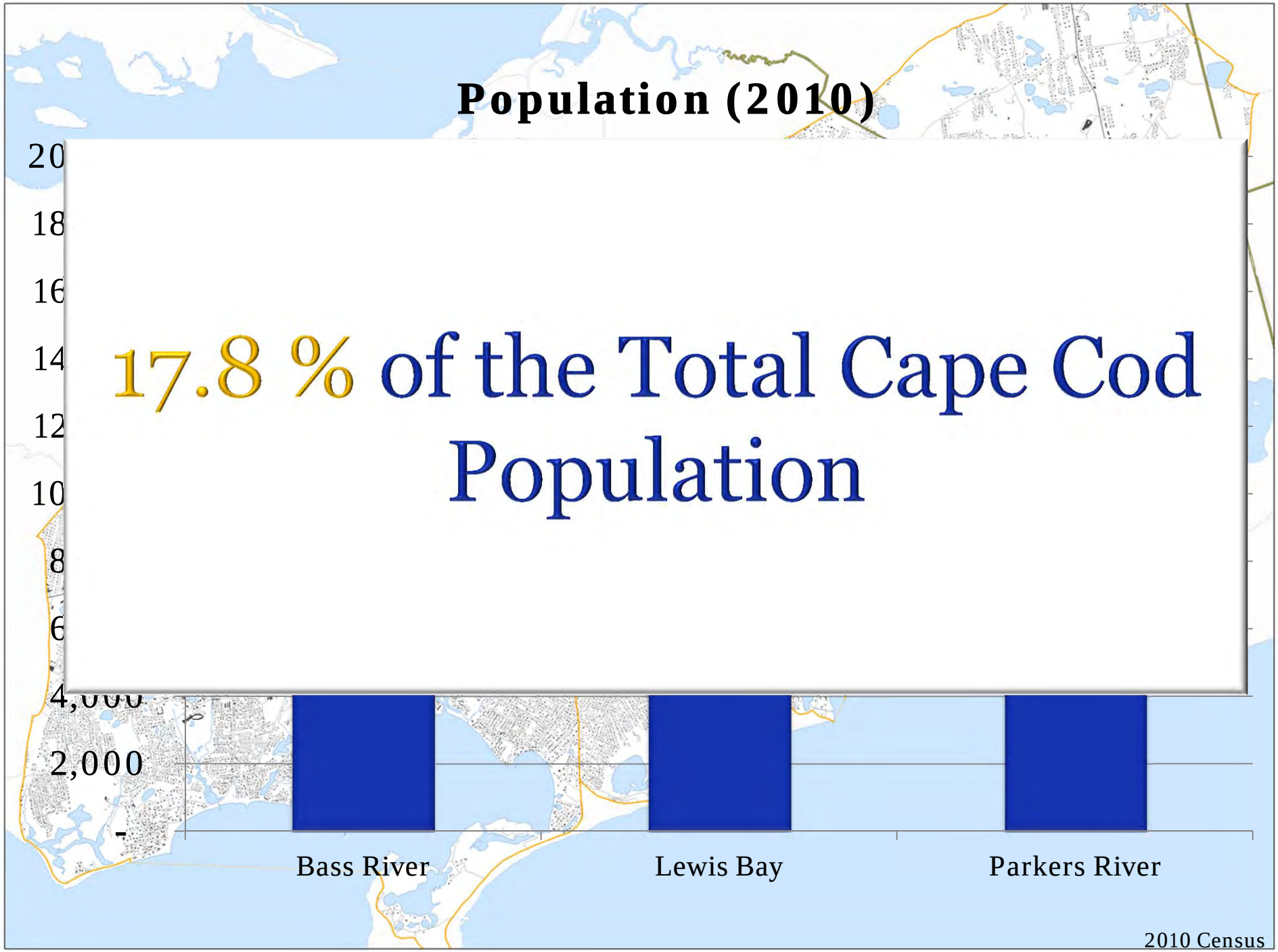

Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

The People

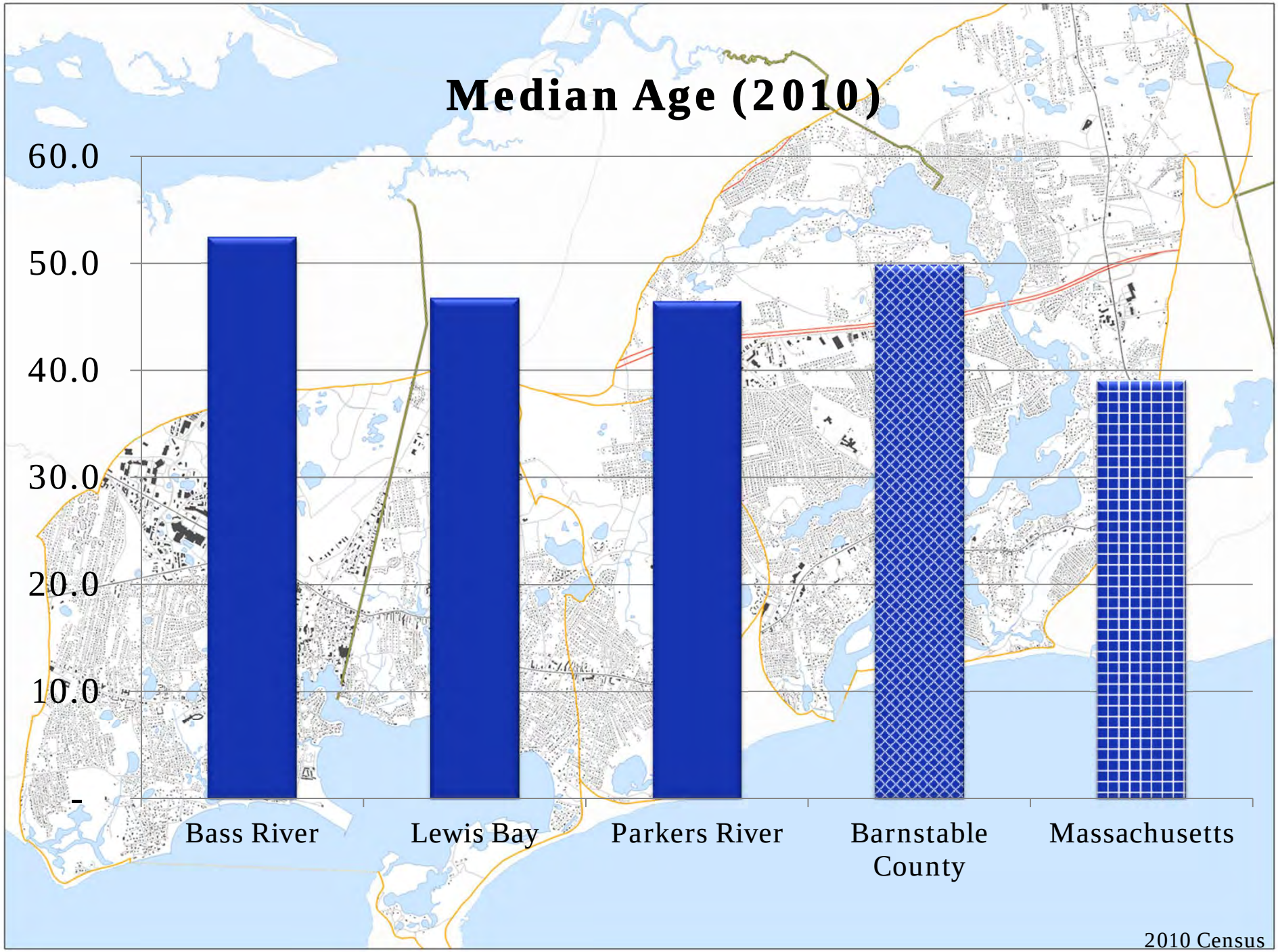
Bass River
Lewis Bay
Parkers River

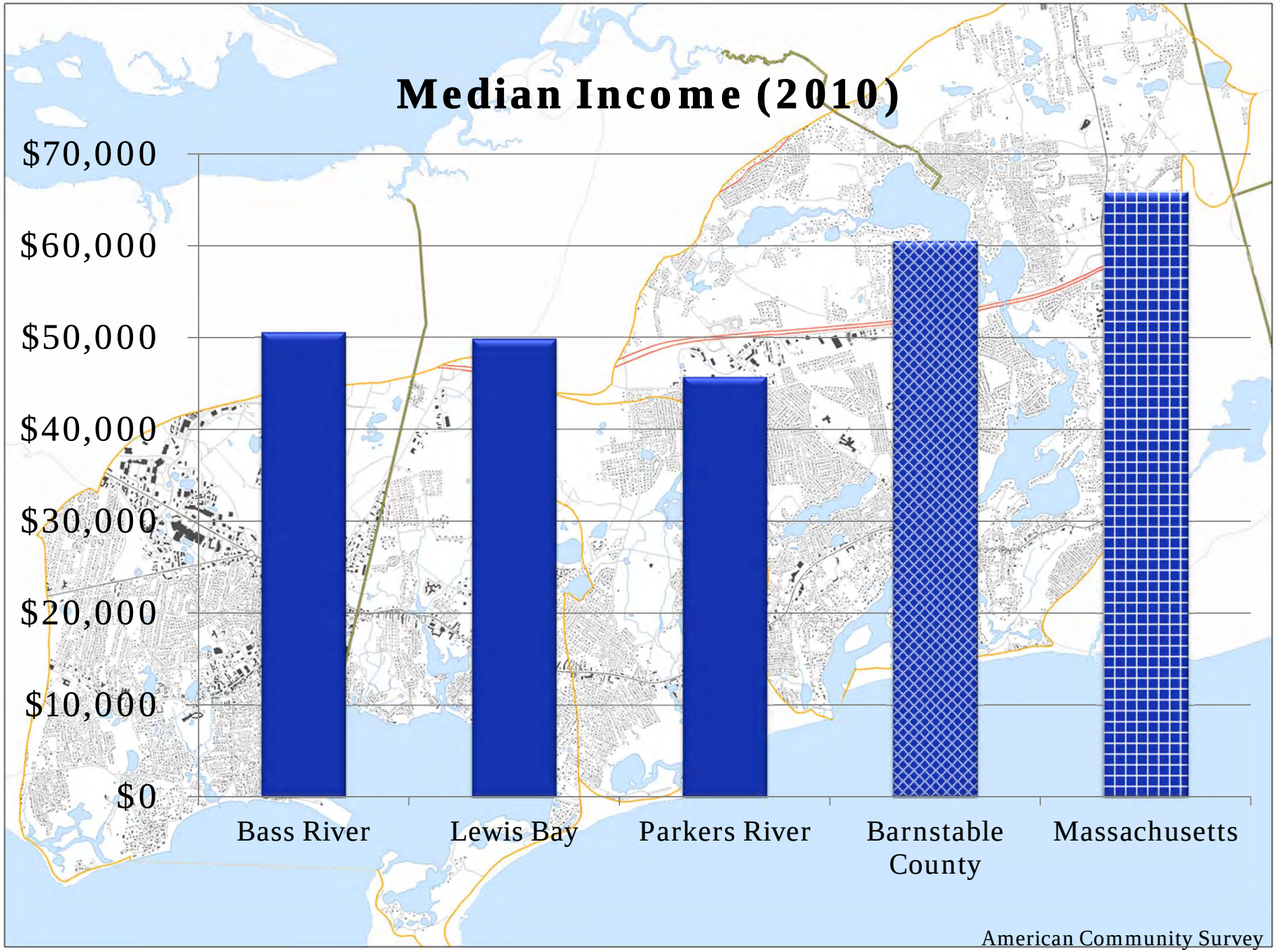

Total Population (2010) = 38,501
2010 Census

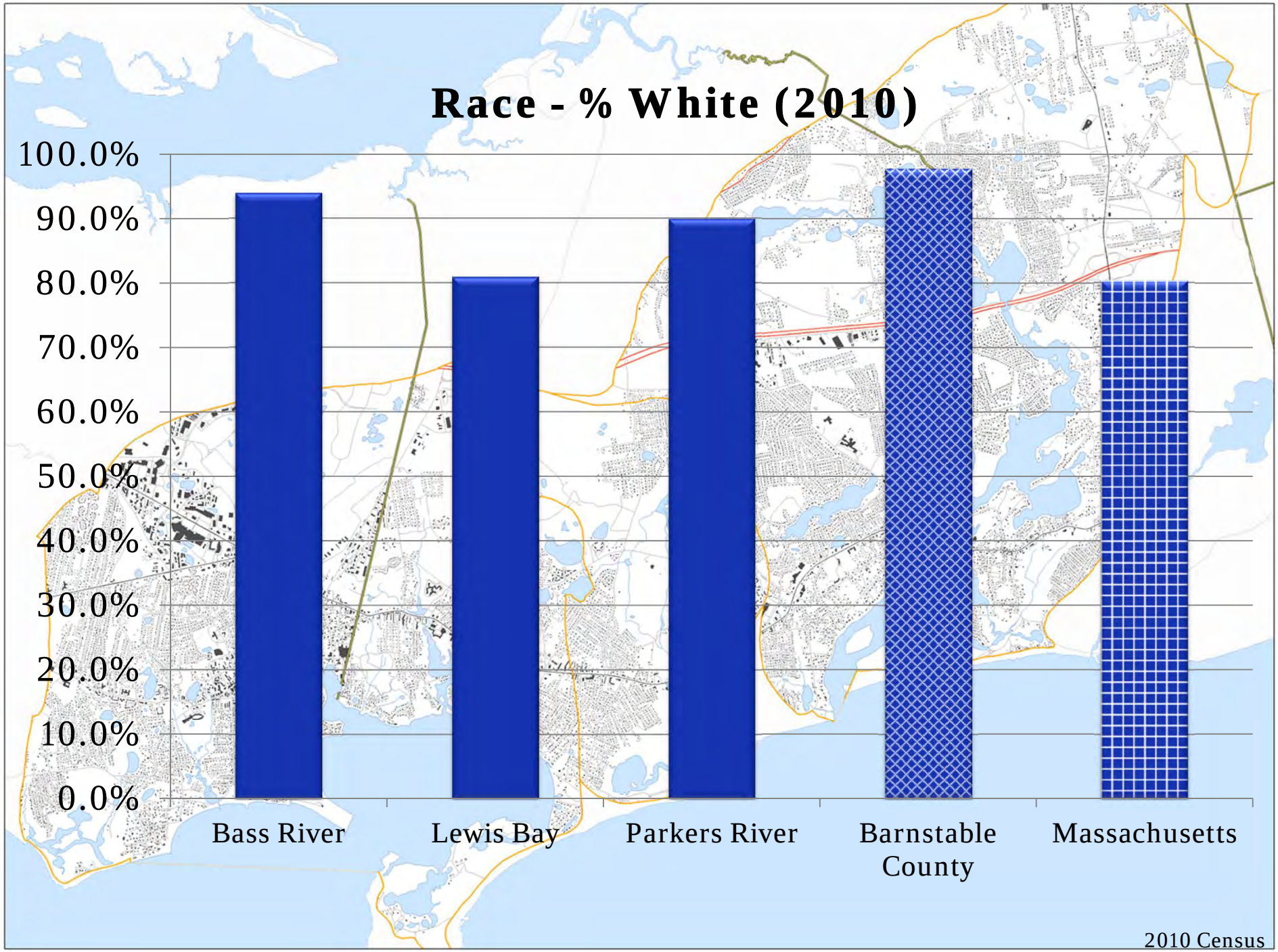
Population (2010)

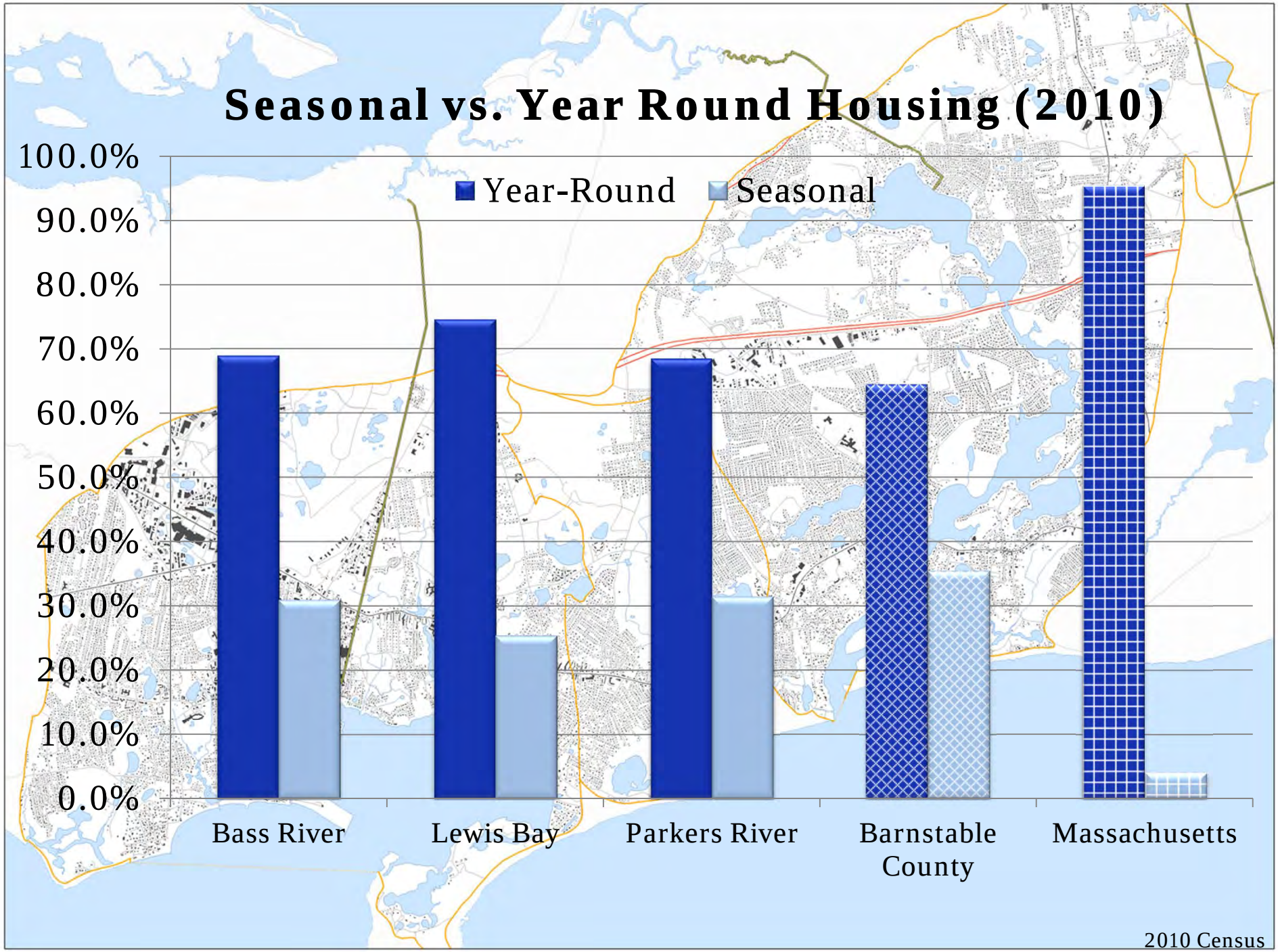


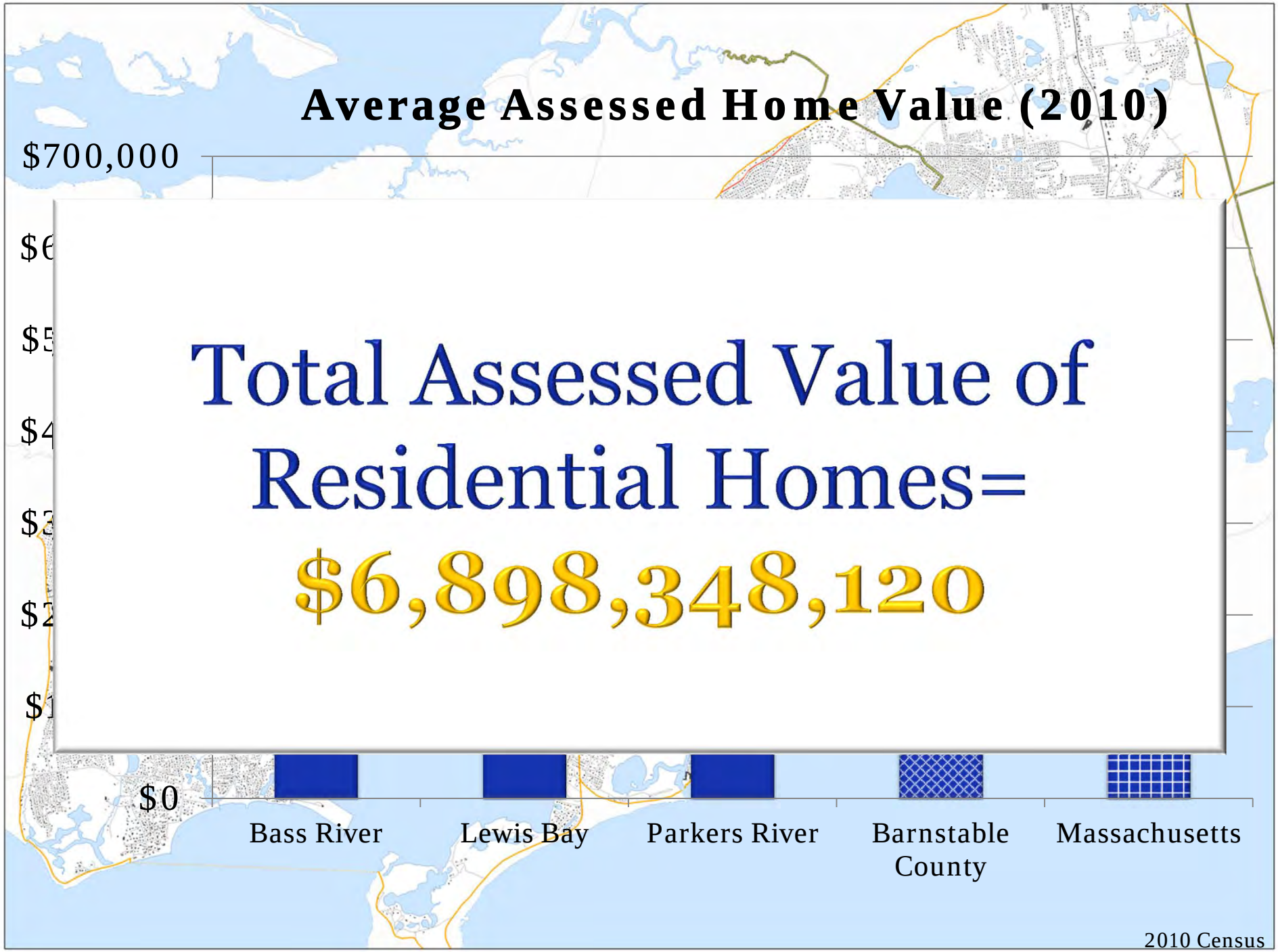
17.8 % of the Total Cape Cod Population


Median Age (2010)
60.0
50.0
40.0
30.0
20.0
10.0
-
Bass River
Lewis Bay
Parkers River
Barnstable County
Massachusetts
2010 Census


Median Income (2010)
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Bass River
Lewis Bay
Parkers River
Barnstable County
Massachusetts
American Community Survey

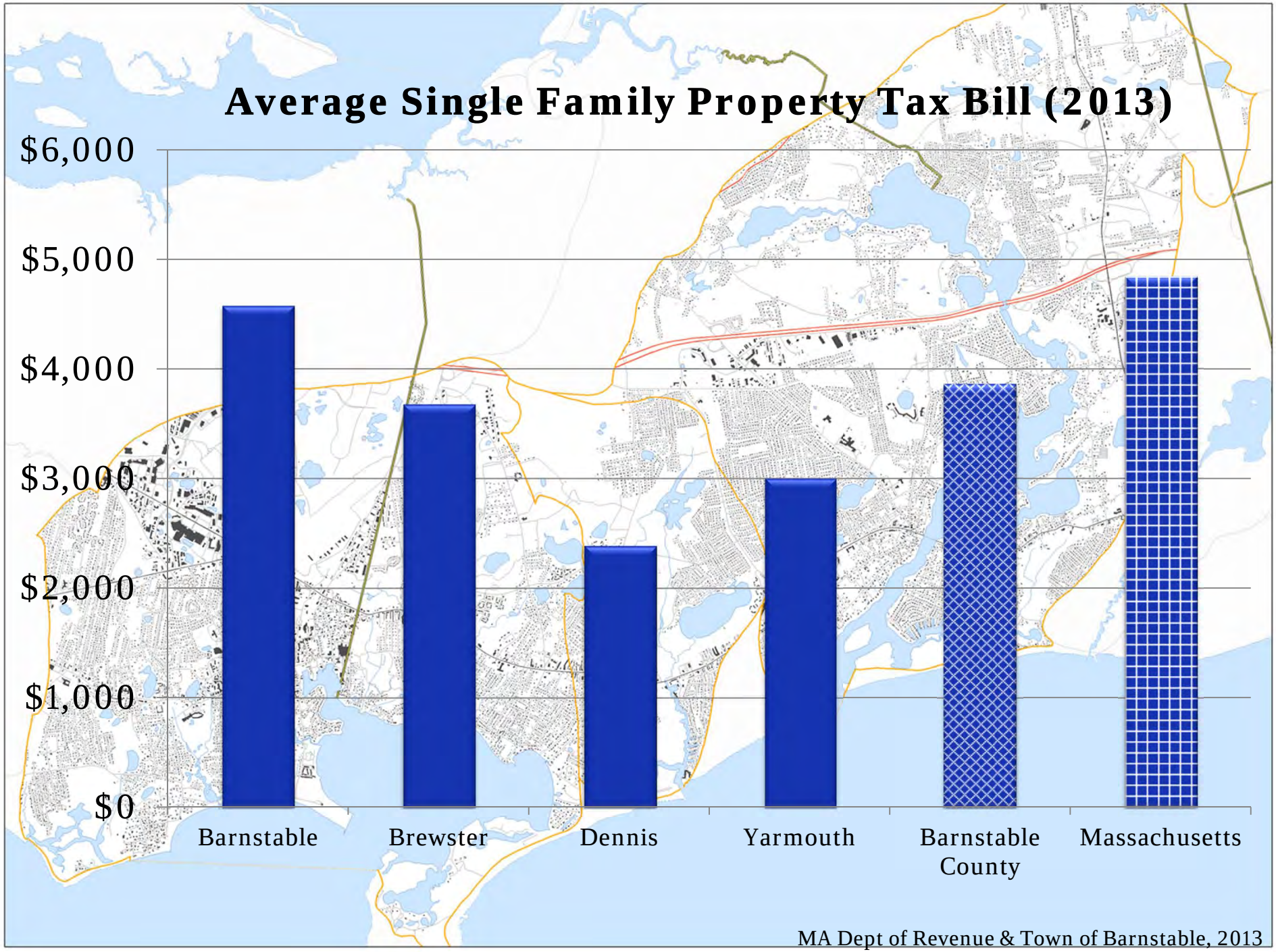

Race - % White (2010)
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Bass River
Lewis Bay
Parkers River
Barnstable County
Massachusetts
2010 Census

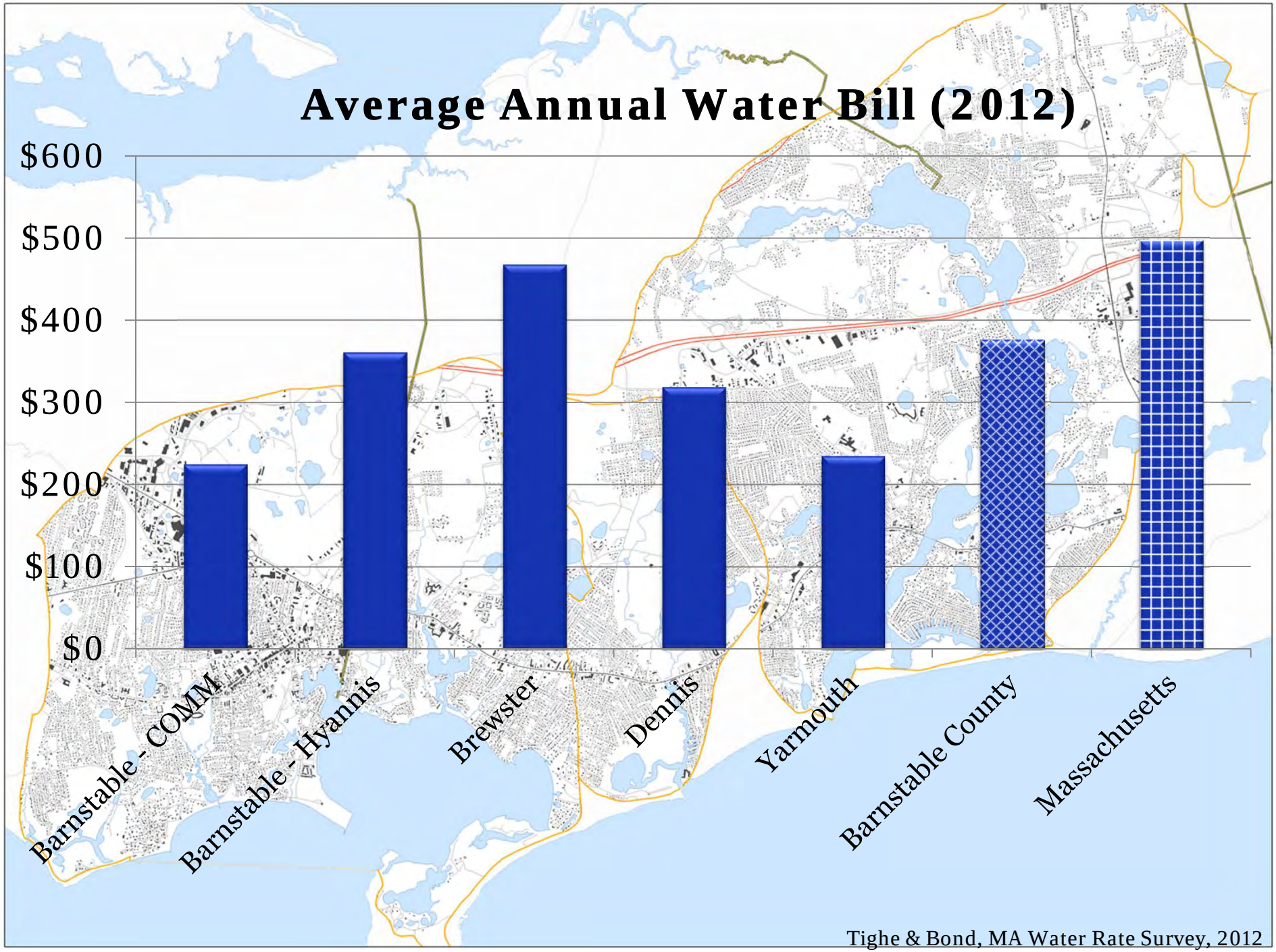

Seasonal vs. Year Round Housing (2010)
Year-Round
Seasonal
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Bass River
Lewis Bay
Parkers River
Barnstable County
Massachusetts
2010 Census

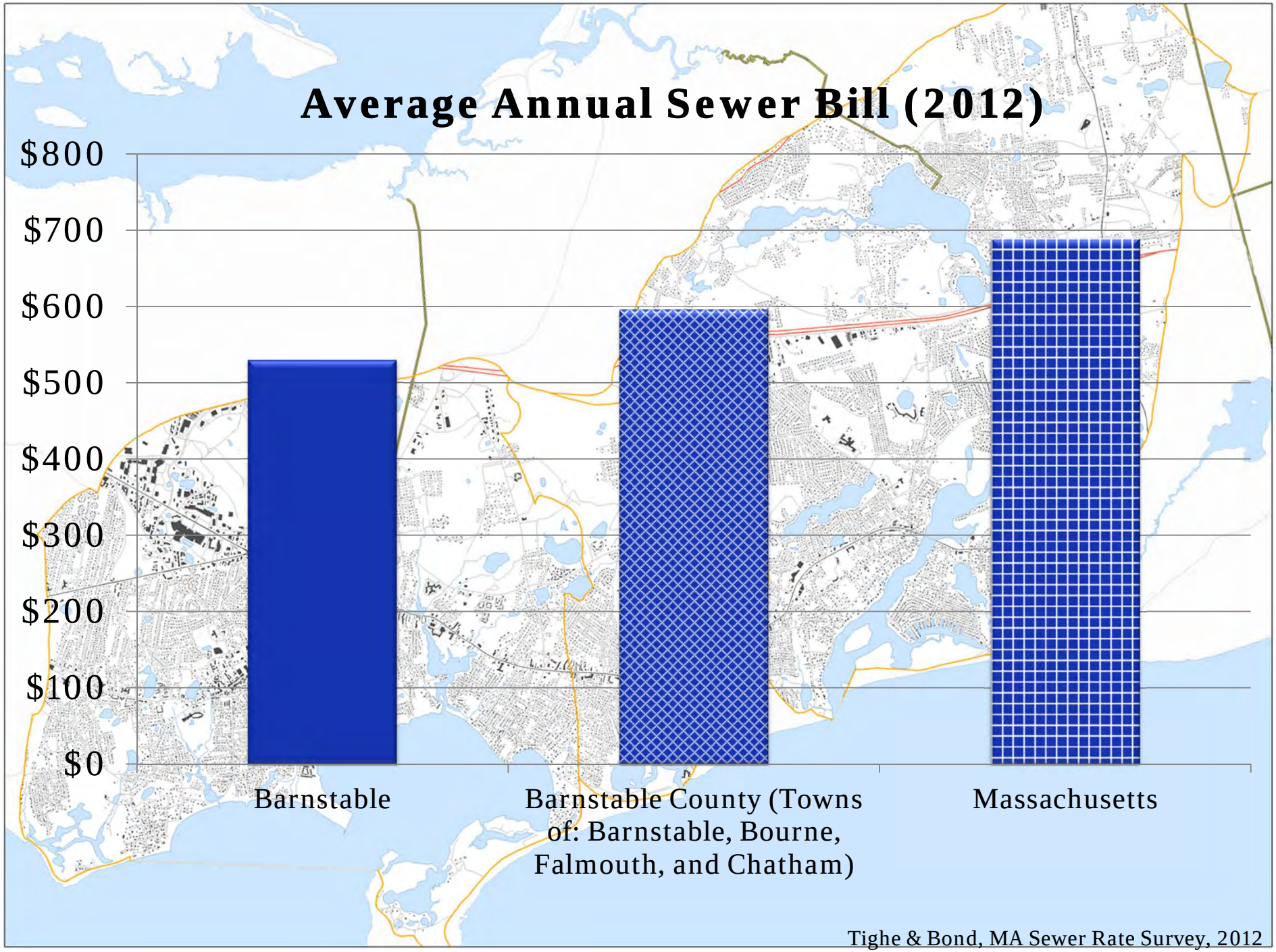

Average Assessed Home Value (2010)
$700,000
$0
Total Assessed Value of Residential Homes=
$6,898,348,120
Bass River
Lewis Bay
Parkers River
Barnstable County
Massachusetts
2010 Census

Your Government & Taxes

Bass River
Lewis Bay
Parkers River


Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Barnstable
Brewster
Dennis
Yarmouth
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013

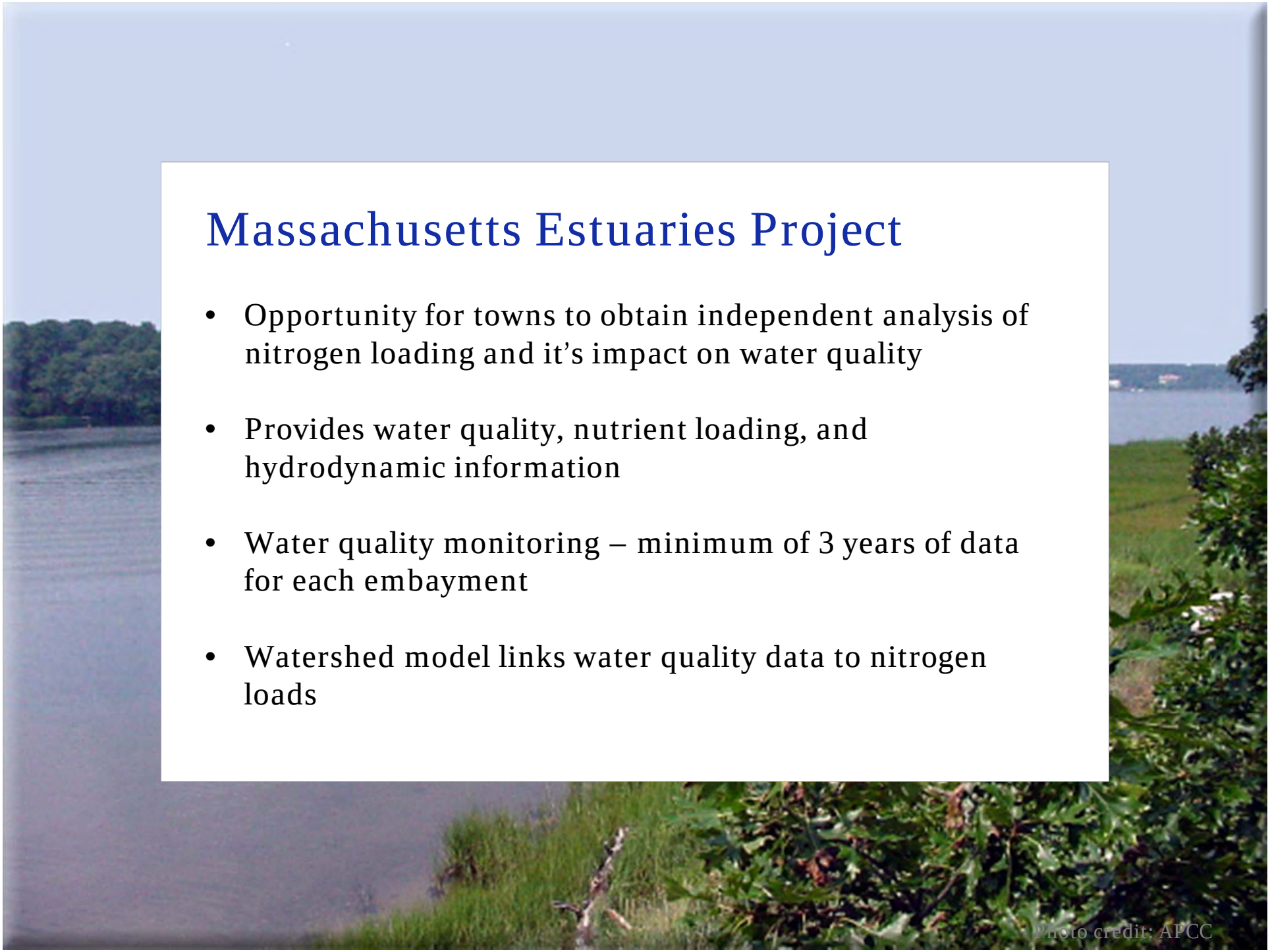

Average Annual Water Bill (2012)
$600
$500
$400
$300
$200
$100
$0
Barnstable - COMM
Barnstable - Hyannis
Brewster
Dennis
Yarmouth
Barnstable County
Massachusetts
Tighe & Bond, MA Water Rate Survey, 2012


Average Annual Sewer Bill (2012)
$800
$700
$600
$500
$400
$300
$200
$100
$0
Barnstable
Barnstable County (Towns of: Barnstable, Bourne, Falmouth, and Chatham)
Massachusetts
Tighe & Bond, MA Sewer Rate Survey, 2012

The Problem

Bass River
Lewis Bay
Parkers River

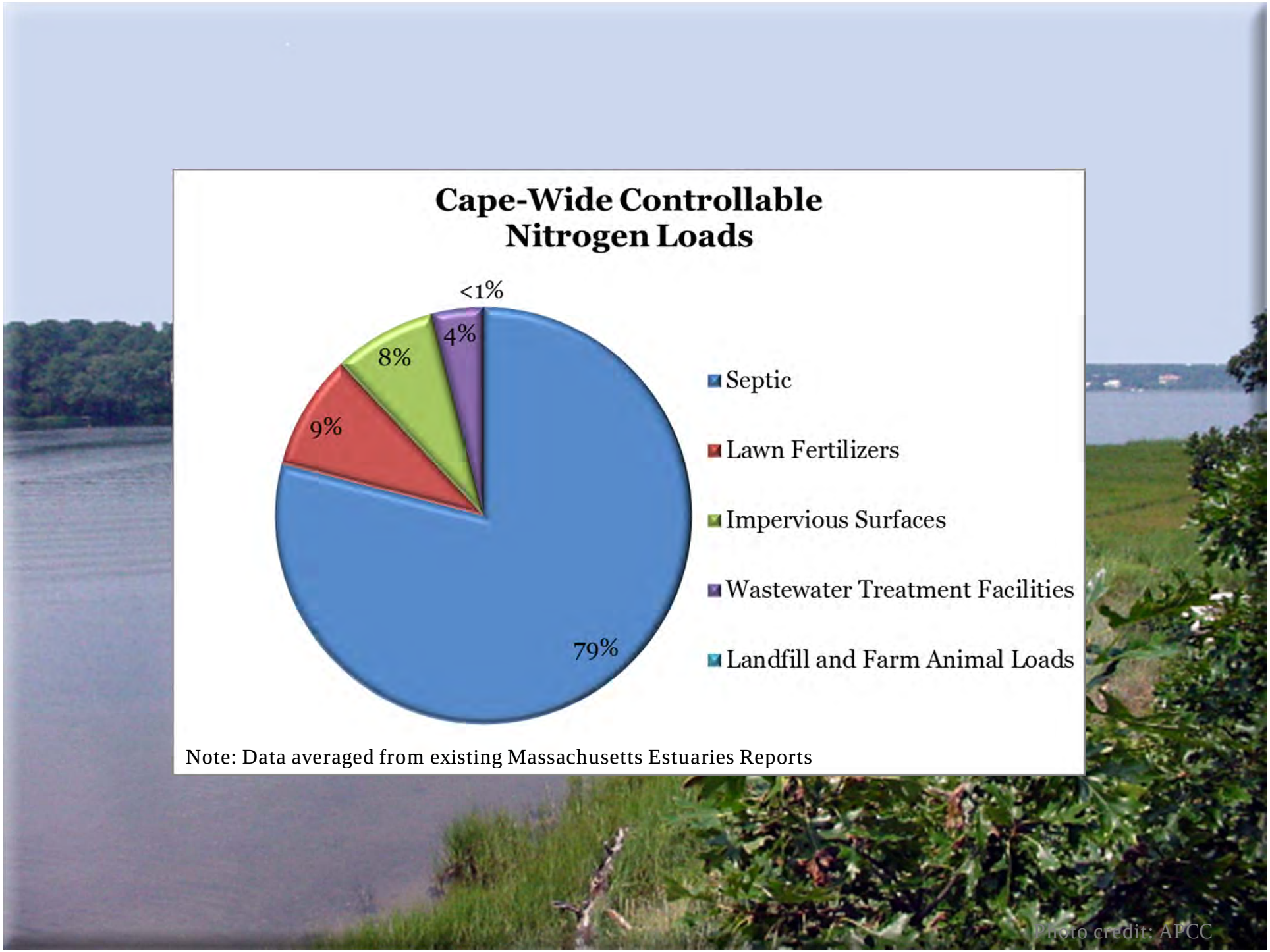

Photo credit: APCC



Massachusetts Estuaries Project

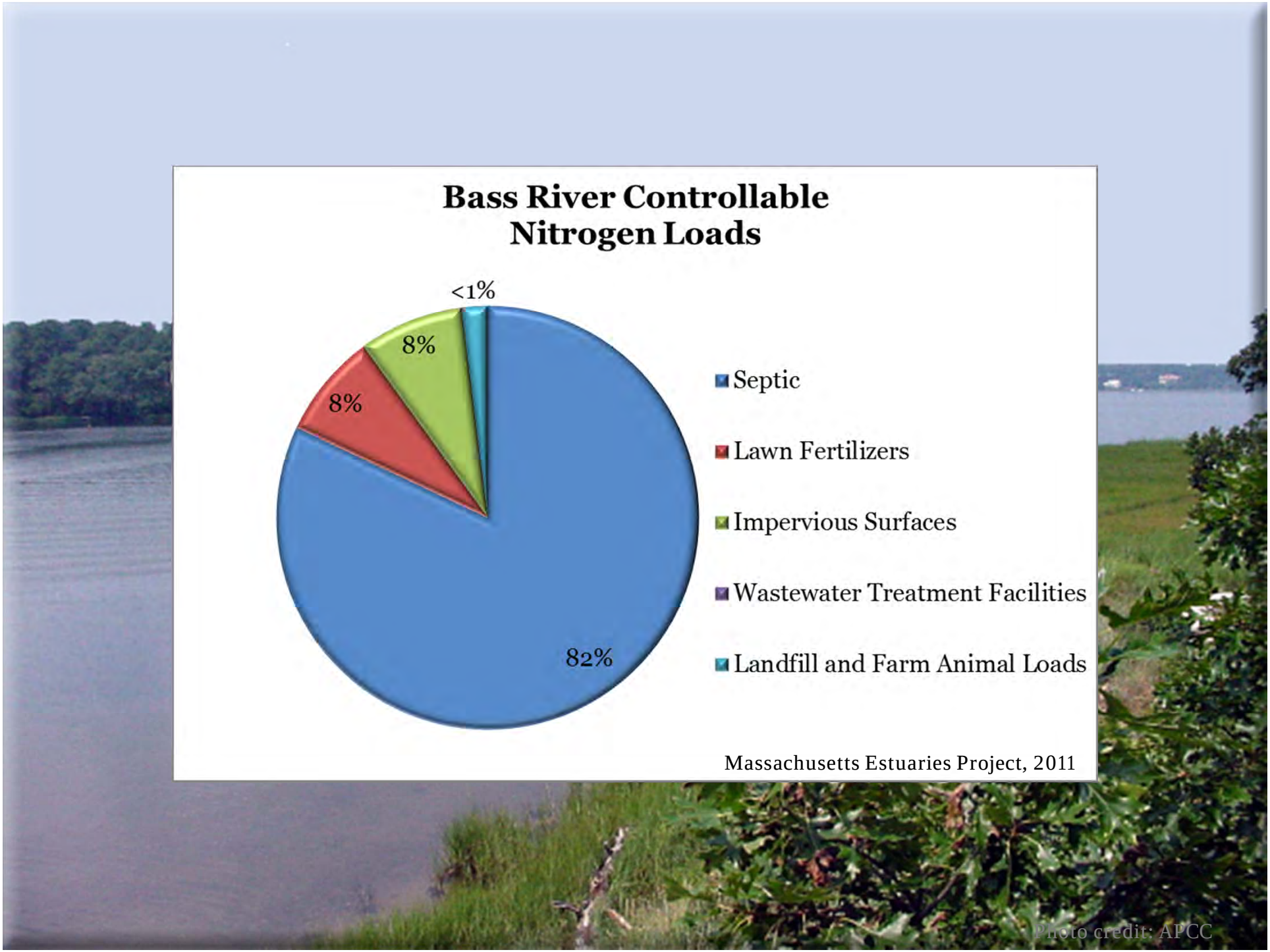
- Opportunity for towns to obtain independent analysis of nitrogen loading and it's impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

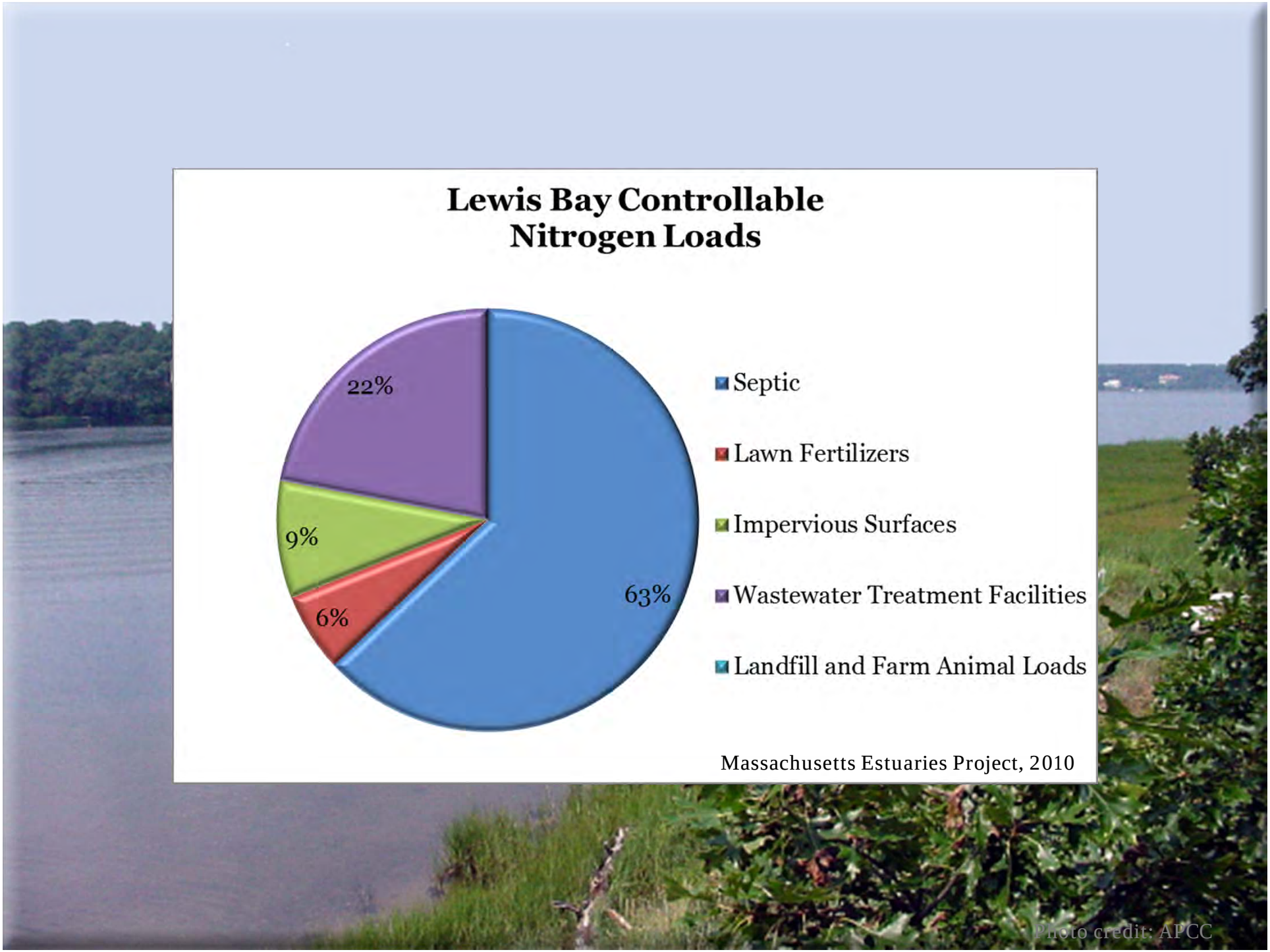
Photo credit: APCC

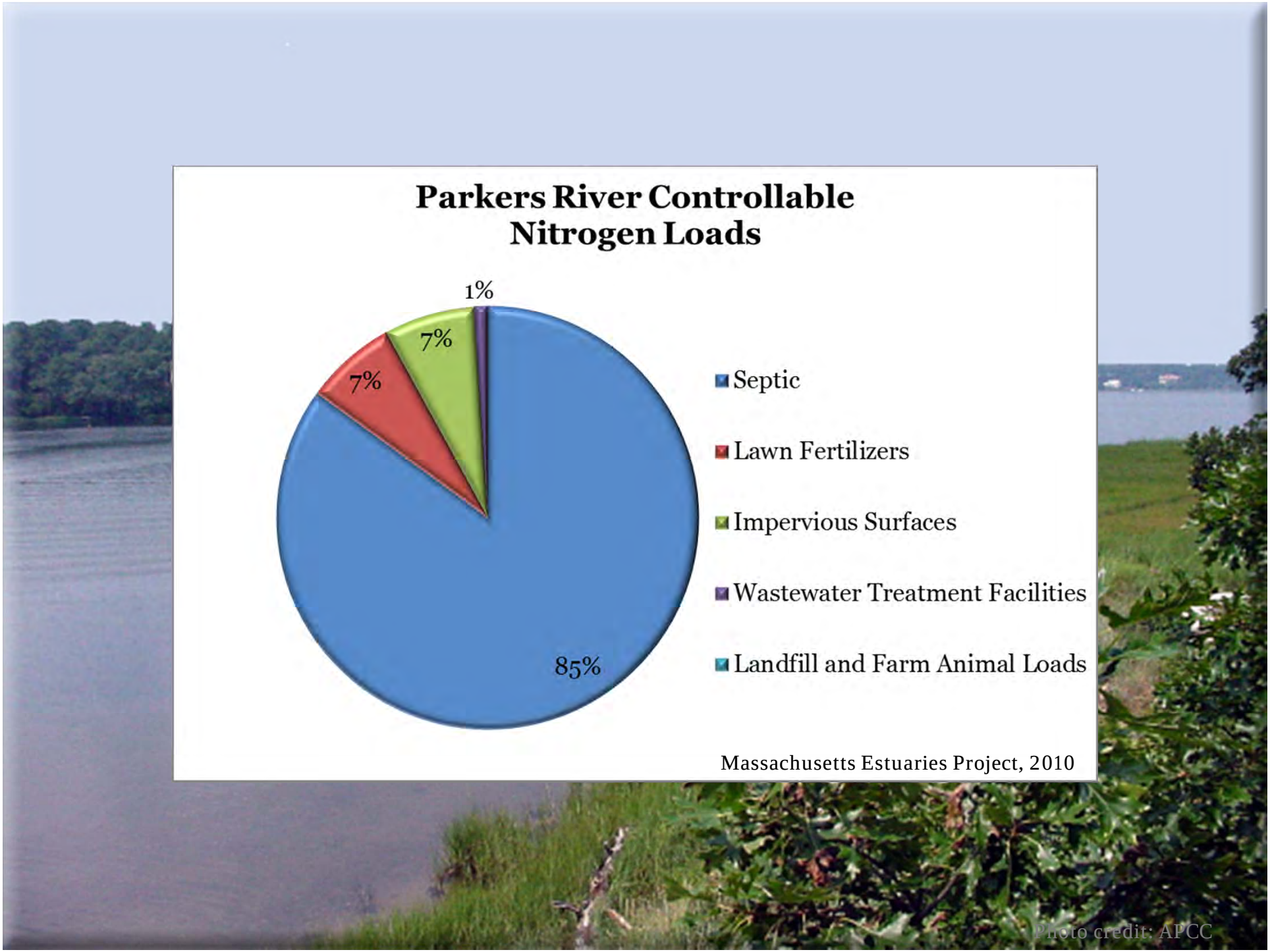


Note: Data averaged from existing Massachusetts Estuaries Reports

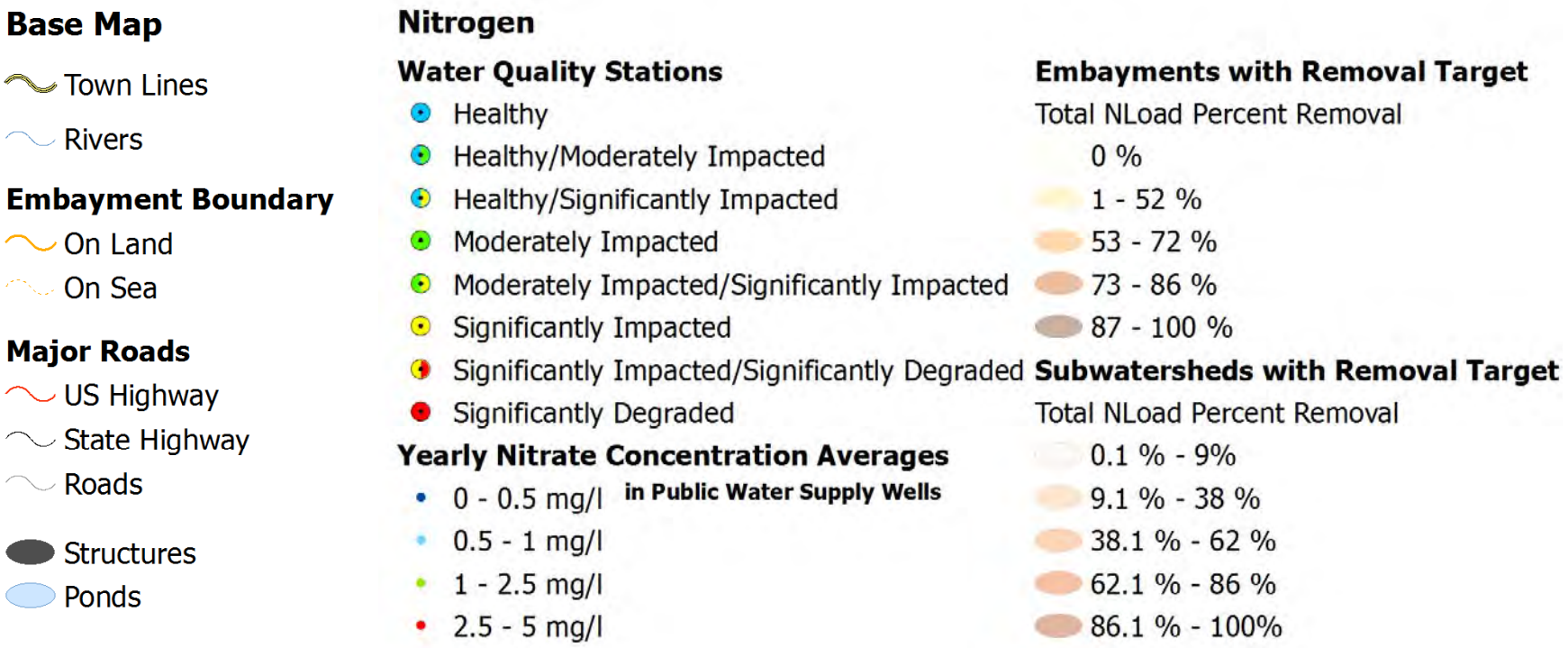
Photo credit: APCC


Bass River Controllable Nitrogen Loads
<1%
8%
8%
82%
Septic
Lawn Fertilizers
Impervious Surfaces
Wastewater Treatment Facilities
Landfill and Farm Animal Loads
Massachusetts Estuaries Project, 2011
Photo credit: APCC

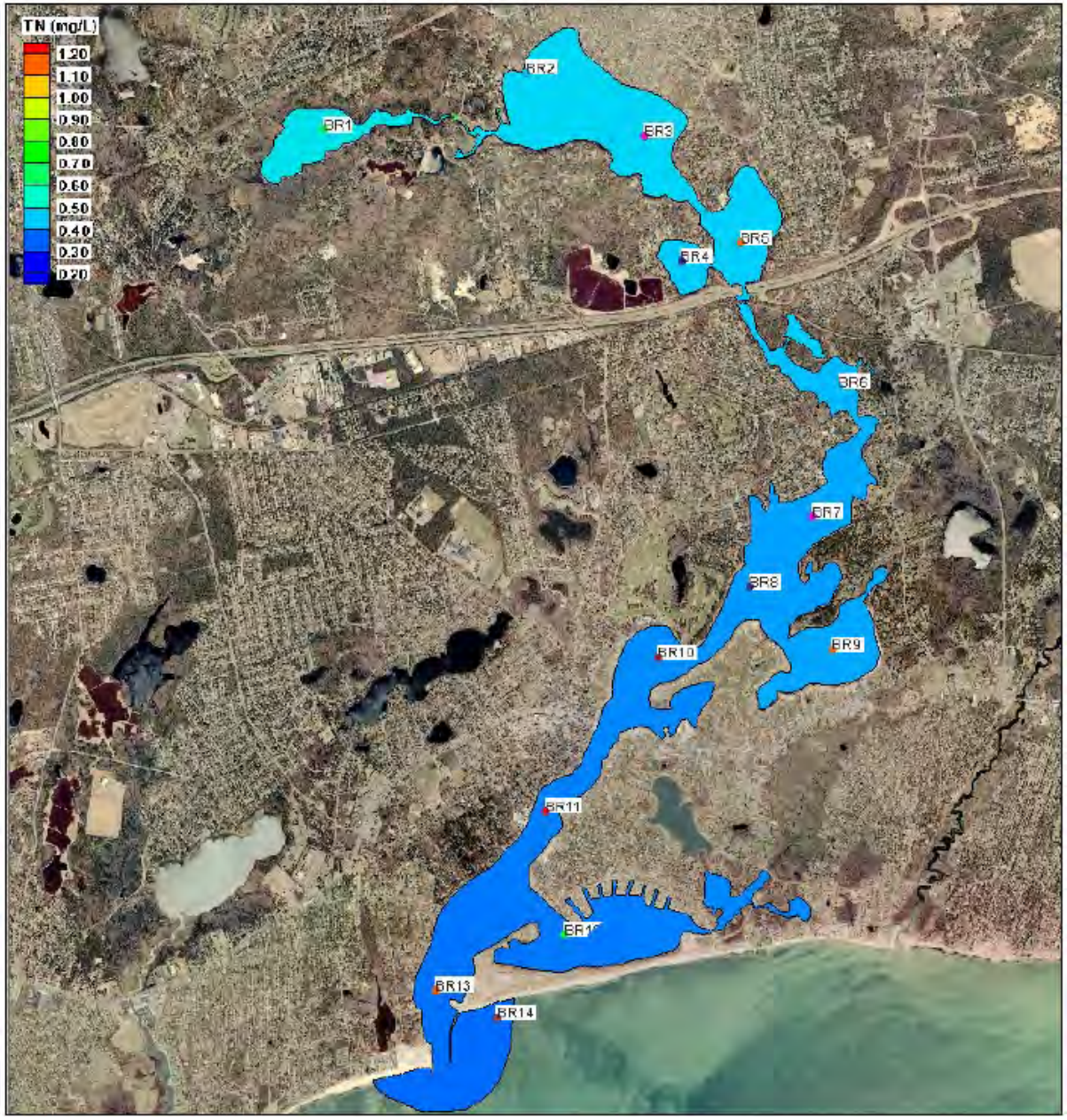

Lewis Bay Controllable Nitrogen Loads
22%
9%
6%
63%
Septic
Lawn Fertilizers
Impervious Surfaces
Wastewater Treatment Facilities
Landfill and Farm Animal Loads
Massachusetts Estuaries Project, 2010
Photo credit: APCC


Parkers River Controllable Nitrogen Loads
1%
7%
7%
85%
Septic
Lawn Fertilizers
Impervious Surfaces
Wastewater Treatment Facilities
Landfill and Farm Animal Loads
Massachusetts Estuaries Project, 2010
Photo credit: APCC

Nitrogen Problem



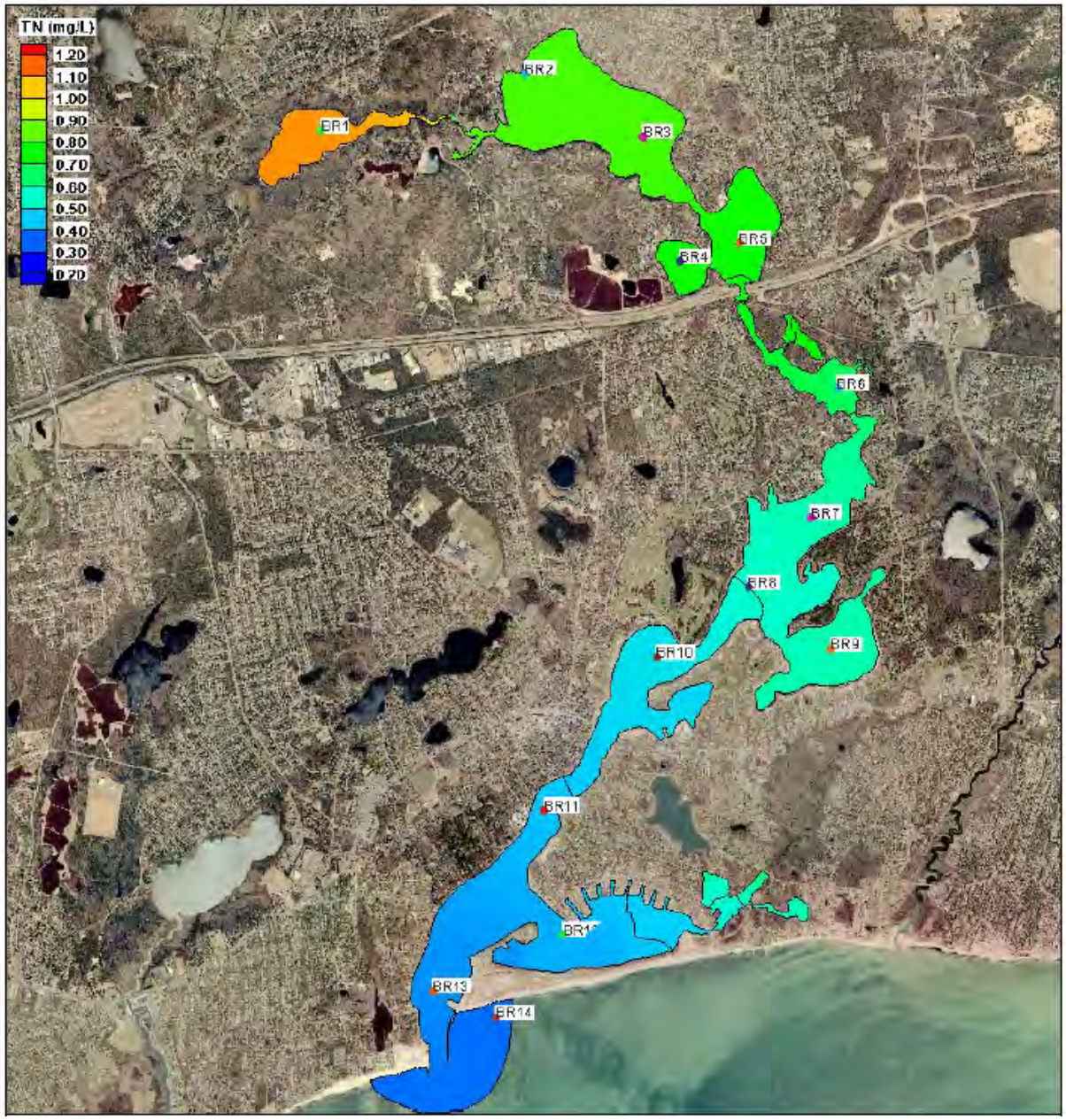
Sources: MassGIS, MEP, CCC



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Bass River System, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Bass River System (BR7) is shown.

(Source: MEP 2011)

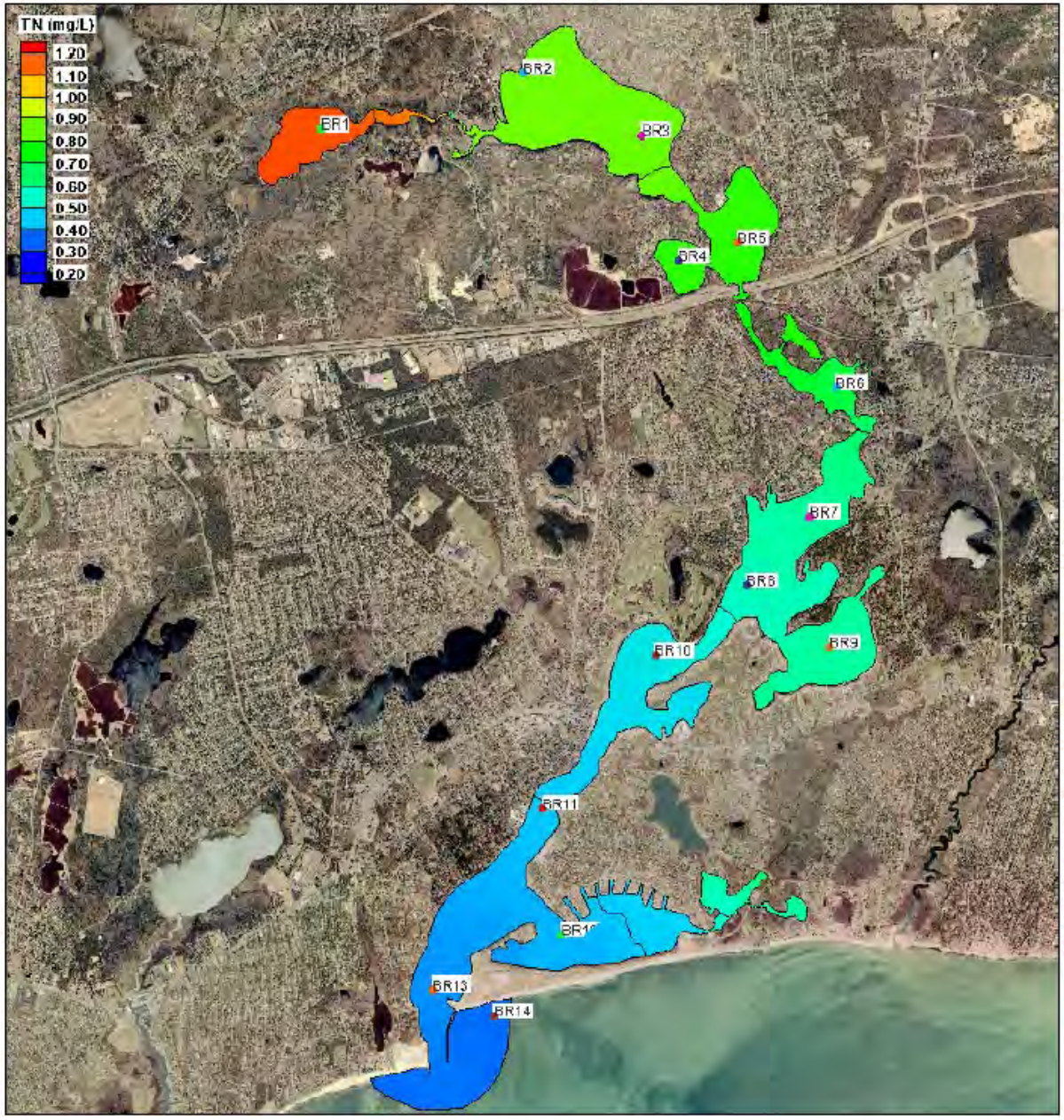
Pre-Colonial Conditions: Bass River



Present Conditions: Bass River

Contour plots of **average total nitrogen concentrations (mg/L)** from results of the present conditions loading scenario, for Bass River System. The approximate location of the sentinel threshold station for Bass River System (BR7) is shown.

(Source: MEP 2011)



Build-out Conditions: Bass River

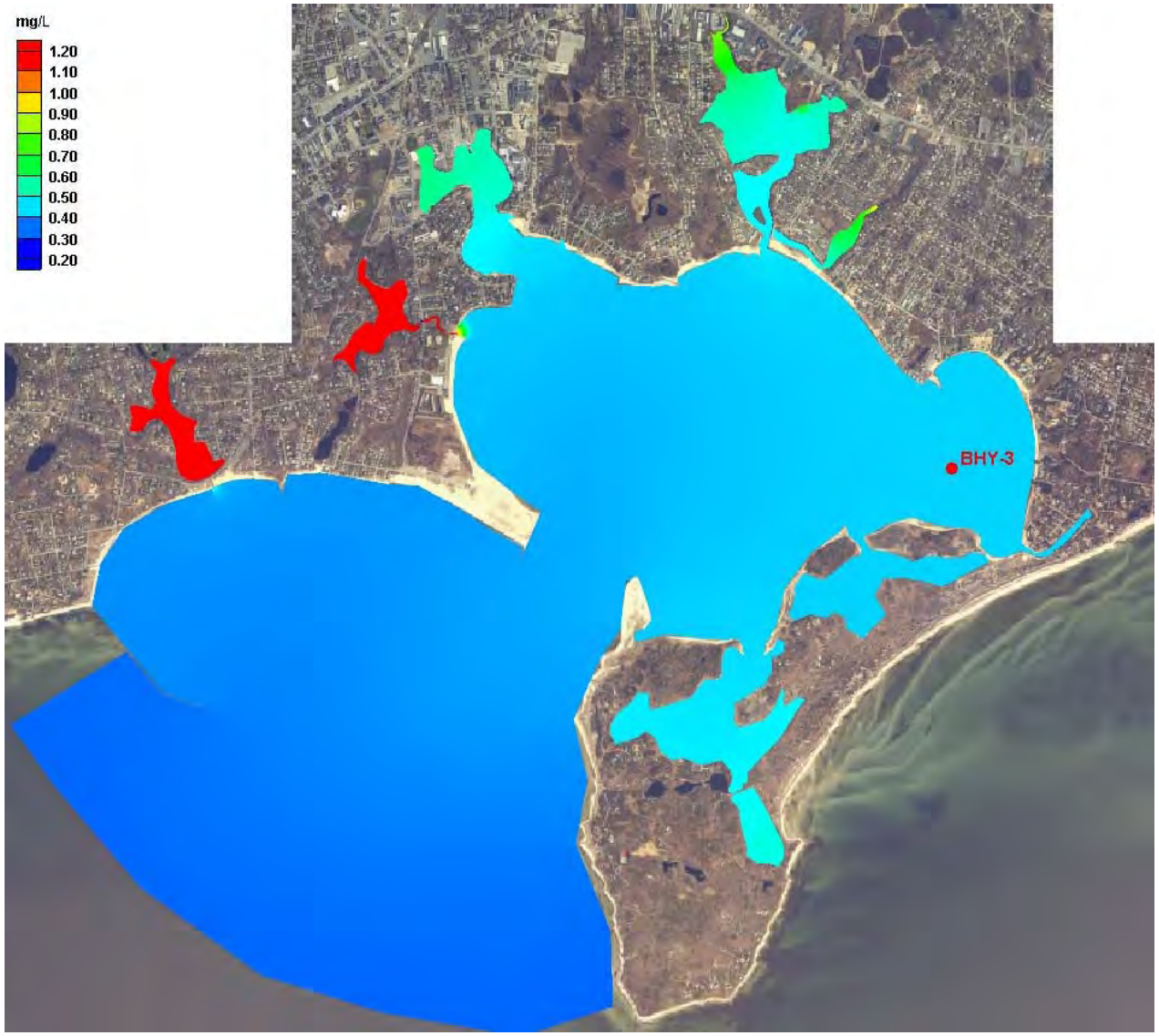
Contour plots of **modeled total nitrogen concentrations (mg/L)** in Bass River System, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Bass River System (BR7) is shown.

(Source: MEP 2011)

Contour plots of **modeled total nitrogen concentrations (mg/L)** in the Lewis Bay system, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold station for the Lewis Bay system (BHY-3) is shown.

(Source: MEP 2010)

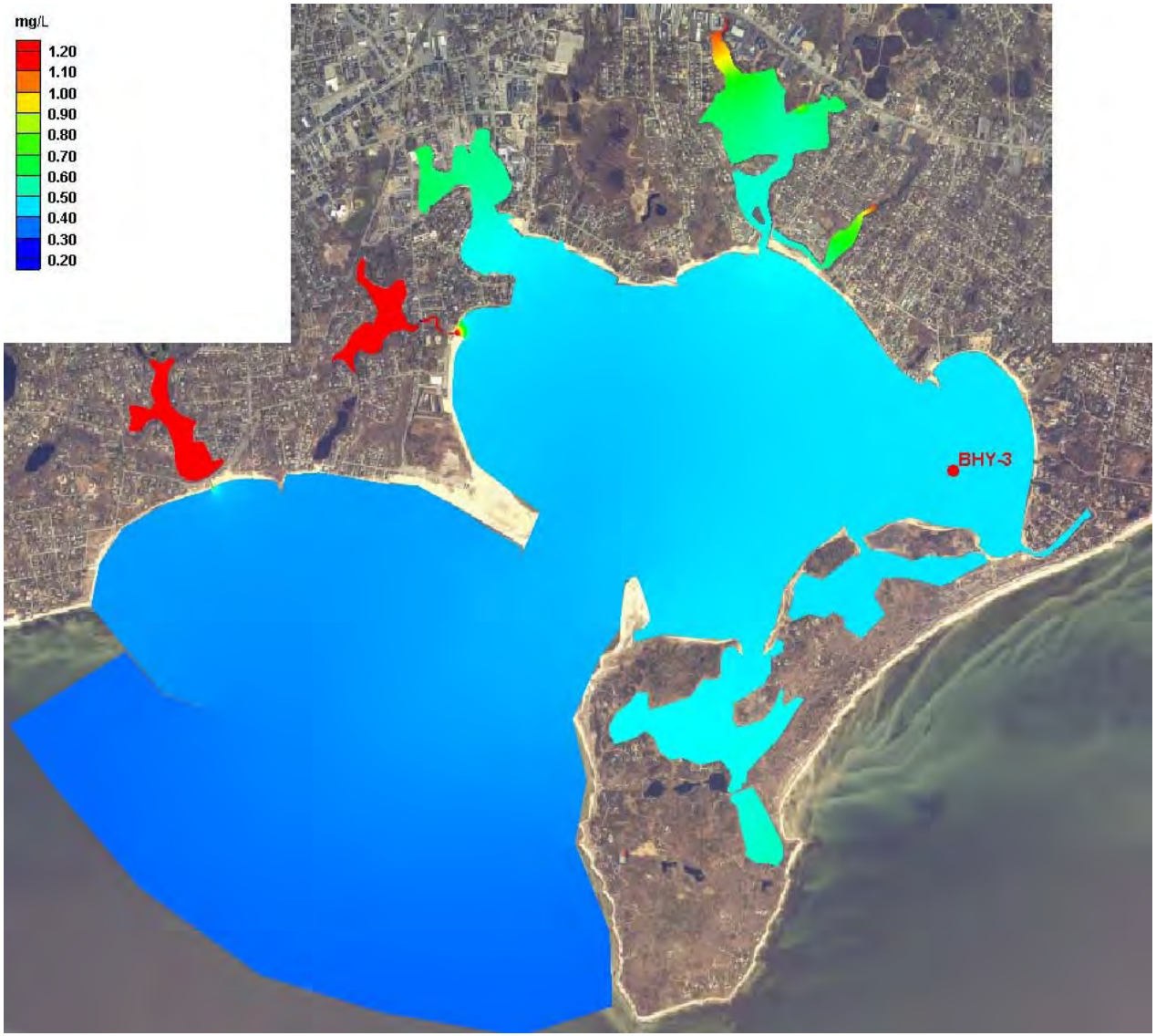
Pre-Colonial Conditions: Lewis Bay



Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for the Lewis Bay system. The approximate location of the sentinel threshold station for the Lewis Bay system (BHY-3) is shown.

(Source: MEP 2010)

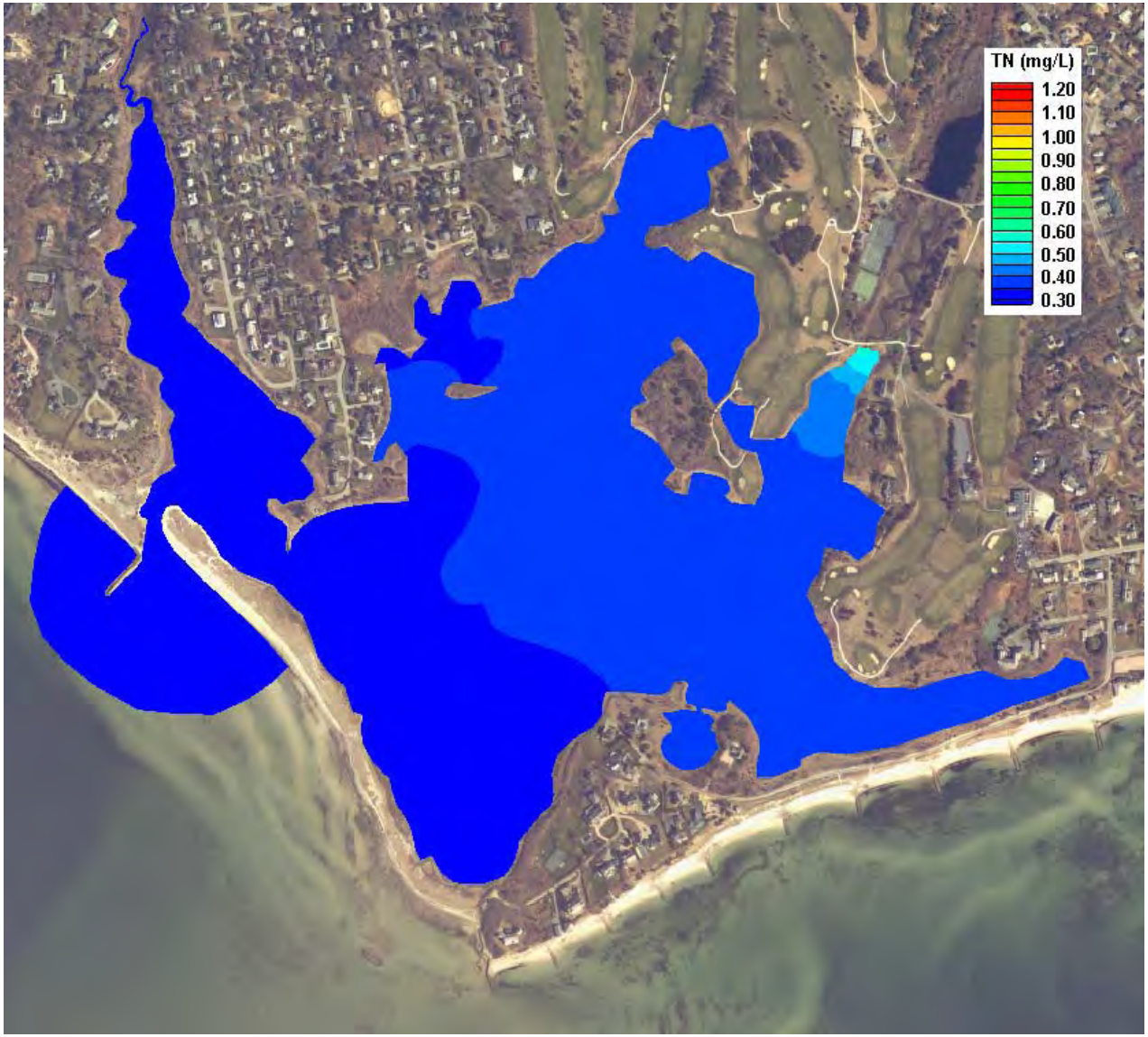
Present Conditions: Lewis Bay



Contour plots of **modeled total nitrogen concentrations (mg/L)** in the Lewis Bay system, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for the Lewis Bay system (BHY-3) is shown.

(Source: MEP 2010)

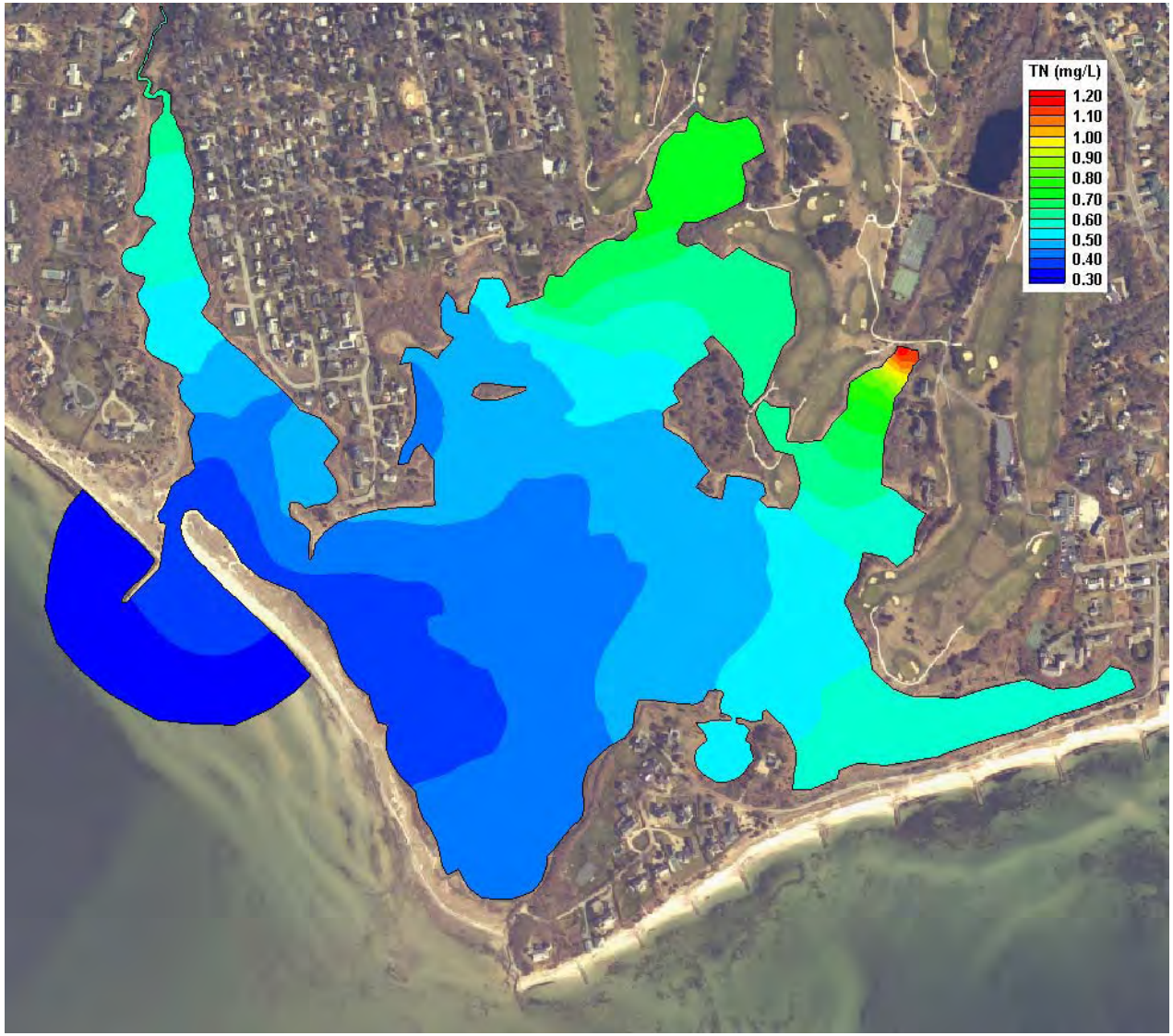
Build-out Conditions: Lewis Bay



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

(Source: MEP 2010)

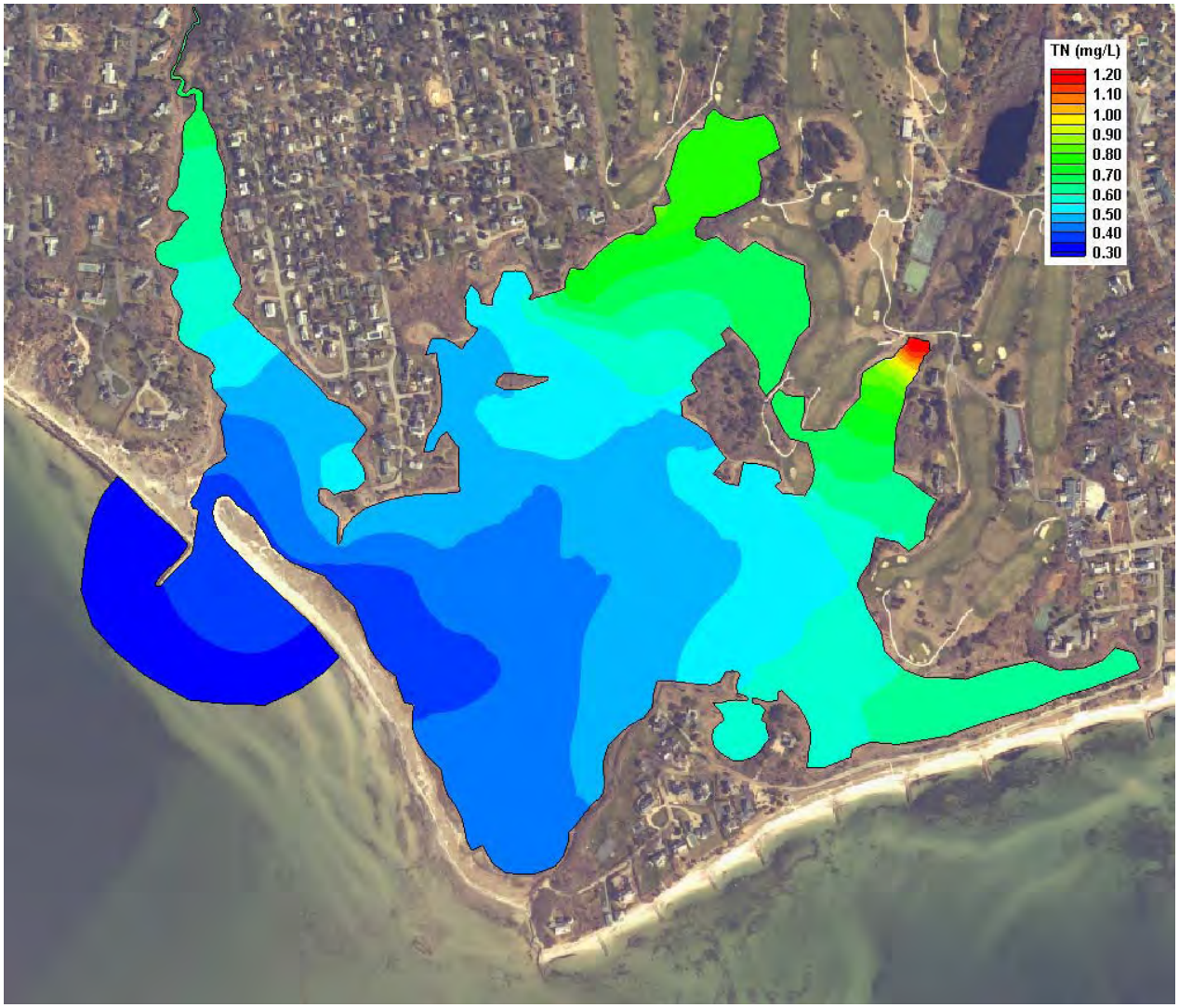
Pre-Colonial Conditions: Halls Creek



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

(Source: MEP 2010)

Present Conditions: Halls Creek



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

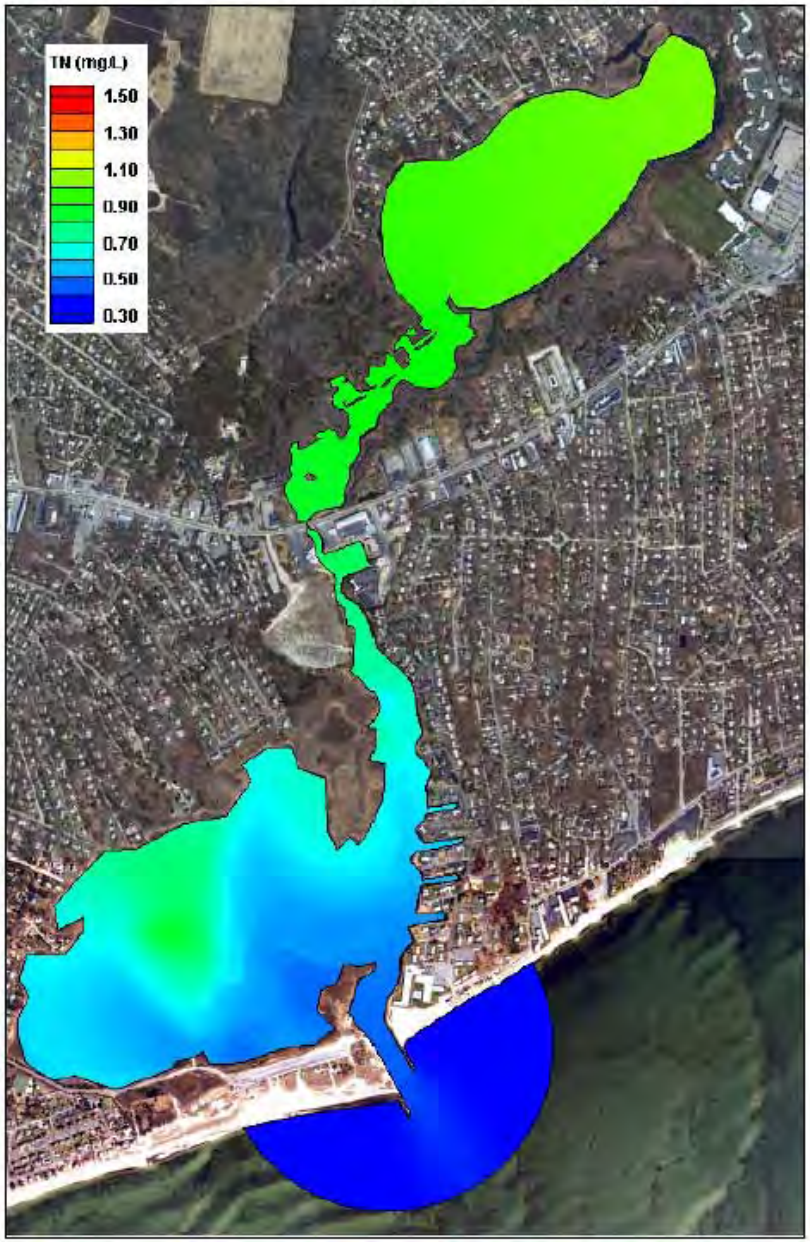
(Source: MEP 2010)

Build-out Conditions: Halls Creek

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

(Source: MEP 2010)

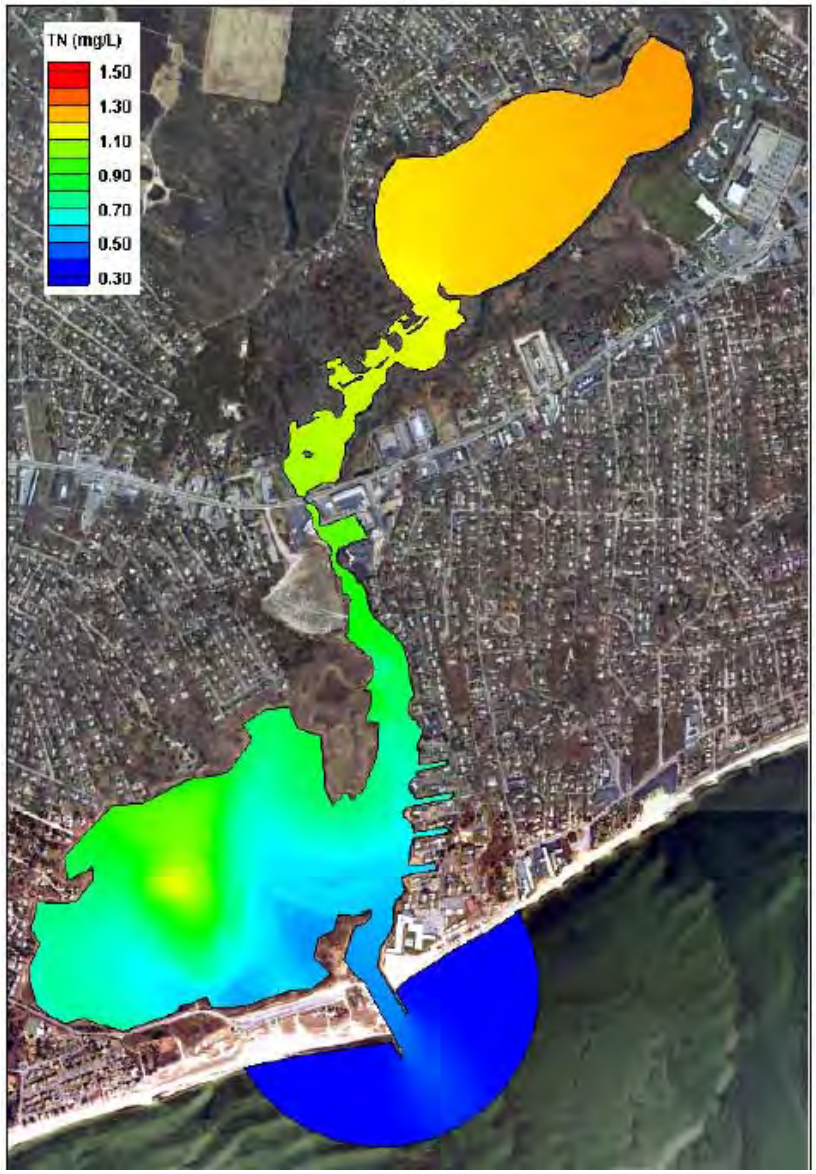
Pre-Colonial Conditions: Parkers River



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

(Source: MEP 2010)

Present Conditions: Parkers River

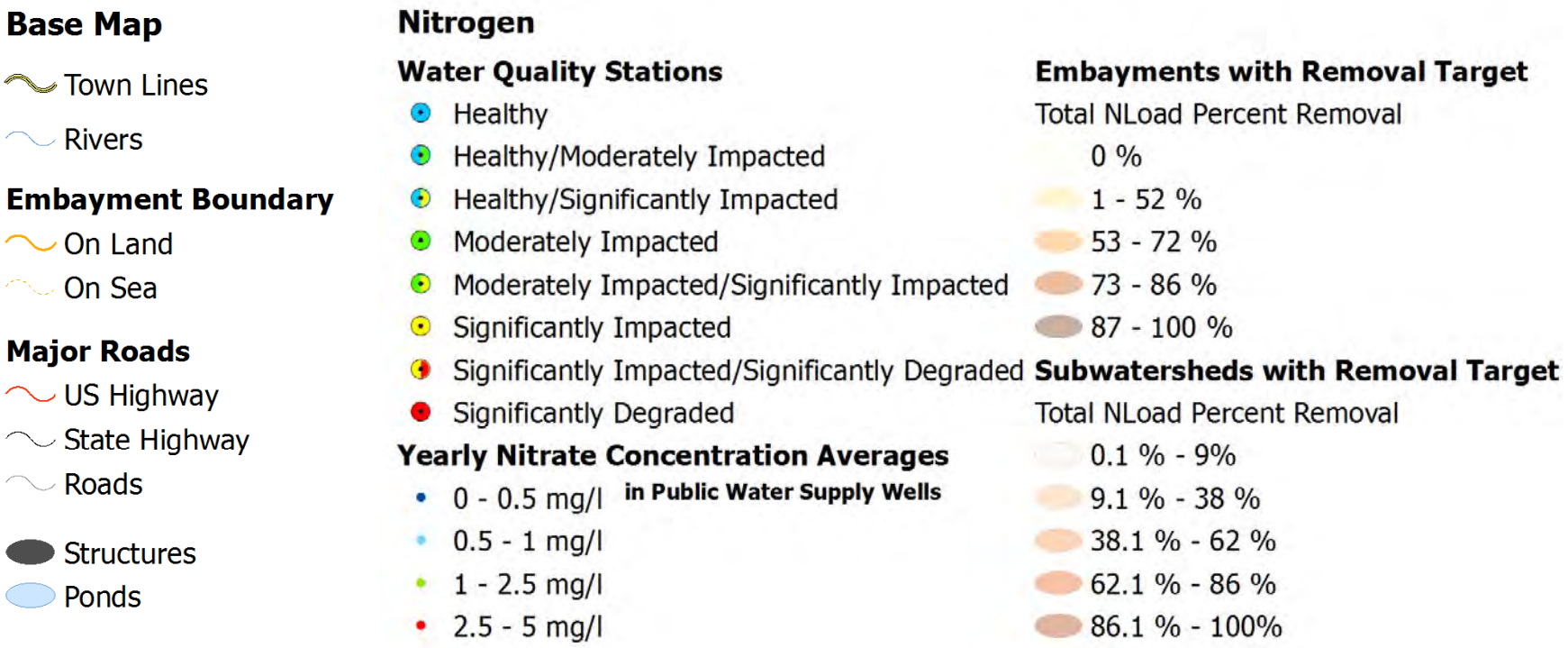


Contour plot of modeled **total nitrogen concentrations (mg/L) in** the Parkers River system, for projected build-out scenario loading conditions.

(Source: MEP 2010)

Build-out Conditions: Parkers River

Nitrogen Problem



Sources: MassGIS, MEP, CCC

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

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Bass River
Lewis Bay
Parkers River

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

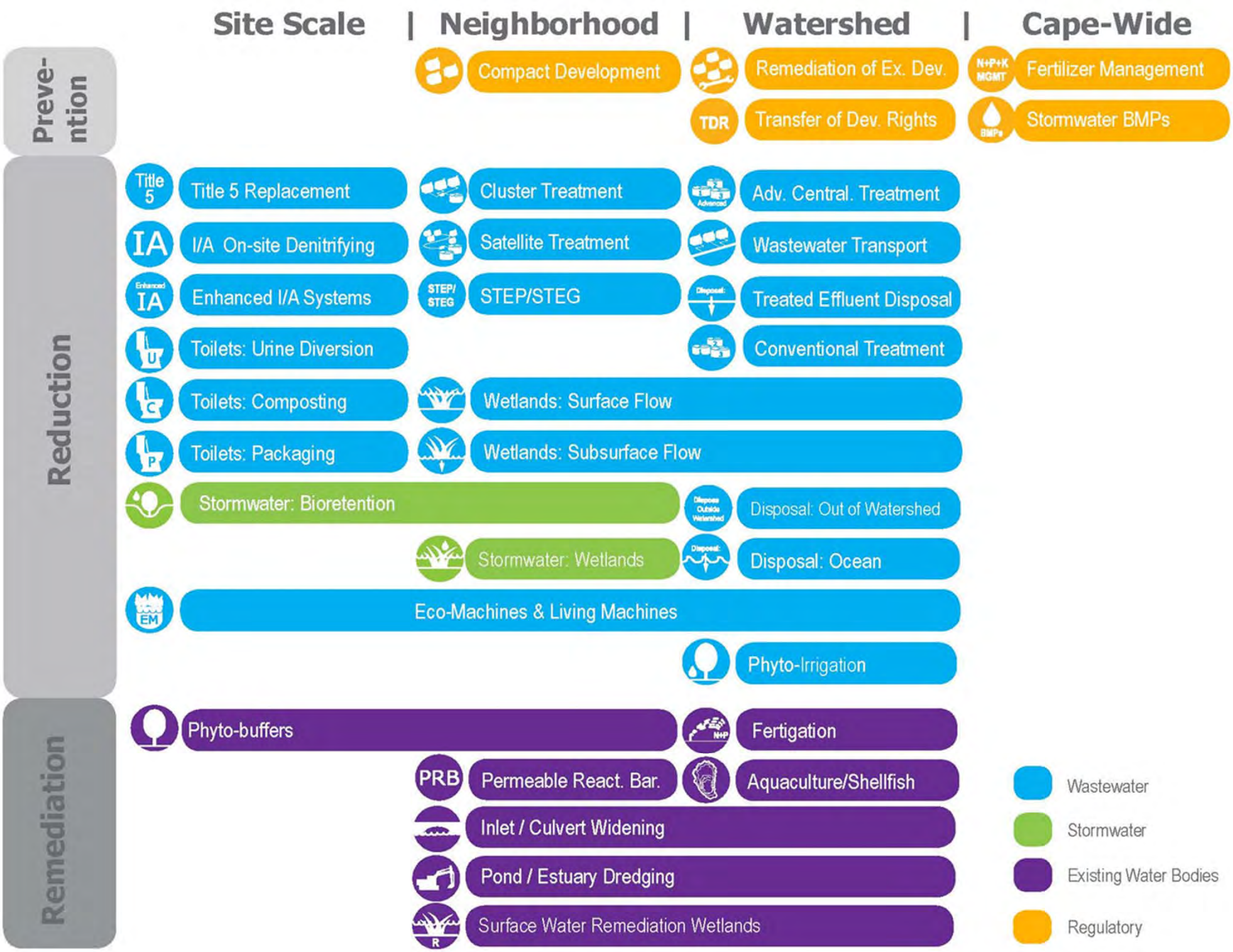
2031 - 2040

2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Bass River
Lewis Bay
Parkers River


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

All materials and resources for the Lewis Bay to Bass River Group will be available on the Cape Cod Commission website:

http://watersheds.capecodcommission.org/index.php/watersheds/mid-cape/lewis-bay-to-bass-river

Bass River
Lewis Bay
Parkers River

Cape Cod 208 Area Water Quality Planning
Lewis Bay to Bass River Watershed Working Group

Meeting One
Thursday, September 19, 2013
Dennis Town Hall, 485 Main Street, South Dennis, MA 02660

DRAFT SUMMARY NOTES

Next Meeting: Monday, November 4, 2013
8:30 am - 12:30 pm
Dennis Town Hall

The following action items were captured during the meeting:

ACTION ITEMS

- Watershed Working Group Members
  - Send any changes or information about errors to the facilitator
- Cape Cod Commission
  - Add other agency info to the chronologies – Corps, DOT, DER, NRCS water plan, DEC, CC Tidal Atlas, actions taken to facilitate flushing
  - Note that there are several independent water districts in this area. Share this information with them, in addition to the municipalities
  - Make GIS layers viewable online (similar to Barnstable's tool)
  - Call bogs "active bogs"
  - Review shoreline changes and the Tidal Atlas with a hydrogeologist
  - Incorporate the post-it note changes and comments into the chronologies
  - Add Barnstable to the slide/GIS of proposed sewers
  - When describing technologies, include info about the end products
- CBI
  - Send PDFs of last two slides to the group
  - Share municipal points of contact for each town

WELCOME AND INTRODUCTIONS

The Cape Cod Commission opened the meeting and welcomed those in attendance. An attendance list can be found in Appendix A.

All meeting documents and presentations for the Lewis Bay to Bass River Watershed Working Group are located here:
http://watersheds.capecodcommission.org/index.php/watersheds/mid-cape/lewis-bay-to-bass-river

REVIEW OF GOALS AND PROCESS

Kristy Senatori from the Cape Cod Commission (the Commission) described the 208 Plan Update process, including the following basic timeline:

- July – Goals, Work Plan, and roles
- August – Affordability/Financing
- September (now) – Baseline conditions
- October – Technology Options Review
- December – Watershed Scenarios

Ms. Senatori explained that the Commission was directed by the state to update the Section 208 plan. It has not been updated since it was created in 1978. This update will focus on the 21st century problems. Wastewater is an issue that crosses town boundaries; two thirds of the watersheds throughout the Cape are cross-boundary watersheds. The update will be watershed based, include stakeholder engagement, and maximize benefits of local planning. They are not aiming for a single optimal solution; instead the goal is to generate a series of solutions for each local area. For this process, the Cape has been separated into four different areas and eleven different watersheds.

The stakeholder process will include public meetings and watershed working groups. During the process, the Commission will also work with these other groups:

- Advisory Board: group of six people who are very helpful in providing feedback to the commission;
- Regulatory, Legal and Institutional Work Group;
- Technical Advisory Committee: providing input on the potential technologies;
- Technology Panel: experts throughout the country who will be giving high-level review of technologies.

In response to a question about who comprised the Advisory Board, Ms. Senatori responded that the members are: Bob Churchill, Bob Lawton, Wendy Northcross, Sheila Vanderhoef, Virginia Valiela, and Robin Wilkins.

Ms. Senatori reviewed the 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. She stated that, although there are experts behind every data layer, the stakeholders know their watersheds best and the Commission values stakeholder input. At this meeting, the Commission was especially seeking information from stakeholders about gaps in their data.

LOCAL PROGRESS TO DATE

Scott Horsley, Area Manager with the Cape Cod Commission, discussed the Progress to Date chronology slides, stating that the goal of this section of the meeting was to make sure everyone had the same basic understanding of the data. Local progress on water quality issues began in 1978 when the 208 Plan was first put in place. Mr. Horsley explained that the chronologies record population

change over time and denote: regulatory/town meeting actions, appropriations, reports/studies, infrastructure/plan implementation, and negative votes/stopped actions. On four separate chronologies, Mr. Horsley highlighted past actions that had been taken in Barnstable, Brewster, Dennis, and Yarmouth that would either protect or inhibit water quality.

Working group members 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. Participants made the following comments and suggestions:

Comments on the Barnstable chronology:

- In Barnstable, sewer planning was started in the late 1920s and that plan included some of the areas that the Town has just finished sewering in the past few years.
- In Barnstable, the Town government doesn't necessarily control the water districts; some are independent.

Comments on the Yarmouth chronology:

- Where it says 58 million on the Yarmouth chronology, it should be 55 million.
- Clarify that it was the Corps of Engineers who carried out the Bass River hydrodynamic study.
    - Ms. Senatori commented that the Corps would be part of the Regulatory, Legal and Institutions working group going forward.

Comments on the Dennis chronology:

- Add that Dennis is a partner in the Yarmouth/Dennis regional septage treatment plans.

General comments on the chronologies:

- The chronologies should include land acquisitions. These are not always undeveloped land – sometimes they were previously developed.
- Ensure that the Commission receives feedback on the chronologies from the water districts in addition to the town planning agencies.
- Add information about projects that have been done to facilitate flushing around the Cape.
- Add information about other studies that have been done and work that has been done by other organizations. E.g. DER projects, NRCS Water Resources Plan.

Other comments:

A participant raised a concern that there were no state government representatives attending this meeting, such as the DOT or DEP. Mr. Horsley responded that these meetings are meant to be locally focused. A participant asked when the nitrogen levels in the embayments were last tested. Mr. Horsley responded that the tests are continuous and ongoing.

BASELINE CONDITIONS

Mr. Horsley and Shawn Goulet, Cape Cod Commission GIS Analyst, presented GIS data layers, demographic data, and water quality data both Cape-wide and specific to the Lewis Bay to Bass River watershed. Working group members and members of the public are encouraged to view the layers on the Cape Cod Commission website when they become available in mid-October. 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. Mr Horsley stated that the Lewis Bay to Bass River watershed covers almost 35 square miles and, relative to other areas, it is a sizeable watershed.

The Cape Cod Commission presented the following GIS data layers:

Natural Features: Mr. Horsley covered natural features, including jurisdictional wetlands, vernal pools, the Sea, Lake, and Overland Surges from Hurricanes (SLOSH) Update 2013, preliminary FEMA Flood Insurance Rate Map (FIRM) Zones 2013, and cranberry bogs. Mr. Horsley stated that one option to consider later in the process is the possible conversion of abandoned bogs to treatment areas. A participant requested that the Commission clarify that the bogs shown on this layer were active bogs. Mr. Horsley noted this change and added that the Commission is doing their best to track the abandoned bogs, but it is hard to track all of them. Mr. Horsley added that water table contours were recently added to the GIS layers, which allow the Commission to see what is up-gradient and down-gradient.

Managed Surfaces: Mr. Horsley explained that managed surfaces include impervious areas and lawns as well as areas that are disturbed and open, e.g. gravel pits. The impervious areas gives an idea of where stormwater is generated, which has a large impact on water quality. Lawns are broken up into residential, golf course, and municipally managed lawns. Lawns are important because of fertilizer use; the Cape Cod Commission will be working with towns to develop regulations around this. A participant noted that cemeteries are both private and public. In response to a question about whether commercial lawns were included in this layer, Mr. Goulet responded that the Commission has information on commercial lawns but it is in a separate category that is not listed here.

Regulatory: Mr. Horsley covered regulatory areas, which includes Areas of Critical Environmental Concern (ACECs), MassDEP-approved wellhead protection areas, Economic Centers, Village Centers and Growth Incentive Zones (GIZ). Open Space data is displayed in terms of three levels of land protection: land protected in perpetuity, limited protection, and no protection. There are two Growth Incentive Zones in this area, in Barnstable and Hyannis. A participant asked if the Growth Incentive Zones are nitrogen restricted. Ms. Senatori responded that some of them are. A participant commented that these zones are redevelopment, not new development. Mr. Horsley added that some developments within the GIZ and Economic Centers are privately funded and cost the taxpayers little or nothing. He explained that density is an important factor in developing cost-effective wastewater treatment; there may be opportunities to incentivize smart growth for developers. In response to a question about what makes resource protection areas different than the regulatory areas, Mr. Goulet explained that some resource protection areas are the natural heritage spots for endangered species; it's a catchall for natural resource areas that we want to protect and preserve. Mr. Horsley added that this relates to the dilemma the 208 Plan Update is attempting to address: the

Cape already has a lot of development in sensitive areas, and current zoning suggests that this will continue; the Cape needs to figure out how this can be done sustainably. In response to participants' concerns about whether the Commission was addressing water contaminants other than nutrients, Mr. Horsley responded that the Commission is aware of emerging contaminant issues such as pesticides, herbicides, and pharmaceuticals. They are not the primary focus of the 208 plan but they will not be overlooked.

Land Use Change*:* Mr. Horsley explained that the land use layers address change and growth over time related to land use density. The layers are based on McConnell land use data from 1951, 1971, and 1999. Participants discussed shorelines change from erosion and whether this effects dilution of the embayments. In some instances the shoreline has a big effect on the embayment and in others it does not. The Working Group agreed that they would speak to a hydrogeologist (or coastal geologist?) for more information on this issue. Mr. Horsley referred people who would like to learn more about shorelines to the MA Coastal Zone Management website.

Density: The density layer shows the current density of existing dwelling units per acre in quarter square mile grids. The data come from the 2010 census. A participant explained that density is important for costing out sewer infrastructure. The Commission needs to know the smallest road length to connect the greatest number of houses.

Buildout: Mr. Horsley introduced buildout and related it back to density. The regional buildout layer shows the maximum potential buildout using the towns zoning regulations. Mr. Horsley explained that there is an infinite number of assumptions that could be made about buildout; every buildout is done differently and shows different results. The Commission came up with a standardized buildout methodology for all towns across the Cape so there would be a consistent standard throughout the 208 Plan Update process. However, the Commission will take into account the local buildouts that have been done; it is important to note that, in any given town, there is a variation in possible outcomes. Mr. Horsley emphasized that density is a critical component to the 208 Update Plan since 30% growth could increase capital costs by 40%. A participant noted that it is impossible to ever get to full buildout across the whole Cape. One town may achieve full buildout, but that will impede other towns' ability to grow. Another participant stated that the Cape already has a wastewater problem that is out of hand and that a possible solution would be to cap growth on the Cape.

People: Mr. Horsley discussed a number of demographic slides. The Section 208 Update will consider demographic changes that could influence the selection of technologies to improve water quality. The demographic data was derived from the 2010 Census. The total population of this watershed is 38,501. It is a highly dense area comprising 17.8% of the Cape Cod population. In response to a question about whether these data are year-round or seasonal, Ms. Senatori explained that this population number refers to year-round residents.

Working group members made the following request regarding the GIS layers presentation:

- There was a lot of data covered in a short time during this section of the meeting. Working group members would find it helpful if the Commission could post the GIS layers online with an easy-to-use viewer, similar to the one Barnstable uses on their website.

THE PROBLEM

Mr. Horsley explained how the Commission is defining the problem that the 208 Plan Update seeks to address. Most of the data come from the Massachusetts Estuaries Project (MEP) studies. Mr. Horsley gave a brief background on the MEP for the participants who were not familiar with it. He referred those who sought more thorough information to the website: www.oceanscience.net. The reports are 200-300 pages, peer-reviewed, and very well done. Mr. Horsley suggested that, while no science is perfect, the Commission considers the MEP data to be "as good as it gets," and an extremely reliable source of information for this effort.

Nitrogen problem: Mr. Horsley covered information about nitrogen loads, based on the MEP studies. He clarified that this process will mainly focus on "controllable" nitrogen loads, i.e. nitrogen sources that the 208 Plan Update process has some control over (wastewater, fertilizers and stormwater). In contrast, there are sources of nutrients that cannot be controlled, for example the nitrogen in precipitation that mainly comes from air pollution outside of Massachusetts. Wastewater is the largest contributor of nitrogen, but Mr. Horsley noted that it is important not to overlook the fact that other sources such as lawns and impervious surfaces (stormwater) also make up a sizeable percentage.

In response to questions about how to read the GIS layers, Mr. Horsley explained that the dark blue indicates good water quality and the red means high nitrogen. The concentrations are directly related to the density of housing and septic systems. Water quality worsened due to development in the 50s and 60s and has remained fairly constant since the 70s. This leveling off was largely due to the last 208 Report. Mr. Horsley noted that the nitrate concentration standard for groundwater is 10 mg/liter, whereas the standard for estuaries is approximately 0.4mg/liter. In this sense, dealing with estuaries is much more challenging than dealing with groundwater. To hit the removal targets in the MEP studies, 73% of the nitrogen that is currently generated within the watershed needs to be removed; this does not take into account future growth.

Mr. Goulet displayed the eelgrass GIS layer, which came from Mass DEP. Mr. Horsley explained that eelgrass extent is one of best indicators of the health of an estuary and eelgrass has virtually disappeared from the area. In response to a question about whether there had ever been any studies done to try to make eelgrass resistant to higher nitrogen levels, Mr. Horsley responded that eelgrass is only a symptom in this case. If we were able to bring the eelgrass back, there would still be an overall water quality problem.

Phosphorus problem: Mr. Horsley explained that the problem in freshwater lakes and ponds is phosphorus rather than nitrogen, but both nitrogen and phosphorus largely come from the same sources so efforts to control one tend to help control the other. The lakes and ponds are categorized as either: eutrophic, mesotrophic, and oligotrophic. Oligotrophic is characterized as clear water with low amounts of plants/algae, while eutrophic waters have decreased clarity and higher biological productivity. A participant added that most of the lakes in this region and on the Cape are classified as mesotrophic (mid-way between oligotrophic and eutotrophic). There are a handful of lakes on the Cape that are still oligotrophic.

Title 5 compliance issues: Mr. Goulet discussed the GIS layer that indicates which properties were issued loans for Title 5 repairs. In response to a question about how homeowners know whether they are violating Title 5, Mr. Horsley explained that they are often alerted to it during inspections when they try to sell their house. Another participant explained that a house has to be Title 5 compliant in order to transfer a deed during a sale. Mr. Horsley stated that, as the sea level rises, the water table is rising at a similar rate. Title 5 requires systems to be 4-5 feet above the water table. As the water table gets closer to existing systems, there will be an increase in Title 5 noncompliance.

Working group members raised the following issues in response to Commission's presentation on nitrogen, phosphorus, and Title 5 compliance:

- A participant raised a concern that the number of assumptions the Commission is making—about buildout, residents' seasonality, and the scientific data—could undermine the plan; different assumptions could lead to very different outcomes.
    - Mr. Horsley acknowledged that the while assumptions may have some influence over outcomes; however, the Commission intends to address the uncertainty by using adaptive management. They will try one solution, keep monitoring it, and, if it does not provide full restoration, then a second, back-up plan can be implemented to attain the objectives. Mr. Horsley added that this process will also evaluate the no-action plan, as doing nothing will still have a cost.
- Participants discussed the issue of seasonality and how to accurately classify seasonal residents. They also raised concerns that the Commission's data on year-round vs. seasonal residents are inaccurate; a small change in the numbers used in the process could have a very large change in outcome.
    - Mr. Horsley responded that the MEP studies used water bills rather than census data to measure the number of residents, so it is a better measure of how much wastewater is currently being generated.
- A participant asked who they could contact if they noticed mistakes in the data or presentation.
    - Ms. Hulet responded that they should send corrections to her.

UPCOMING MEETINGS

Mr. Horsley covered the technology matrix. At the next meeting the group will discuss how to attain the stated nitrogen reduction goals identified within the MEP reports. The technology matrix is a broad list of strategies and approaches that have been reviewed by many organizations and experts. Many of these technologies have a lot of promise, but a lot of them are brand new. The Commission will send out a fact sheet for each of the technologies.

Regarding the various technologies available, a participant commented that it would be helpful to have an understanding of the end product/lifecycle of each option in order to understand the costs involved. For instance, sewage treatment involves trucking solids, crossing jurisdictions, and other complications. Ms. Hulet noted that the Commission will take this into account when discussing the technologies during the second meeting and will attempt to give participants a more complete picture of how wastewater treatment works.

Mr. Horsley walked through the steps the group will follow during the technology review in the next meeting:

1. Discuss target goals so we know the goals we need to reach.
2. Look at high nitrogen reduction areas, Title 5 problem areas, and pond recharge areas.
3. Examine solutions that are easier to implement, such as fertilizer management and stormwater mitigation. Golf courses are already doing a lot of fertilizer management, and every town on the Cape is engaged in a very active stormwater mitigation process.
4. Discussing innovative and lower-cost solutions that can be applied within the watershed or embayment, such as permeable reactive barriers, inlet/culvert openings, constructed wetlands, and dredging.
5. Looking at alternative on-site options such as eco toilets, I/A technologies, shared systems, etc.
6. Examining priority collection/high-density areas like village centers, economic centers, etc.
7. Considering supplemental sewering.

A participant requested that the Commission send out PDFs of the final two slides in the presentation.

OPERATING PROTOCOLS AND NEXT STEPS

Ms. Hulet reviewed a draft of the operating protocols and asked the group for their feedback. The protocols contain information on the purpose of the process, why we're meeting, who is involved, and rules of engagement. She covered the final products the group hopes to cover:

1. Needs and impairments summary for each of the groups (this meeting)
2. List of technologies and approaches that are appropriate (second meeting).
3. Possible scenarios – hopefully at least 2 for each watershed group (third meeting).

Ms. Hulet reminded the group that the meetings are part of a public process. Any written materials, including emails, are considered public record. Ms. Hulet also covered the process for reviewing and finalizing meeting summaries with the group.

Mr. Horsley explained that, at the beginning of the next meeting, the group will go over all of the technologies to make sure that everyone is on the same page. In response to participants' concerns that the group is only meeting three times, Ms. Senatori noted that the process has to move quickly because the State gave the Commission a 12-month timeline and the Commission has to produce a draft plan by spring 2014.

PUBLIC COMMENTS

No public comments were given.

Appendix A
Attendance

Name	Affiliation
Working Group Members	
George Allaire	Director of Public Works, Town of Yarmouth
Linda Bolliger	Hyannis Park Civic Association
Debra Dagwan	Town Councilor, Town of Barnstable
Dale Saad	Special Projects Manager, Town of Barnstable
Charles Spooner	
Phil Boudreau	Citizens Advisory Committee, Town of Barnstable
Sam Wilson	Sotheby's International Realty
Rick Lawlor	Golf Course Superintendent
Mike Trovato	Economic Development Specialist, Town of Barnstable
Spyro Mitrokostas	Dennis Chamber of Commerce
Steven Didsbury	Nitrogen Neutral
Jan Hively	Various Civic Associations
Observers	
Dan Milz	PhD Candidate, University of Chicago
Fred Chirigotis	Town Councilor, Town of Barnstable
Staff	
Shawn Goulet	GIS Analyst, Cape Cod Commission
Scott Horsley	Area Manager for the Mid Cape Groups and Consultant to the Cape Cod Commission
Kristy Senatori	Deputy Director - Information, Innovation, & Design, Cape Cod Commission
Anne McGuire	Community Relations Specialist, Cape Cod Commission
Carri Hulet	Facilitator, Consensus Building Institute
Carly Inkpen	Facilitator, Consensus Building Institute

Cape Cod 208 Area Water Quality Planning
Nauset and Cape Cod Bay Marsh Group Watershed Working Group

Meeting One
Draft Meeting Agenda
Wednesday, September 25, 2013
Eastham Town Hall, 2500 State Hwy, Eastham, MA 02642
8:30 am - 12:30 pm

8:30 Welcome – *Cape Cod Commission*

8:35 Introductions, confirm working group membership and participation – *Facilitator and Working Group*

9:00 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

9:15 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Cape Cod Commission*

9:30 Review and add to chronology of work to date – *Working Group*

9:45 Discussion: drawing on past work to move forward – *Facilitator and Working Group*

10:00 Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Area Manager*

10:45 Break

11:00 Discussion of Baseline Conditions - *Facilitator and Working Group*

11:30 Review/Discuss Process Protocols - *Facilitator and Working Group*

12:00 Framework for Moving Forward: Preview Meetings 2 and 3 – *Area Manager*

12:10 Public Comments

12:30 Adjourn

Nauset & Cape Cod Bay Marsh Group

Baseline Conditions & Needs Assessment

What is the 208 Plan?

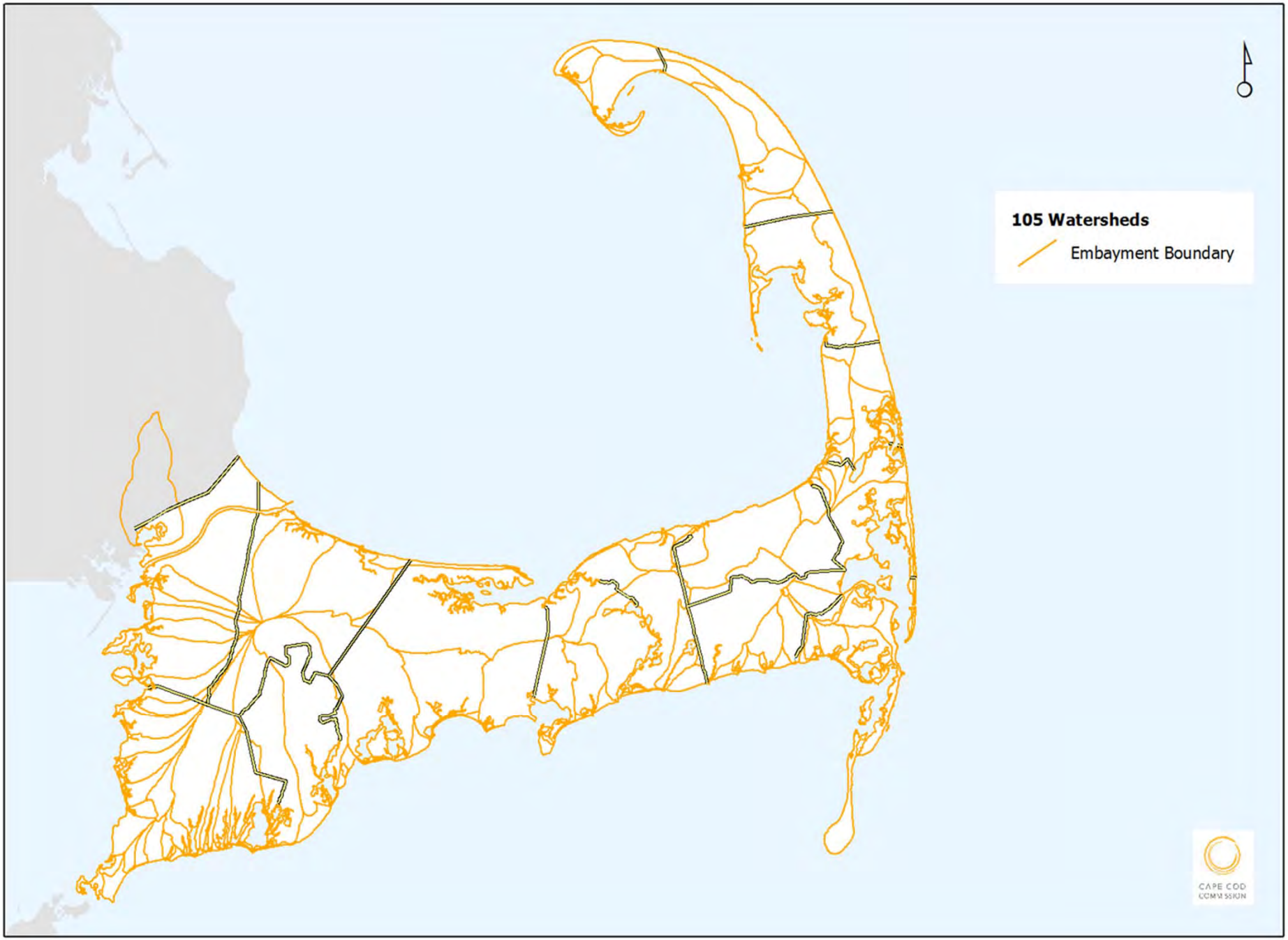
Clean Water Act Section 208

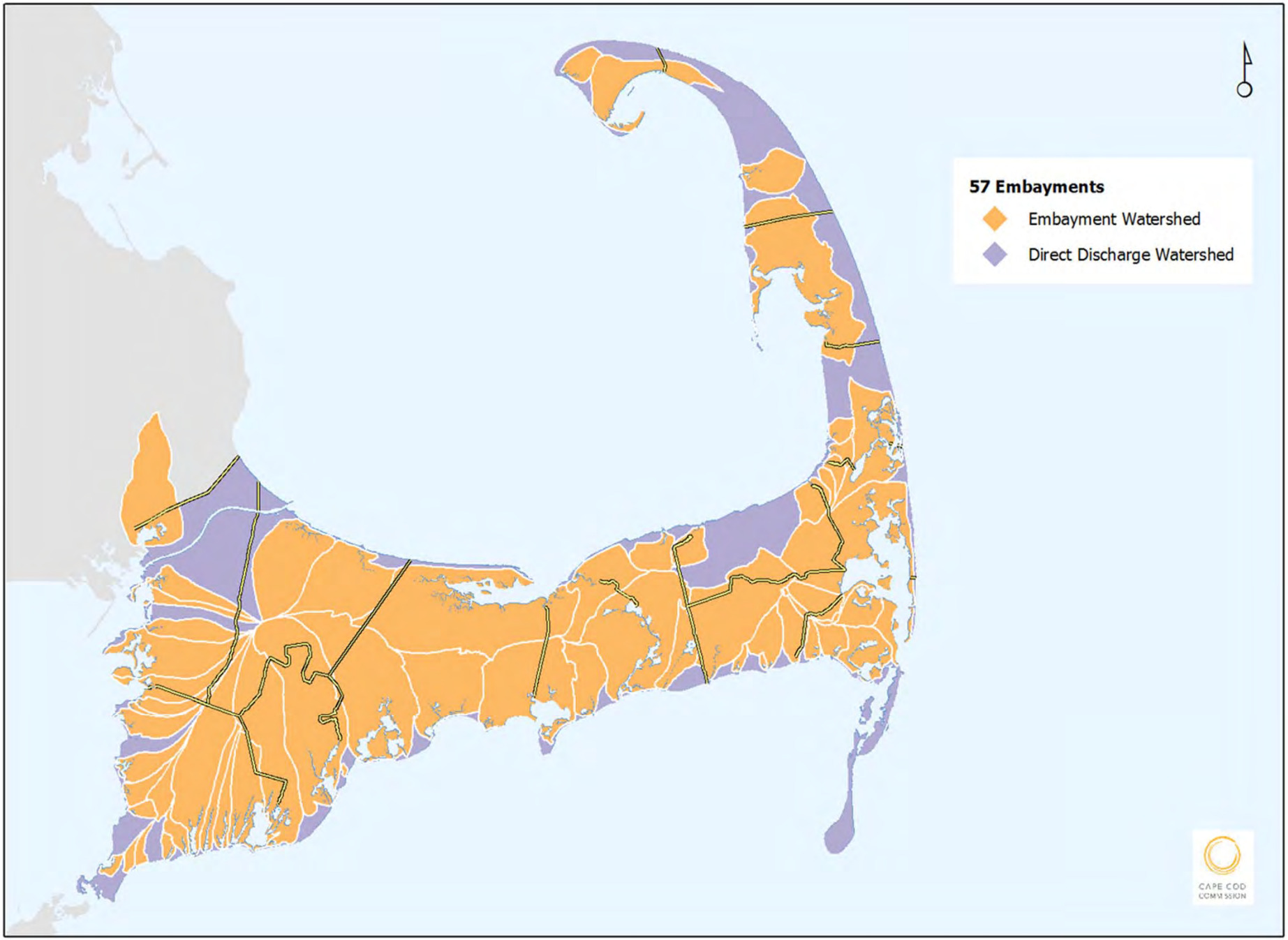
The Commission was directed to update the 1978 Plan

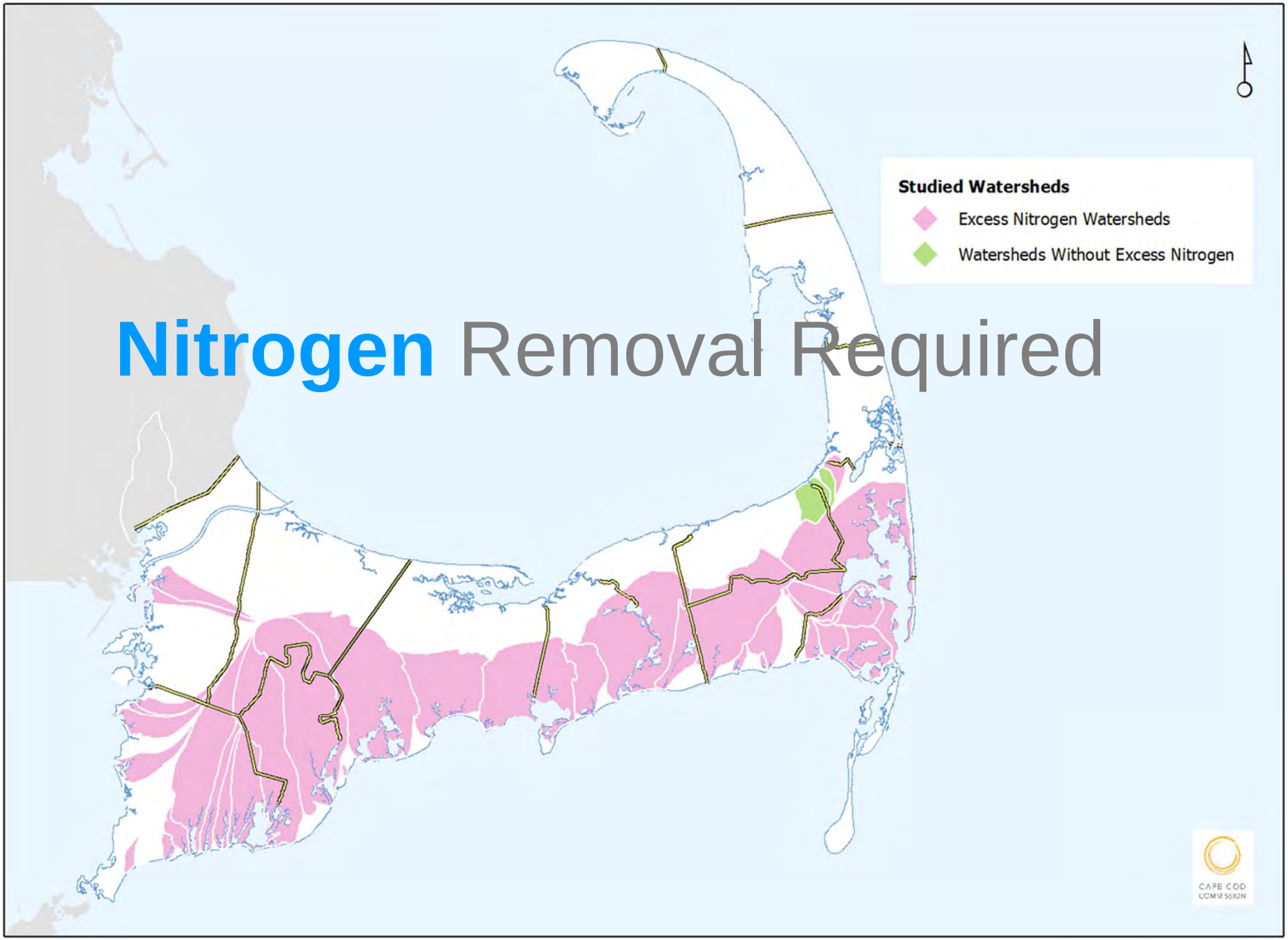
The Commonwealth provided $3 million to fund the project

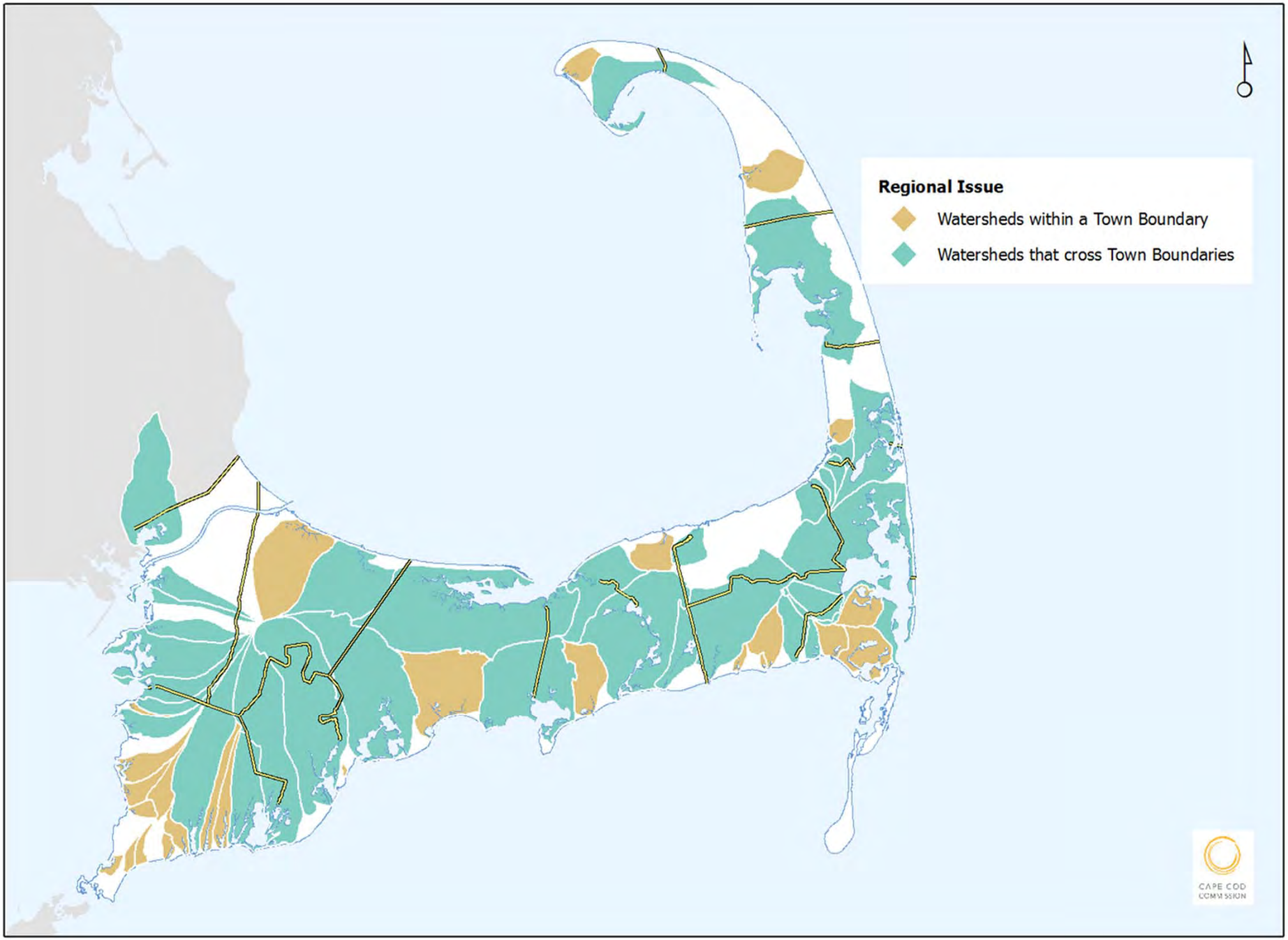
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

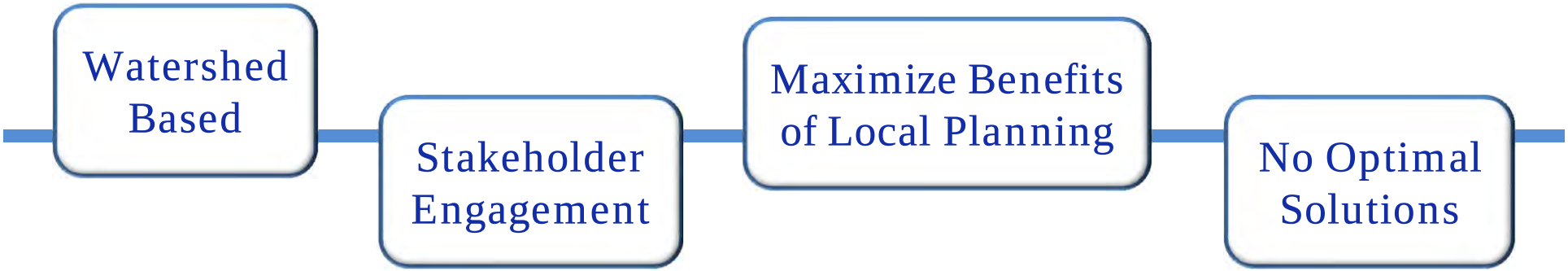

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

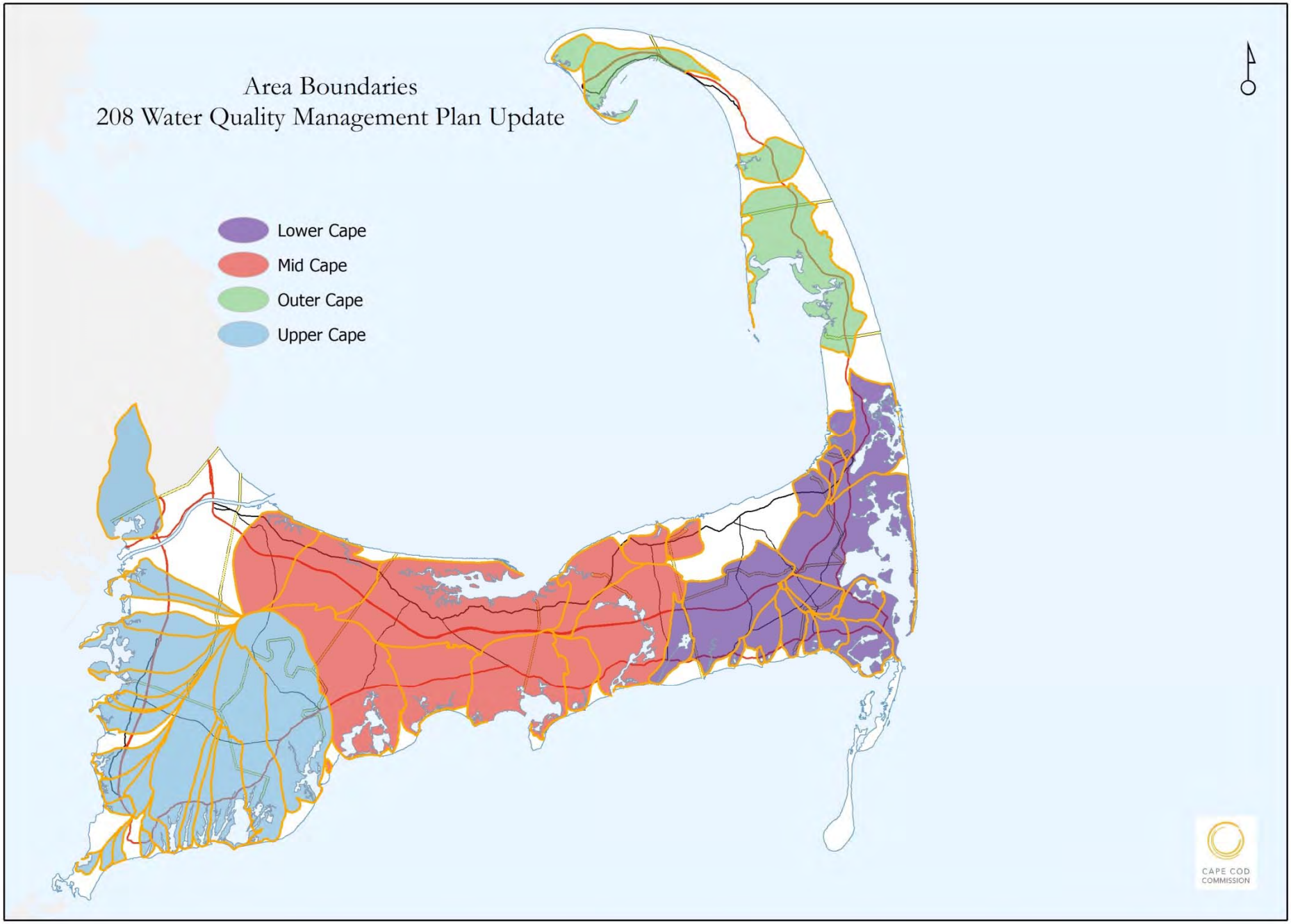

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

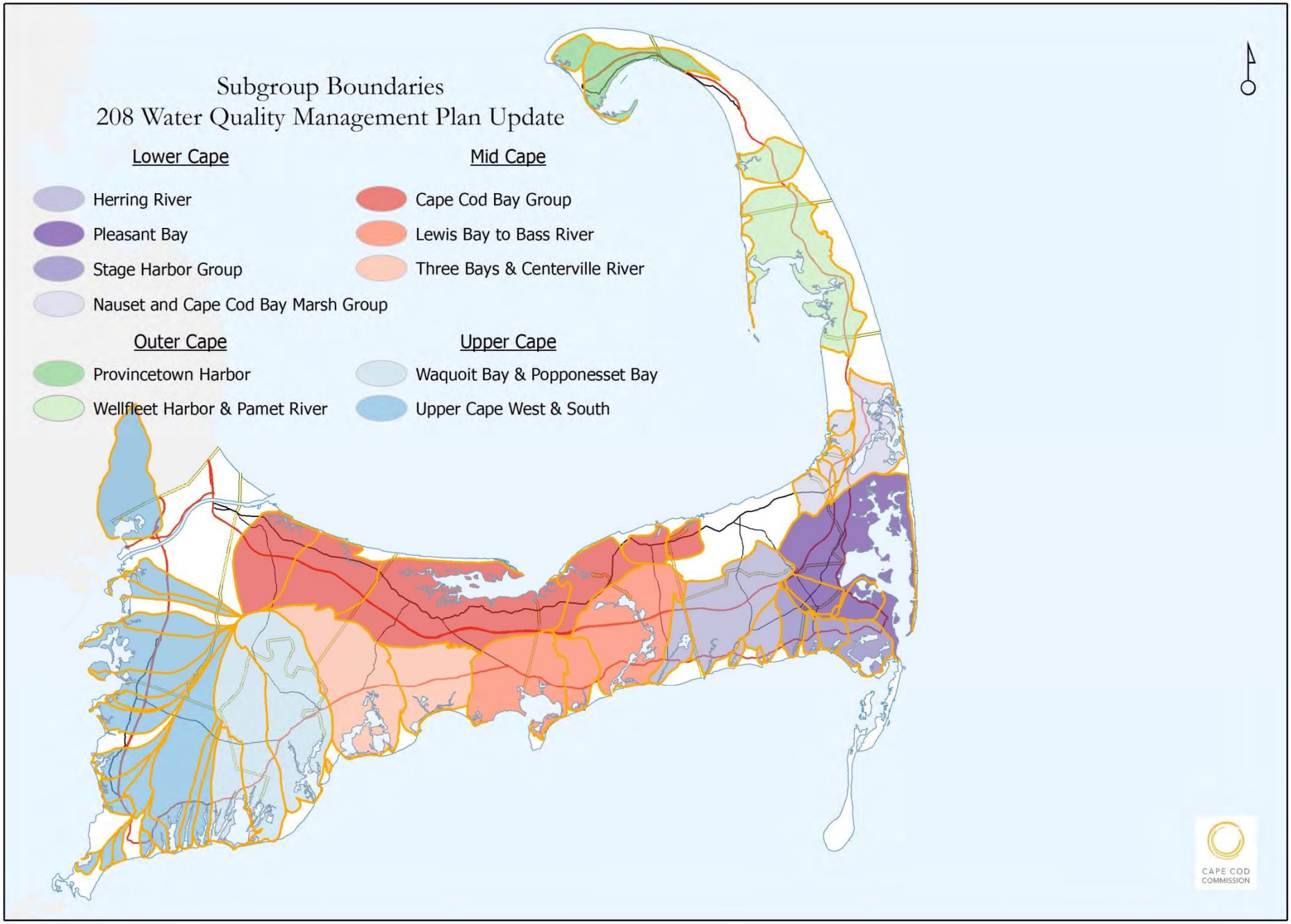

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

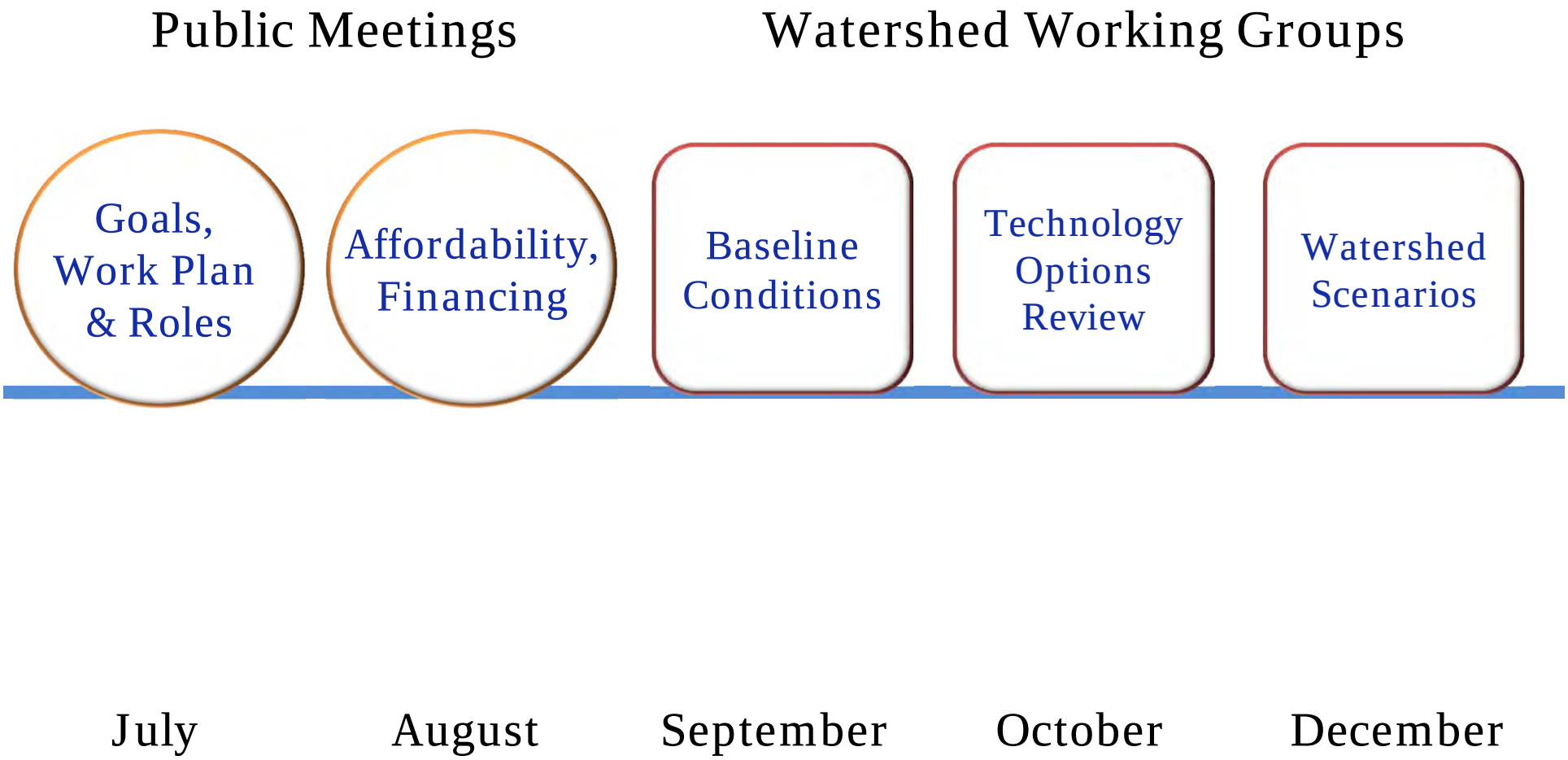


Goal:
To generate a series of approaches in each watershed that will meet water quality standards

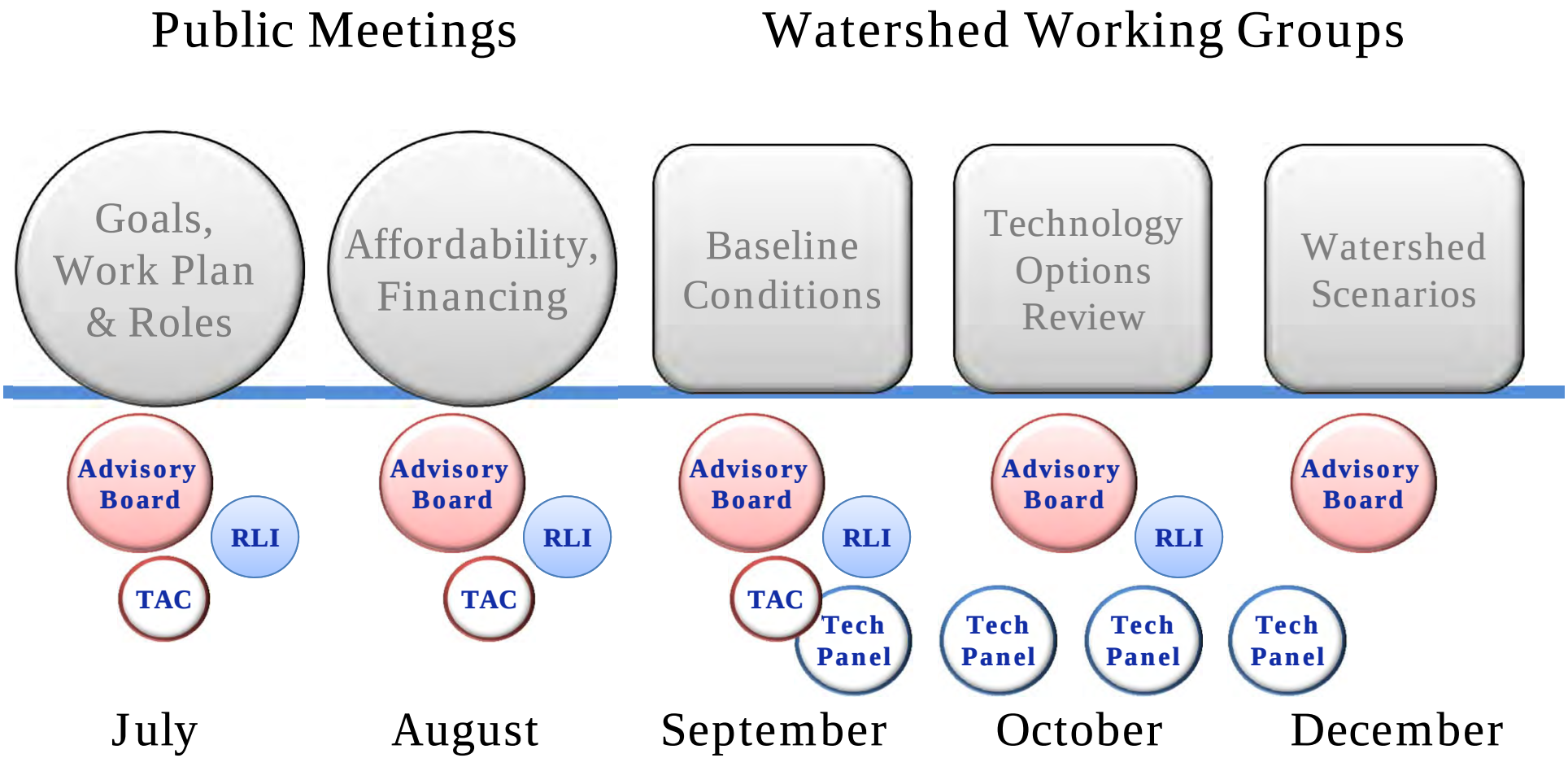

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

What is the stakeholder process?



208 Planning Process



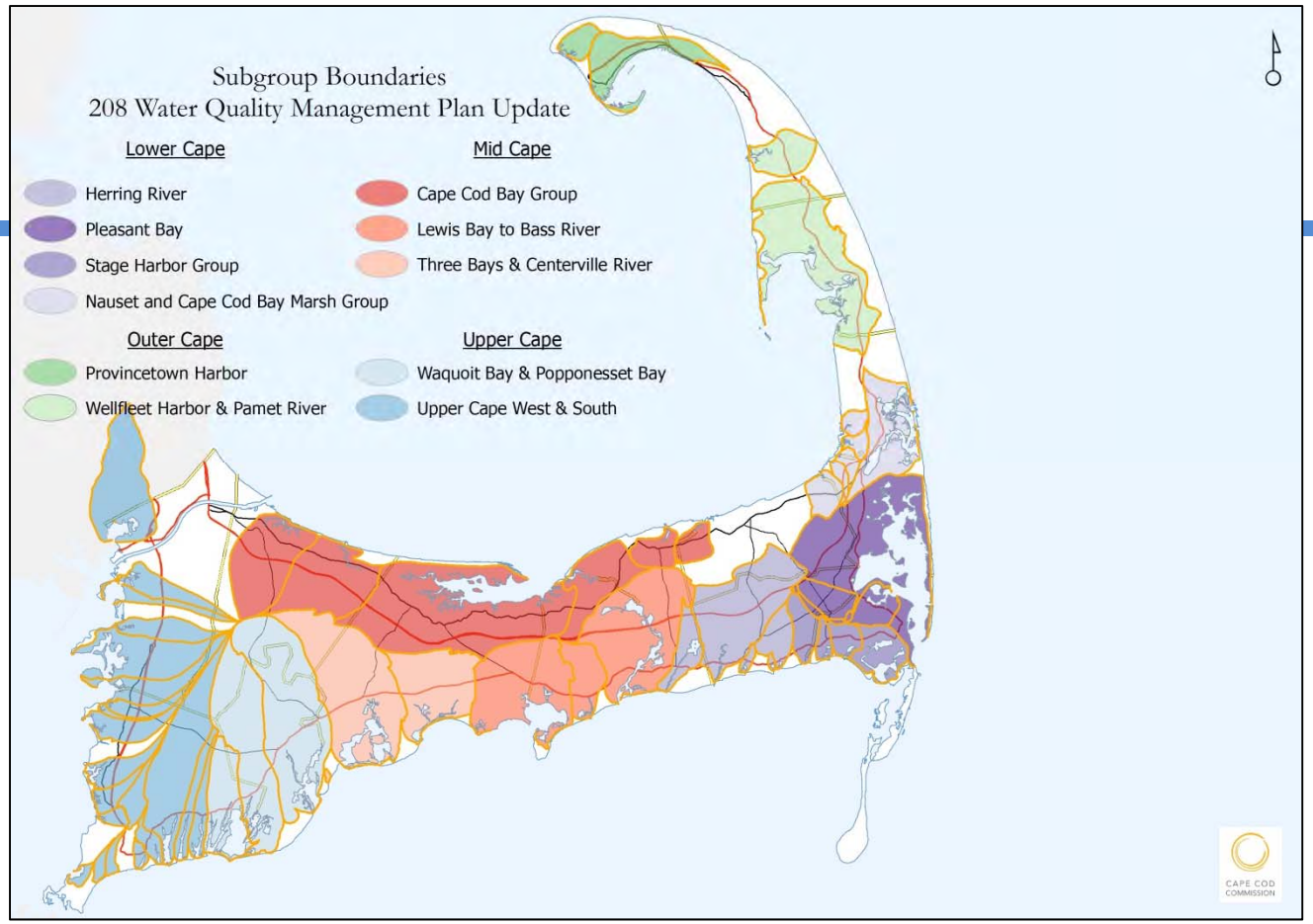
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



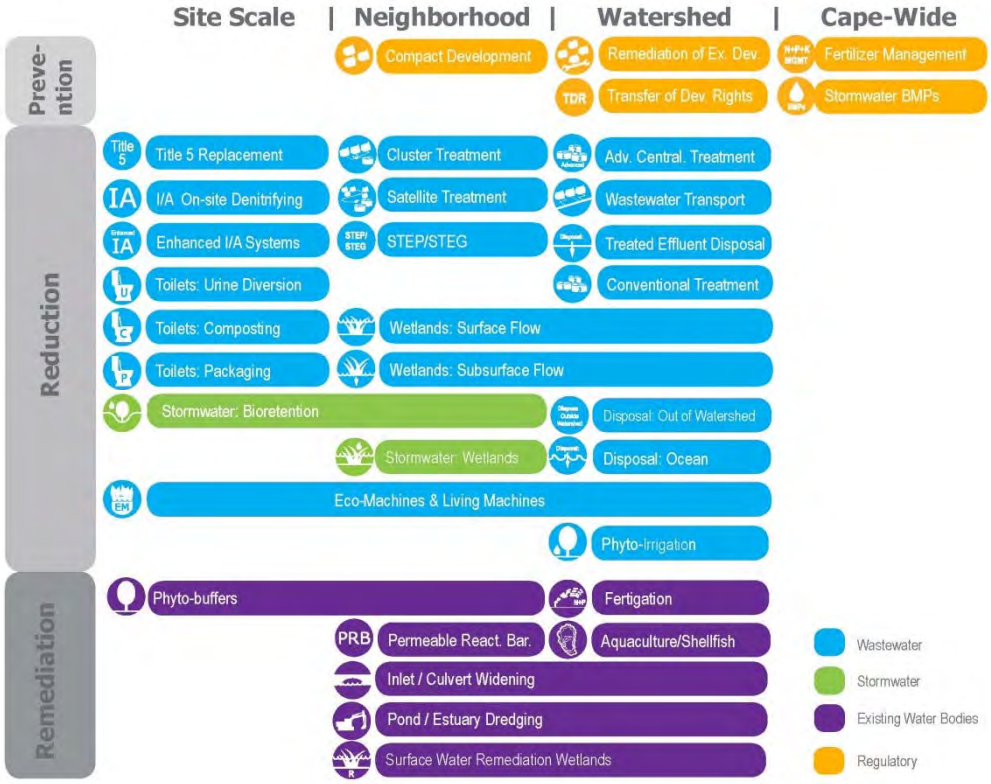
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5



208 Planning Process

Baseline Conditions

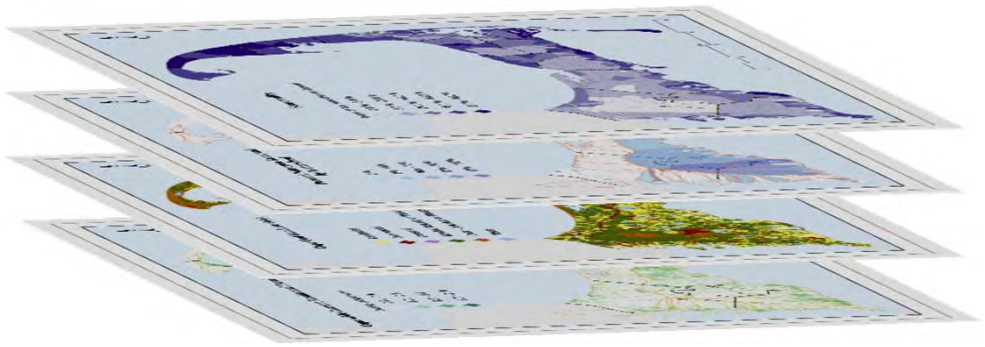
11 Working Group Meetings: Sept 18-27

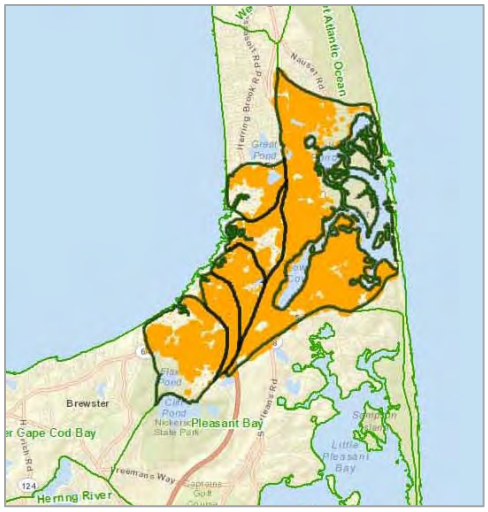
Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11





208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Goal of Today's Meeting:

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

208 Planning Process

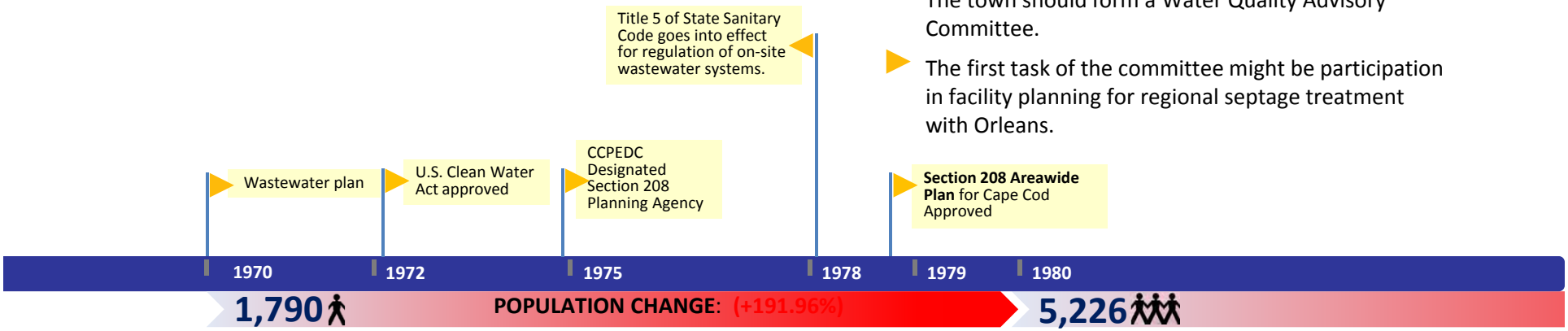
Local Progress to Date

Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh

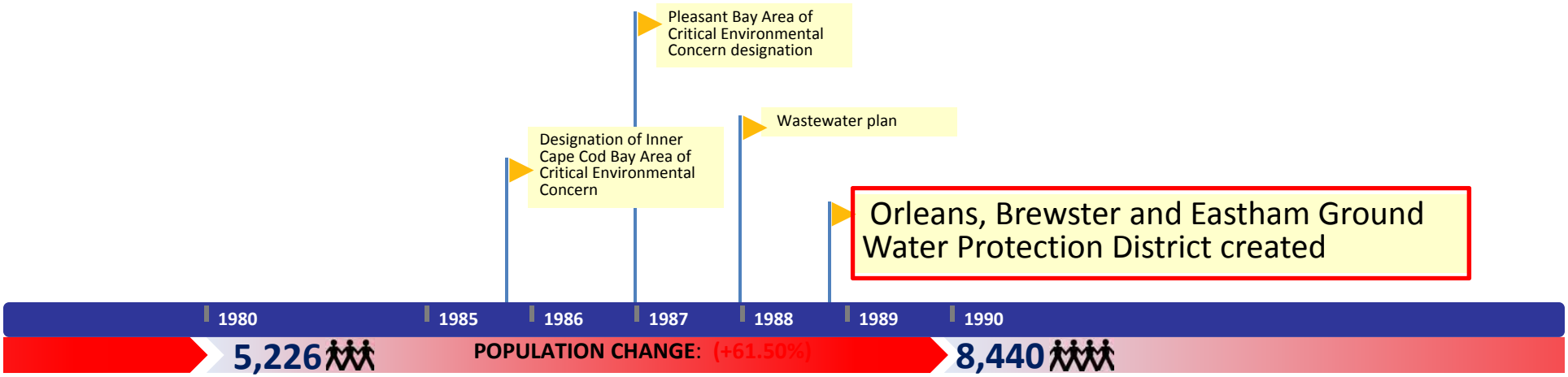
Brewster

From 1978 Section 208 Plan

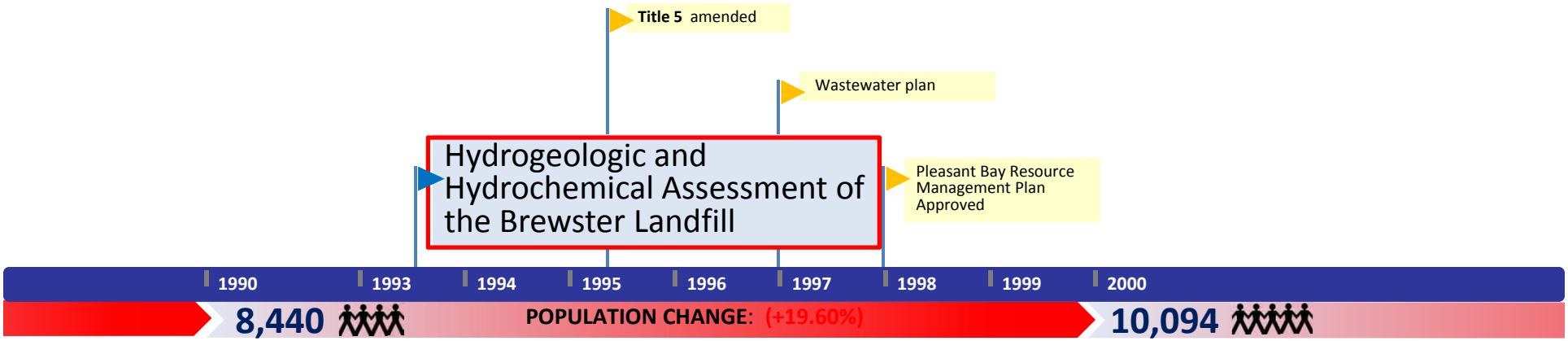
- Present and future town well sites should be protected from the non-point sources resulting from New development by creating Watershed Protection Districts.
- The town should cooperate in regional water supply planning to determine future water supply needs of neighboring towns and whether it can assist.
- 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.



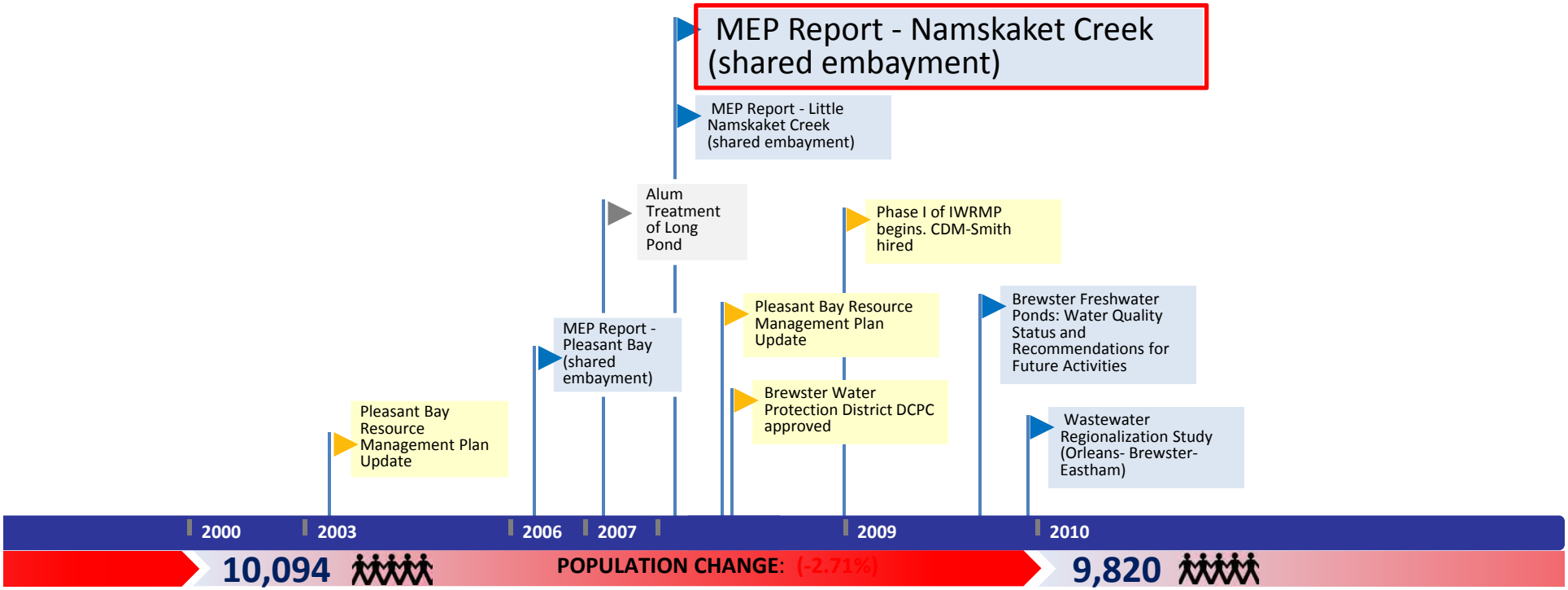
Brewster: 1970-2013



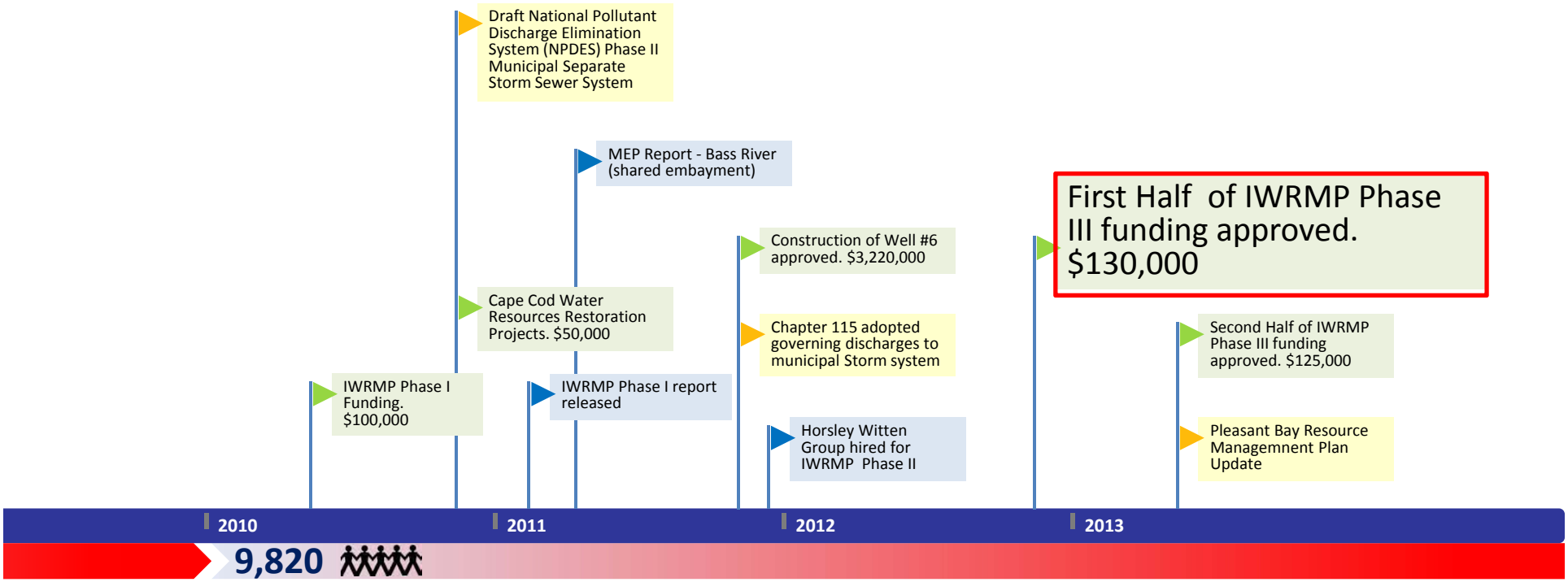
Brewster: 1970-2013



Brewster: 1970-2013



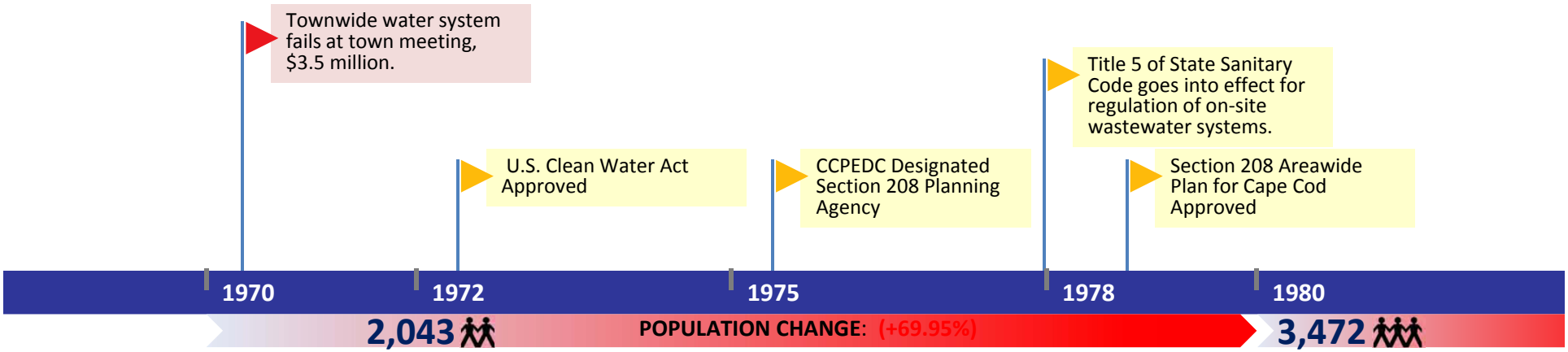
Brewster: 1970-2013



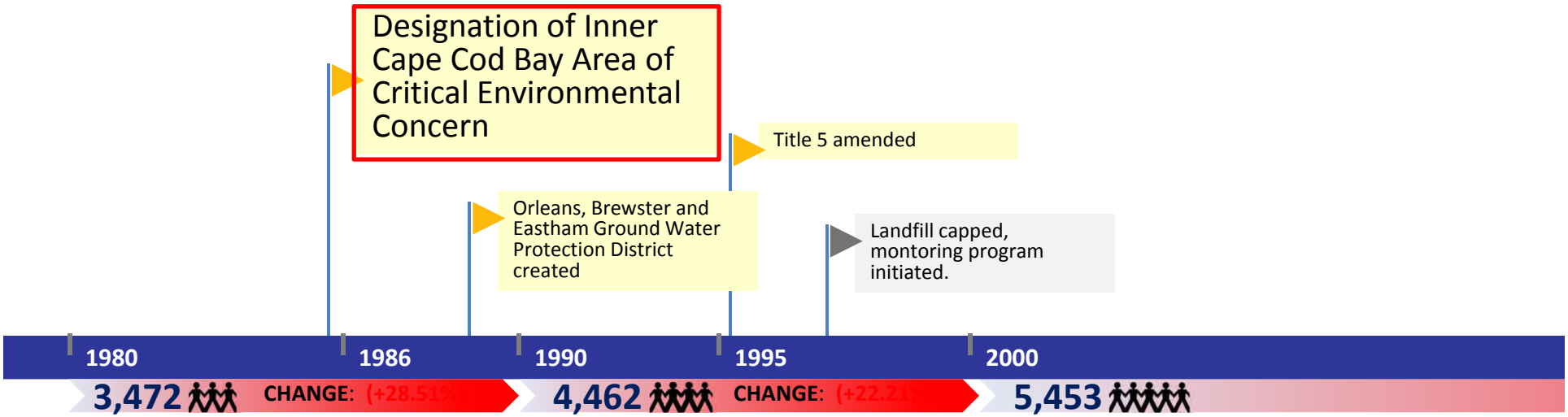
Eastham

From 1978 Section 208 Plan

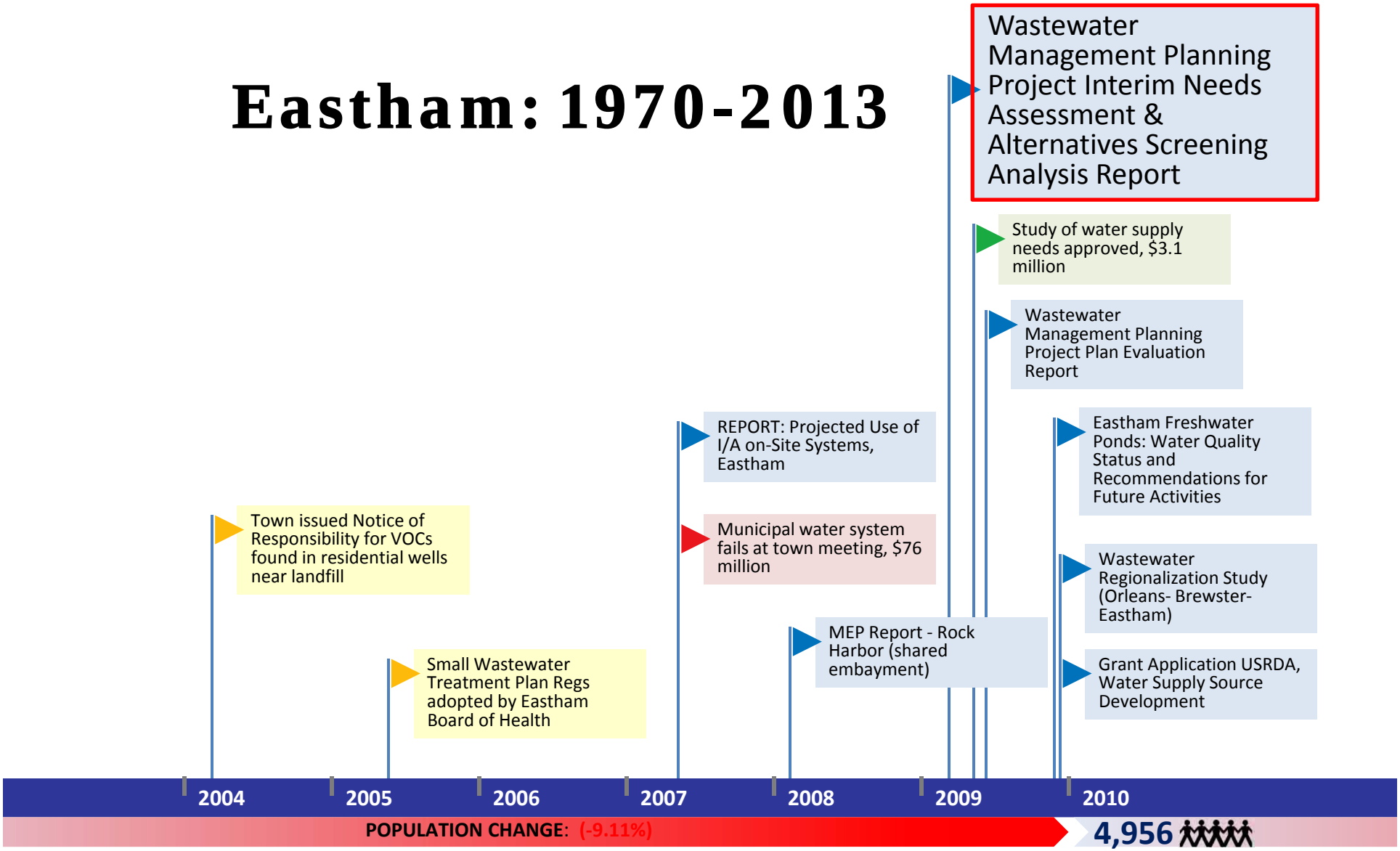
- Eastham should give priority to improving Title 5 enforcement and controlling conversion of seasonal dwellings.
- The town should work with CCPEDC to implement a Seasonal Residential District for the western shore of Eastham.
- Water supply is also of concern in Eastham. The high density areas and the town's present 20,000 square foot minimum lot size are not considered to provide adequate protection of private wells.
- It is suggested that the town begin to implement its water supply plan in the near future to serve densely populated areas, and areas around the town landfill.
- The town should install water table wells around the existing landfill to determine the probable direction of groundwater flow from the site.
- Further studies in cooperation with USGS may be necessary to locate the plume, since public water is not available and development is encroaching on the landfill area.
- The town should join regional waste disposal planning efforts in the hopes that a regional solution will be available before the existing site is exhausted.
- Eastham should join with Orleans in construction of a regional septage facility.



Eastham: 1970-2013

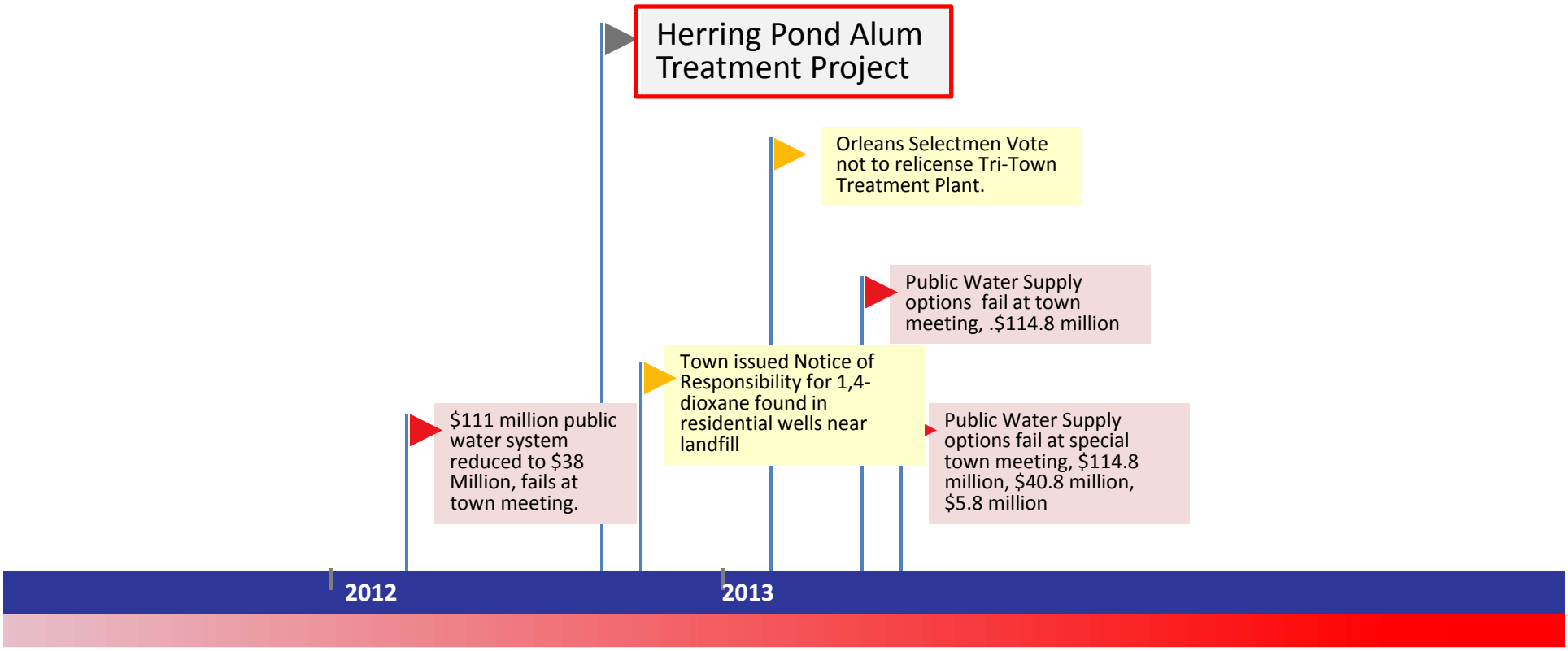


Eastham: 1970-2013



POPULATION: 4,956
(-9.11%)

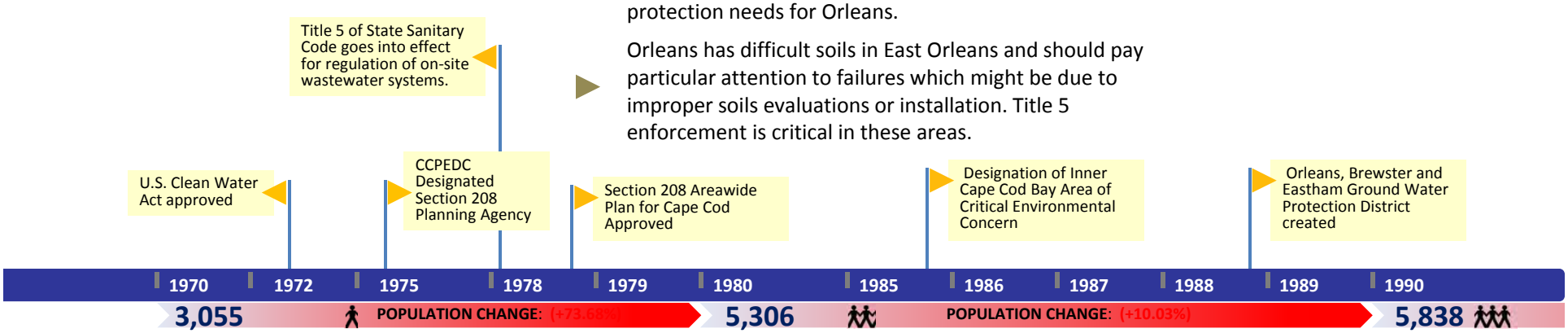
Eastham: 1970-2013



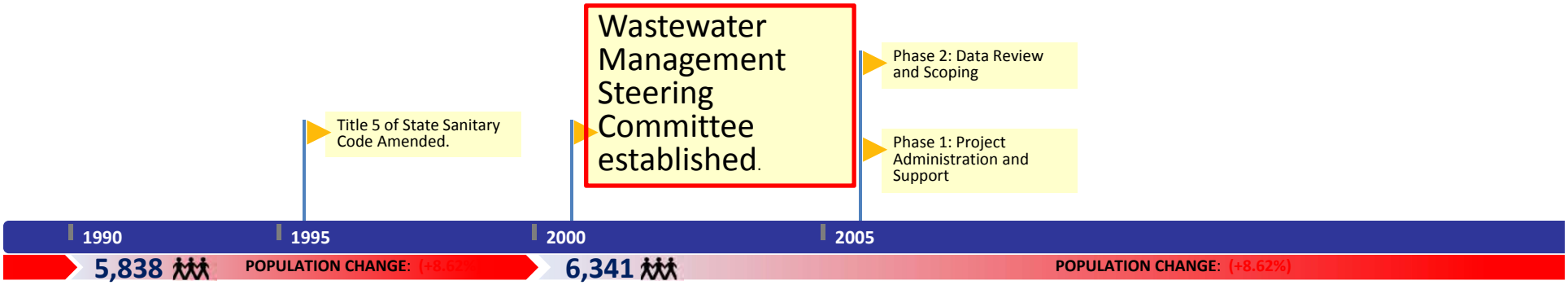
Orleans

From 1978 Section 208 Plan

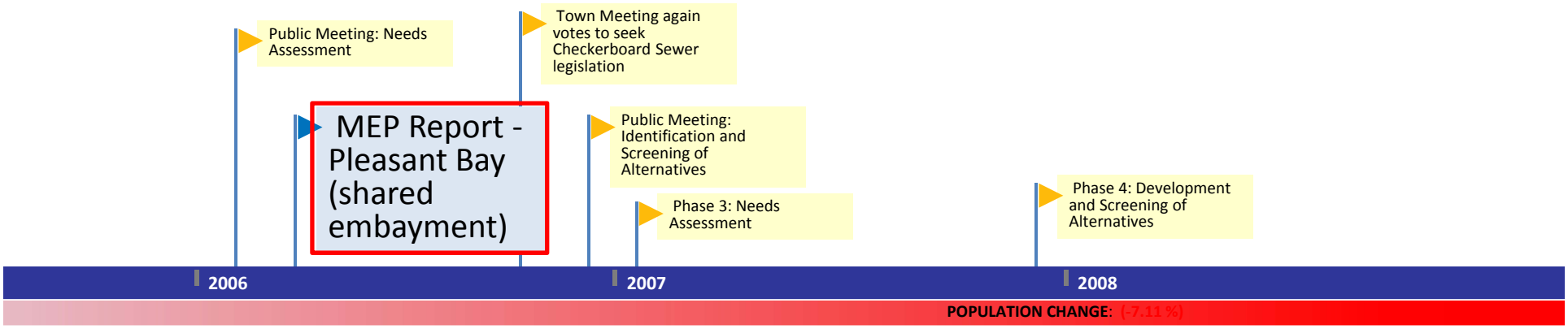
- The major problems in Orleans at present are septage management, failing systems in the town center, and protection of water quality in the municipal wells.
- Orleans is one of the first towns on the Cape to take positive action to abate the serious problems posed by septage disposal.
- A scope of 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.



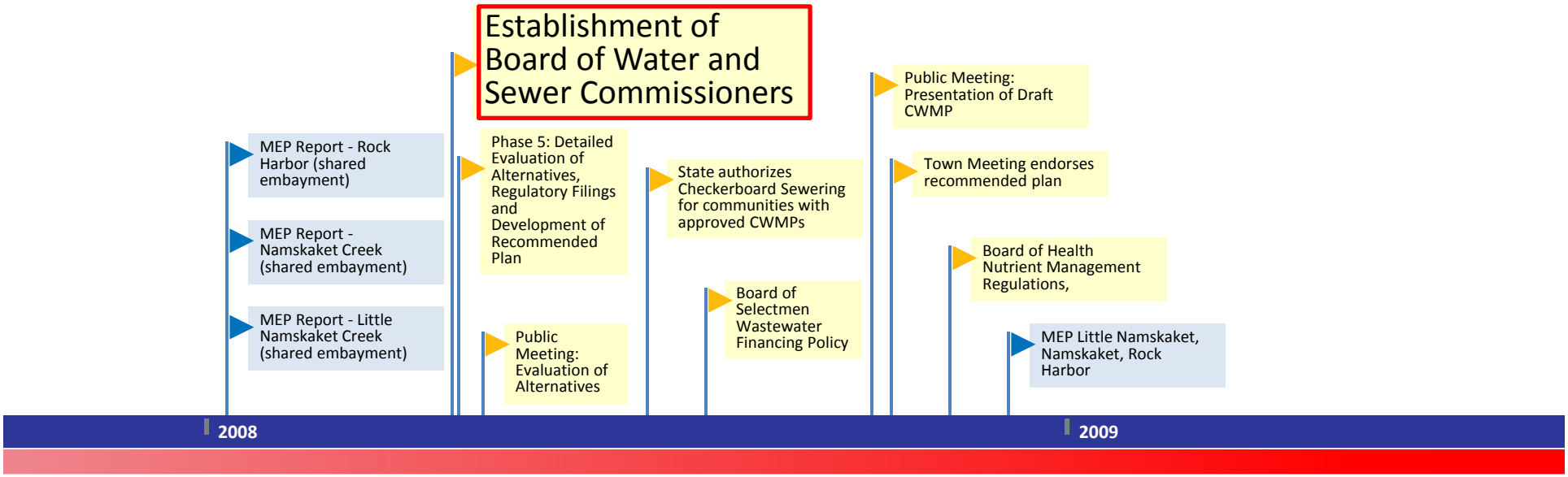
Orleans: 1970-2013



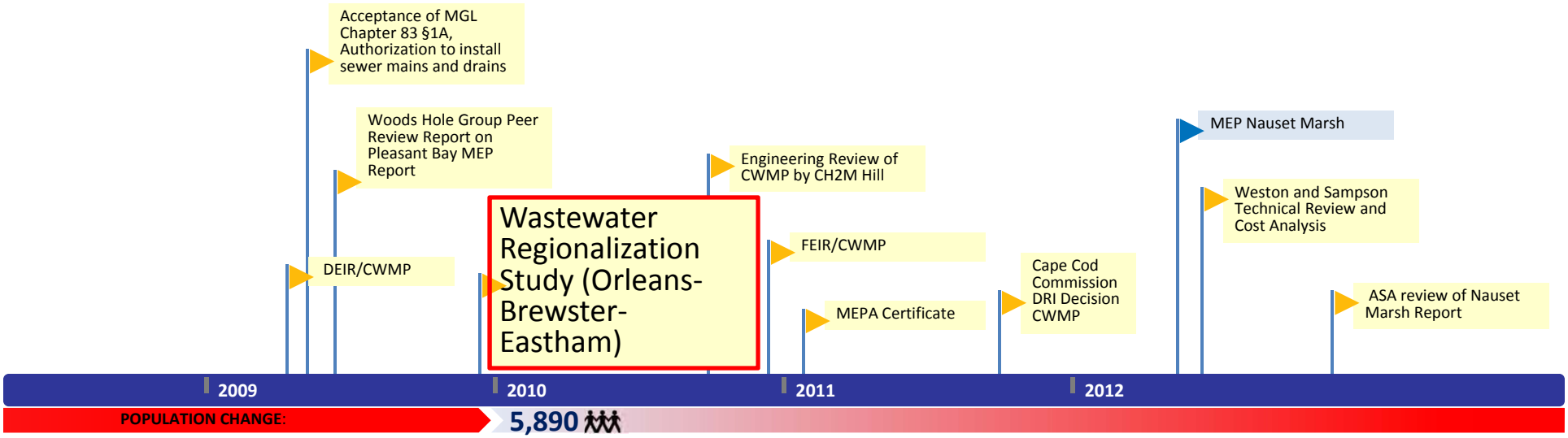
Orleans: 1970-2013



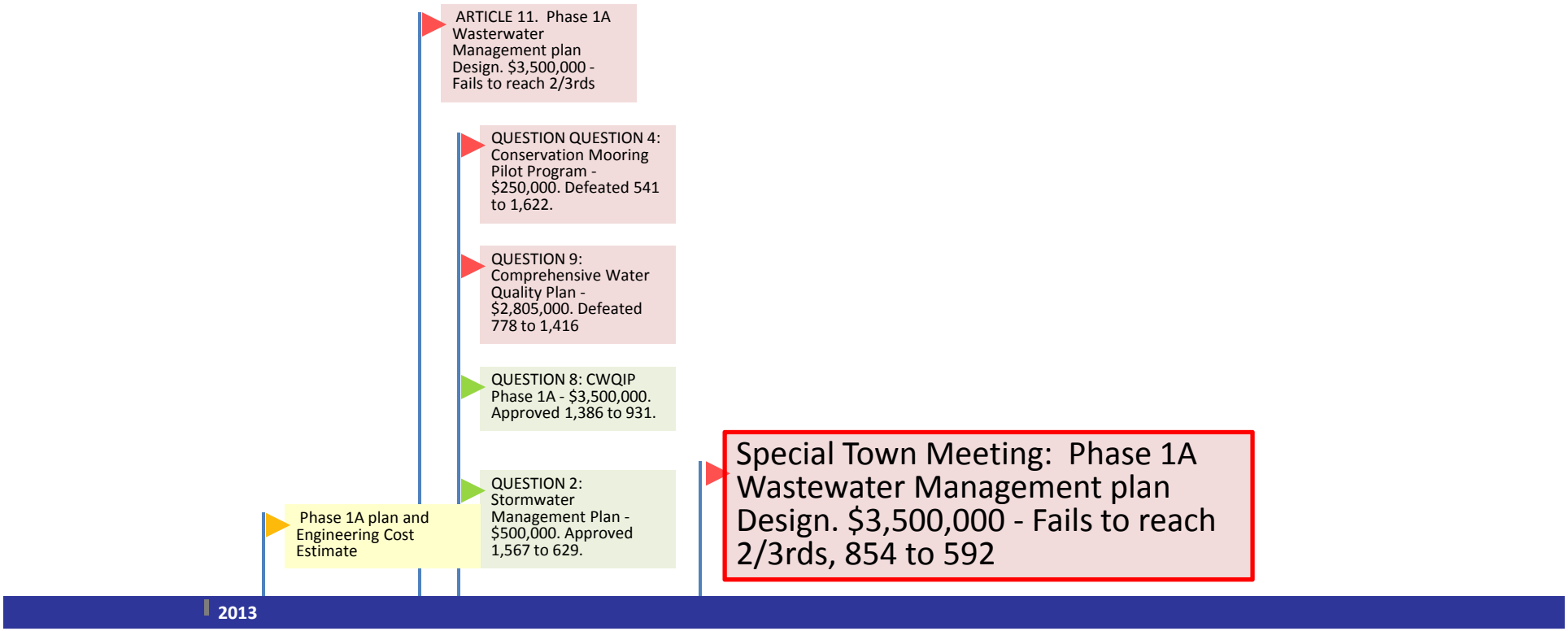
Orleans: 1970-2013



Orleans: 1970-2013



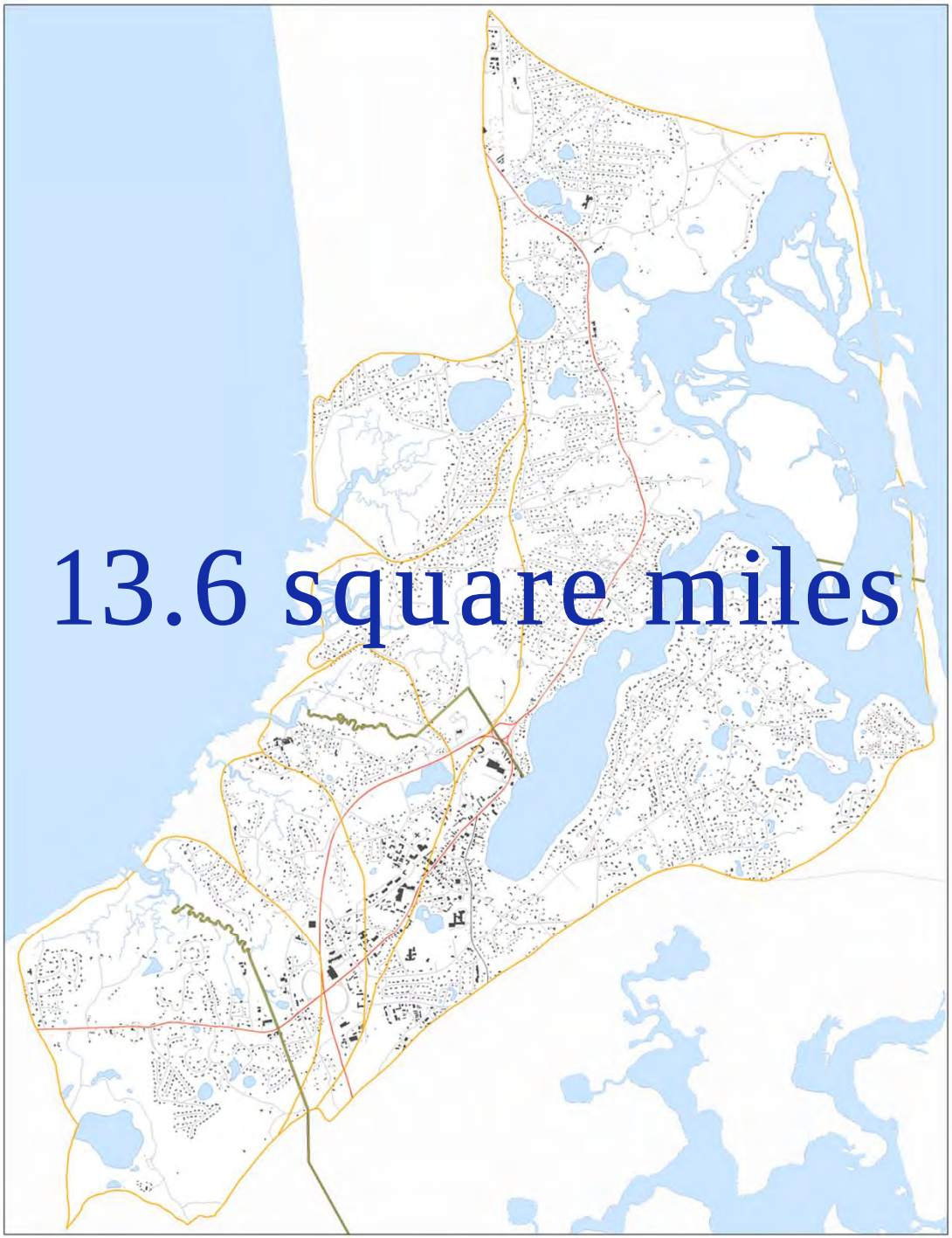
Orleans: 1970-2013



Did we miss anything?

Your Watersheds

Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh


13.6 square miles


3 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 Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

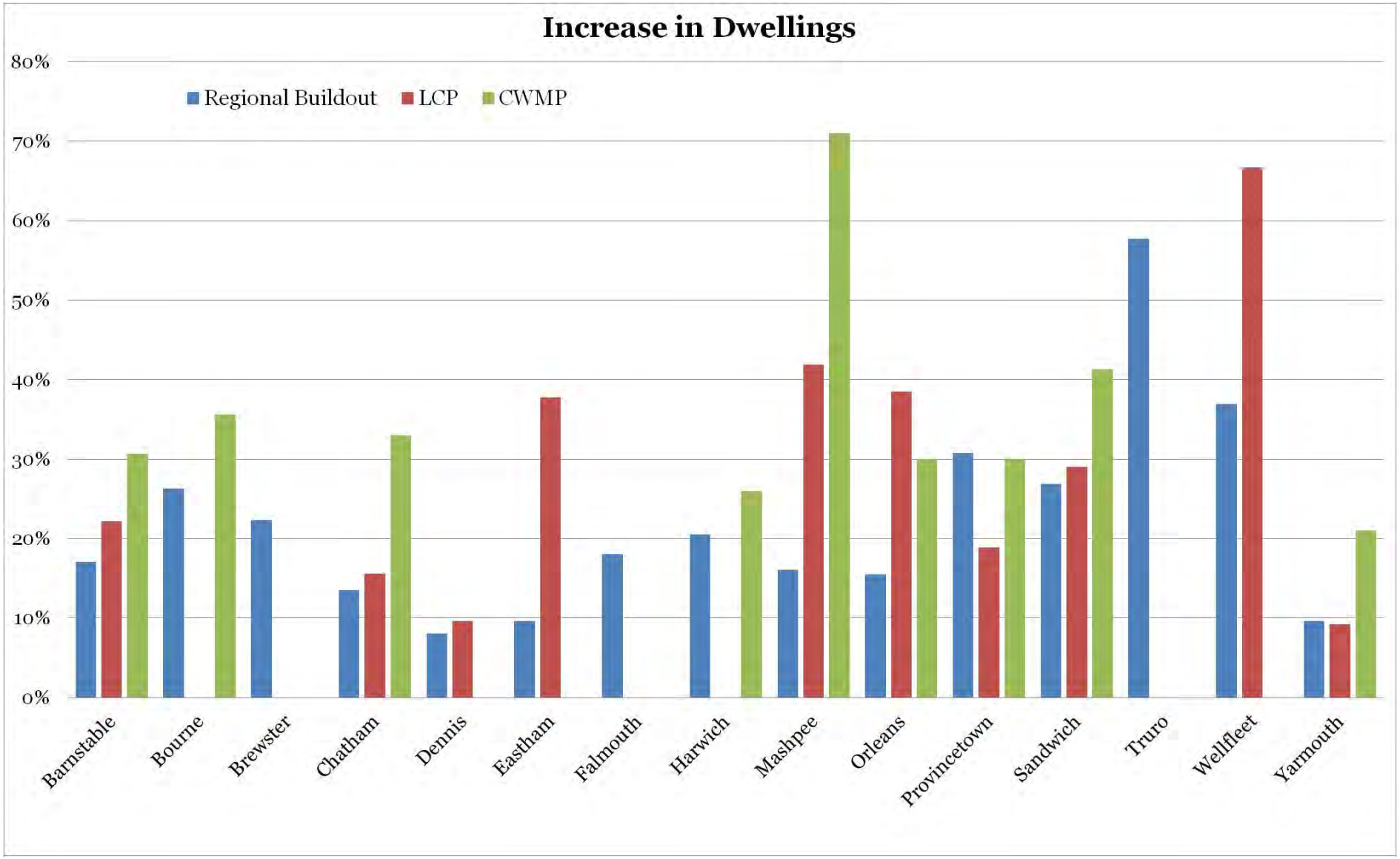
Sources: MassGIS, MassDOT

Density

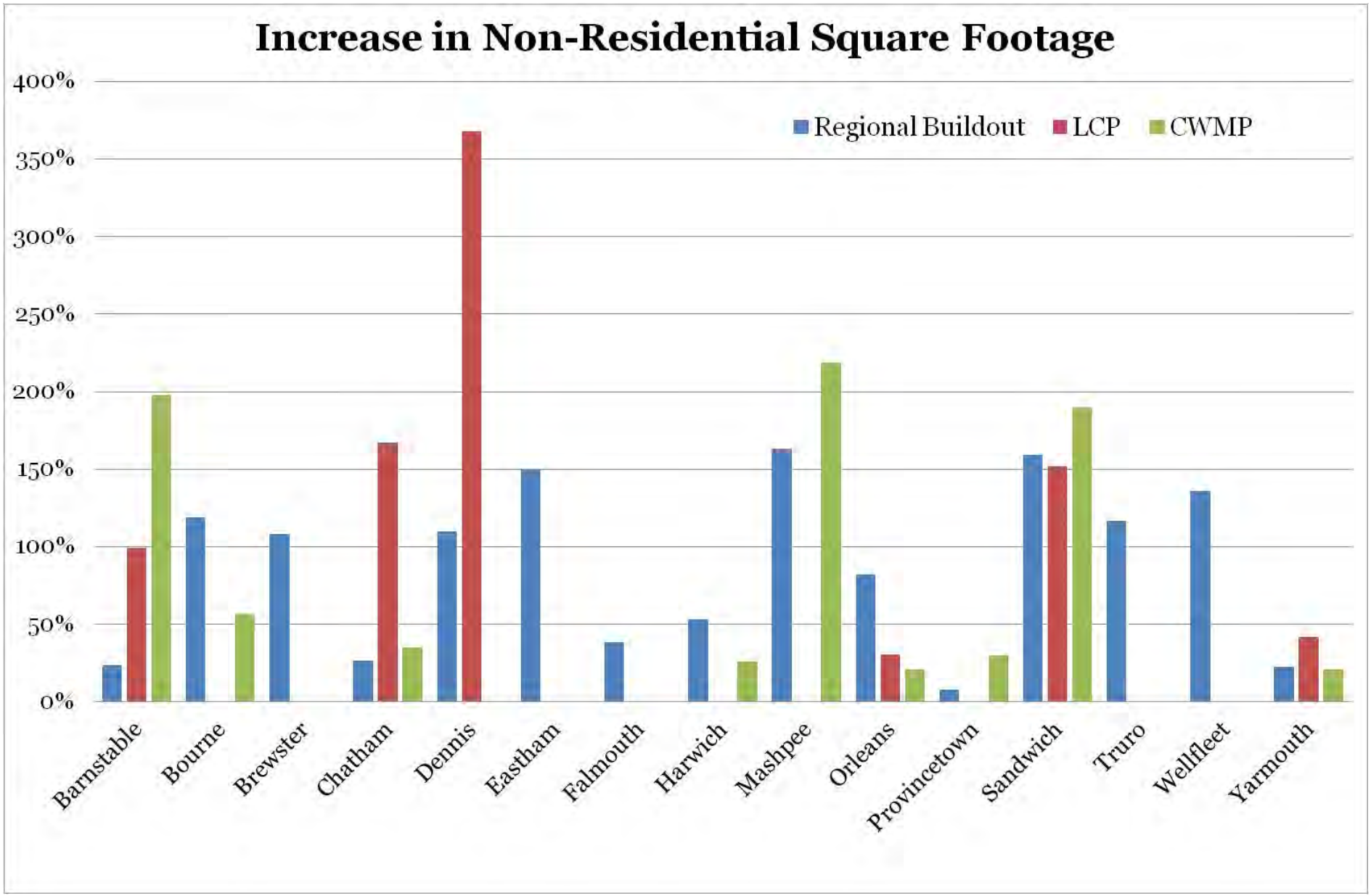
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

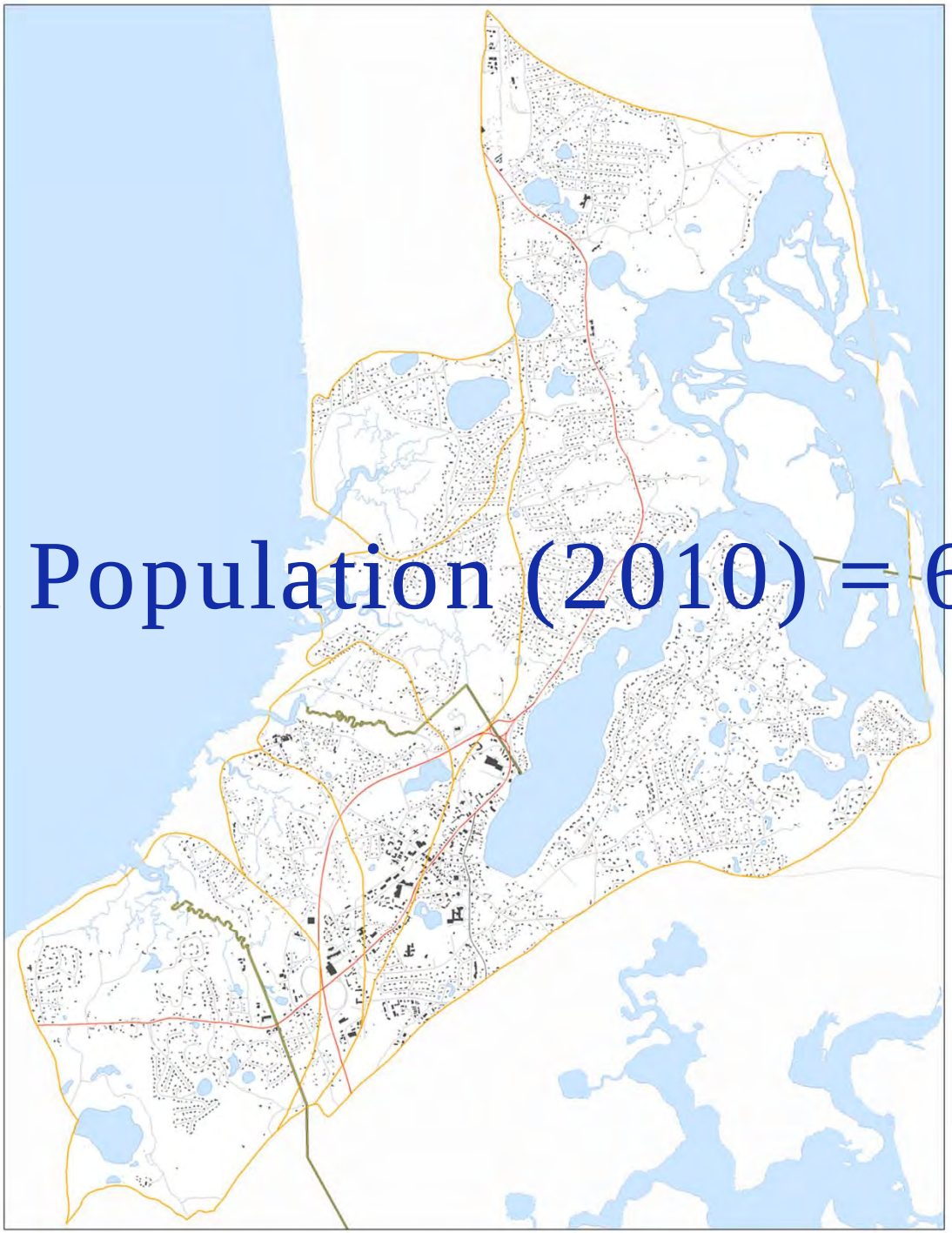

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout


Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

The People

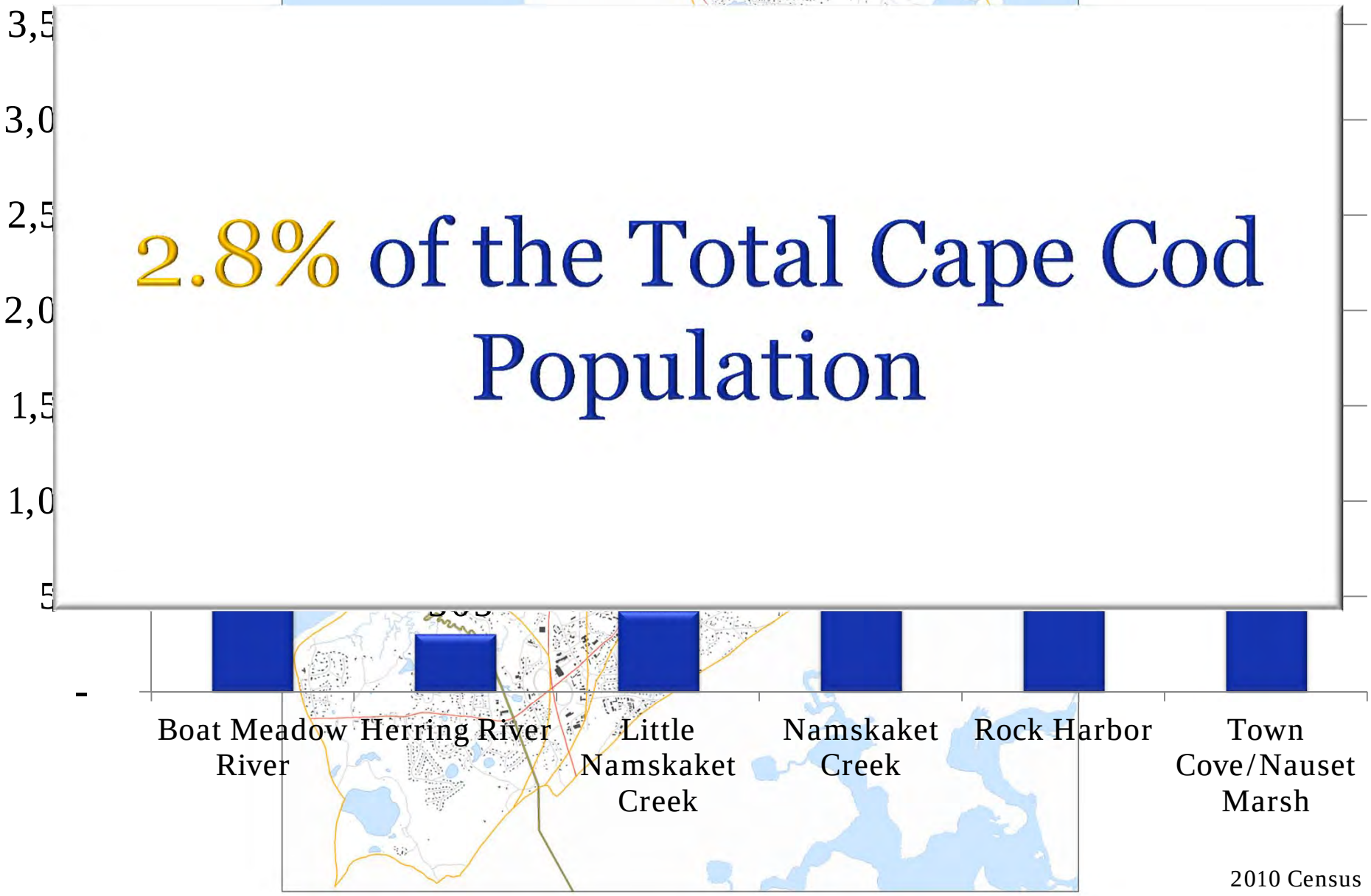
Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh



Total Population (2010) = 6,220

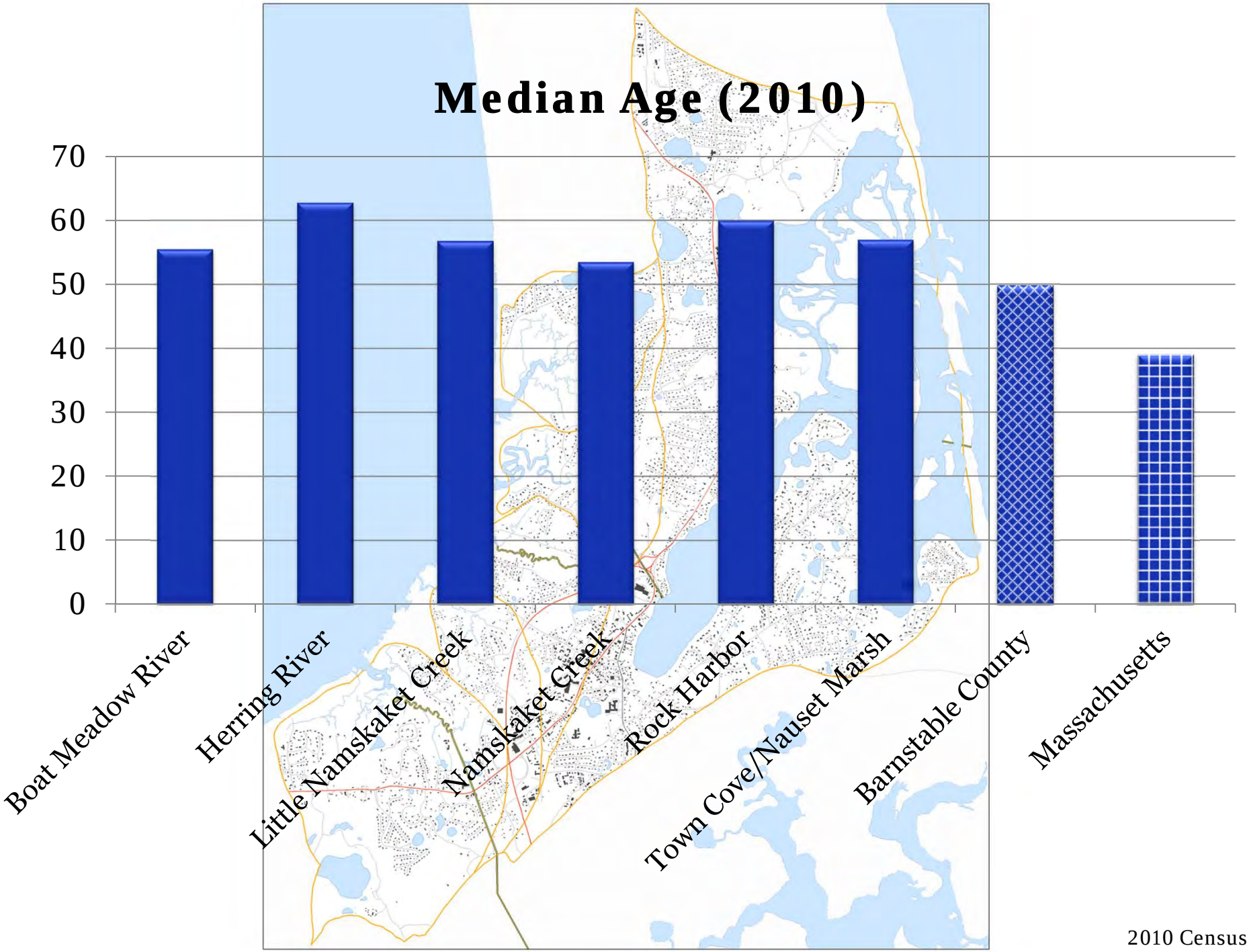
2010 Census

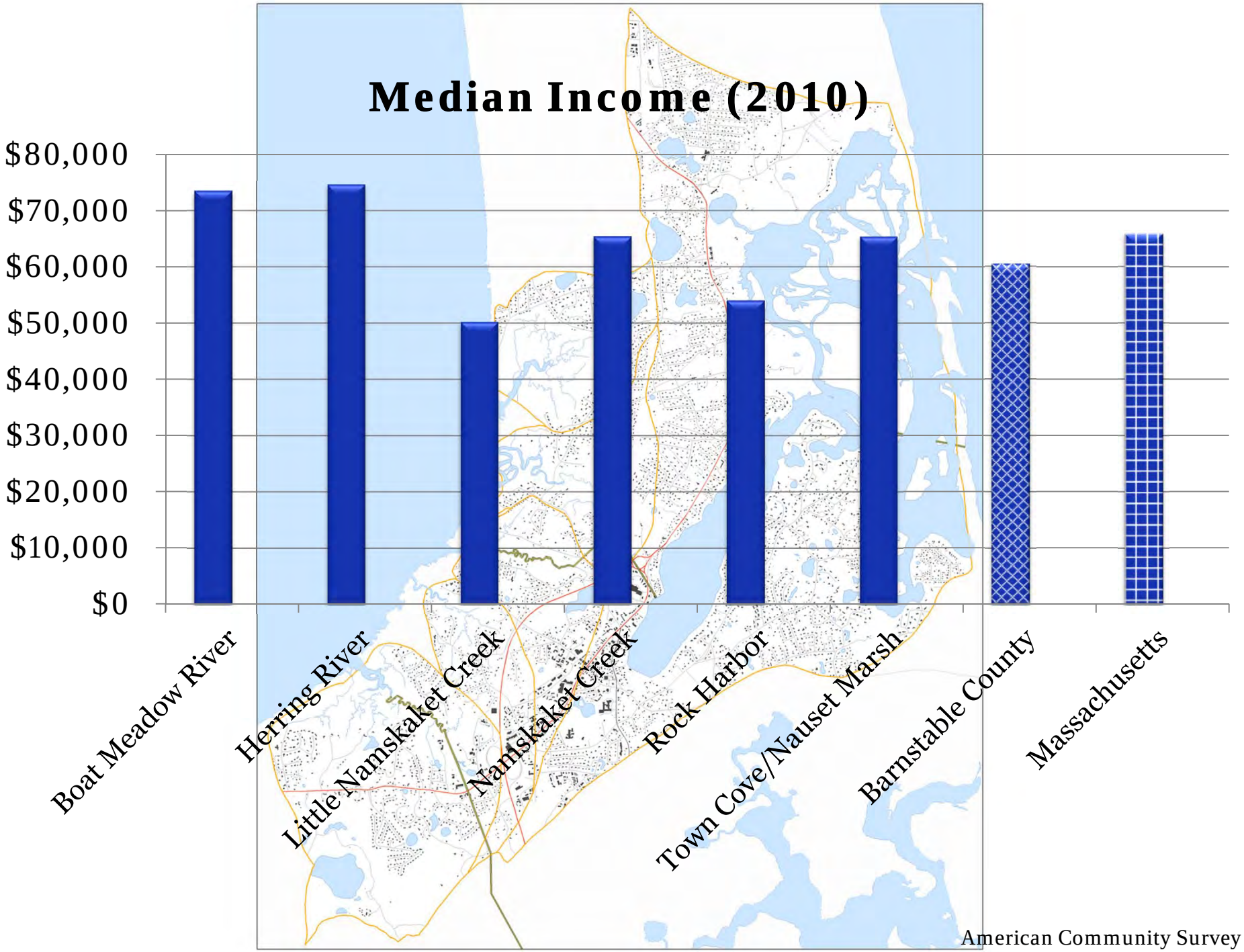
Population (2010)

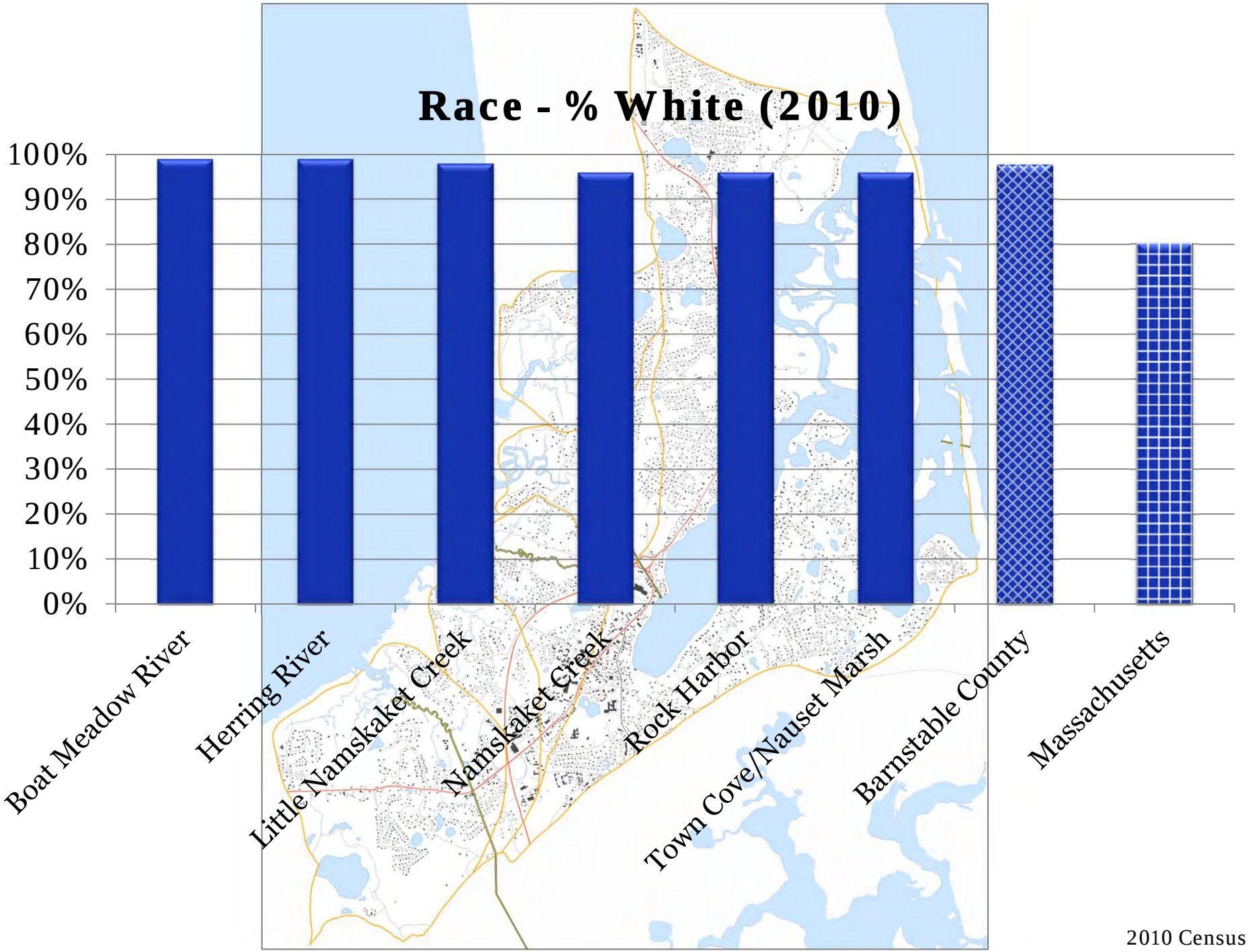


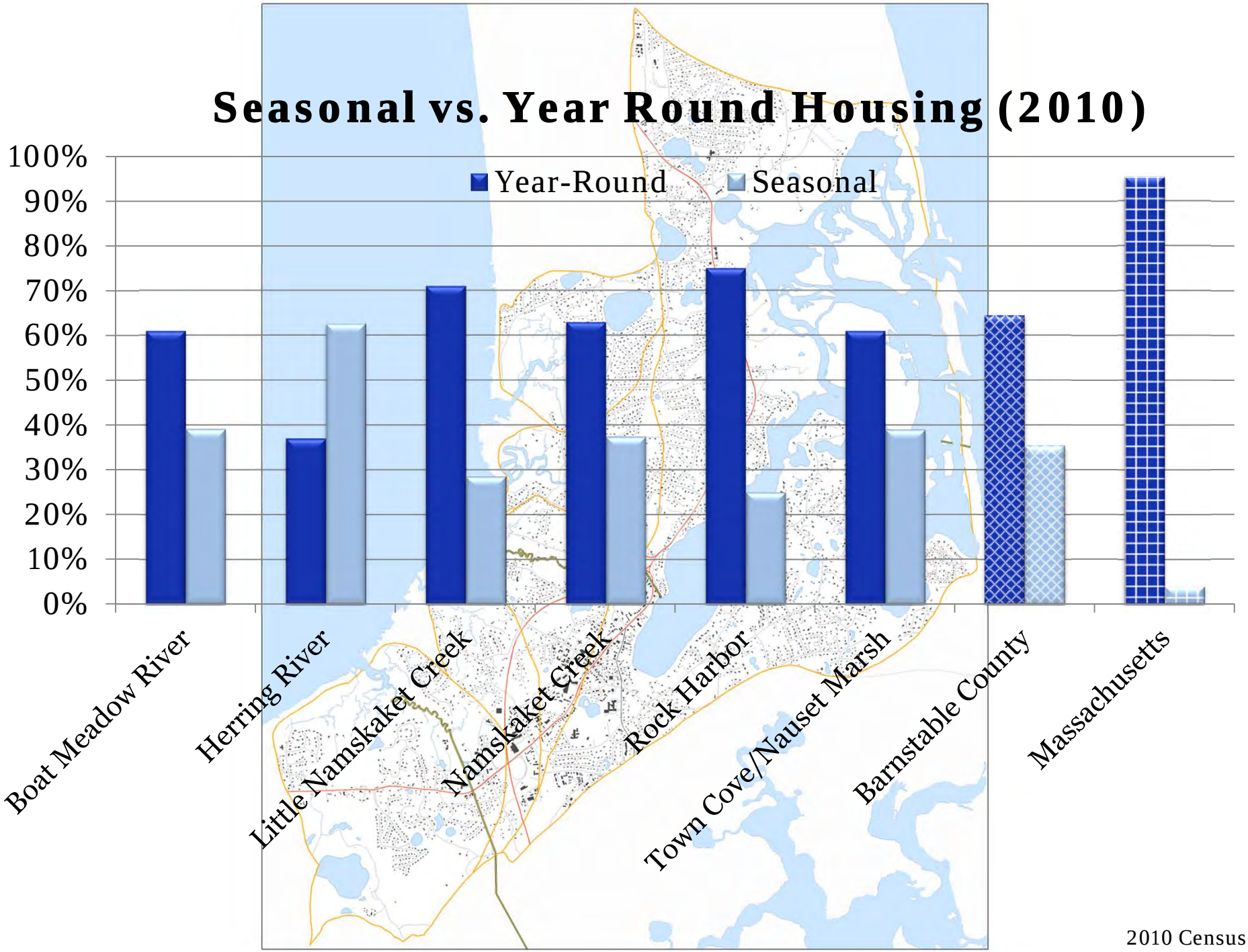
2.8% of the Total Cape Cod Population

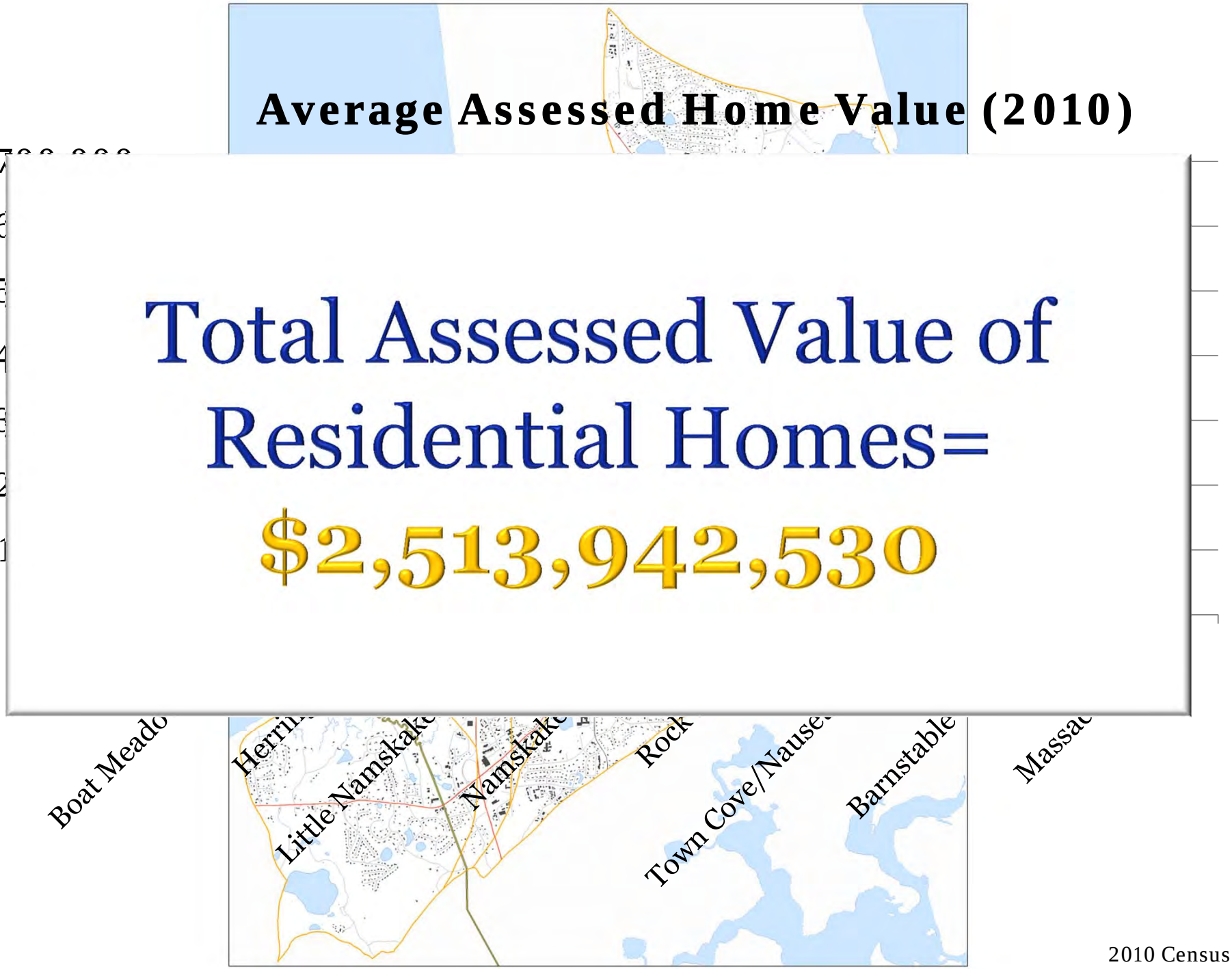
2010 Census


Median Age (2010)
70
60
50
40
30
20
10
0
Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh
Barnstable County
Massachusetts
2010 Census


Median Income (2010)
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh
Barnstable County
Massachusetts
American Community Survey

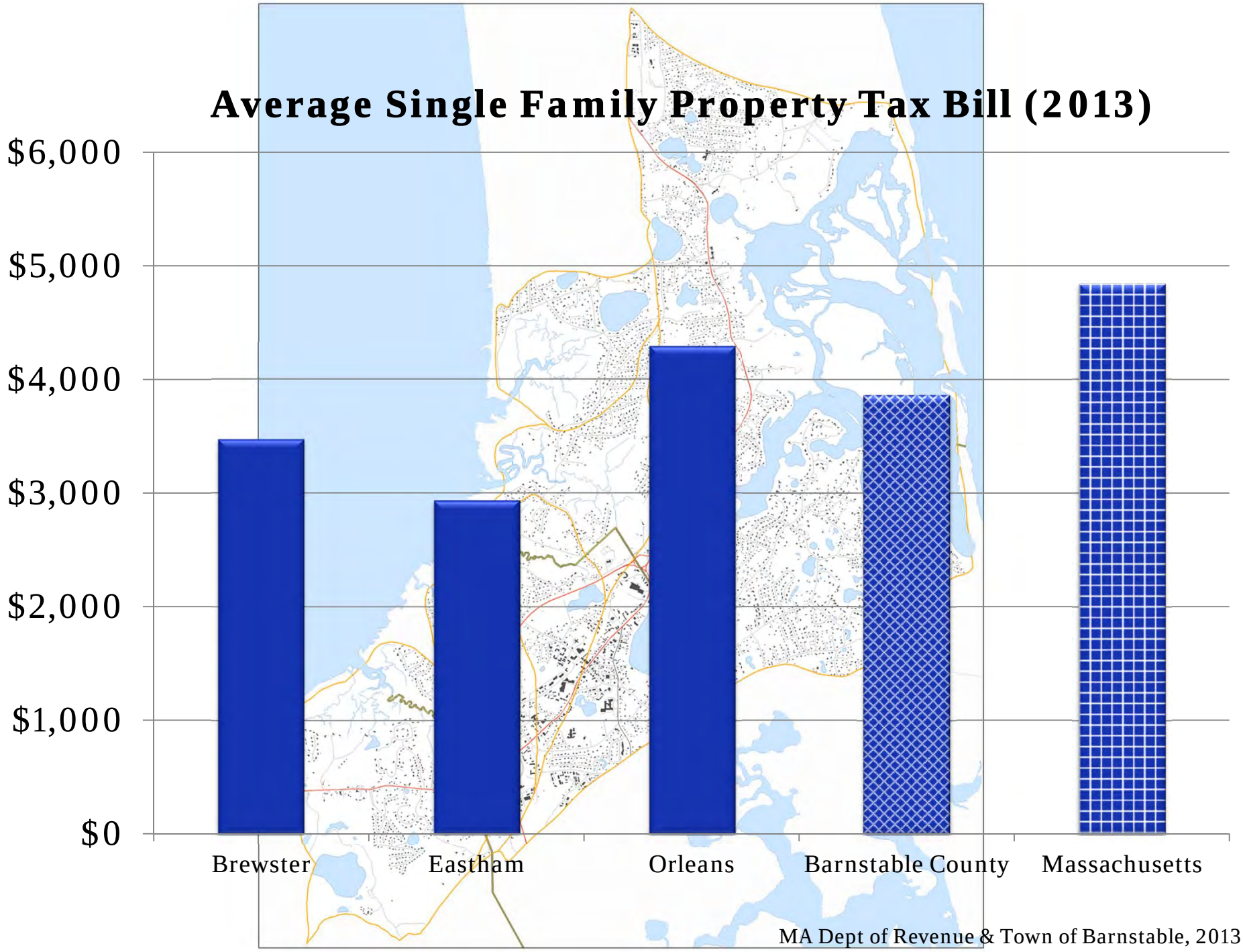

Race - % White (2010)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh
Barnstable County
Massachusetts
2010 Census

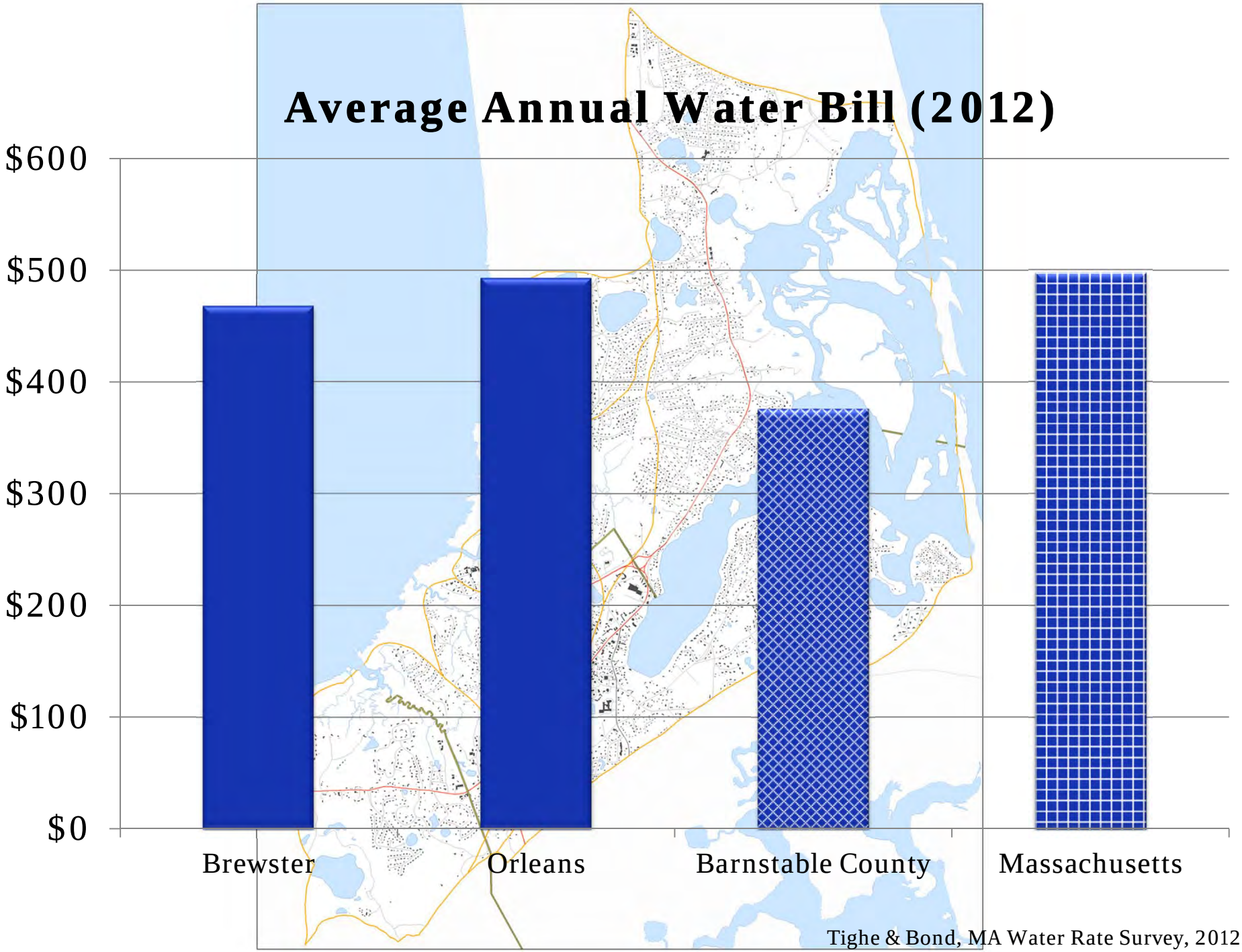

Seasonal vs. Year Round Housing (2010)
Year-Round
Seasonal
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh
Barnstable County
Massachusetts
2010 Census


Average Assessed Home Value (2010)
Total Assessed Value of Residential Homes=
$2,513,942,530
Boat Meado
Herrin
Little Namskake
Namskake
Rock
Town Cove/Nause
Barnstable
Massac
2010 Census

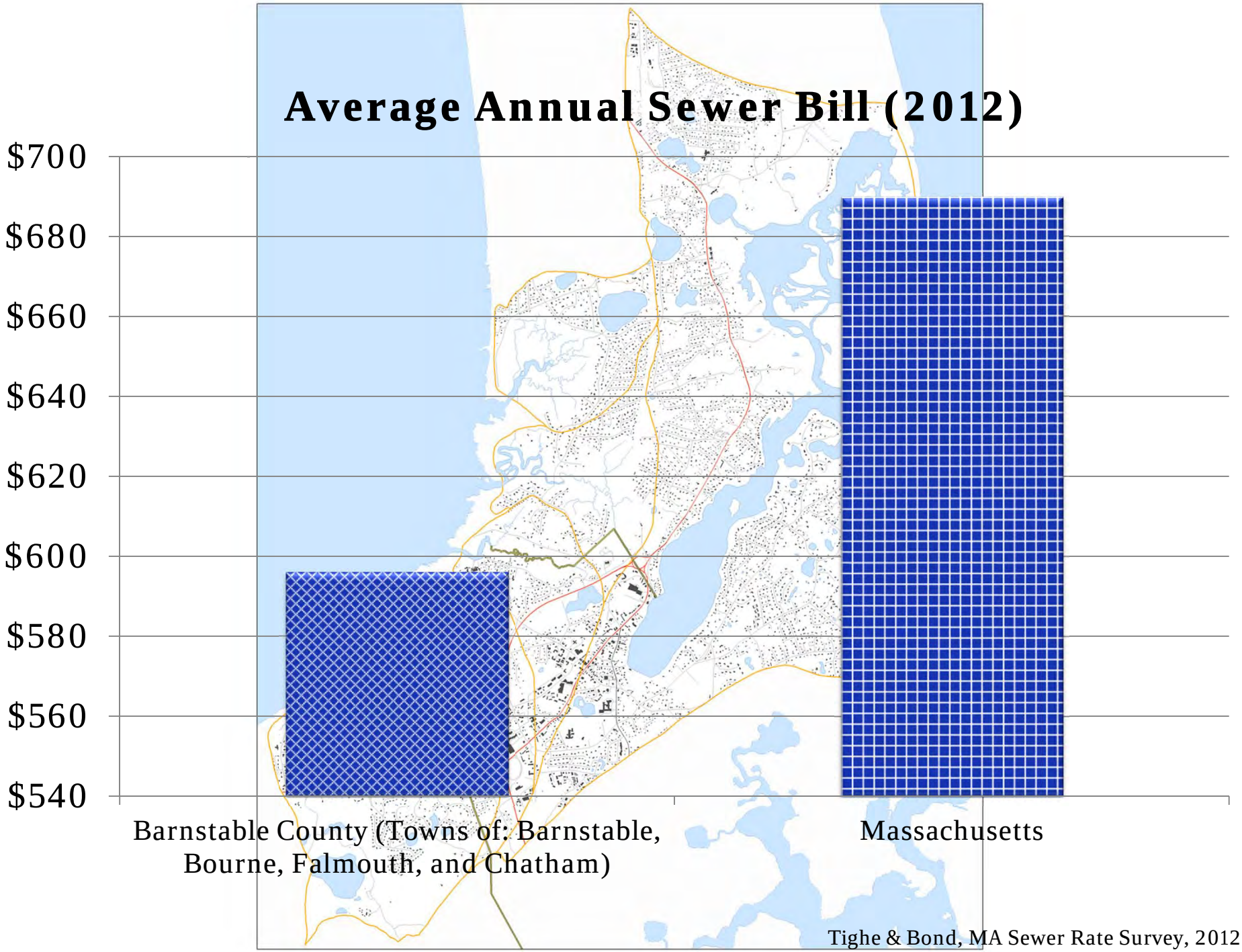
Your Government & Taxes

Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh


Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Brewster
Eastham
Orleans
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013



Tighe & Bond, MA Water Rate Survey, 2012

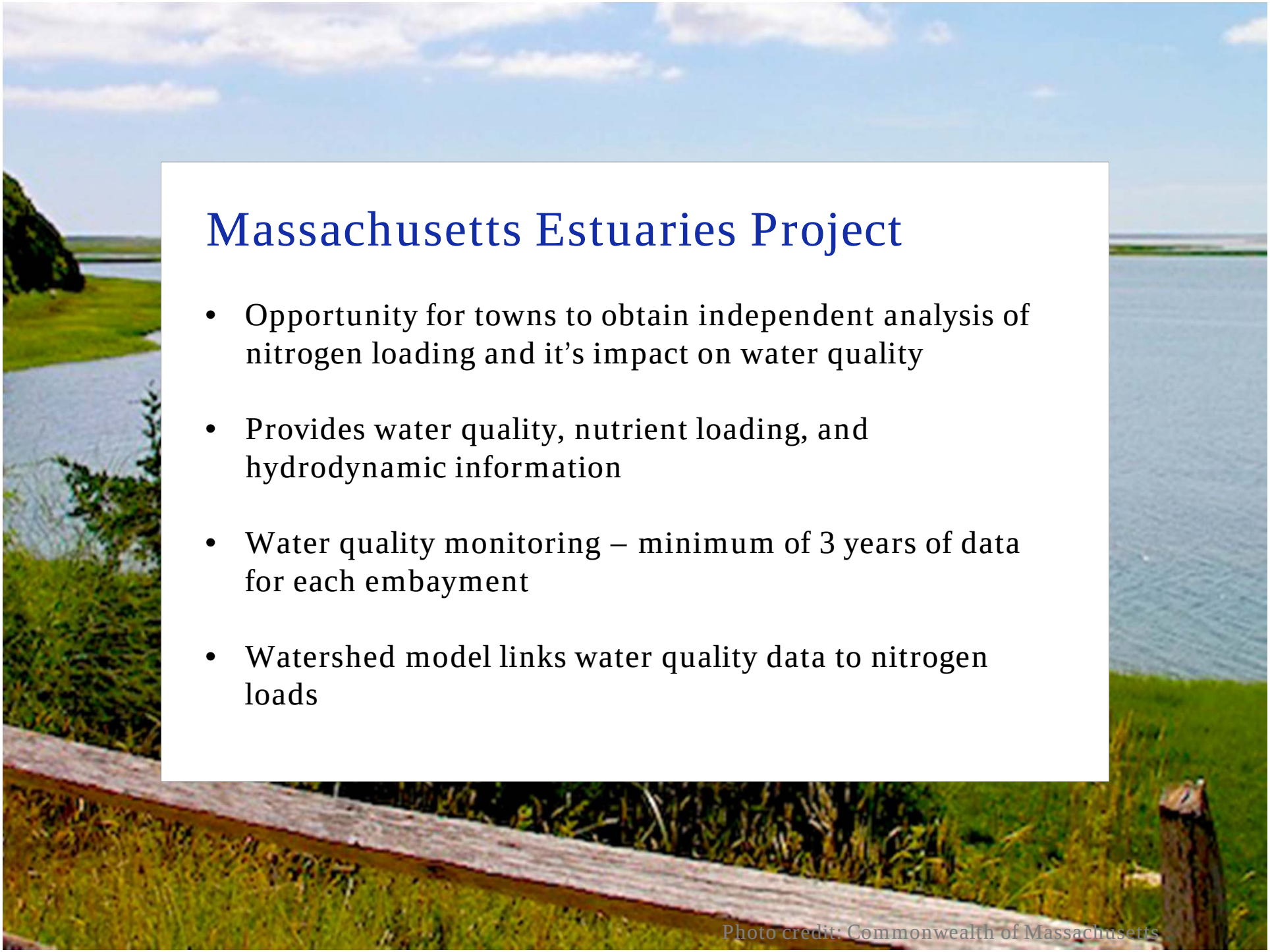


Tighe & Bond, MA Sewer Rate Survey, 2012

The Problem

Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh

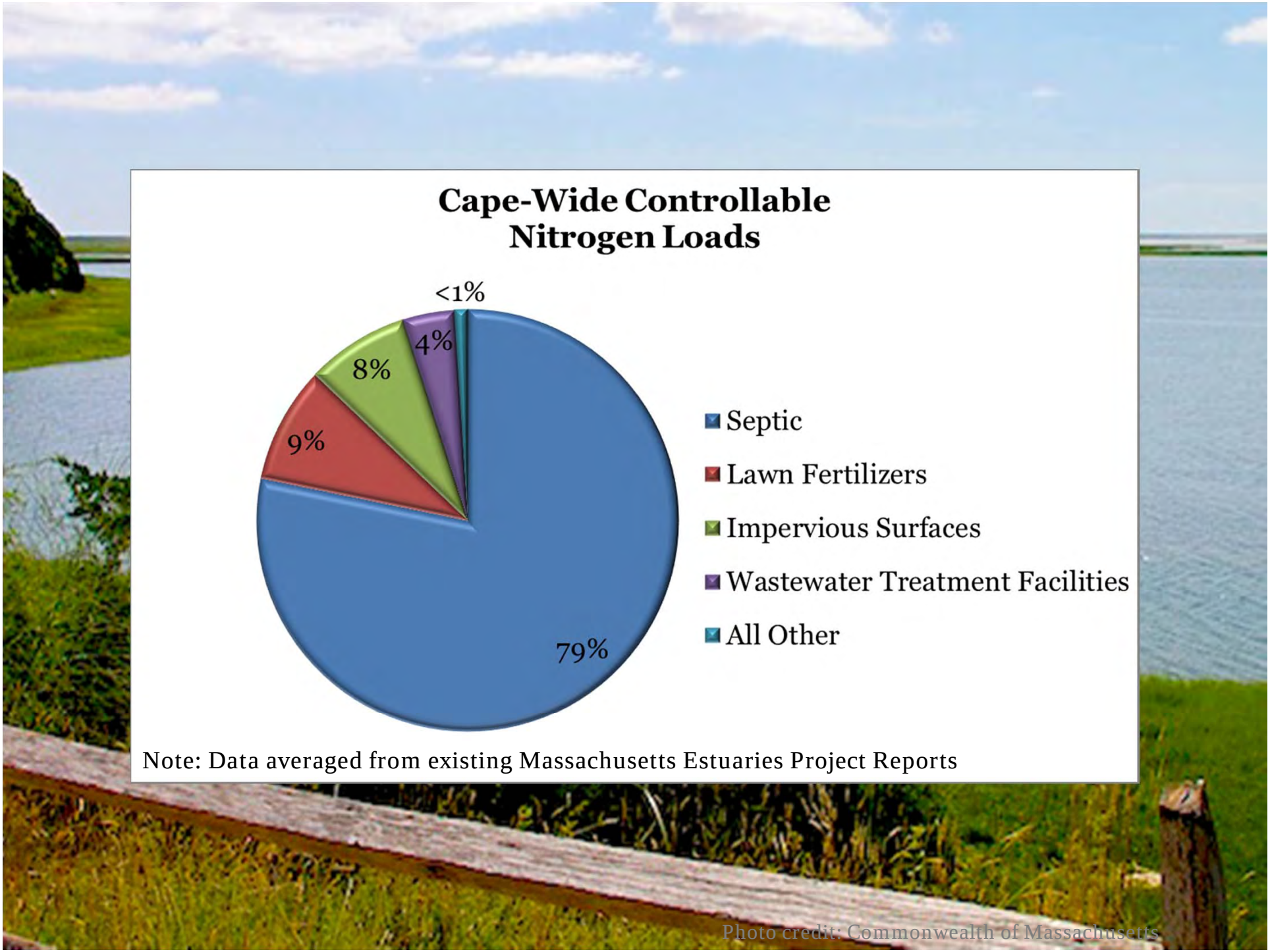

Photo credit: Commonwealth of Massachusetts



Massachusetts Estuaries Project

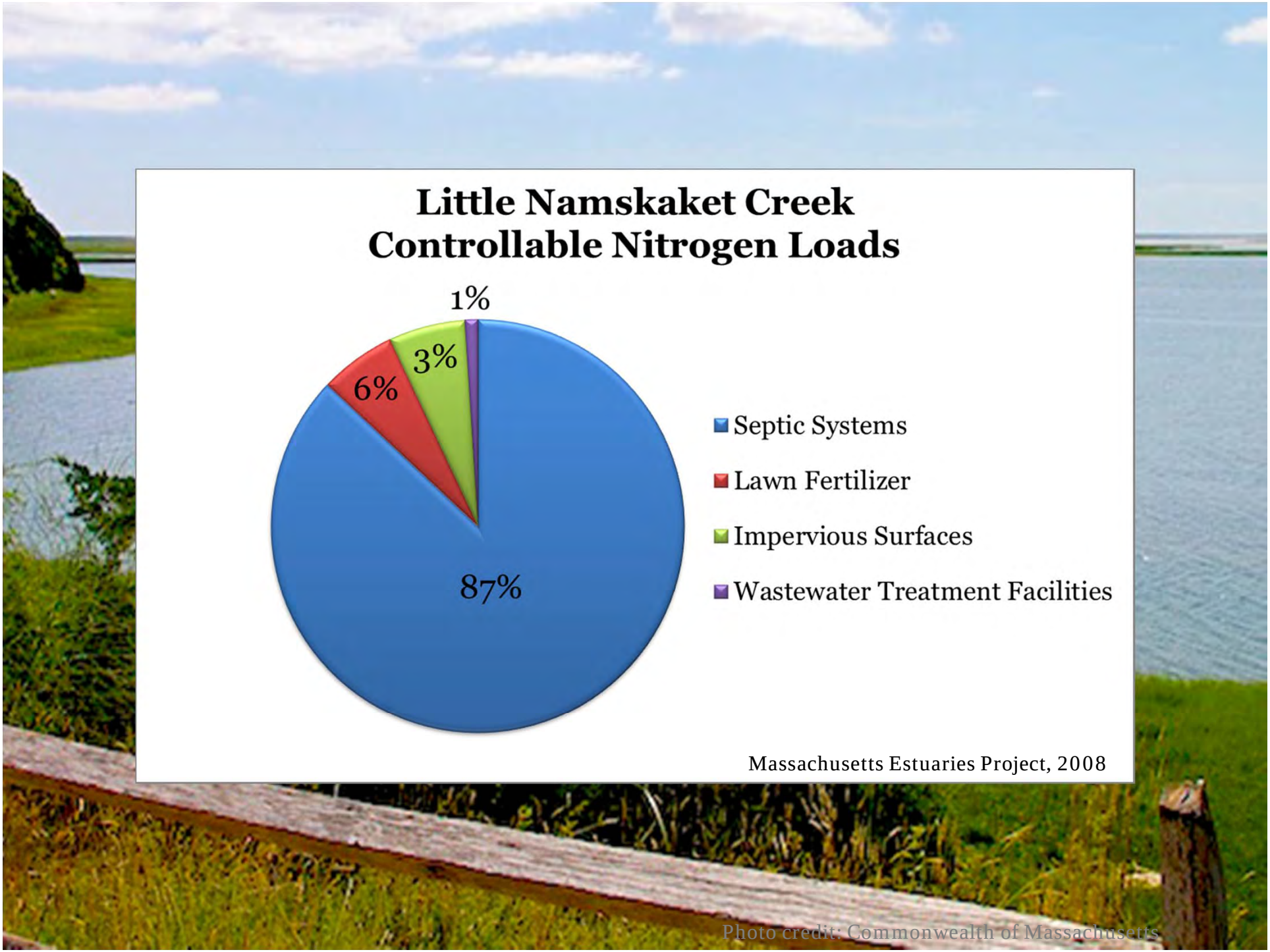
- Opportunity for towns to obtain independent analysis of nitrogen loading and it's impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

Photo credit: Commonwealth of Massachusetts



Note: Data averaged from existing Massachusetts Estuaries Project Reports

Photo credit: Commonwealth of Massachusetts


Little Namskaket Creek
Controllable Nitrogen Loads
1%
3%
6%
87%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Wastewater Treatment Facilities
Massachusetts Estuaries Project, 2008
Photo credit: Commonwealth of Massachusetts

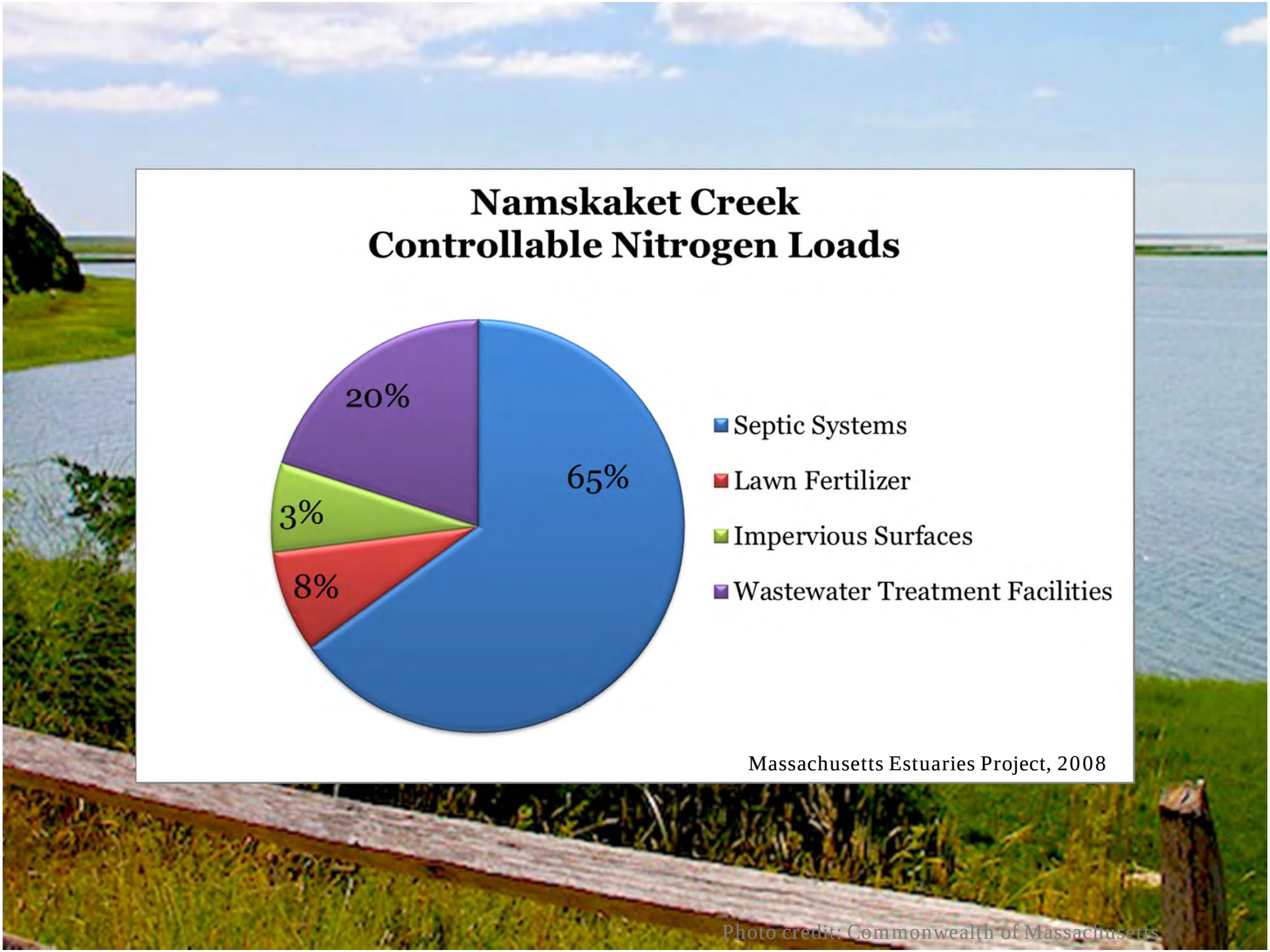
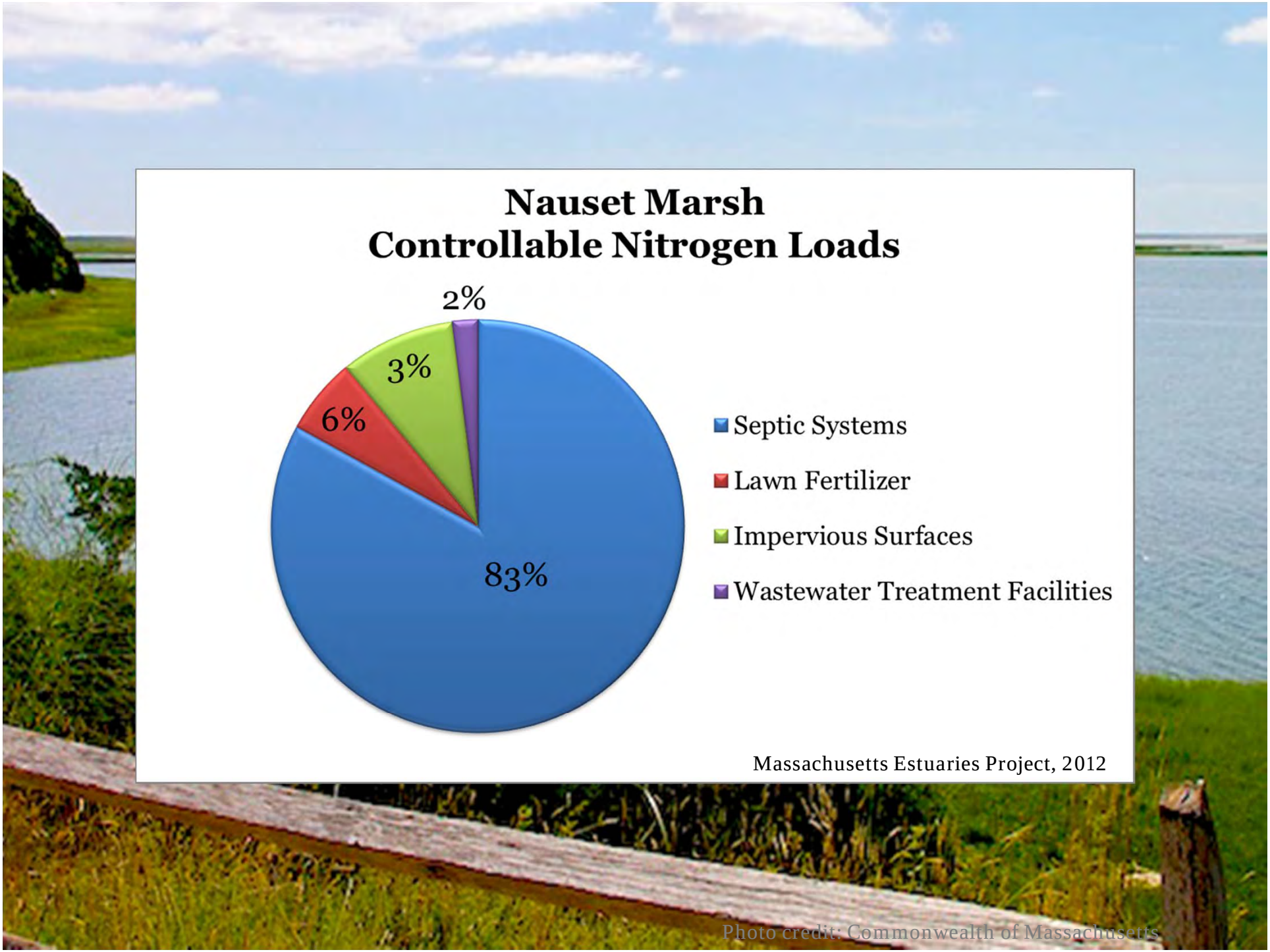
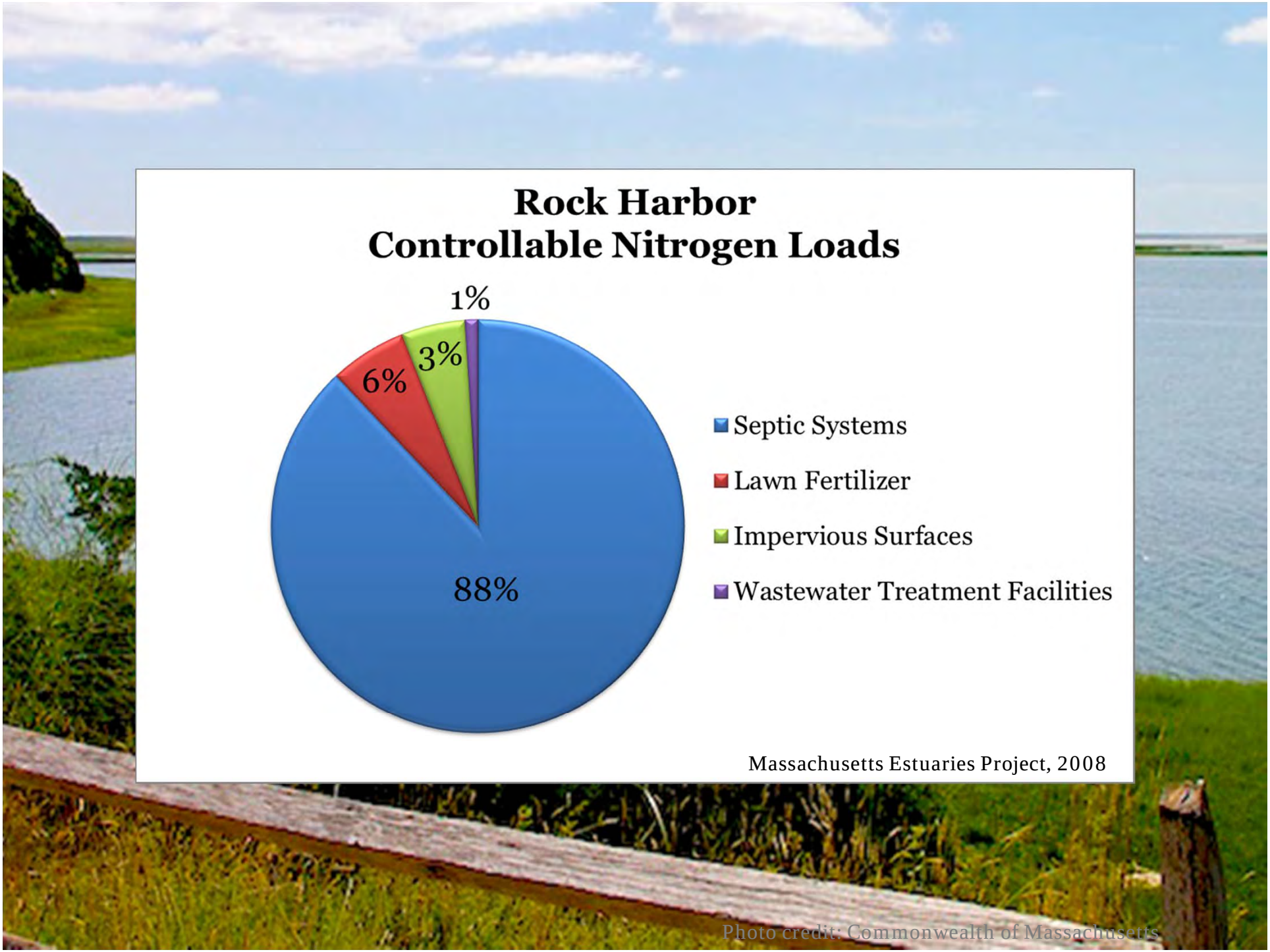
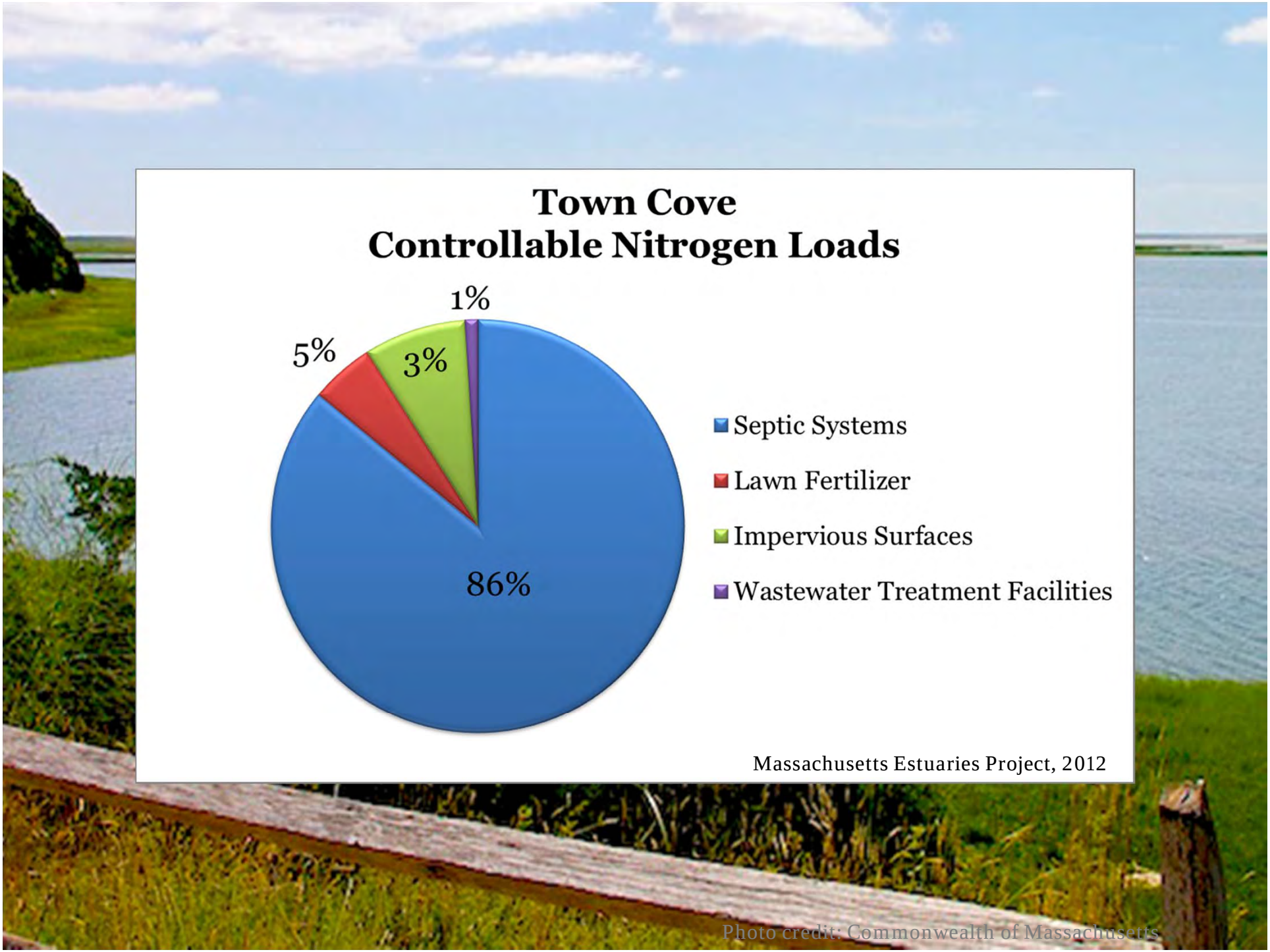


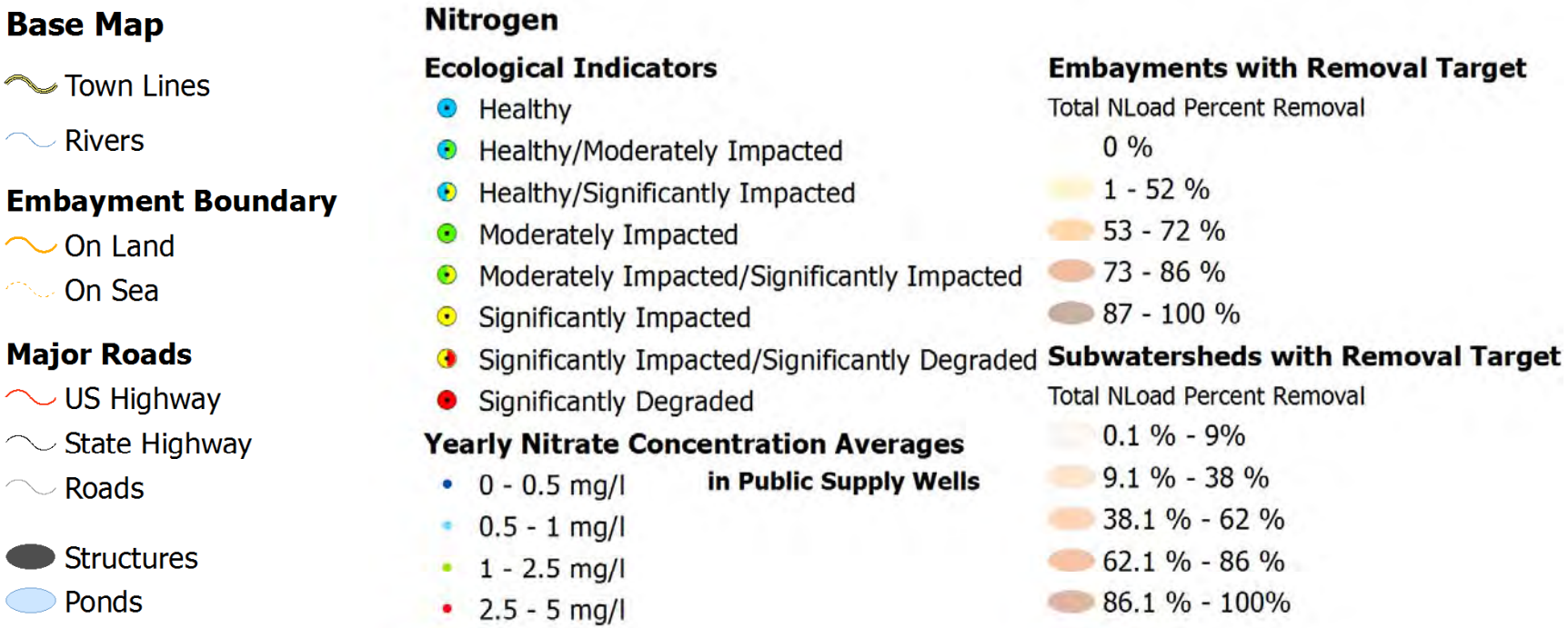
Photo credit: Commonwealth of Massachusetts


Nauset Marsh
Controllable Nitrogen Loads
2%
3%
6%
83%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Wastewater Treatment Facilities
Massachusetts Estuaries Project, 2012
Photo credit: Commonwealth of Massachusetts

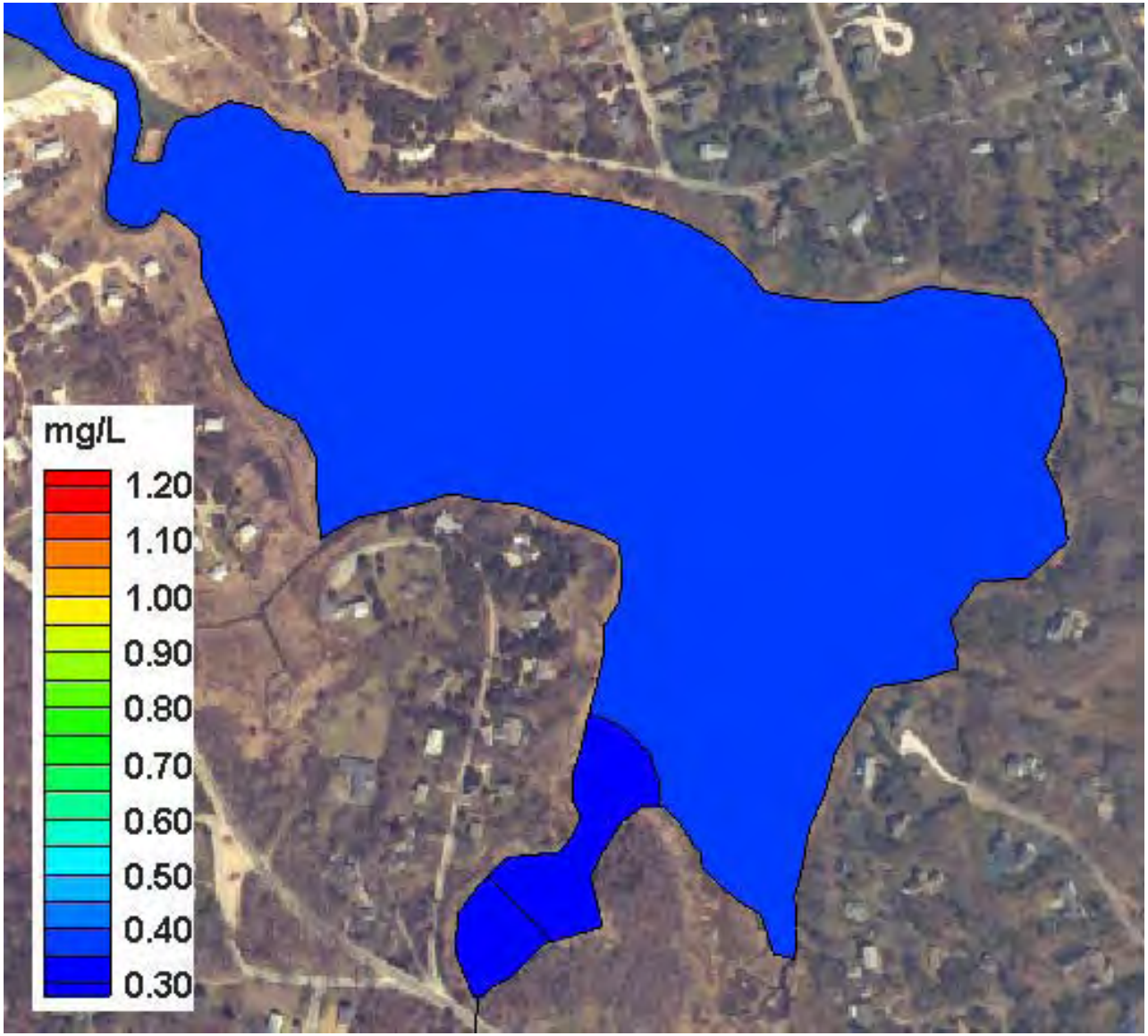

Rock Harbor
Controllable Nitrogen Loads
1%
3%
6%
88%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Wastewater Treatment Facilities
Massachusetts Estuaries Project, 2008
Photo credit: Commonwealth of Massachusetts


Town Cove
Controllable Nitrogen Loads
1%
5%
3%
86%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Wastewater Treatment Facilities
Massachusetts Estuaries Project, 2012
Photo credit: Commonwealth of Massachusetts

Nitrogen Problem



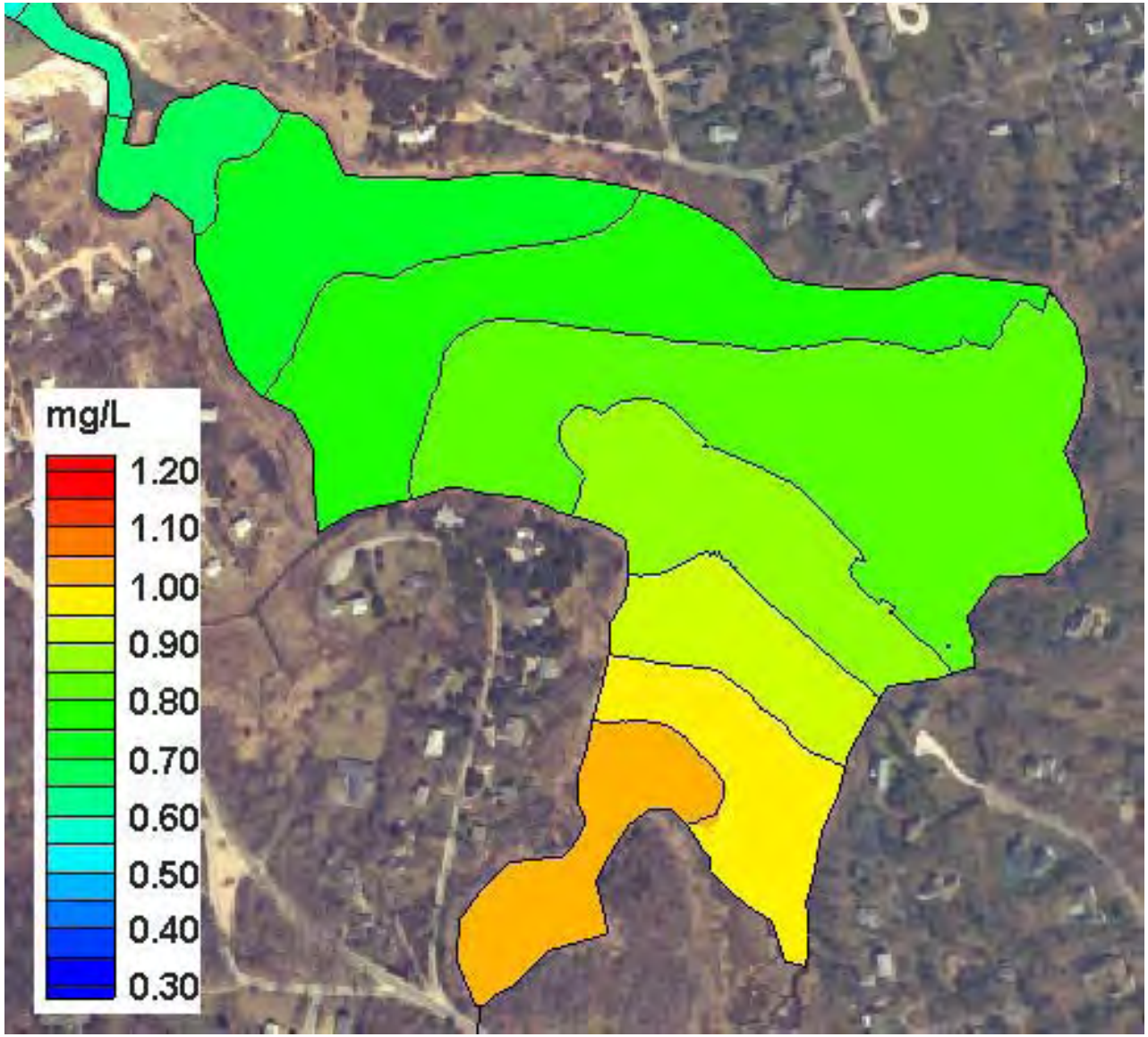
Sources: MassGIS, MEP, CCC



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in Little Namskaket Creek for no anthropogenic loading conditions.

(Source: MEP 2008)

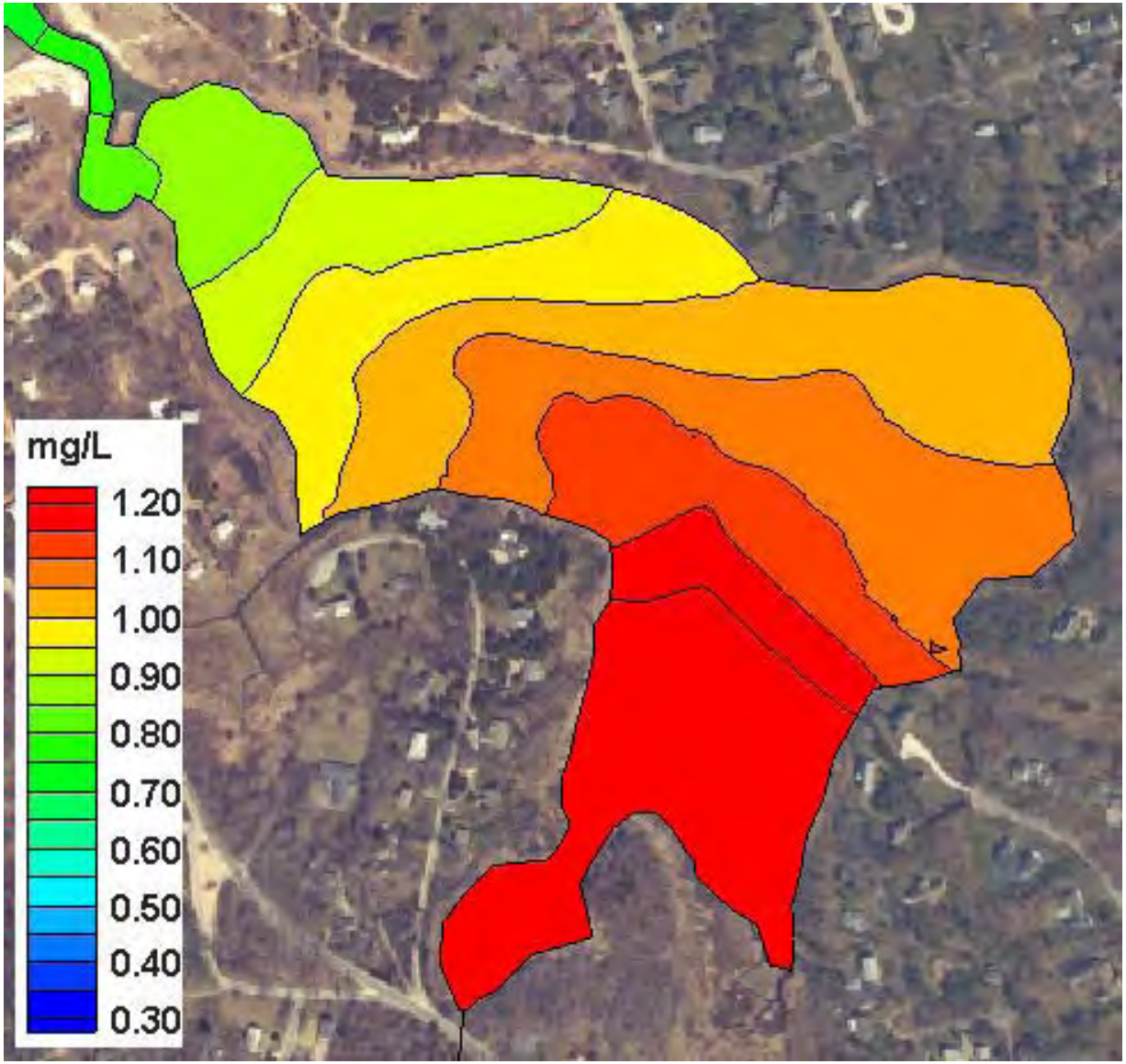
Pre-Colonial Conditions: Little Namskaket Creek



Contour Plot of **average total nitrogen concentrations** from the results of the present conditions loading scenario for the Little Namskaket Creek system.

(Source: MEP 2008)

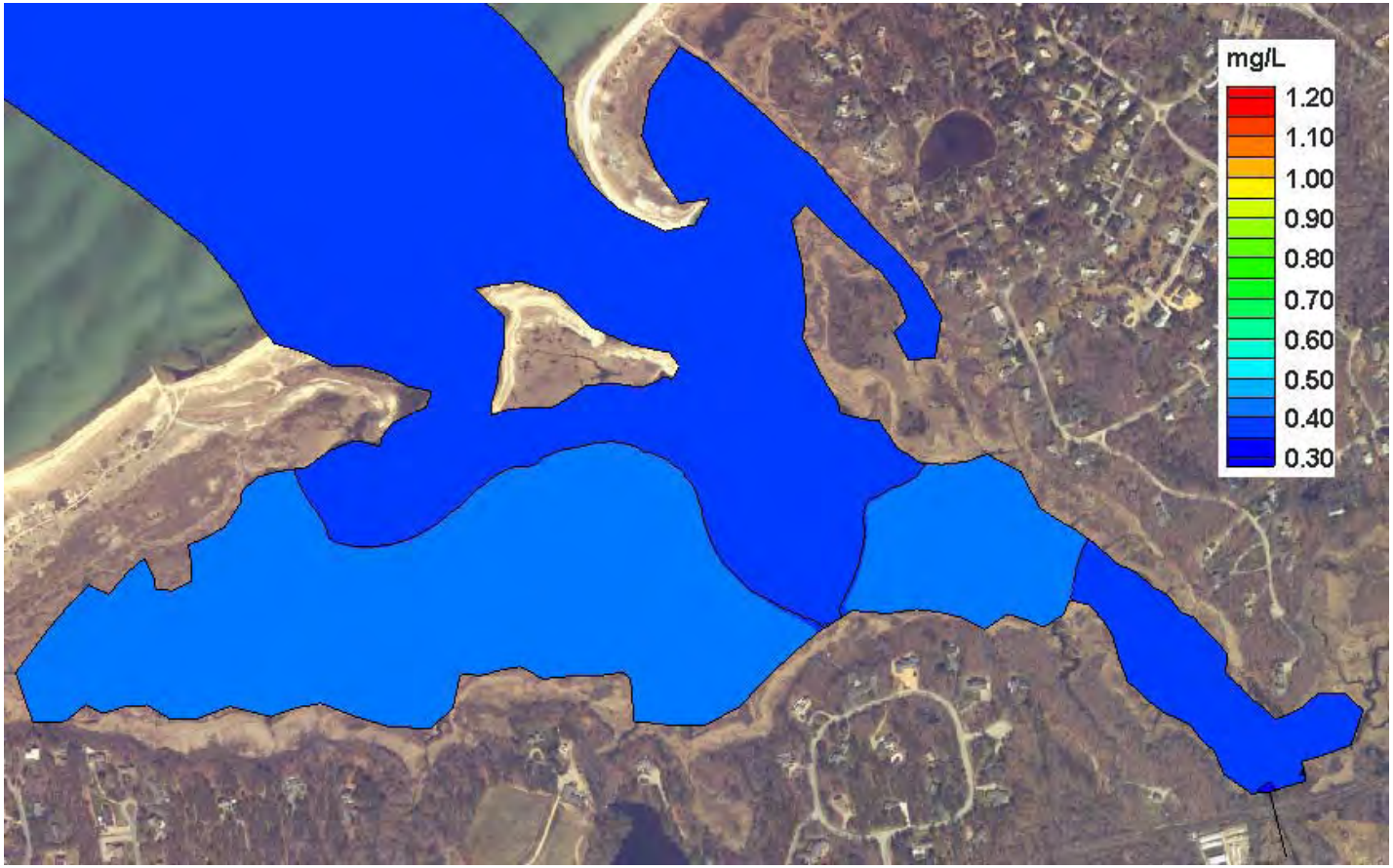
Present Conditions: Little Namskaket Creek



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Little Namskaket Creek system, for projected build-out loading conditions.

(Source: MEP 2008)

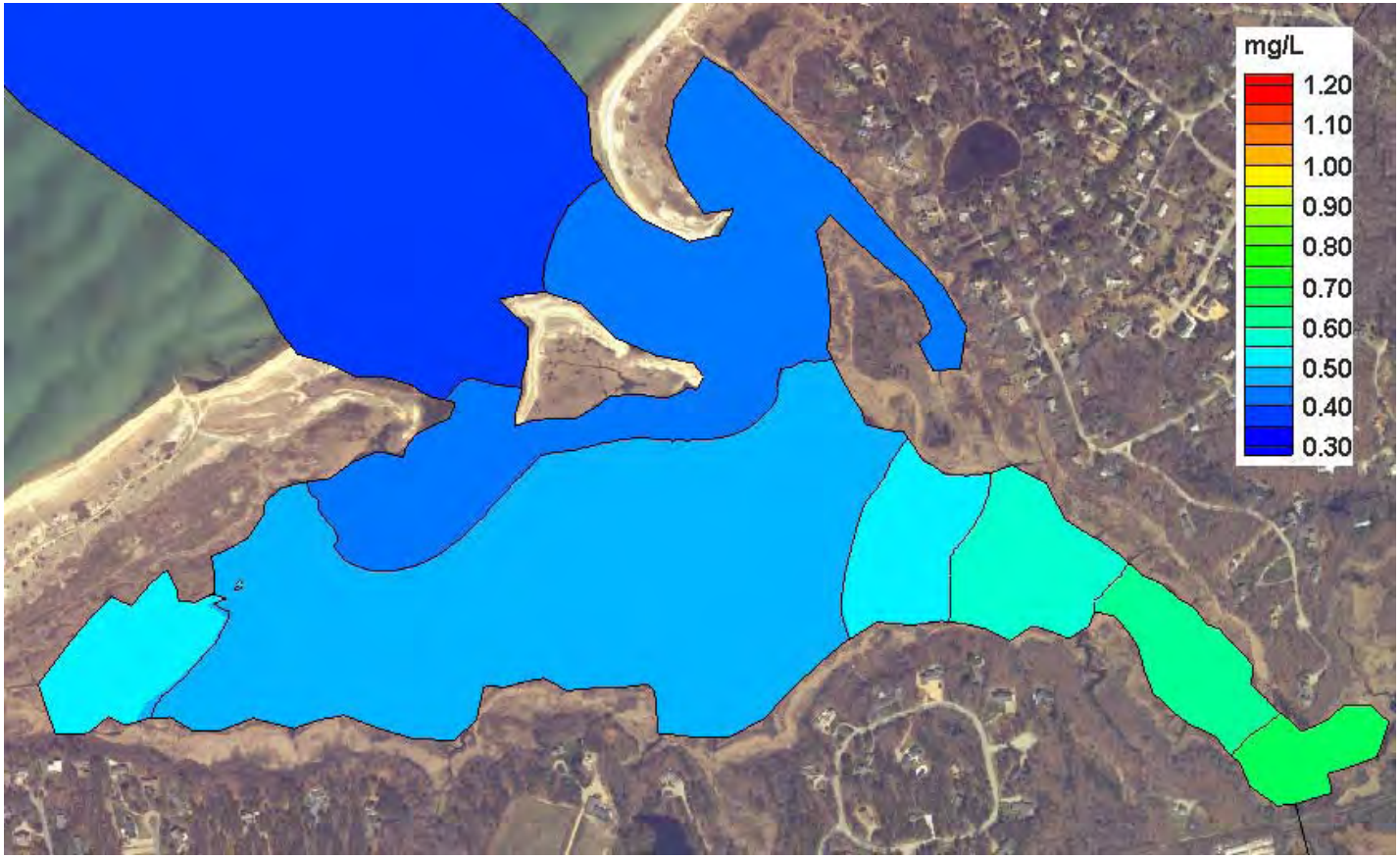
Present Conditions: Little Namskaket Creek



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in Namskaket Creek for no anthropogenic loading conditions.

(Source: MEP 2008)

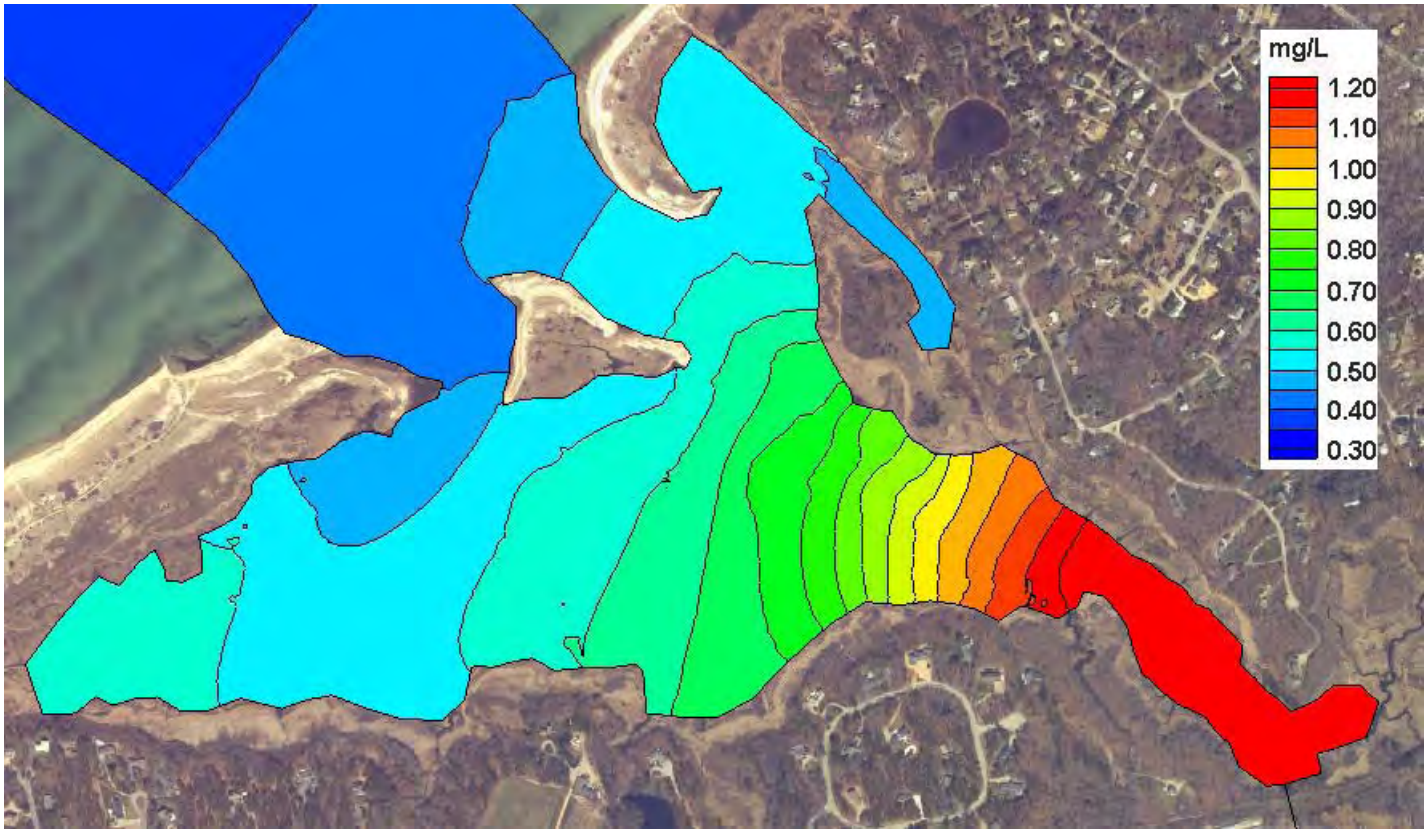
Pre-Colonial Conditions: Namskaket Creek



Contour Plot of **average total nitrogen concentrations** from the results of the present conditions loading scenario for the Namskaket Creek system.

(Source: MEP 2008)

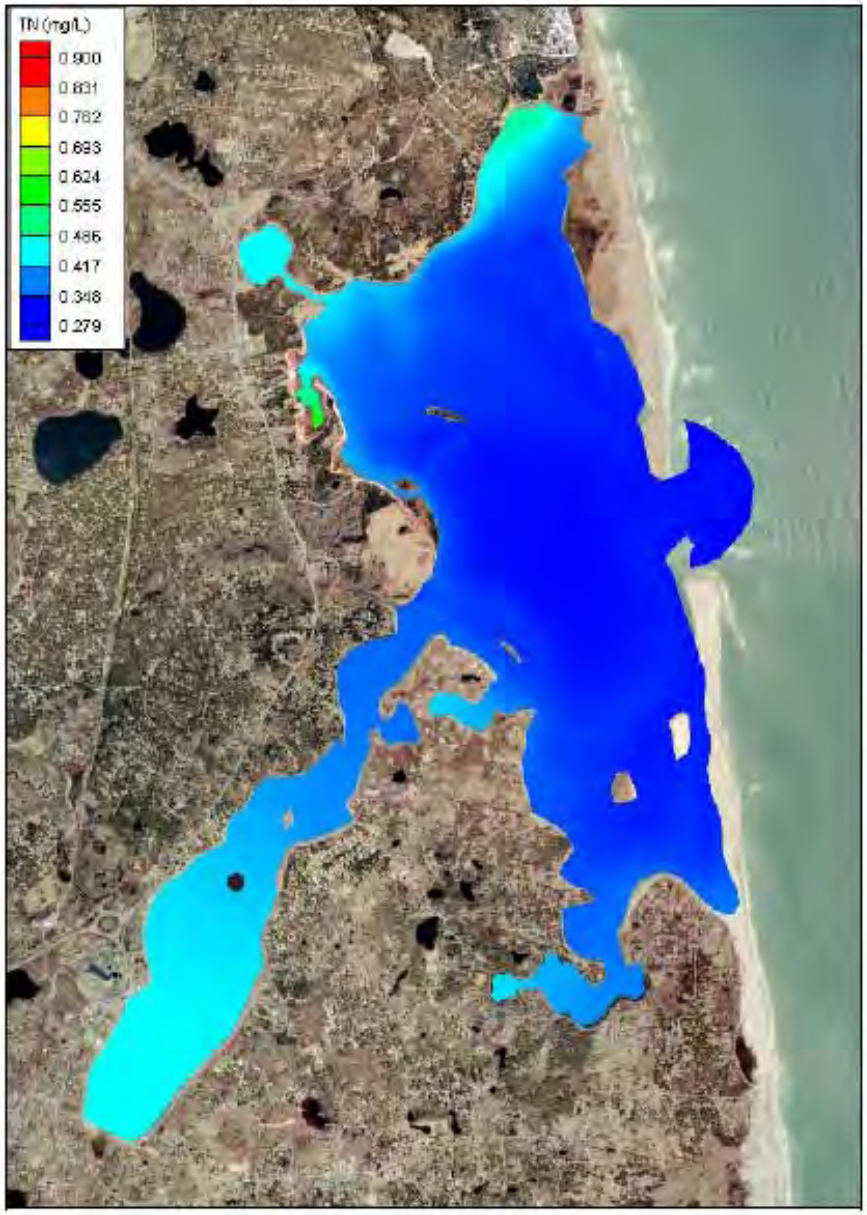
Present Conditions: Namskaket Creek



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

(Source: MEP 2008)

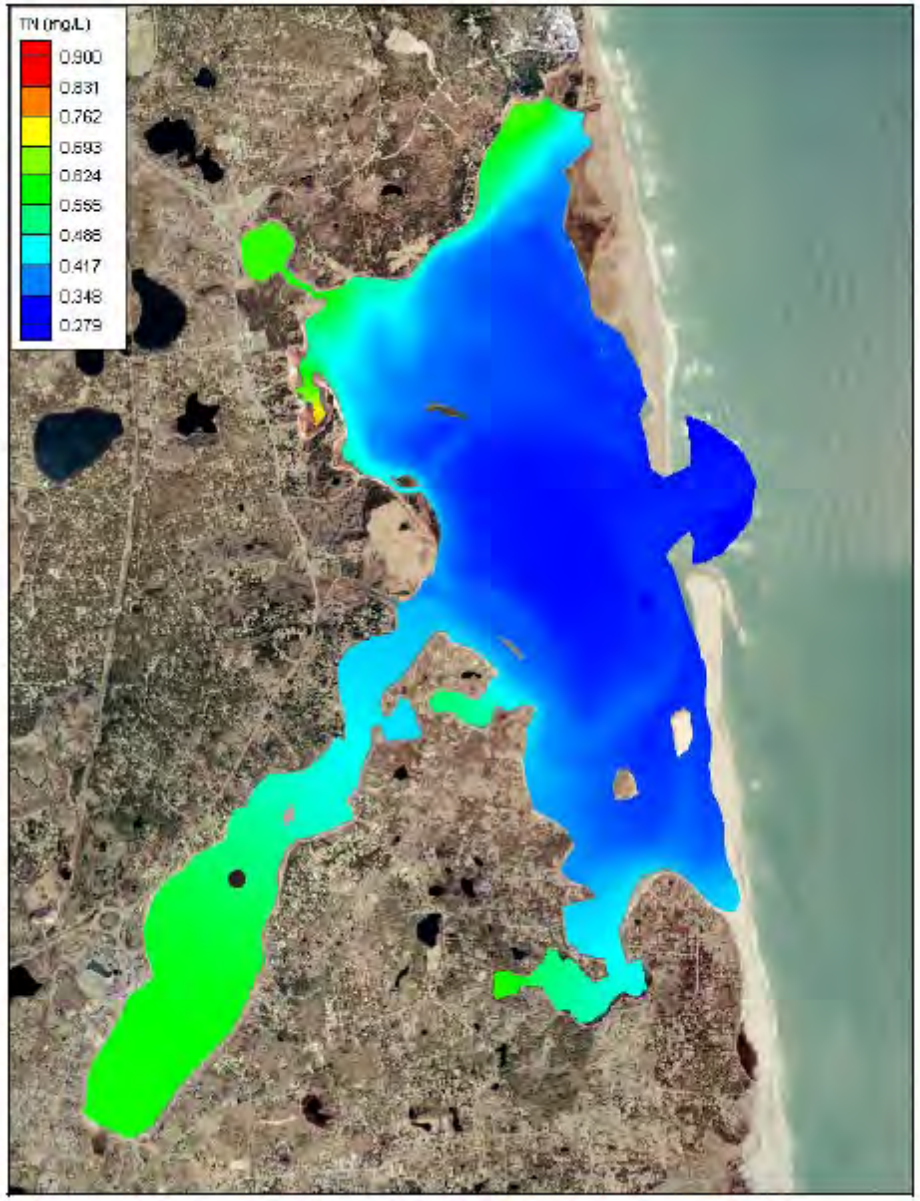
Build-out Conditions: Namskaket Creek



Contour plots of **modeled total nitrogen concentrations (mg/L)** in the Nauset Harbor estuary system under no anthropogenic loading conditions. The approximate location of the sentinel threshold station for the Nauset Harbor estuary system is shown by the black symbol (WMO-27 in Town Cove).

(Source: MEP 2012)

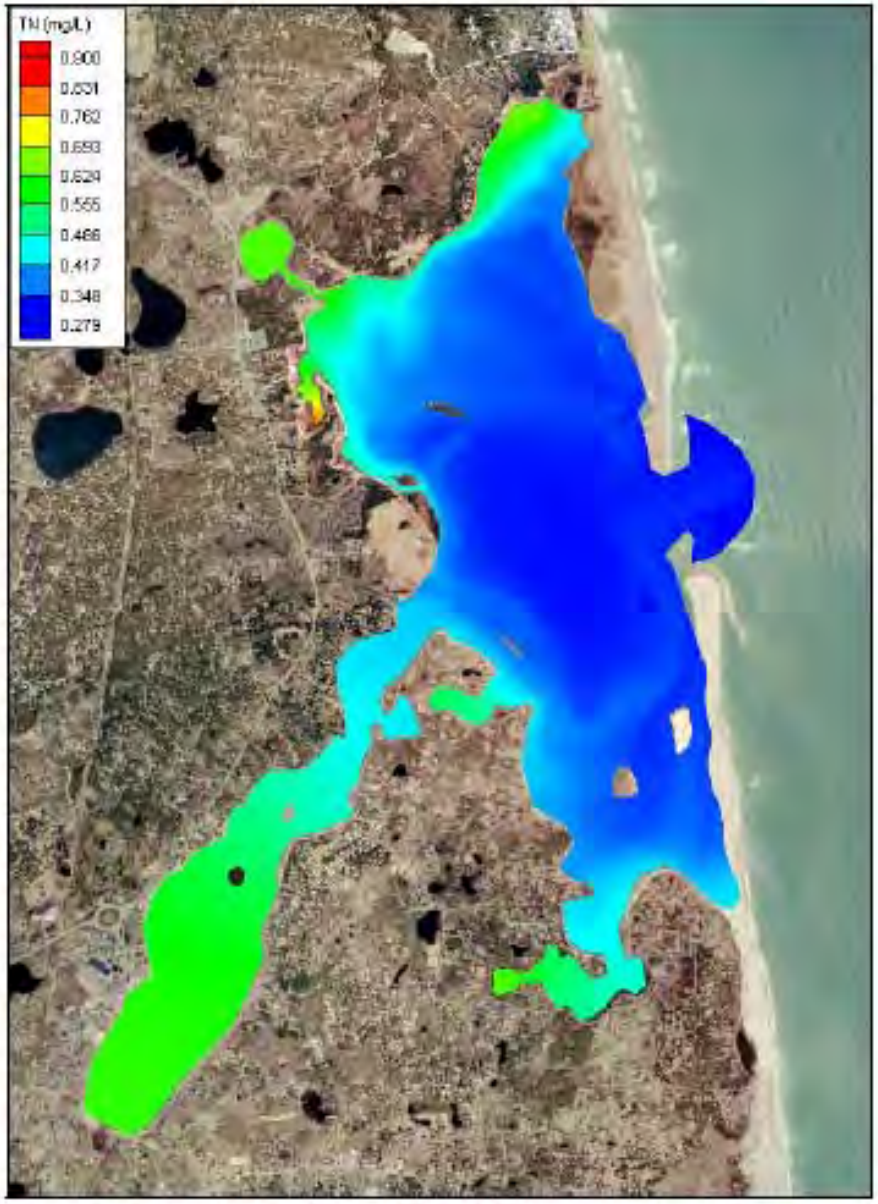
Pre-Colonial Conditions: Nauset Marsh/Town Cove



Contour plots of **average total nitrogen concentrations** from the results of the present conditions loading scenario for the Nauset Harbor estuary system. The approximate location of the sentinel threshold station for the Nauset Harbor estuary system is shown by the black symbol (WMO-27 in Town Cove).

(Source: MEP 2012)

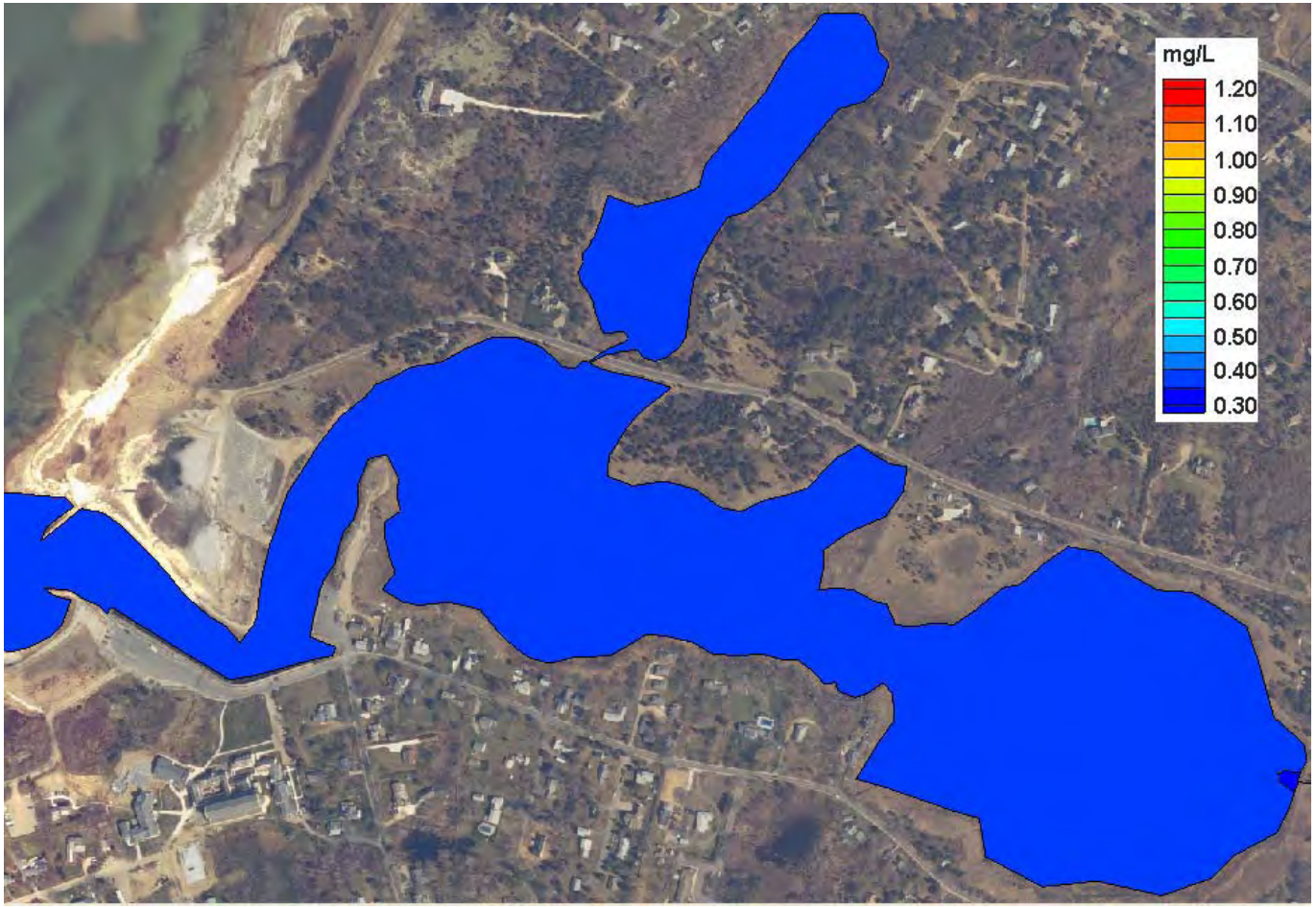
Present Conditions: Nauset Marsh/Town Cove



Contour plots of **modeled total nitrogen concentrations (mg/L)** in the Nauset Harbor estuary system under projected build-out loading conditions. The approximate location of the sentinel threshold station for the Nauset Harbor estuary system is shown by the black symbol (WMO-27 in Town Cove).

(Source: MEP 2012)

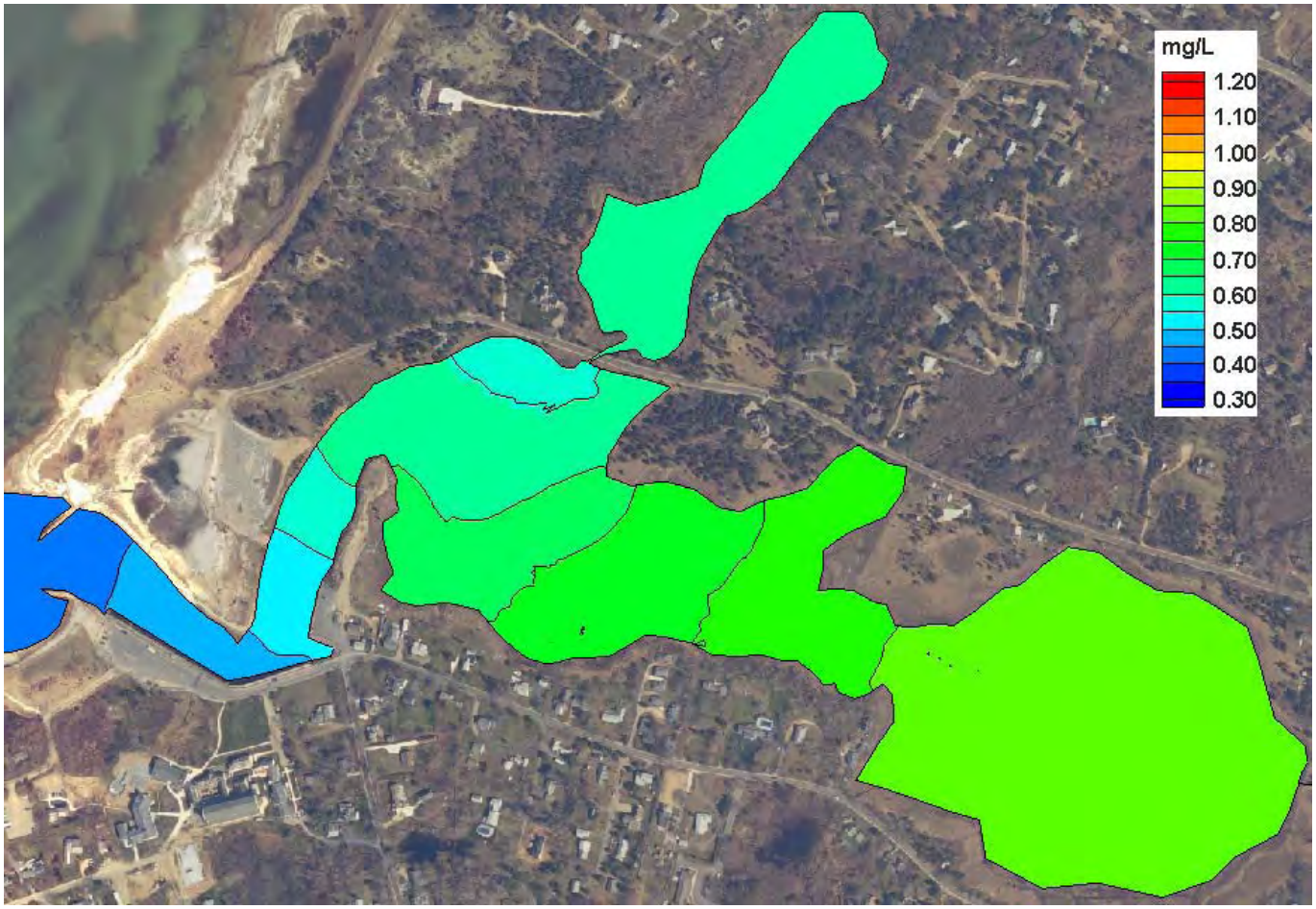
Build-out Conditions: Nauset Marsh/Town Cove



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

(Source: MEP 2008)

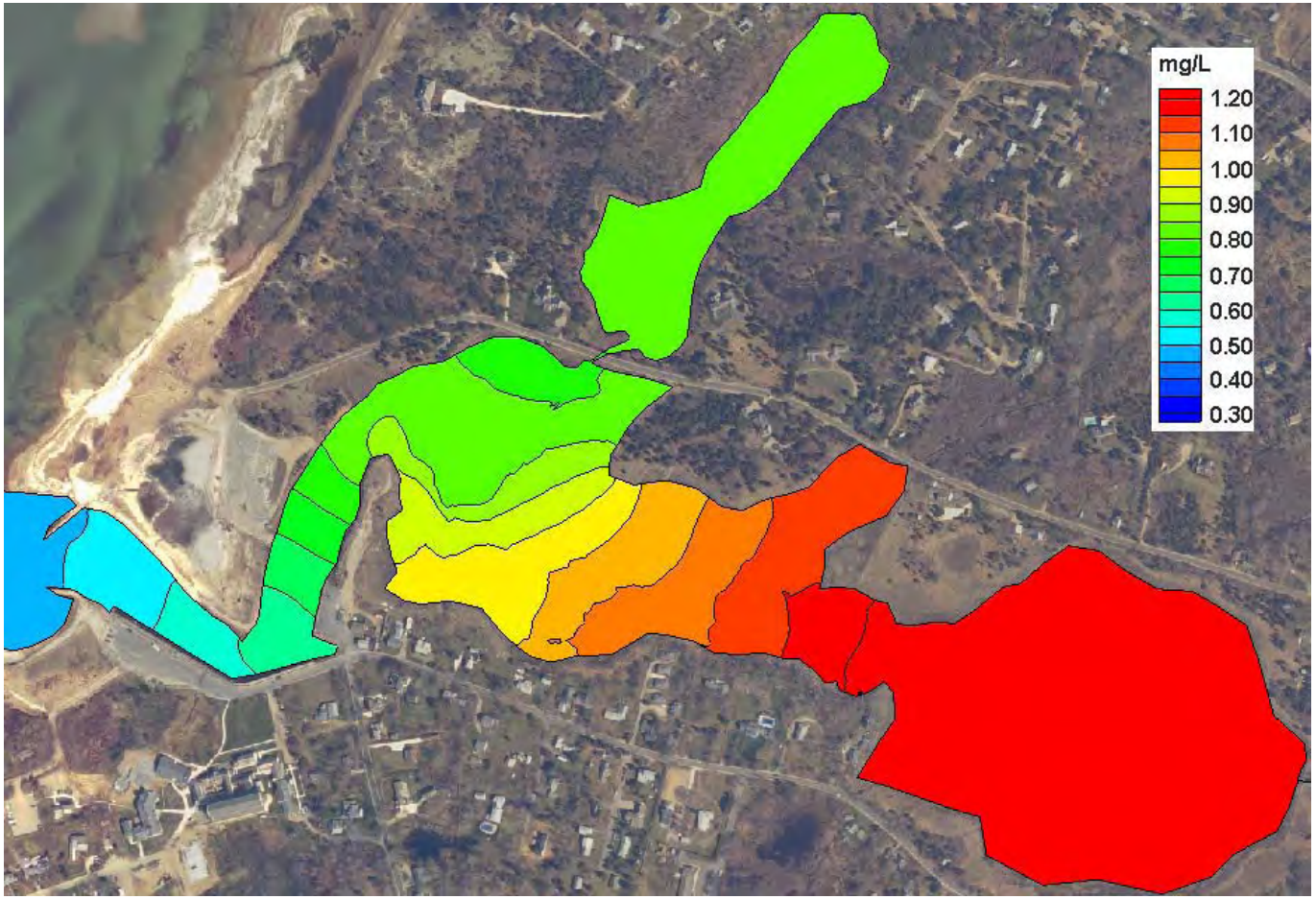
Pre-Colonial Conditions: Rock Harbor



Contour Plot of **average total nitrogen concentrations** from the results of the present conditions loading scenario for Rock Harbor.

(Source: MEP 2008)

Present Conditions: Rock Harbor

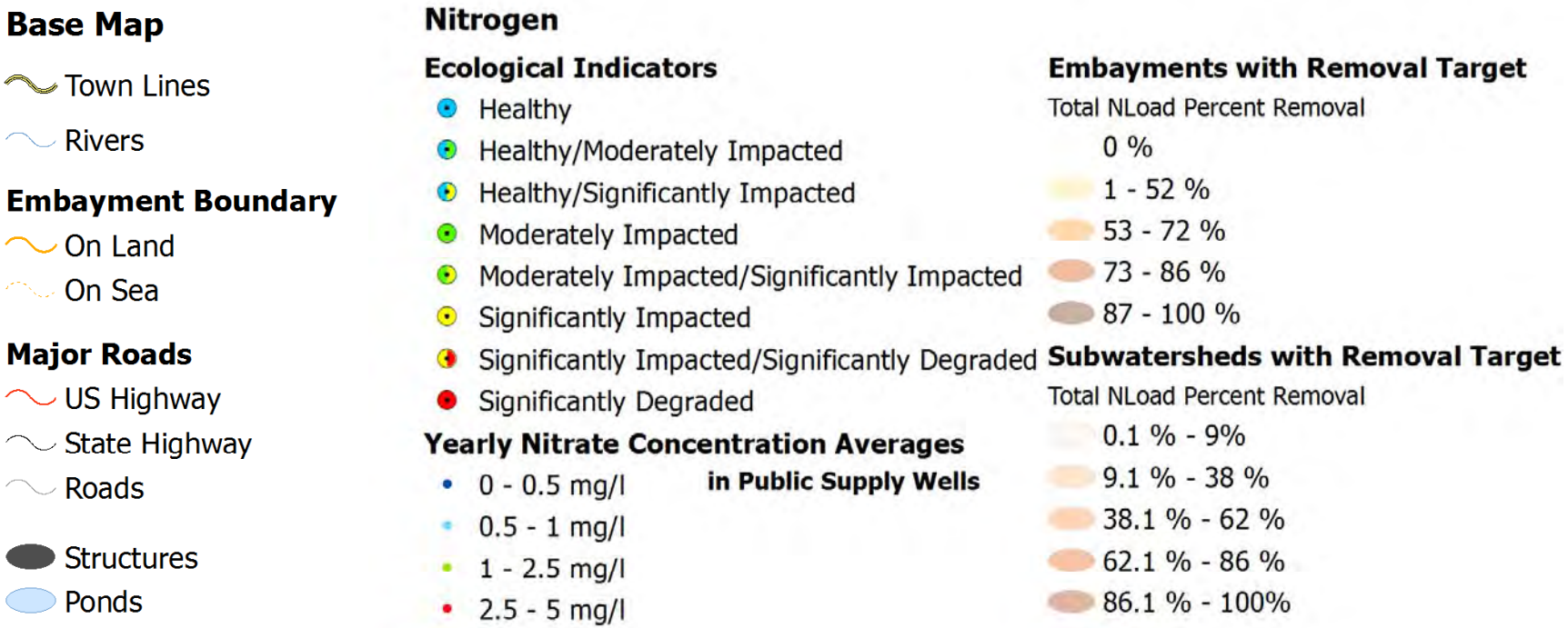


Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Namskaket Creek system, for projected build-out loading conditions.

(Source: MEP 2008)

Build-out Conditions: Rock Harbor

Nitrogen Problem



Sources: MassGIS, MEP, CCC

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

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

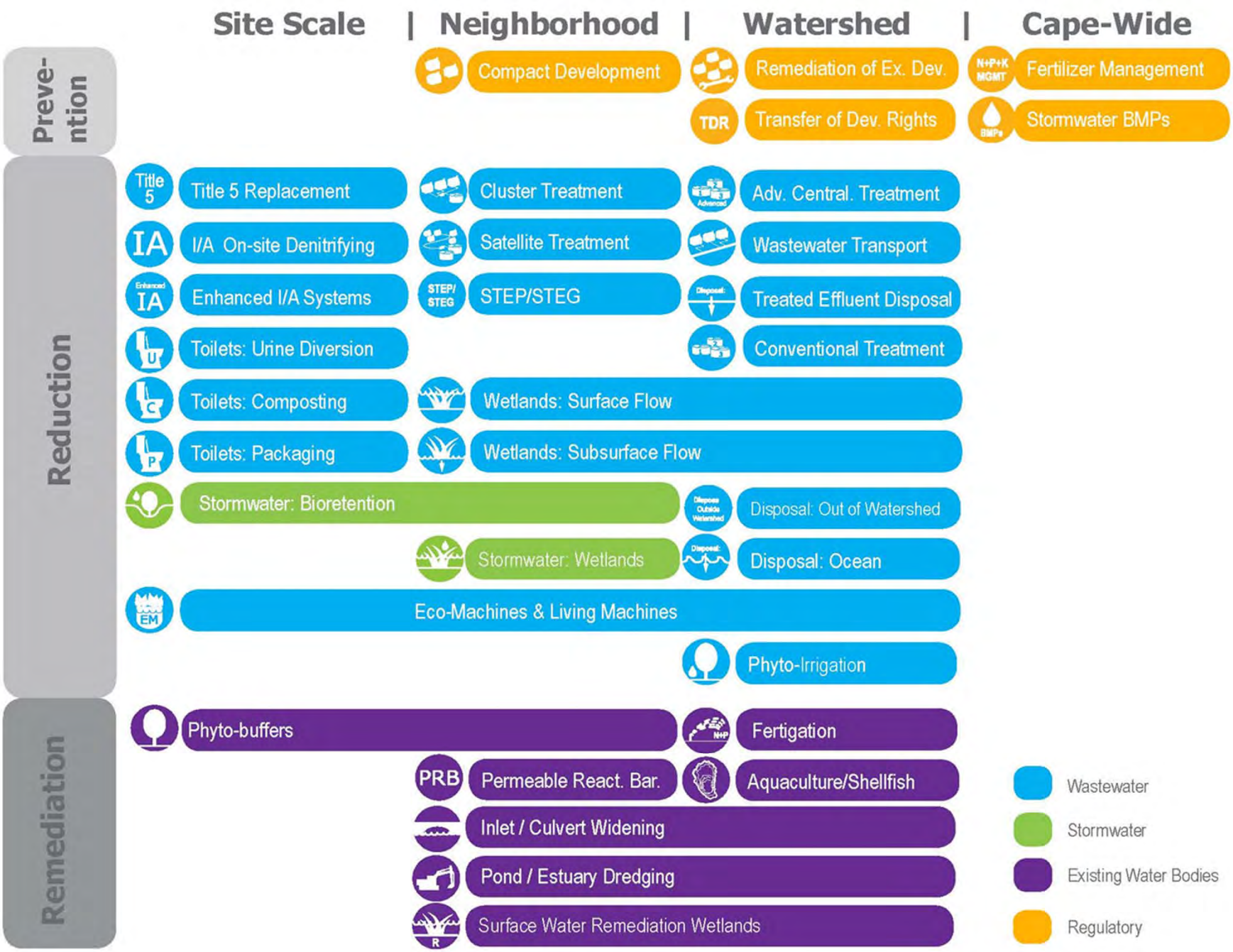
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

All materials and resources for the Nauset and Cape Cod Bay Marsh Group will be available on the Cape Cod Commission website:

http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/boat-meadow-herring-river

Boat Meadow River
Herring River
Little Namskaket Creek
Namskaket Creek
Rock Harbor
Town Cove/Nauset Marsh

Cape Cod 208 Area Water Quality Planning
Nauset and Cape Cod Bay Marsh Watershed Working Group

Meeting One
Thursday, September 19, 2013
Eastham Town Hall
2500 State Highway, Eastham Massachusetts 02642

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 came out of the Working Group meeting:

- 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.
- Cape Cod Commission:
  - Send a copy of the PowerPoint presentation used during the Working Group meeting to Working Group members.
  - Send a link with the lists of the members of the Advisory Board; a Regulatory, Legal, and Institutional Work Group; the Technical Advisory Committee of the Cape Cod Water Protection Collaborative; and the Technology Panel to Working Group members.
  - Review Eastham density and buildout data.
  - Distribute the MEP buildout scenario that includes the Tri-Town wastewater treatment facility.
  - Clarify dates of data in the MEP report.
  - Help to contextualize and characterize the different types of data and how it could be used in the decision-making process.
- CBI
  - Distribute September meeting summary.
  - Distribute meeting materials for October meeting: fact sheets and agendas.

WELCOME AND INTRODUCTIONS

The Cape Cod Commission opened the meeting and welcomed those in attendance. An attendance list can be found in Appendix A. All meeting documents and presentations for the Nauset and Cape Cod Bay Watershed Working Group will be located here:

http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/nauset-and-cape-cod-bay

Ms. Stacie Smith, facilitator from the Consensus Building Institute (CBI), reviewed the agenda and described CBI's role and the member selection process.[1] Ms. Smith then acknowledged the disagreements in 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 noted that many people volunteered to be part of the Working Group, especially from Orleans. The convening process sought to ensure the full range of voices were represented, sufficiently balanced across conflicting viewpoints, while avoiding domination of one set of issues or perspectives, and also keeping the Working Group to a size that it could deliberate productively. To do this, CBI worked with civic and environmental leaders within Orleans to recommend primary representatives for those points of view, and requested that others serve as alternates. She asked if anyone felt that their perspective was not being represented by the participants at the table: a representative from the Orleans Conservation Trust stated that, as the Trust is a primary landowner on the marsh and has conservation restrictions in place on its lands, it would be appropriate for the Trust to formally be included in the Working Group. Working Group members agreed to include Orleans Conservation Trust in the Working Group.[2] In addition, a representative from the Golf Course Superintendents of Cape Cod introduced himself, explained the positive role that his organization and golf course constituents are playing to address wastewater issues, and offered his assistance to the Working Group.

REVIEW OF GOALS AND PROCESS

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.

The Nauset and Cape Cod Bay Marsh Watershed Working Group covers the watershed that encompasses the municipalities of Brewster, Eastham, and Orleans. Ms. Smith explained that, over the course of the Section 208 Water Quality Planning process, the Working Group will examine different options and will explore how to evaluate those different options. She added that the role of the Working Group would be to provide information and insight into the exploration and evaluation of those options.

[1] 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.

[2] After the meeting, several members of Orleans CAN contacted the facilitator to request they also have a representative.

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.

Ms. Perry reviewed the timeline of the 208 Planning Process. Public meetings were held in July and August, and the Watershed Working Groups will meet in September, October, and early December. 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.[3] The current, September, meetings are focused on baseline conditions, with the October meetings focused on technology options and the December meetings focused on reviewing different scenarios for the local watersheds covered by the Working Group.

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

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

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.
The efforts of each Working Group will be supported by an Advisory Board; a Regulatory, Legal, and Institutional Work Group; the Technical Advisory Committee of the Cape Cod Water Protection Collaborative; and a Technology Panel – membership of these committees is posted on the Watersheds website. Ms. Perry explained that while Working Group members are welcome to attend meetings of the Technical Advisory Committee, input on different technologies will be solicited from Working Group members at the October meeting.
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."

LOCAL PROGRESS TO DATE

Ms. Patty Daley, Cape Cod Commission, provided an overview of efforts made across the Cape, and in the municipalities of Brewster, Eastham, and Orleans, to address water pollutants. She stated that, since Title 5 of the Massachusetts Sanitary Code for the regulation of on-site wastewater systems went into effect and the Section 208 Area-wide Plan for Cape Cod was approved, both in 1978, most Cape Cod municipalities have worked hard to address point-source pollutants. Many Cape Cod towns hired health agents in the late 1970s to implement Title 5 programs and systems. Since that time, however, non-point-source pollutants have become more of a concern and these need to be addressed today.

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 Nauset and Cape Cod Bay Marsh Working Group. 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 members reflected on lessons learned from reviewing the chronologies. Member offered the following general lessons and comments:

- The towns have been working on wastewater issues for many years, with much effort from lots of people, and a credible, strong basis to build on.
- There are a significant number of water and wastewater projects that have been turned down by voters. We need to understand why these projects are being rejected and what we can do about it.
- Many voters are confused by the competing facts being offered and we need to work with average citizens to educate them and get them involved.
- The elephant in the room for Orleans is the wastewater treatment facility. This is the issue where everything fell apart.
- All three communities need to work together to achieve a shared approach.

- There have been noteworthy grassroots volunteer efforts such as the establishment of freshwater lake and pond monitoring programs and the Pond and Lake Stewardship Project (PALS) at the county level.

Participants also made the following comments about additions and changes to the timelines:

- Brewster has made some changes around zoning that should be included in the timeline.
- Collaboration between the towns should be included in the timelines.
- More information should be included about public outreach and public education on the timelines.
- All three towns should include information about additional elements that play a role in wastewater management, such as land protection efforts, land acquisition efforts, and efforts to protect drinking water supplies.

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.[4] 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. There are no golf courses in this watershed.

Regulatory Layer – The regulatory layer illustrates Areas of Critical Environmental Concern, MassDEP Approved Wellhead Protection Areas, and Growth Incentive Zones. OpenSpace data is

[4] Data used for modeling and analysis is available through the link on page 1 of this summary.

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. Landuse Vision Map data delineates economic centers; industrial and service trade areas, village boundaries, resource protection areas, other designations, and undesignated lands. Brewster and Orleans have Landuse 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 1995 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 Wastewater 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 sewering costs.)

She explained the proximity of homes to each other also makes a big difference in terms of the economic feasibility of installing a wastewater collection system. A collection system could mean a traditional sewer system or alternative systems such as constructed wetlands or living machines. The design of a collection system would have to consider both existing units and likely buildout in the future. Ms. Daley stated that the communities will need to consider how they are going to grow, as it is much more expensive to grow in a more sprawled out fashion rather than compactly.

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

- Does the Commission have additional layers showing forests and other natural features? *Yes, the Commission does have those layers but they were not presented here to simplify the layer .*

- Does the Commission have data to show increases in the number of dwellings? *The Commission does have this data at the town-level, but that sort of data may be presented in finer grain in the buildout report.*
- Wouldn't greater buildout lead to greater efficiency in terms of providing services, and therefore lower cost? *After addressing the wastewater and nutrient flows from current developments, every new development would likely need to have 100% of its wastewater treated or otherwise mitigated in order to maintain compliance with water quality standards. As a result, additional buildout that is diffuse will likely be much more expensive than compact development.*
- How are the different projections for future population growth and buildout reconciled and taken into account? *These different projections were done at different times and for different purposes. The CWMP buildout projection is a 20-30 year buildout because that is the planning horizon. LCPs are done town-wide for theoretical buildout dates. The regional buildout scenario was created for baseline, standardized buildout.*
- How are the population declines of the past few years factored into the buildout scenarios? *The Commission is aware of the population declines, but it is important to remember that even with a recent decline in population, the built infrastructure (including buildings) remains in place.*
- The figures for Eastham do not add up. *The Commission will review the Eastham data.*

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 made the following comments and questions. *Responses from the Cape Cod Commission are italicized.*

- Are cesspools combined with the figures for Title 5 systems? Yes, this particular data set characterizes Title 5 systems and cesspools as the same. *The Commission is currently in the process of hiring a consultant to contact municipalities to locate properties that have cesspools, and Title 5 failures and/or varainces.*

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 solve. In many areas of the Cape, the Massachusetts Estuary Project (MEP) provides three years of nutrient loading, 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 the Nauset and Cape Cod Bay Marsh Watershed area. Septic systems are the main contributors of controllable nitrogen in the MEP study of this watershed area. She noted that the MEP date on the slide is the date of publication of the MEP technical report, not necessarily the date of the data collected.

Ms. Daley proceeded to present a series of maps and diagrams illustrating contour plots of modeled past, current, and anticipated future nitrogen concentrations in the embayment 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 *(responses from the Cape Cod Commission are italicized)*:

- It seems that nitrogen loads from lawn fertilizers and from impervious surfaces would overlap. How did the Commission differentiate between these? *Impervious surfaces are things like roofs, highways, roads, etc. The Commission counted impervious surfaces as an area and counted contribution of nitrogen from those surfaces. Lawn area conversions are centered on lawns and calculating nitrogen loading from lawns involves assumptions such as a 5000 square foot lawn would require 3 pounds of nitrogen and would have 20% runoff.*
- An assumption built into the MEP analysis and methodology is that by controlling nitrogen you can bring water quality into compliance with EPA and state regulations. Rock Harbor demonstrates that this is not necessarily true, however. As such, it is not

obvious that removing septic nitrogen will necessarily equate with reaching nitrogen goals for water quality.

- Does the Commission's presentation account for the tri-town wastewater treatment facility? *This presentation does not include changes from Comprehensive Wastewater Management Plans (CWMPs), but Massachusetts Estuary Project (MEP) did create a scenario showing this.* Can we see this scenario? *The Commission will follow up on this request*.
- The information about Title 5 loan applications also implicates the economic standing of the person applying for a loan. *Yes, that is correct. There could be many places where Title 5 infrastructure was repaired or upgraded without a loan.*

EXISTING AND PROPOSED SOLUTIONS

Ms. Daley 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 illustrates the locations of natural attenuation sites, existing permitted water treatment facilities, and CWMP sewer-shed phasing, if applicable. They requested group members provide additional information on planned stormwater upgrades and remediation sites. Group members made the following comments and asked the following questions *(responses from the Cape Cod Commission are italicized)*:

- There are a number of storm water remediation sites in Orleans that are missing.

WORKING GROUP FEEDBACK

Based on the information they saw, Ms. Smith then asked group members to list the priority actions, priority areas, or issues of greatest concern. Group members made the following comments and asked the following questions *(responses from the Cape Cod Commission are italicized)*:

- Why are we including sub-watersheds that do not have MEP data? *The Section 208 Update Plan must include all embayments. Although we do not have full data for these watersheds, we do have data about ponds. The Center for Coastal Studies also has data about these watersheds that the Commission can access.*
- If the Regional plan uses only regional build-outs, how will this be reconciled with town planning drawing on community-level buildouts? I am uncomfortable not using our town's buildouts, which were worked on extensively. *The Commission created a parcel-by-parcel buildout model based on local zoning regulations and these models are useful for citizens to understand what their zoning allows, and to have a standardized view of the entire Cape. The Commission will avail itself of the local buildout work because the Commission understands that its model is theoretical. Nevertheless, the regional buildout is helpful for regional solutions. The Commission recognizes that in the specific watersheds, the Section 208 Update process will need to use watershed-based buildouts for recommending local treatment solutions.*
- Buildout models should account for both supply and demand, not just zoning potential. Also demographics and trends about population, and should be consistent with the time horizon of any infrastructure.

- The Working Group needs to account for three towns in different points in their data collection. The area cannot have one town push forward too fast while the others are held back.
- Having several buildout scenarios is valuable as it allows for sensitivity testing that would not be possible with only one buildout scenario.
- The data is somewhat overwhelming. I have no way of assessing its accuracy, importance, priority, or sufficiency. *The Commission can help to contextualize and characterize the different types of data and how it could be used in the decision-making process.*
- Buildout should account for possible reuse of lots, the demolition of old homes, and the construction of large homes. *The Commission has discussed redevelopment and thinks that there is significant amount of development that can occur this way.*
- Wastewater presents an inherent incentive for the three communities to work together, as there are financial incentives to collaborate. Even if imperfect in its details, the data shows that there is a problem.
- Disagreement is about the cause of the problem, and the most economical ways of dealing with the solutions. We need to look at all the sources of stress, all the possible solutions, and the unintended consequences of any decision we make. Affordability is a very important factor. We also need to think about how we define and measure success.
- We should include the Silent Spring study that found contaminant of emerging concern.
- As we collaborate, we need to think about how we allocate use of Namskaket, as the only watershed with additional nitrogen assimilative capacity.
- In addition to a planning horizon, we need to adopt a treatment horizon and a regulatory horizon. How will we anticipate changing regulatory requirements, including those for contaminants of emerging concern.

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 for public distribution.

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 sewering 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 sewering or other grey infrastructure management options

PUBLIC COMMENTS

The facilitator opened the floor for public comments. The following statement was made:

- The discussion today focused on the loss of population, but we are also gaining. NGOs are very important in terms of educational exercises that they are conducting to get us to this point. For the next discussion, all of the issues need to be put out on the table first before getting into the discussion.

Appendix A
Attendance

Paul Amman
Kenneth Ainsworth
Donald Arthur
Sandy Bayne
Judith Bruce
Lynn Bruneau
Amy Costa
Jane Crowley
Joy Cuming
Tom Daley
Ed Daly
Karin Delaney
Ed DeWitt
Lisa Dillon
Bob Donath
Jeff Eagles
Cheryl Eisner
David Farquhar
Gary Furst
Kevin Galligan
Charles Harris
Carl Harris
Steven Hertz
John Hodgson
Pat Hughes
Charles Ketchuck
Martin McDonald
Sandy McFarlane
Sims McGrath
Dan Milz
Ed Nash
Ginia Pati
Lori Roueche
Judy Scanlon
Len Short
Sid Snow
Bruce Taub

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?

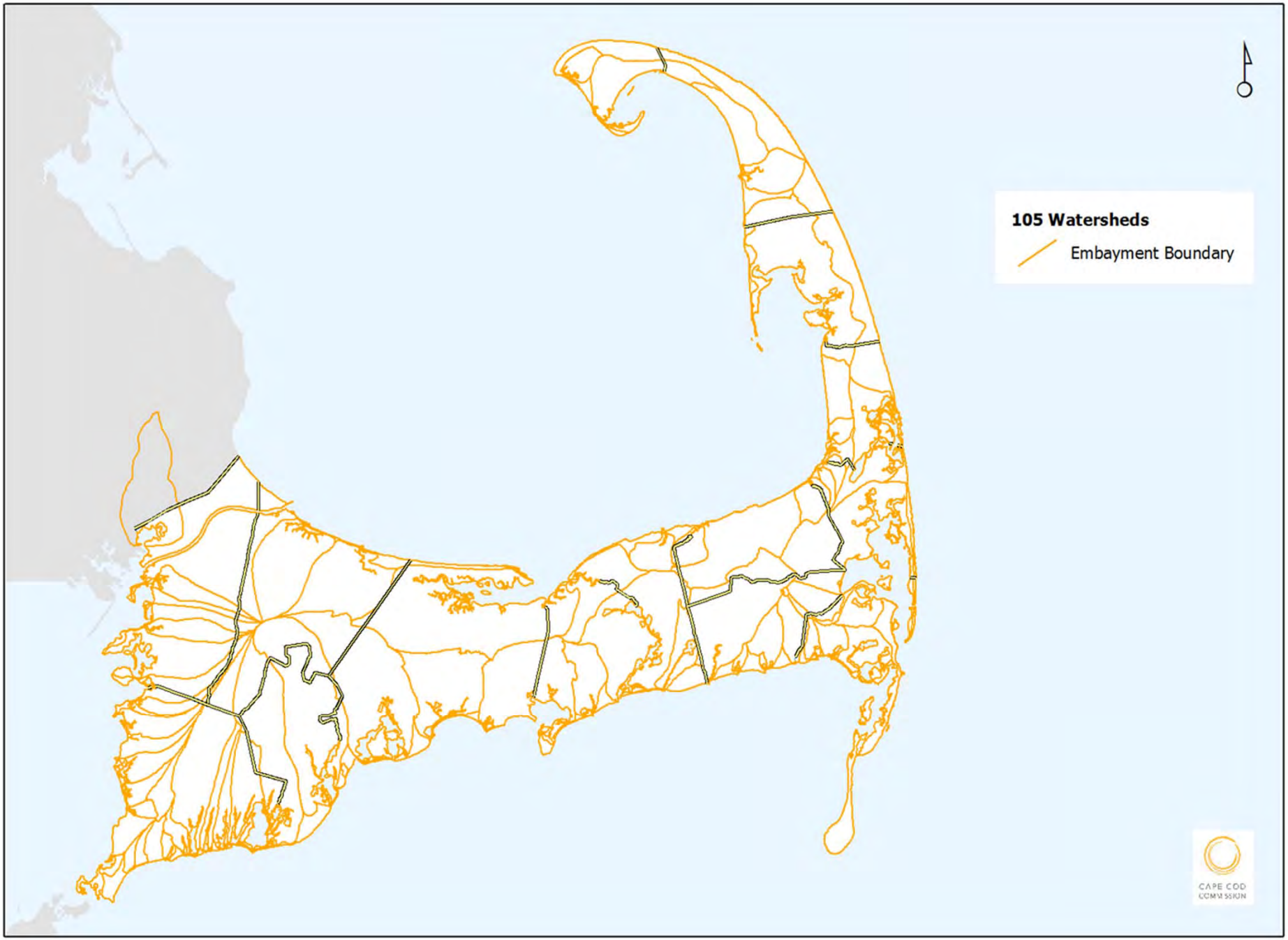
Clean Water Act Section 208

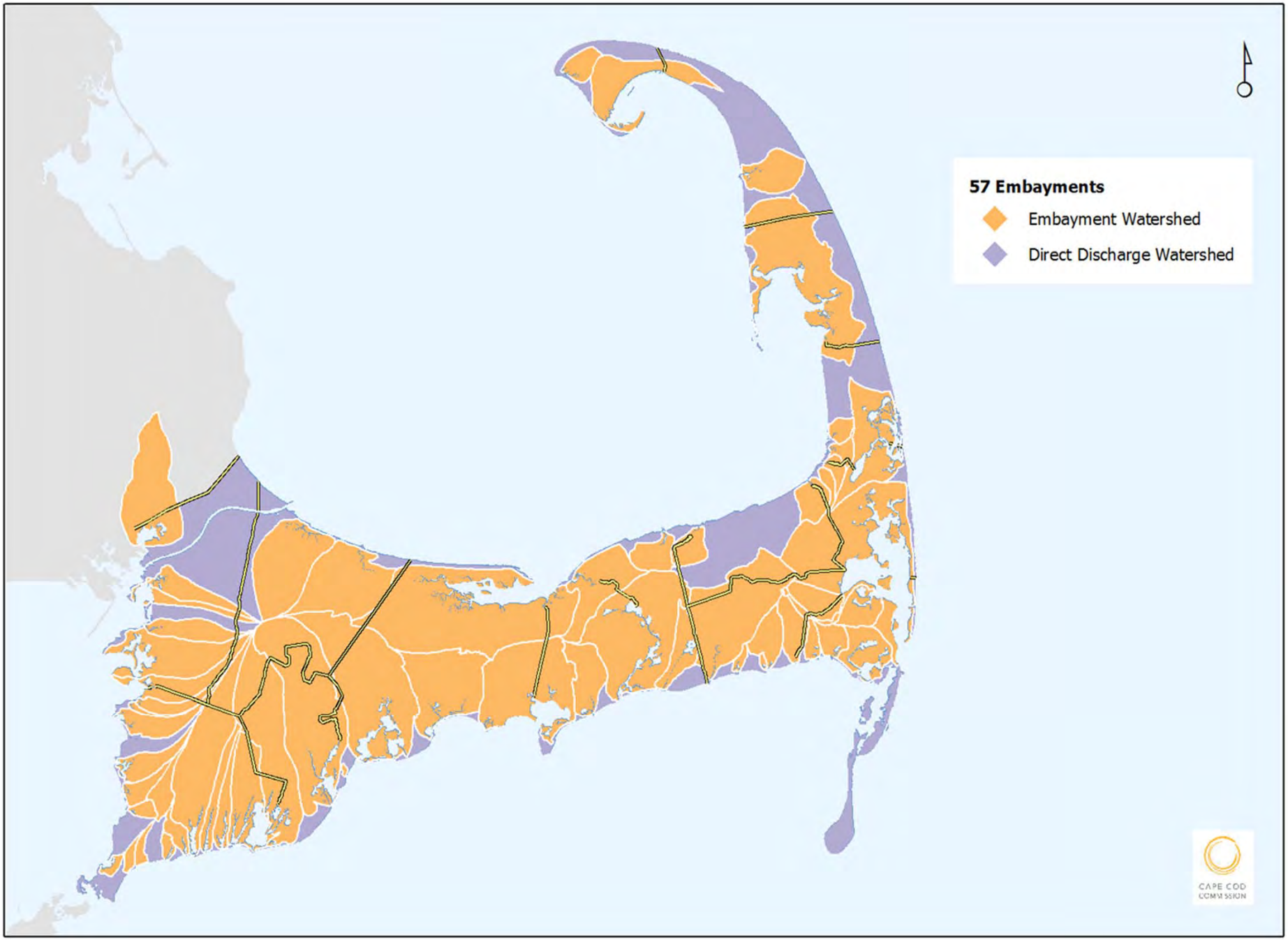
The Commission was directed to update the 1978 Plan

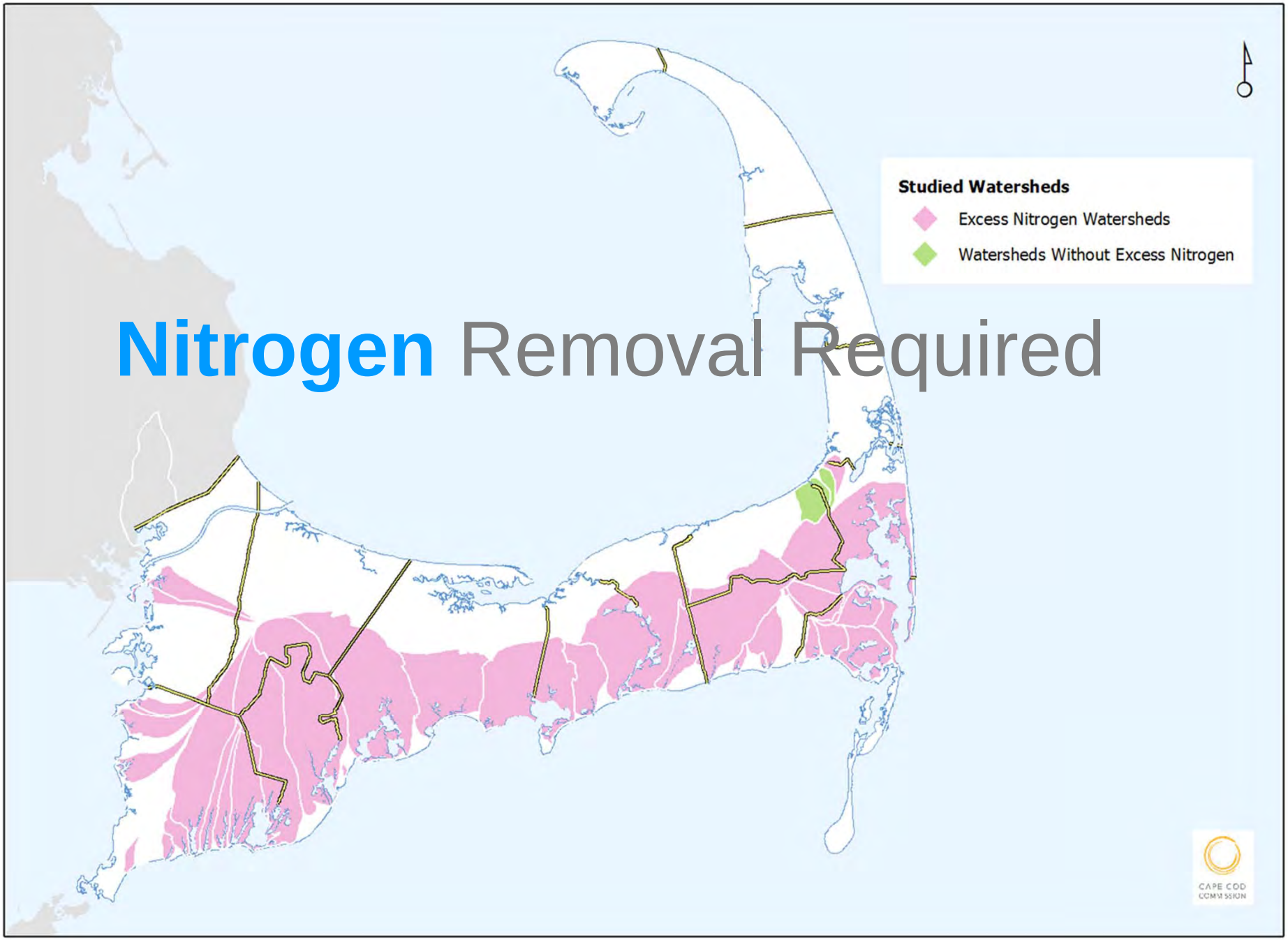
The Commonwealth provided $3 million to fund the project

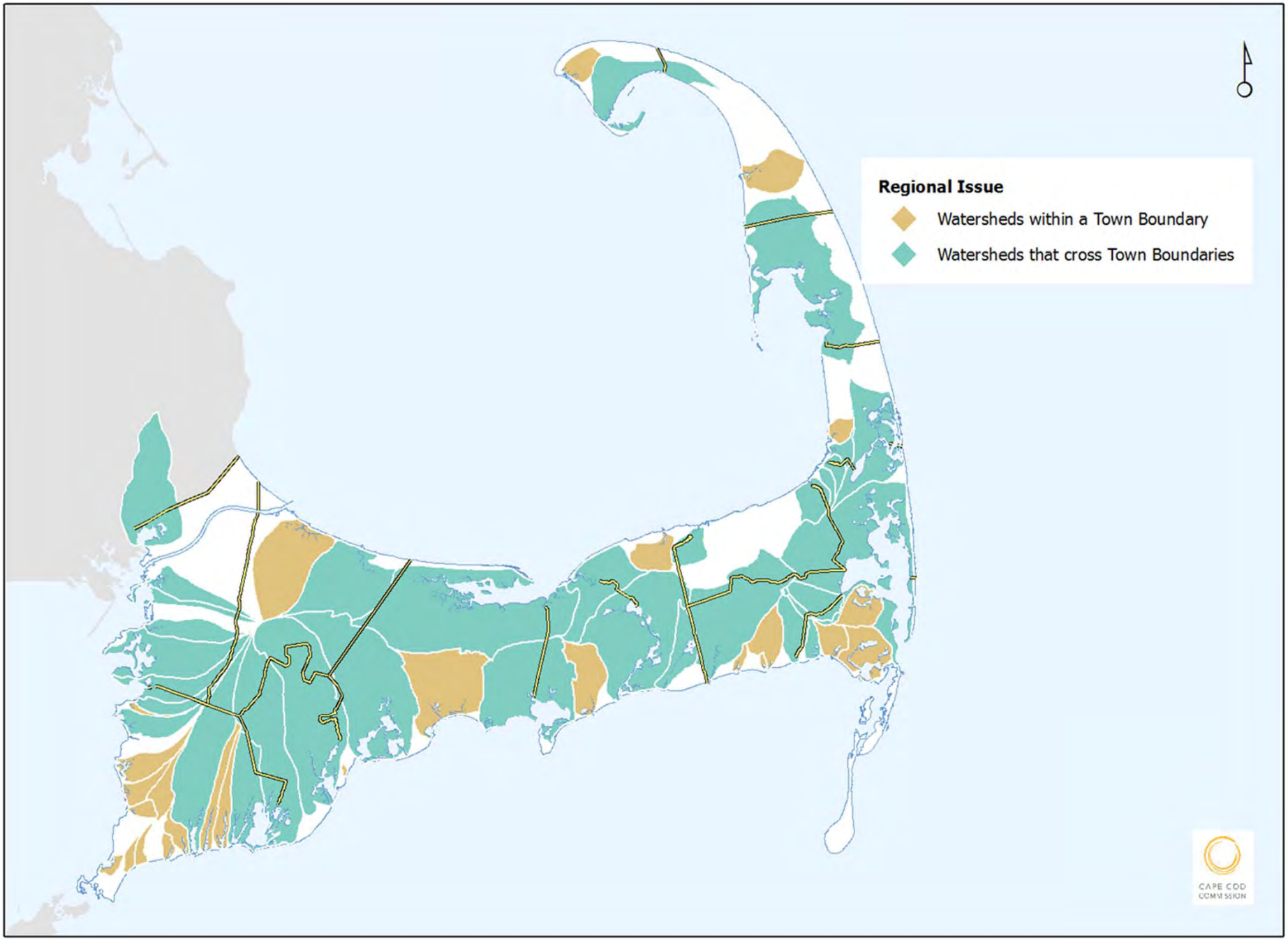
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

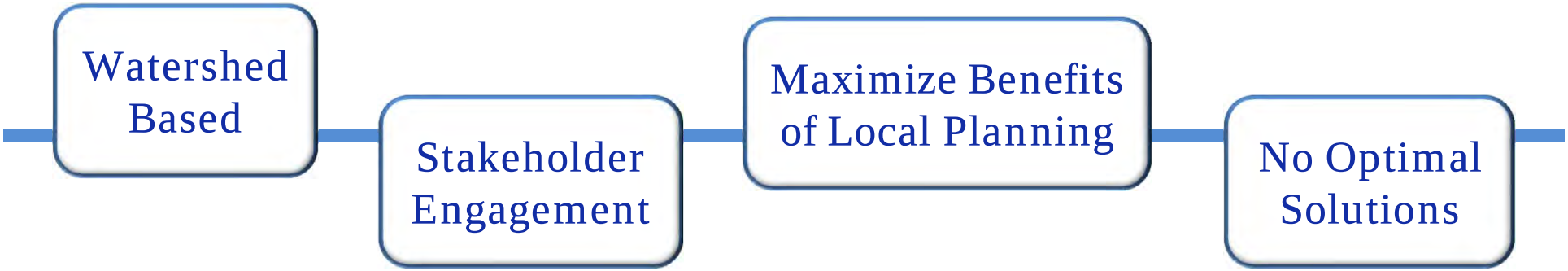

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

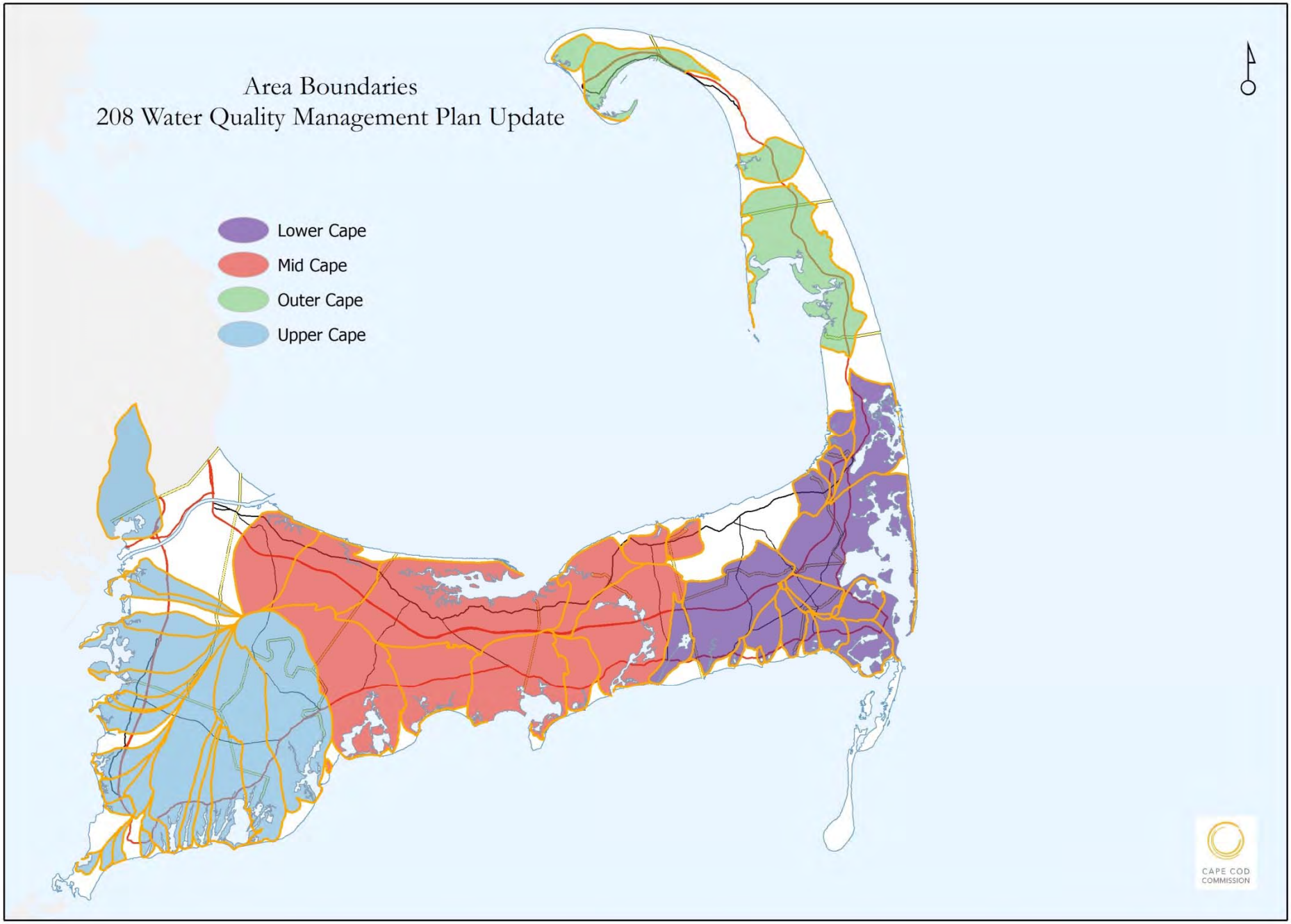

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

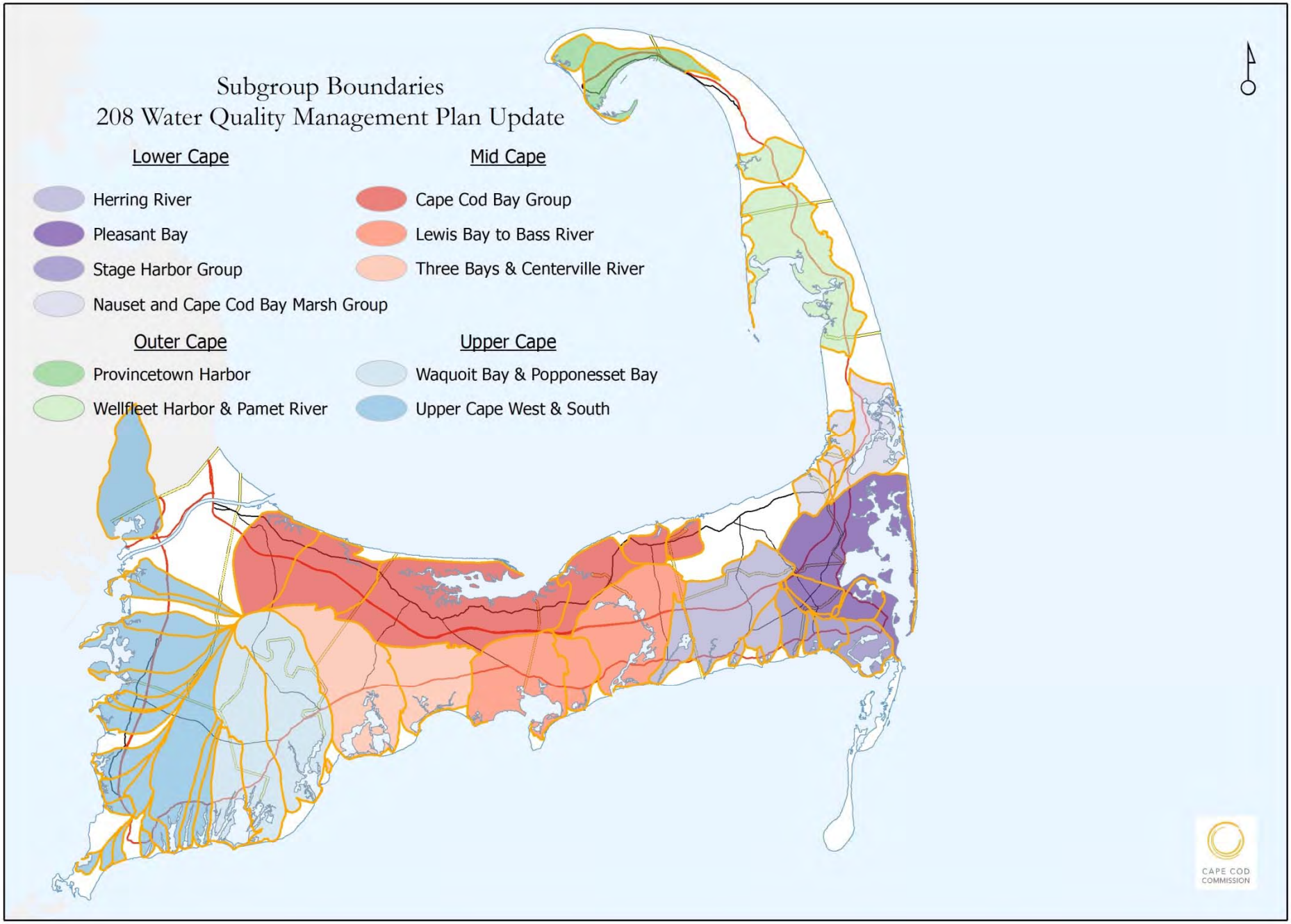

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

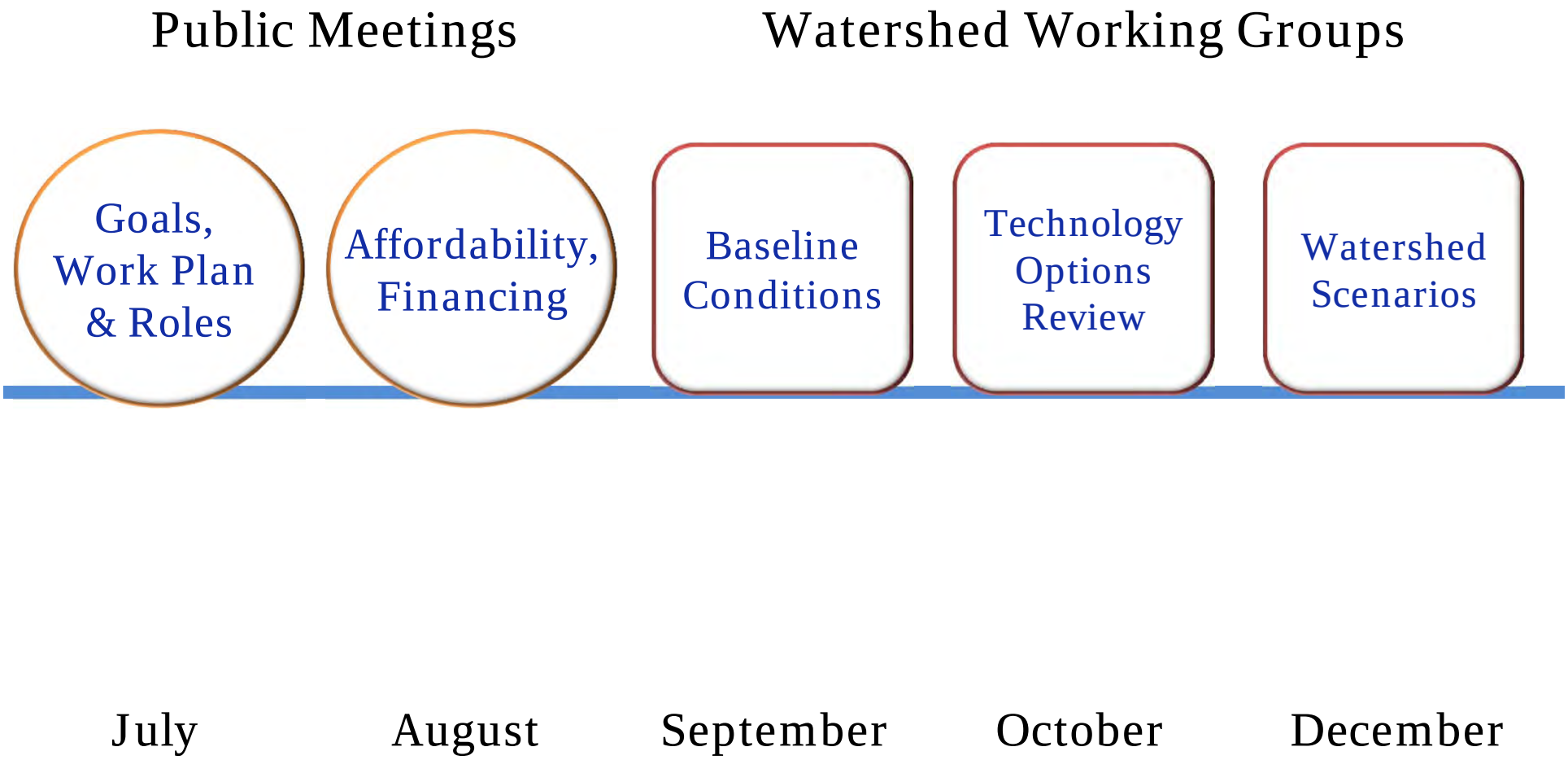


Goal:
To generate a series of approaches in each watershed that will meet water quality standards

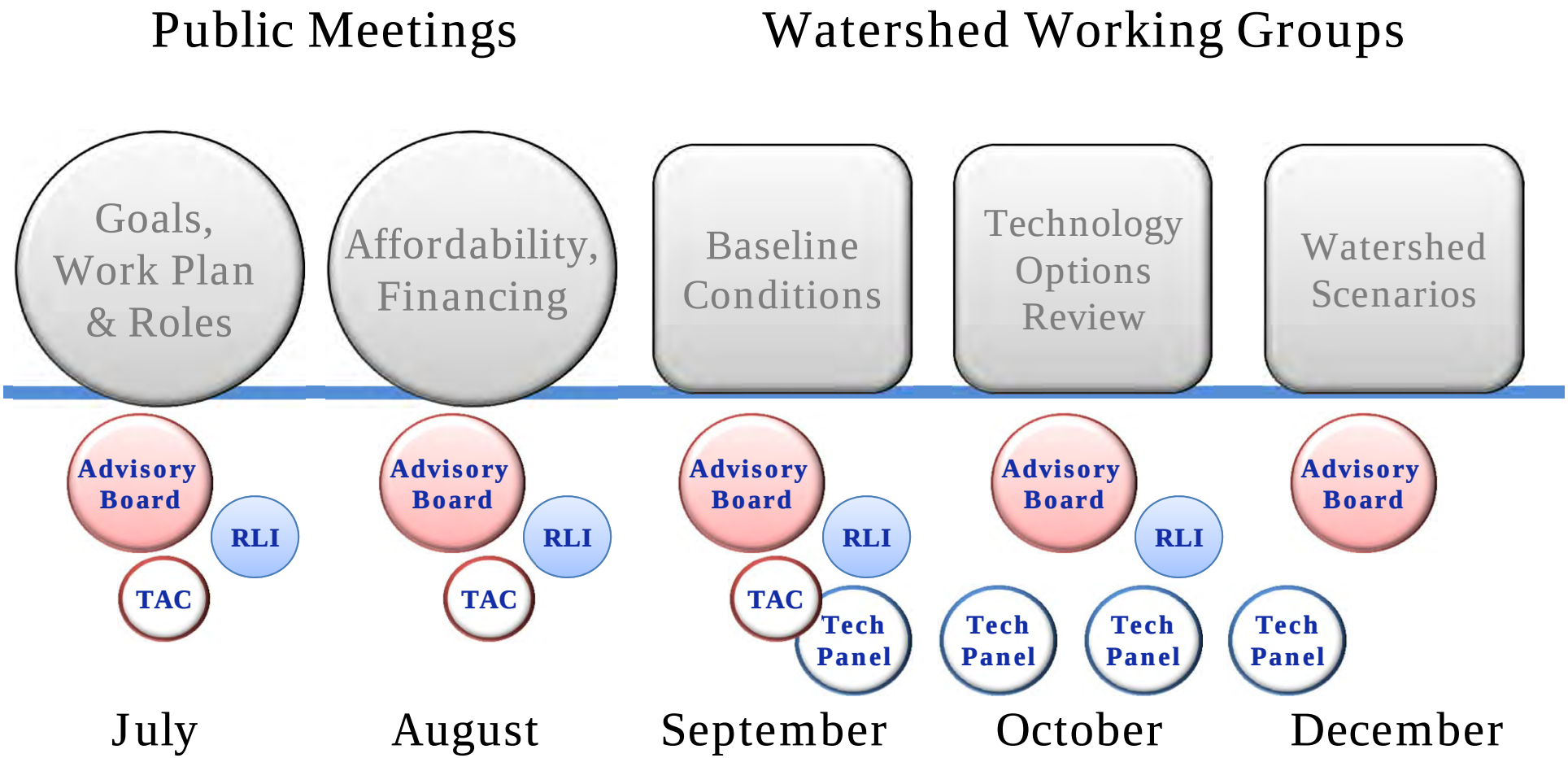

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

What is the stakeholder process?



208 Planning Process



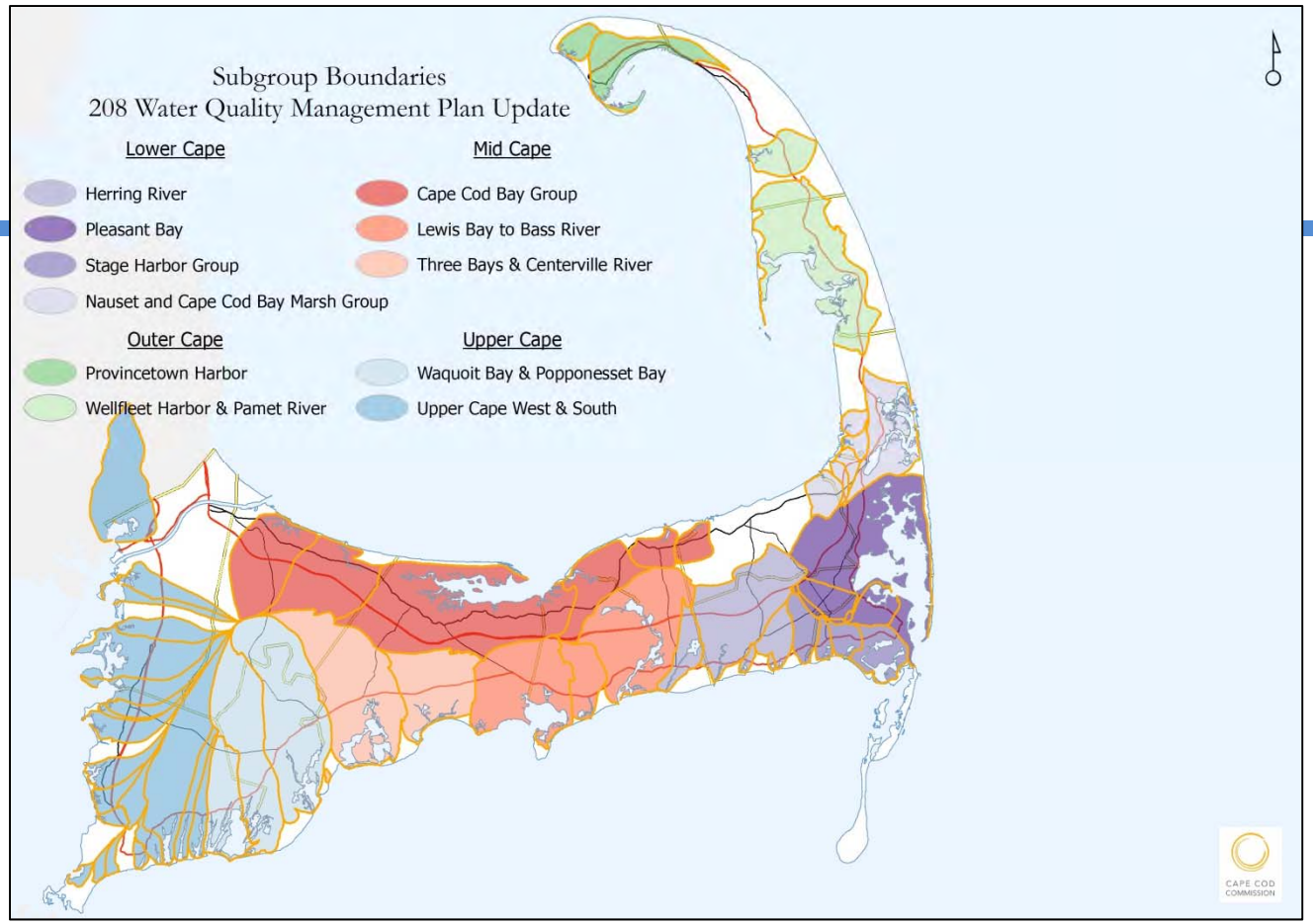
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



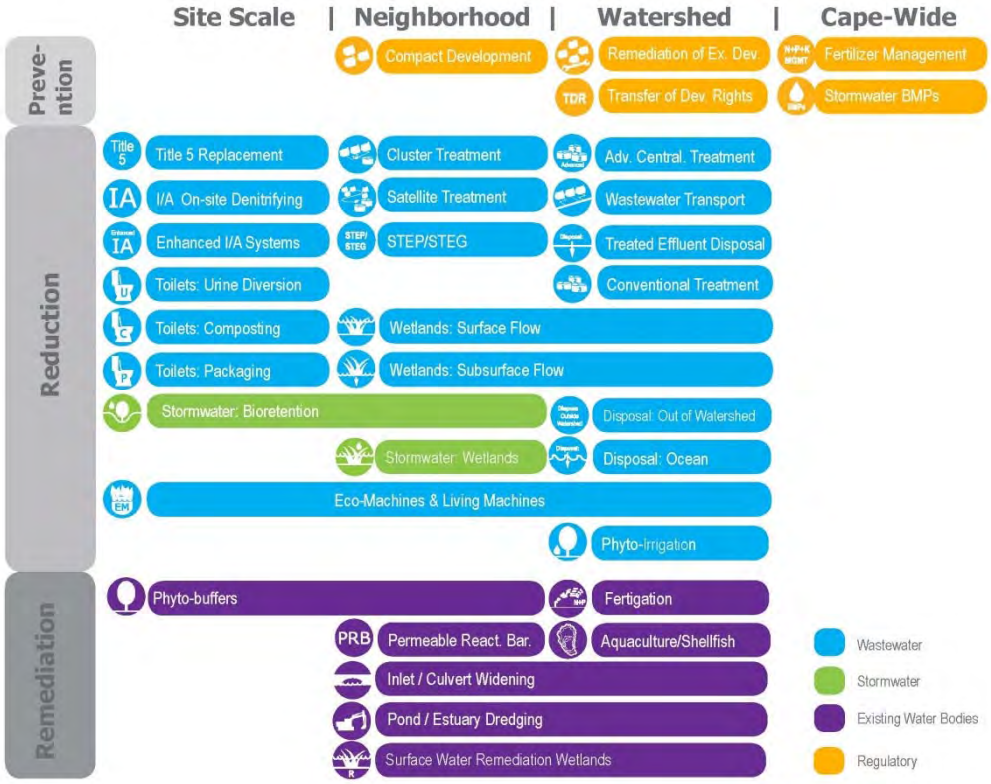
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5



208 Planning Process

Baseline Conditions

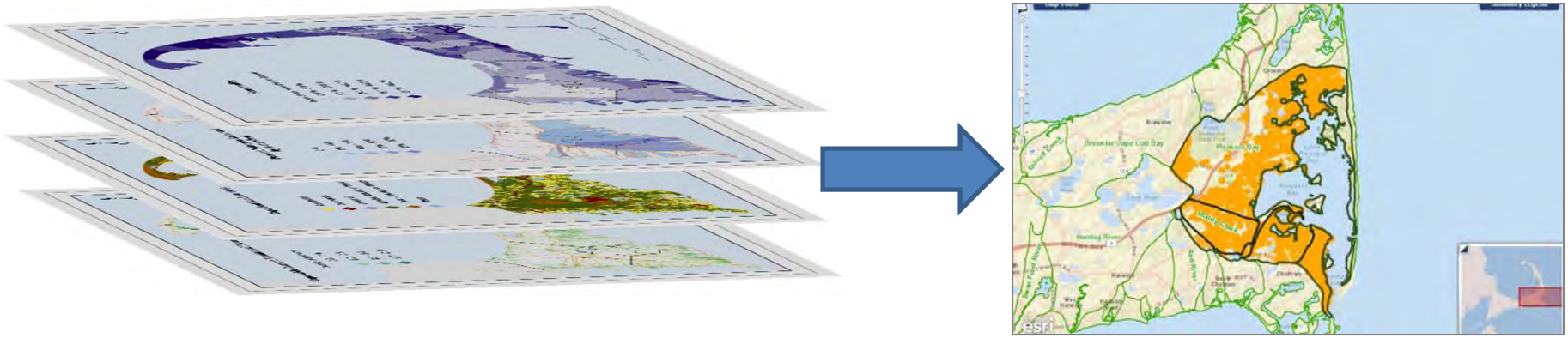
11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11



208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Goal of Today's Meeting:

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

208 Planning Process

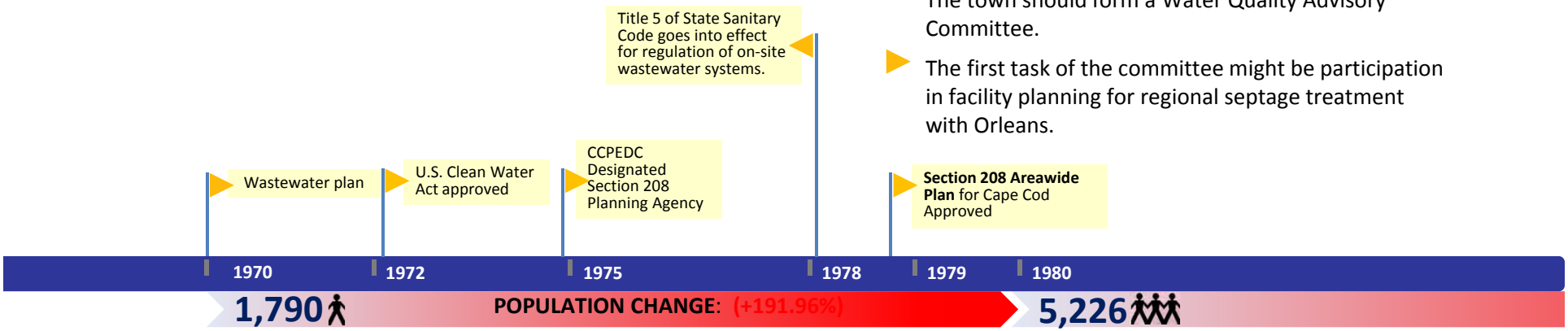
Local Progress to Date

Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay

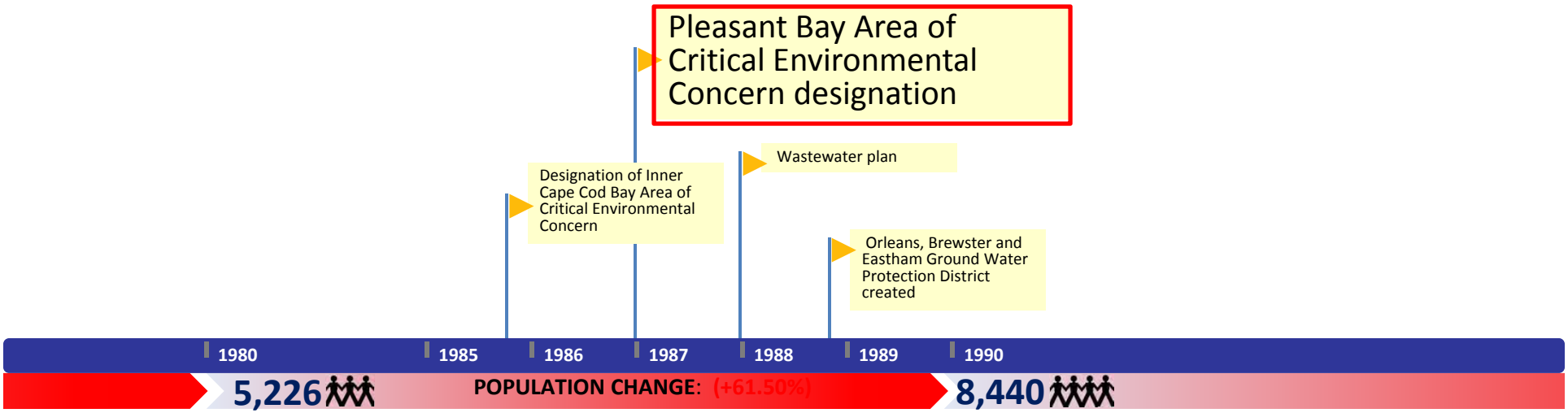
Brewster

From 1978 Section 208 Plan

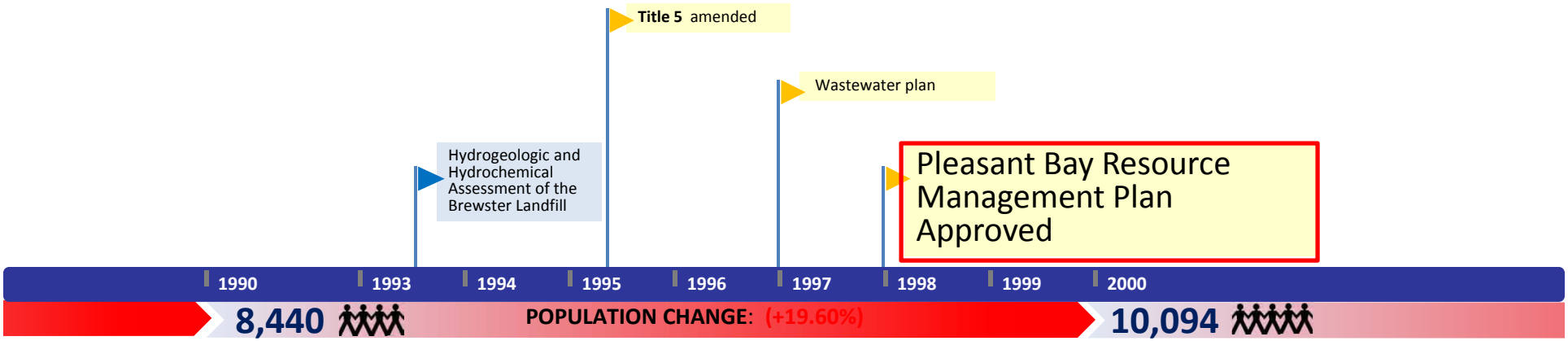
- Present and future town well sites should be protected from the non-point sources resulting from New development by creating Watershed Protection Districts.
- The town should cooperate in regional water supply planning to determine future water supply needs of neighboring towns and whether it can assist.
- 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.



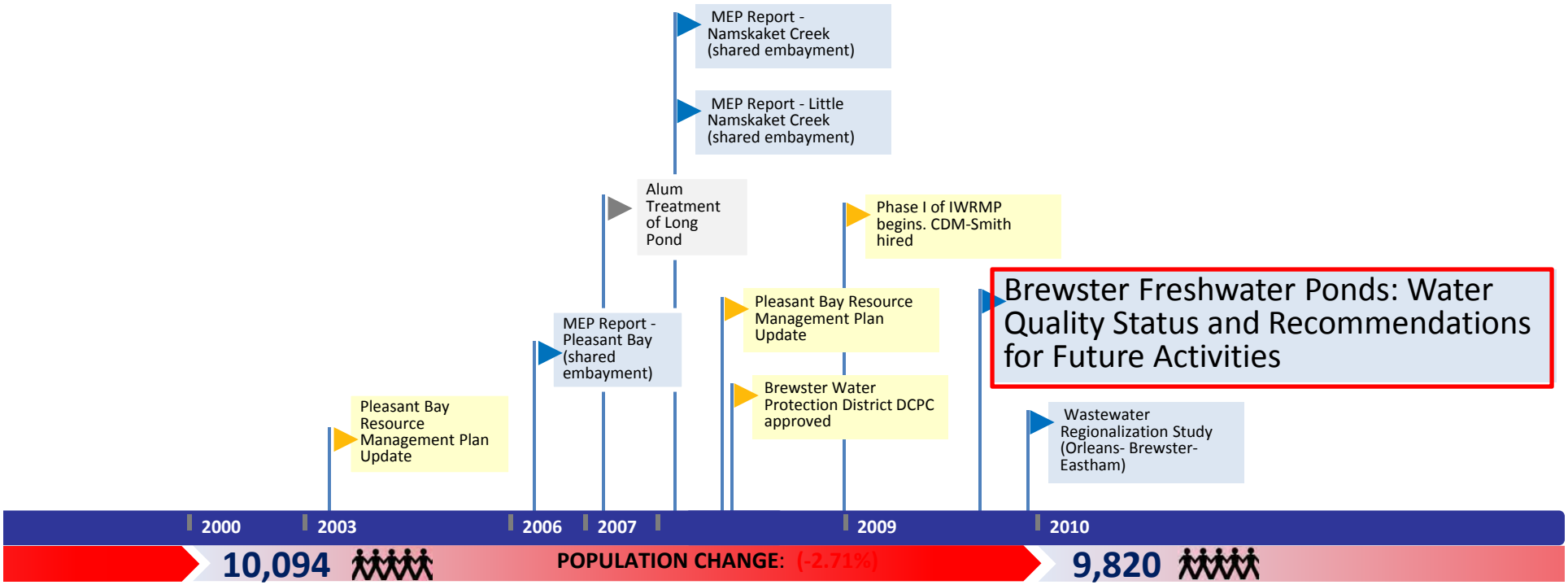
Brewster: 1970-2013



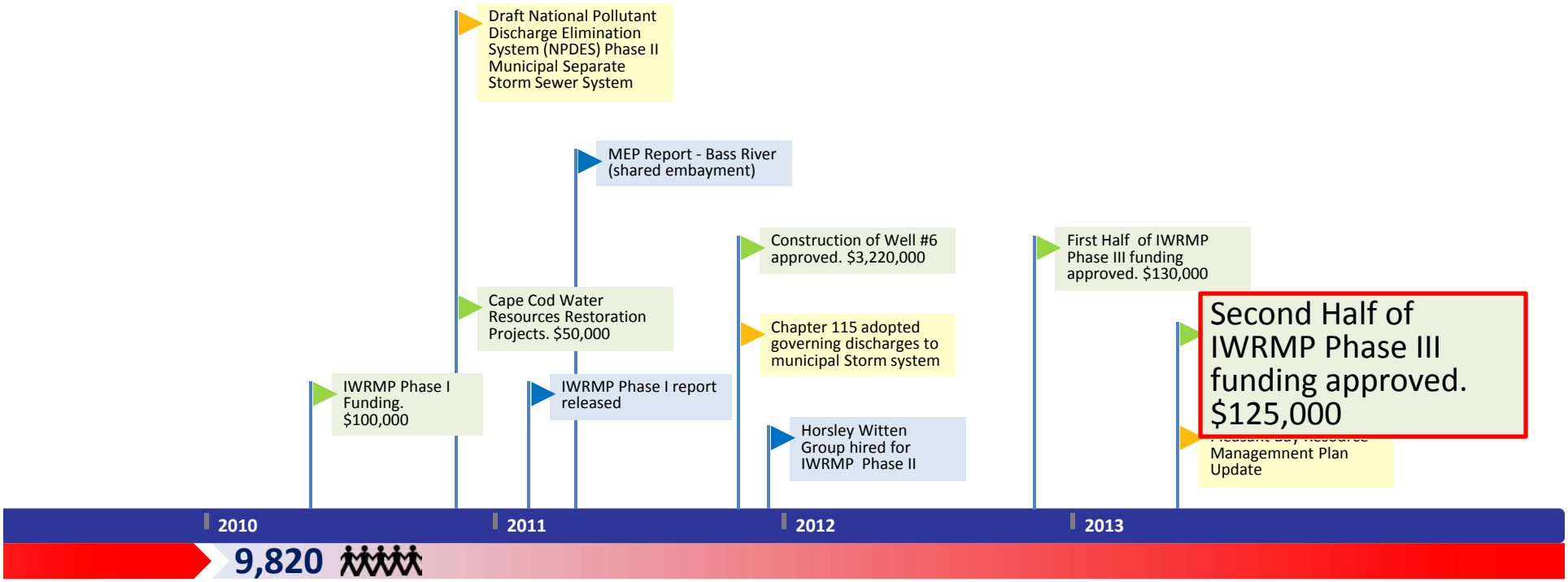
Brewster: 1970-2013



Brewster: 1970-2013



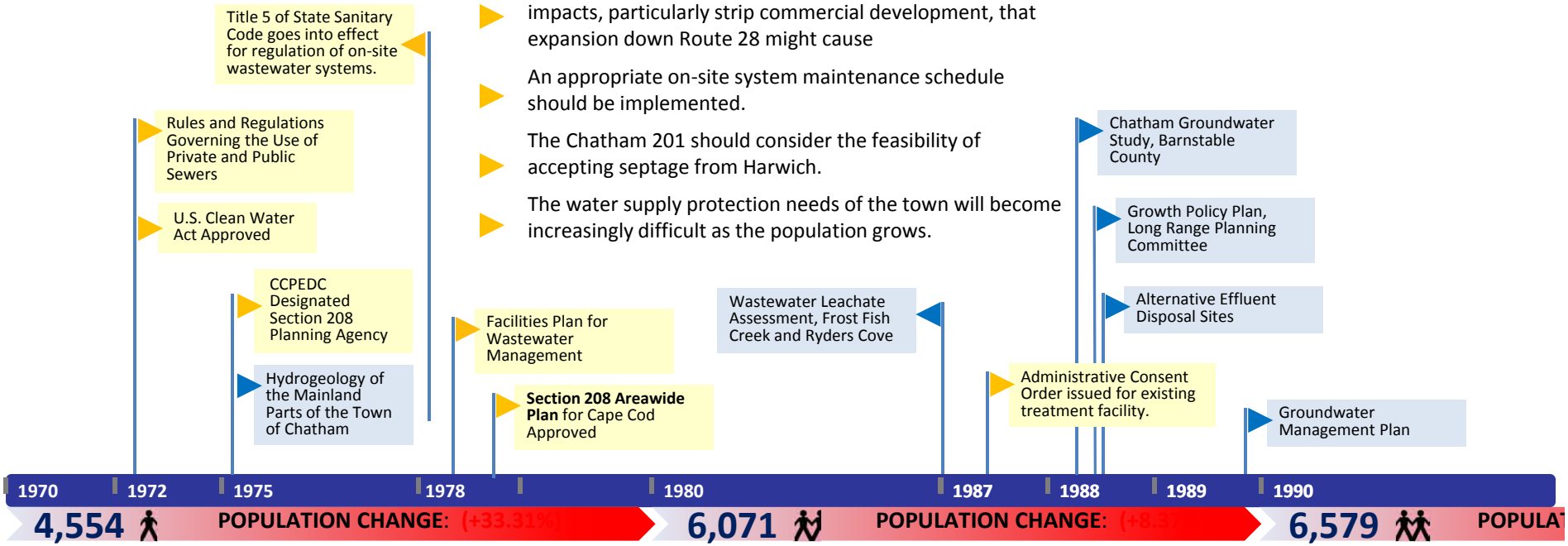
Brewster: 1970-2013



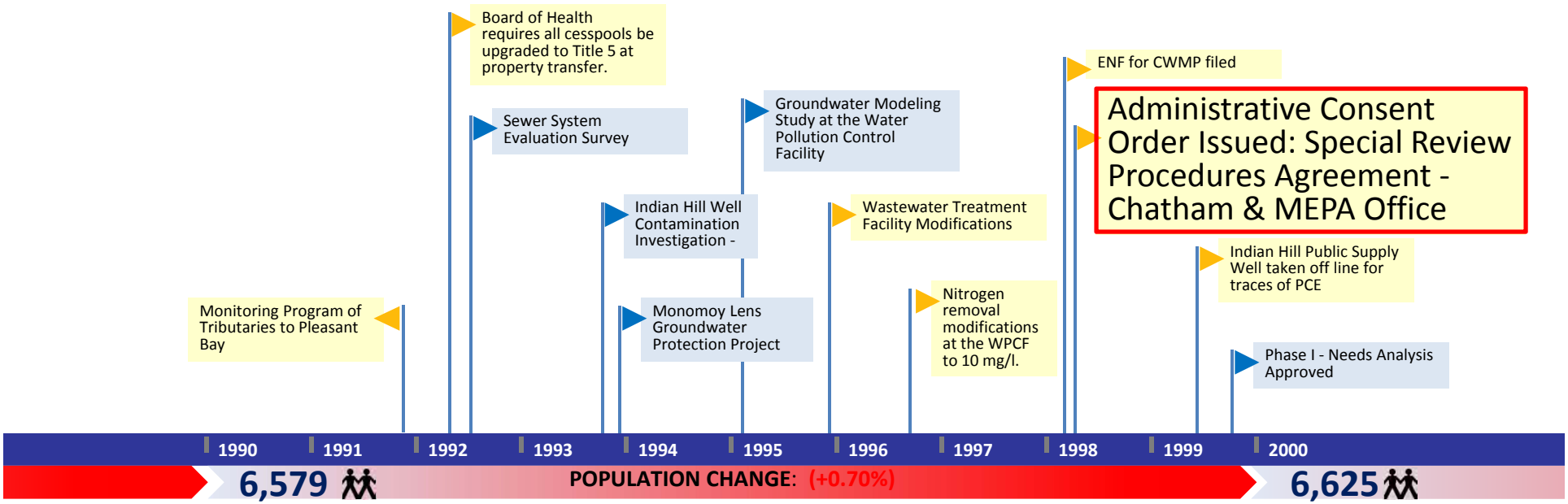
Chatham

From 1978 Section 208 Plan

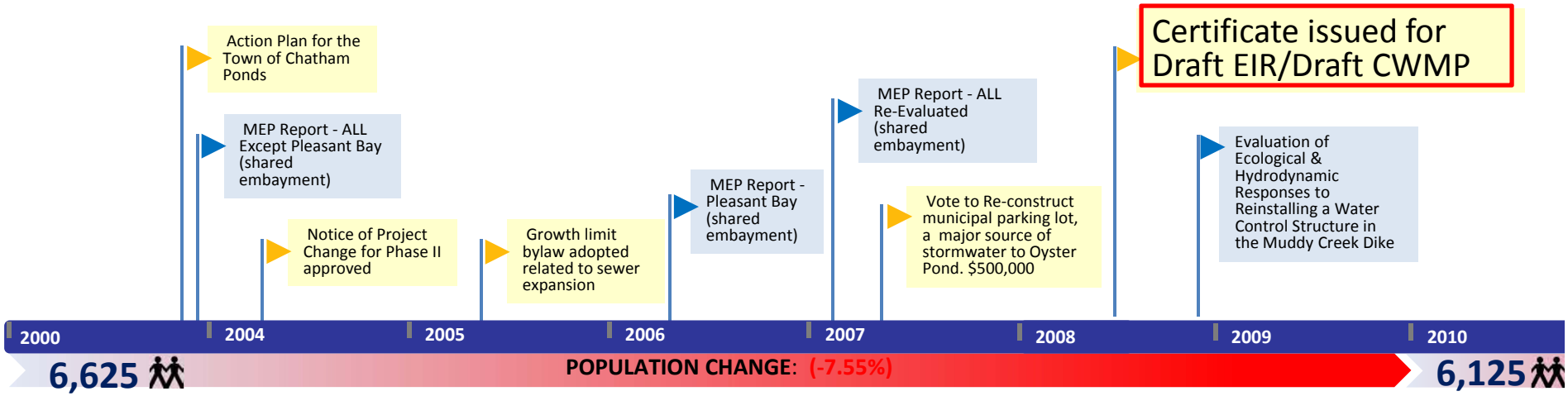
- A study is needed to examine the present capacity of the town's sewage treatment plant and the possible need to expand the present collection system.
- The 201 facility plan should be town-wide in scope and should fully evaluate all problem areas in the town including coastal water problems.
- The 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.

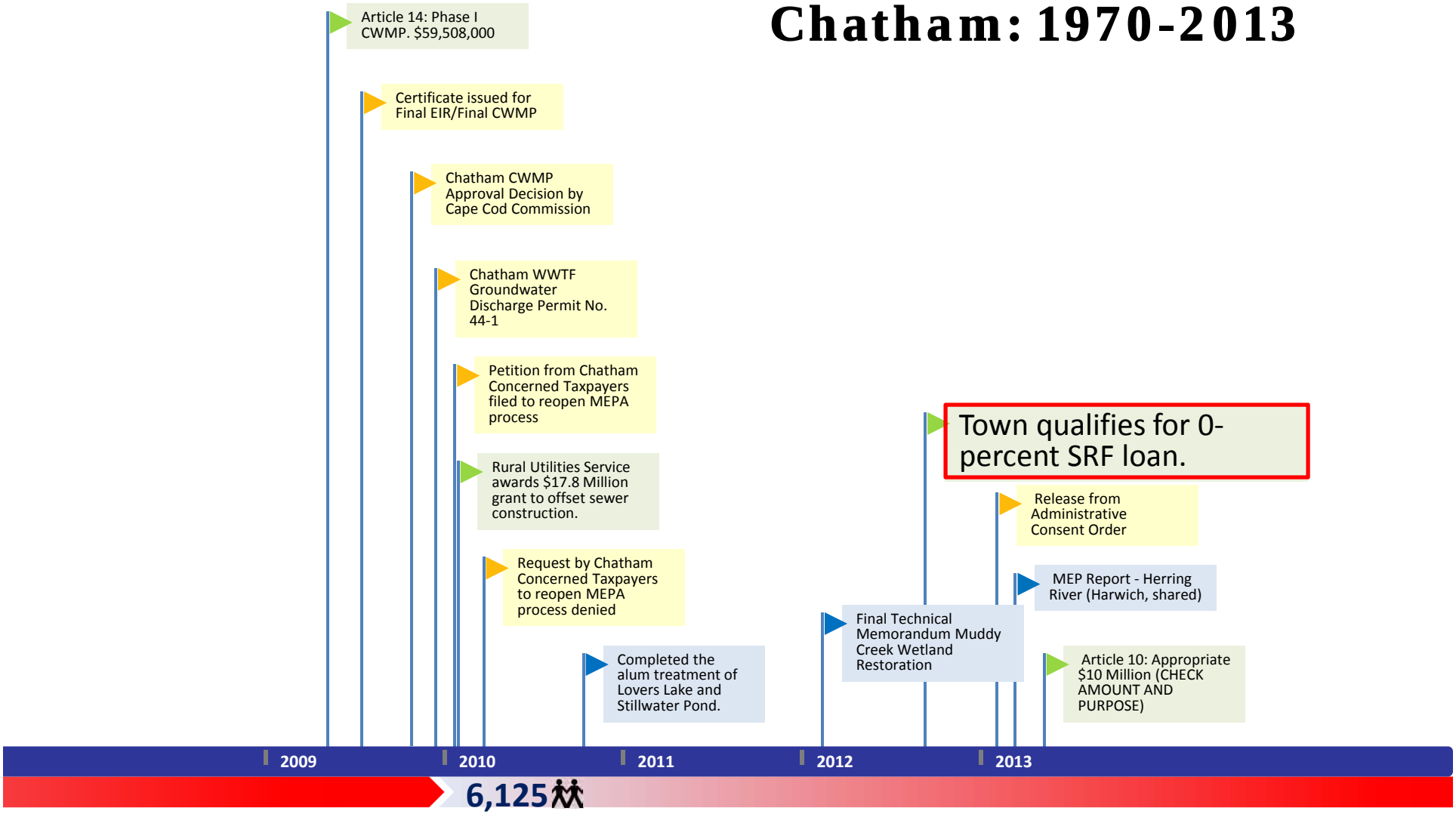


Chatham: 1970-2013



Chatham: 1970-2013

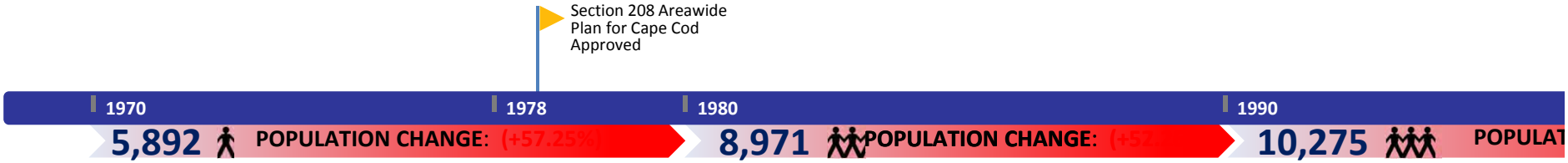



Chatham: 1970-2013
Article 14: Phase I CWMP. $59,508,000
Certificate issued for Final EIR/Final CWMP
Chatham CWMP Approval Decision by Cape Cod Commission
Chatham WWTF Groundwater Discharge Permit No. 44-1
Petition from Chatham Concerned Taxpayers filed to reopen MEPA process
Rural Utilities Service awards $17.8 Million grant to offset sewer construction.
Request by Chatham Concerned Taxpayers to reopen MEPA process denied
Completed the alum treatment of Lovers Lake and Stillwater Pond.
Final Technical Memorandum Muddy Creek Wetland Restoration
Town qualifies for 0-percent SRF loan.
Release from Administrative Consent Order
MEP Report - Herring River (Harwich, shared)
Article 10: Appropriate $10 Million (CHECK AMOUNT AND PURPOSE)
2009
2010
2011
2012
2013
6,125

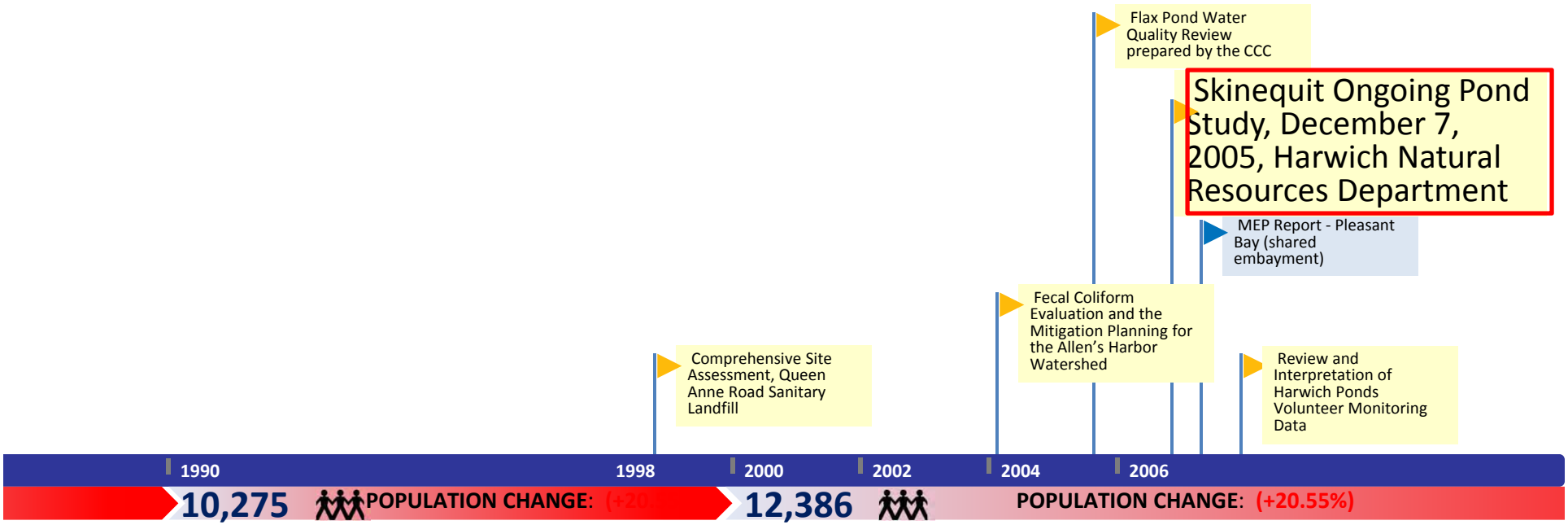
Harwich

From 1978 Section 208 Plan

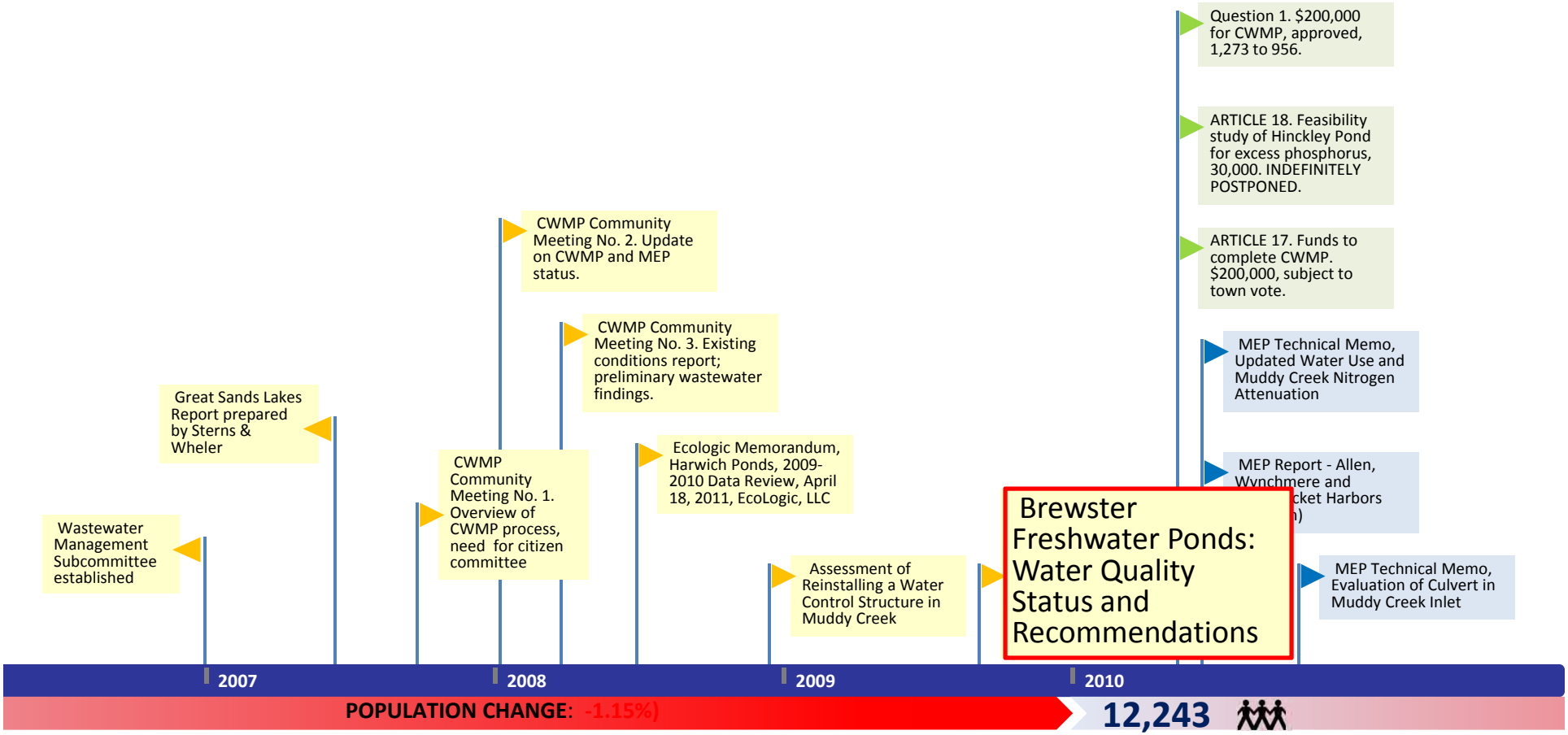
- That the town recognize that the Category 2 problem areas on the south side of town need special attention.
- It is also suggested that the town consider establishing "Seasonal Residential Districts" in this area to control the conversion of seasonal dwellings to year-round occupancy.
- The 208 plan 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.



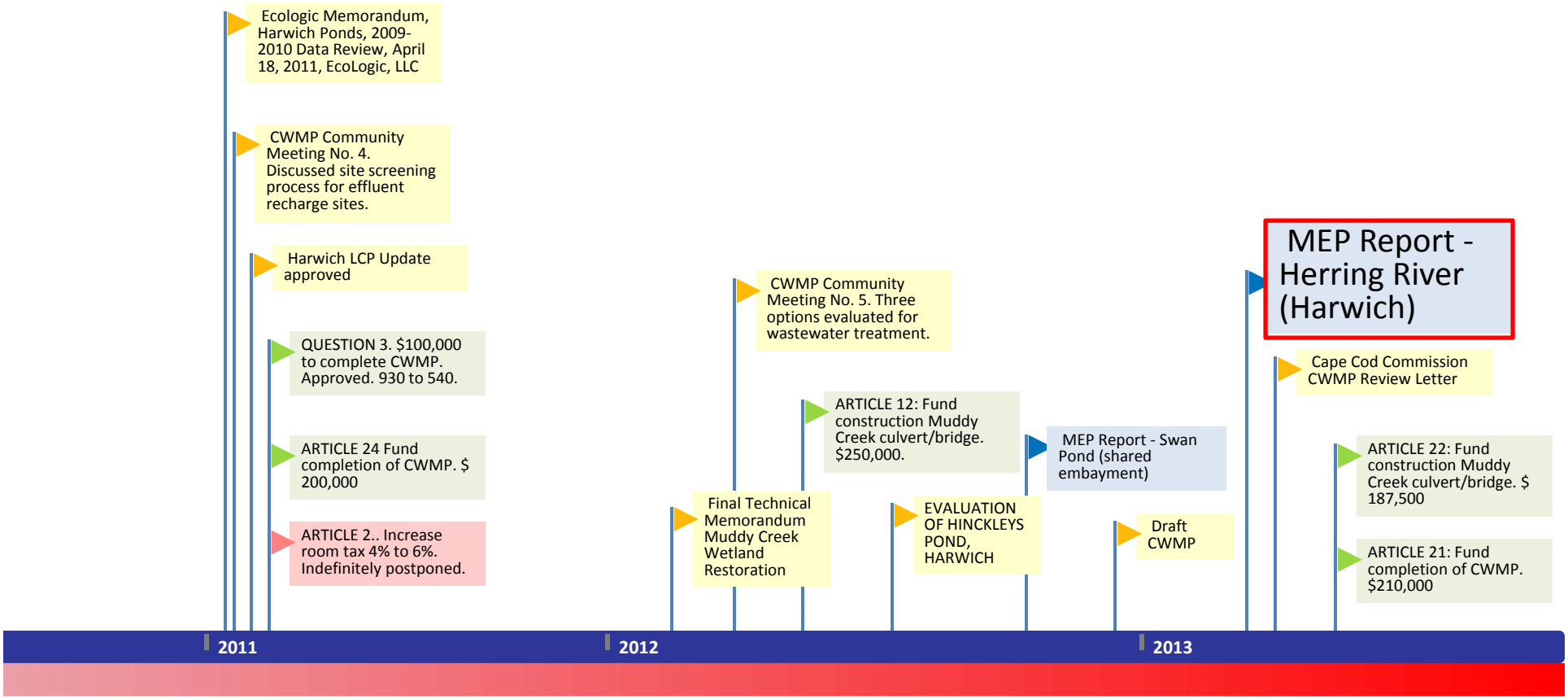
Harwich: 1970-2013



Harwich: 1970-2013



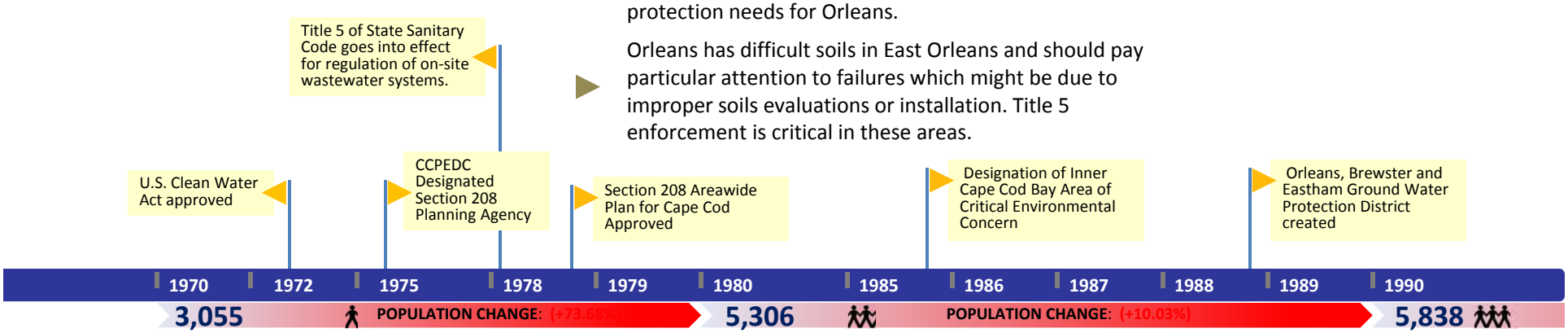
Harwich: 1970-2013



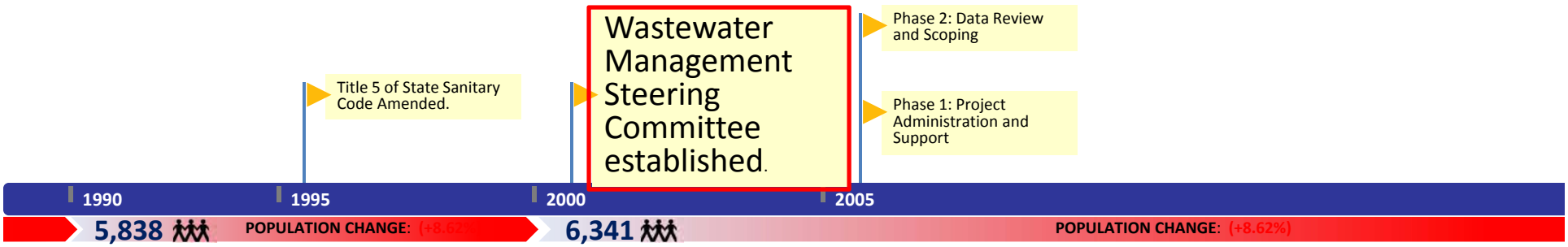
Orleans

From 1978 Section 208 Plan

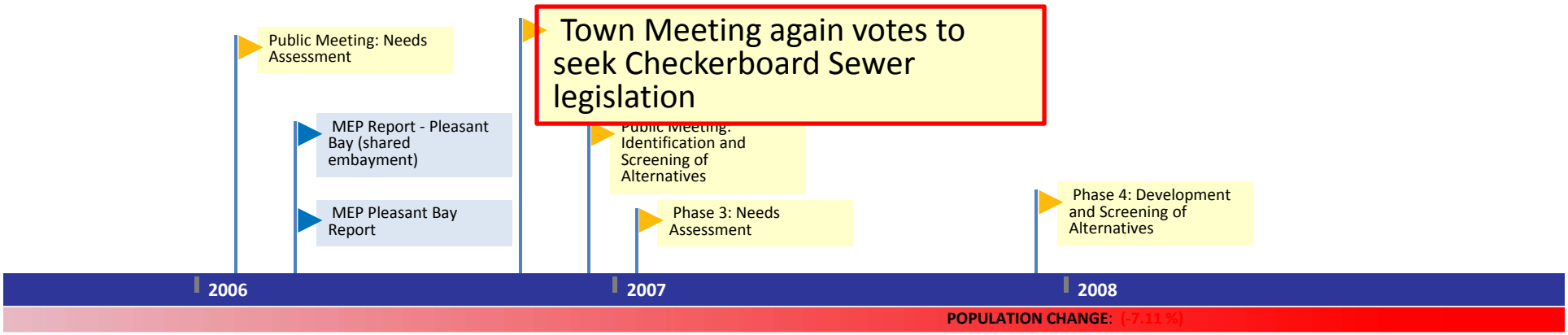
- The major problems in Orleans at present are septage management, failing systems in the town center, and protection of water quality in the municipal wells.
- Orleans is one of the first towns on the Cape to take positive action to abate the serious problems posed by septage disposal.
- A scope of 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.



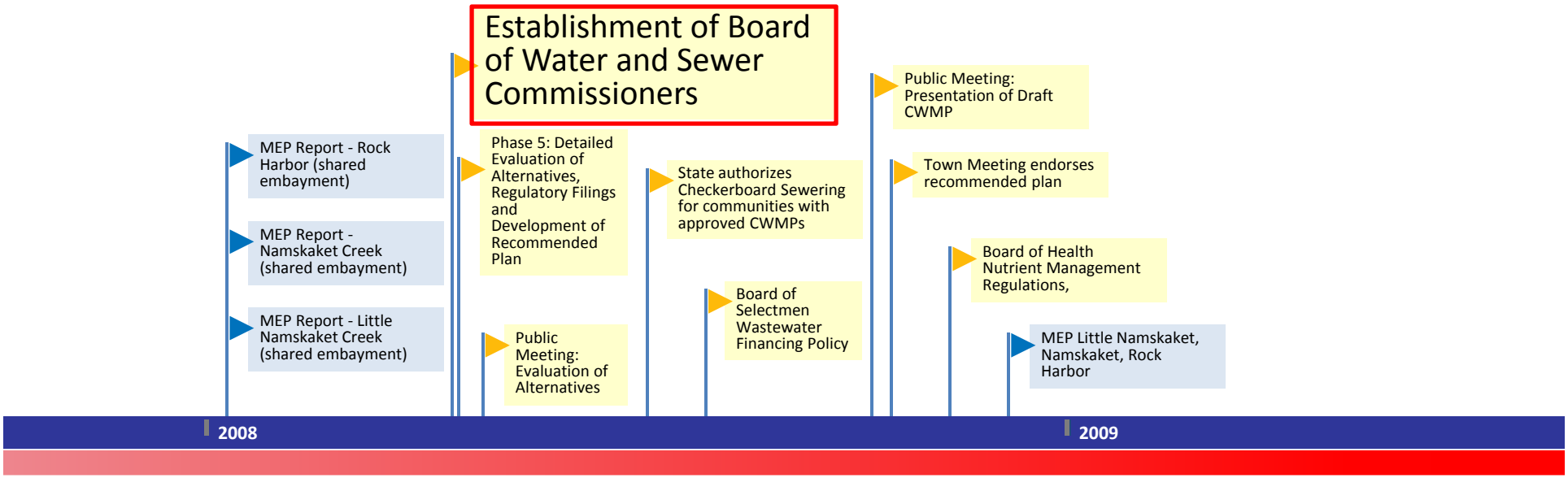
Orleans: 1970-2013



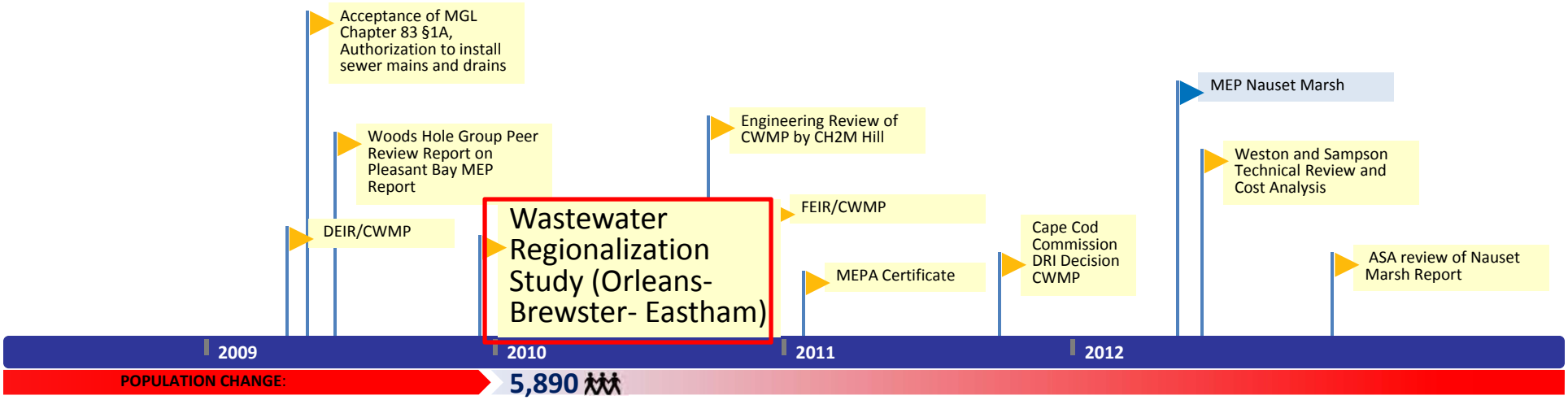
Orleans: 1970-2013



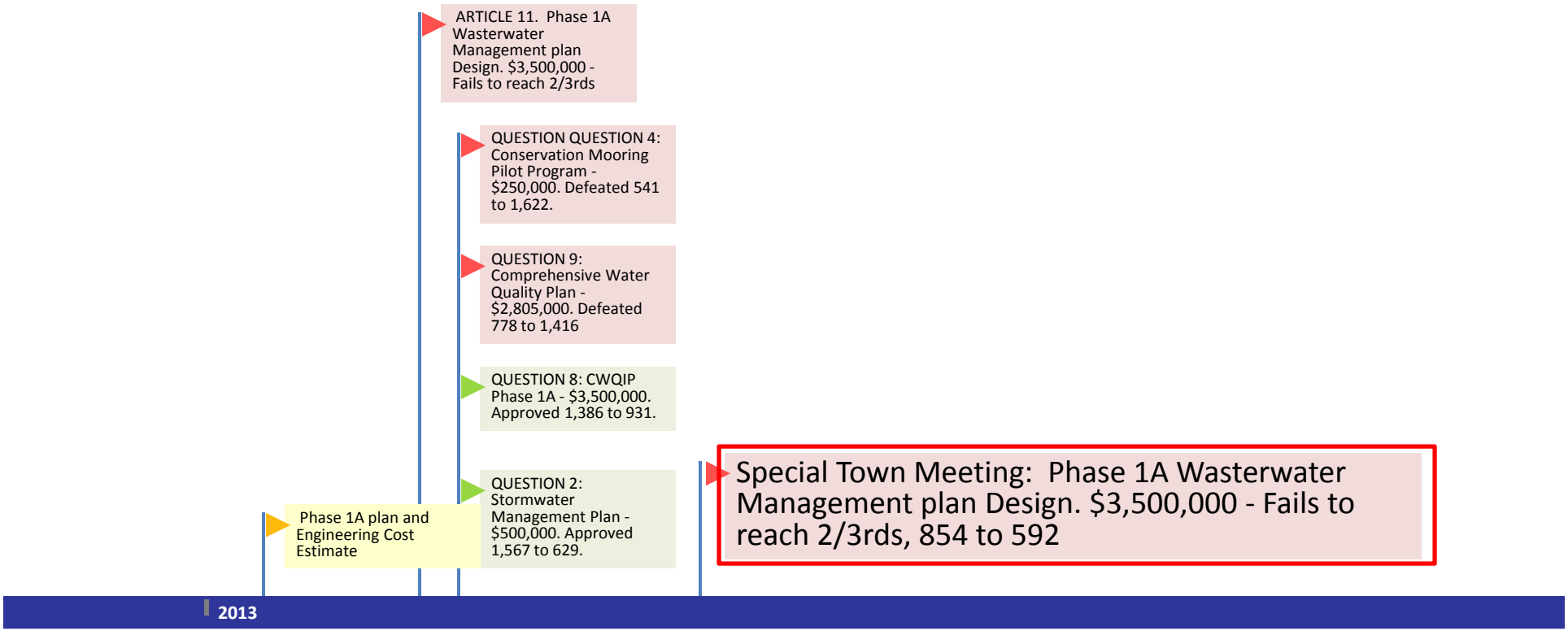
Orleans: 1970-2013



Orleans: 1970-2013



Orleans: 1970-2013

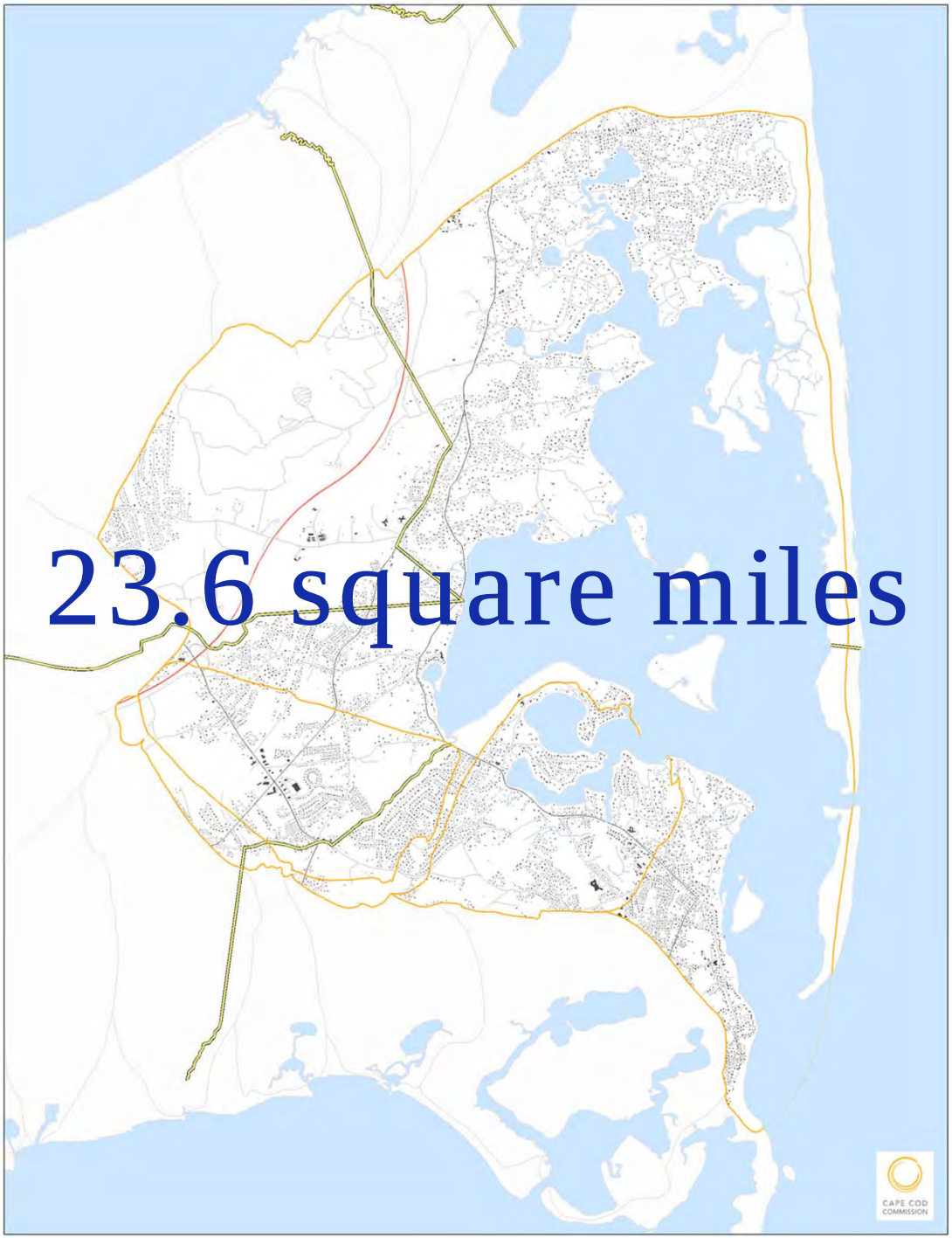


Did we miss anything?

Your Watersheds

Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay


CAPE COD
COMMISSION


23.6 square miles
CAPE COD COMMISSION


4 Towns
CAPE COD COMMISSION

Cape Cod National Seashore

Natural Features

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

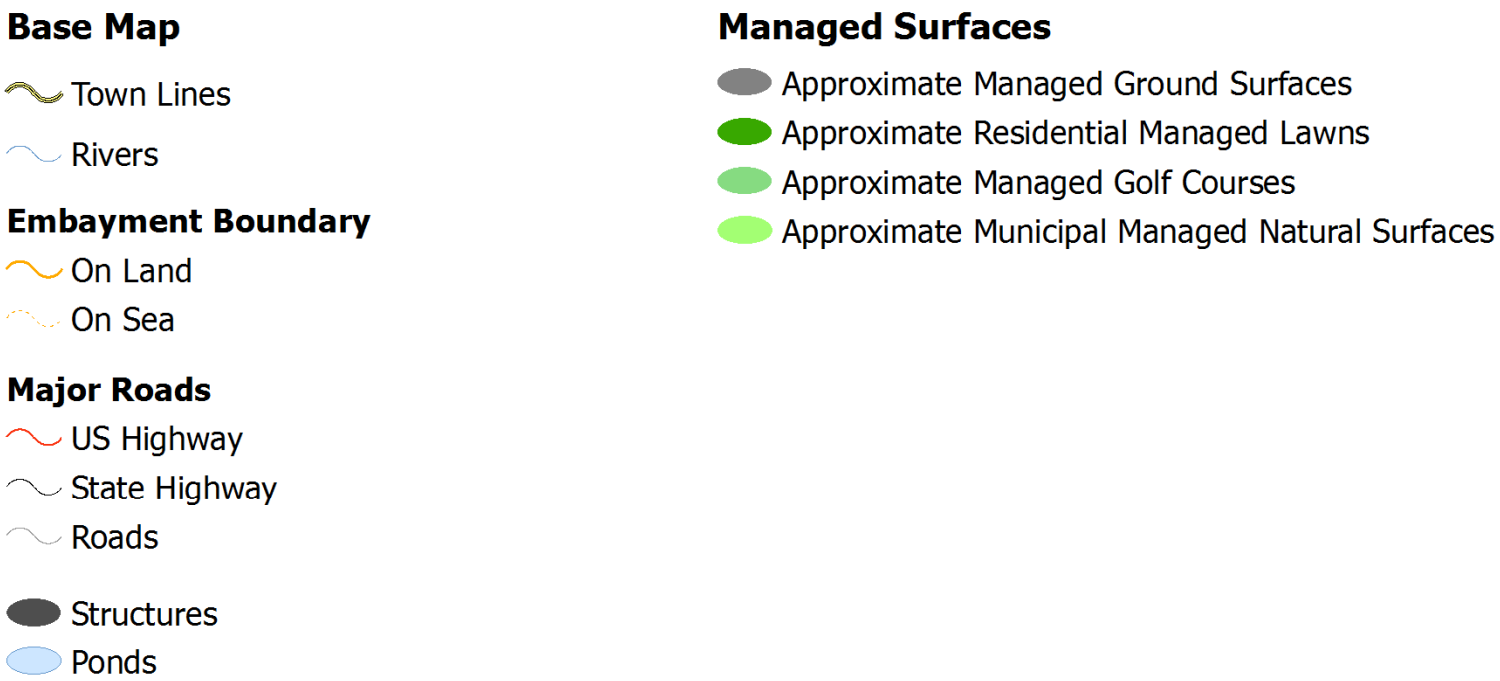
- Structures
- Ponds

Natural Areas

- Natural Heritage & Endangered Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

Managed Surfaces



Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

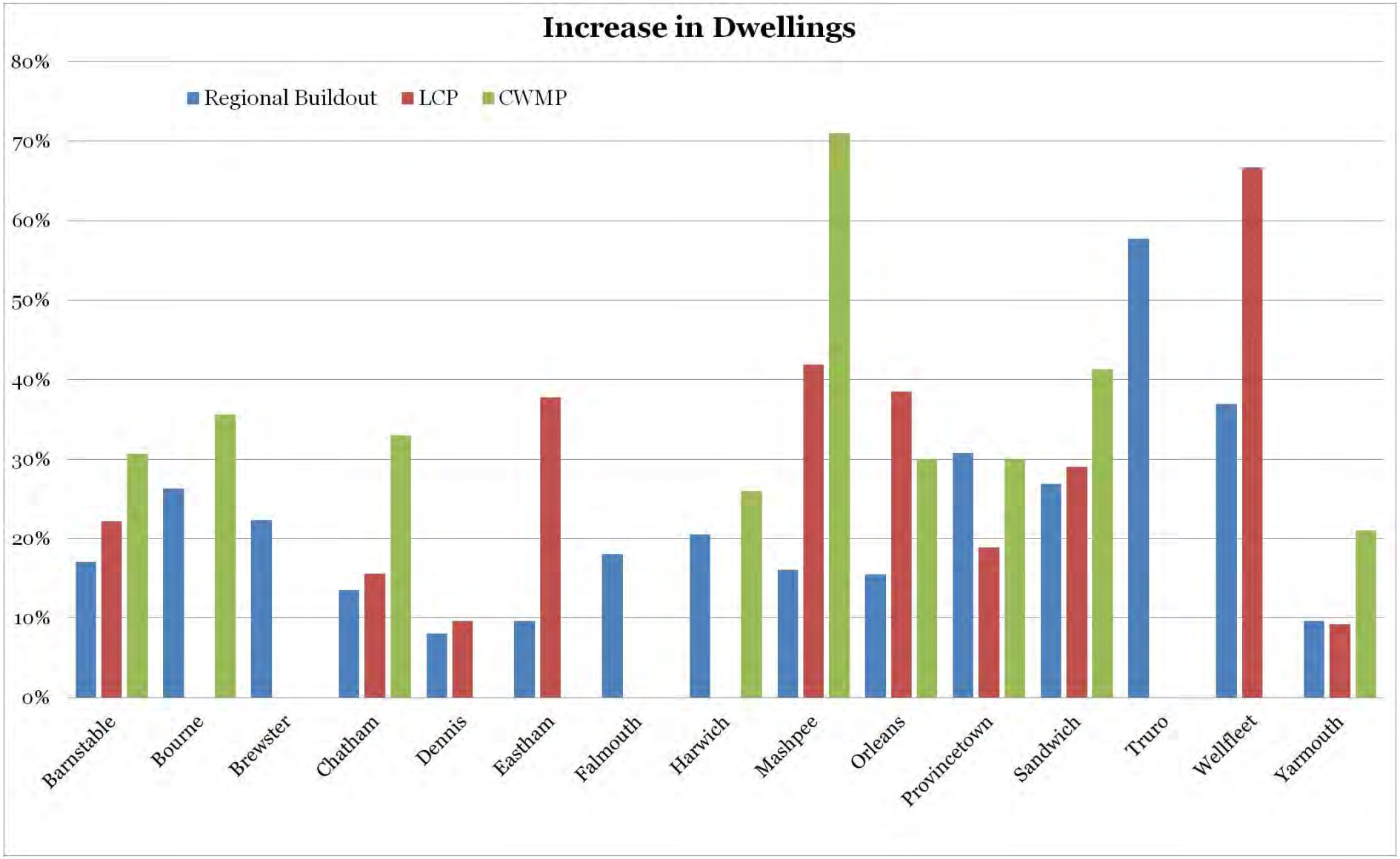
Sources: MassGIS, MassDOT

Density

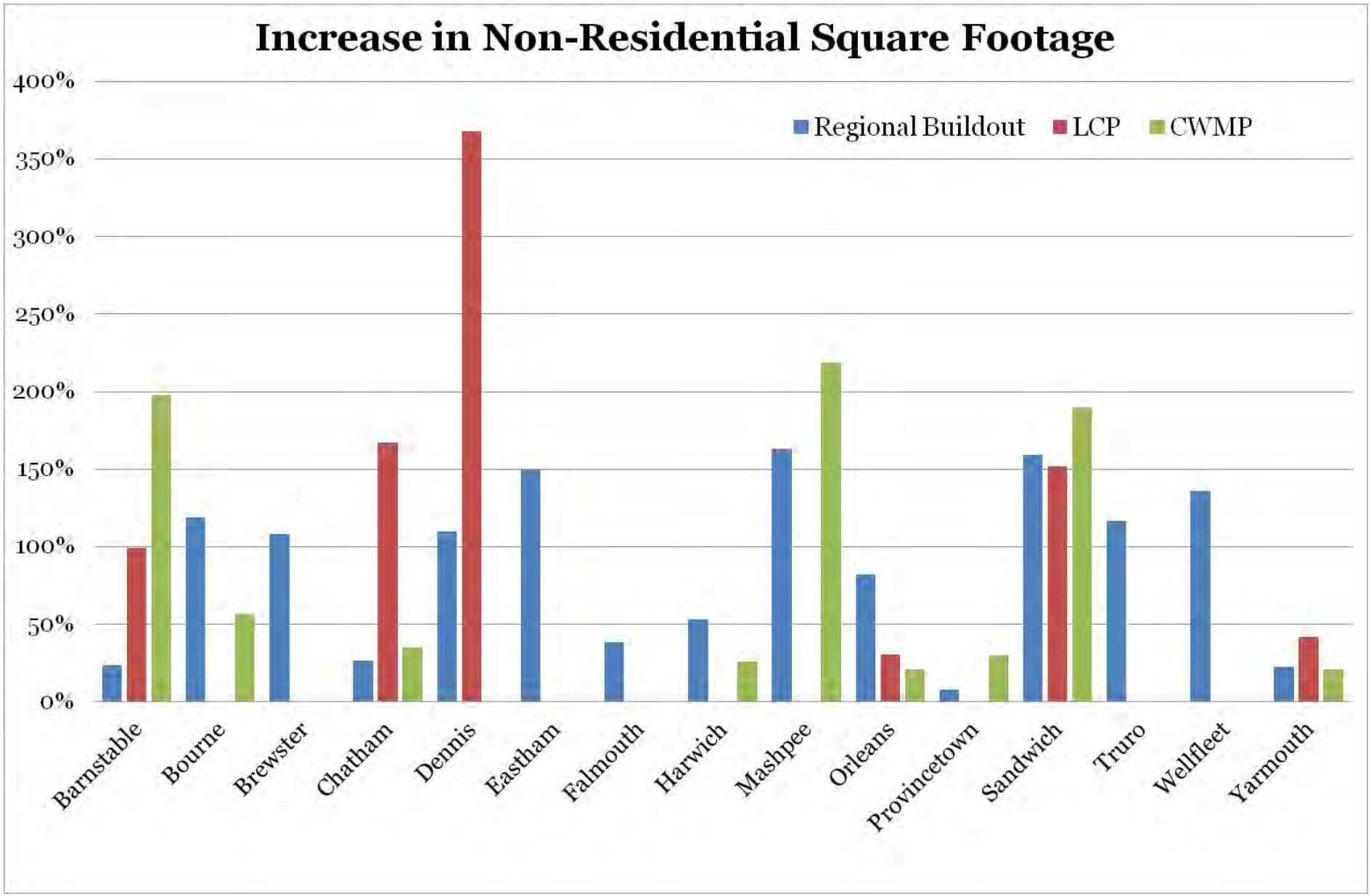
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

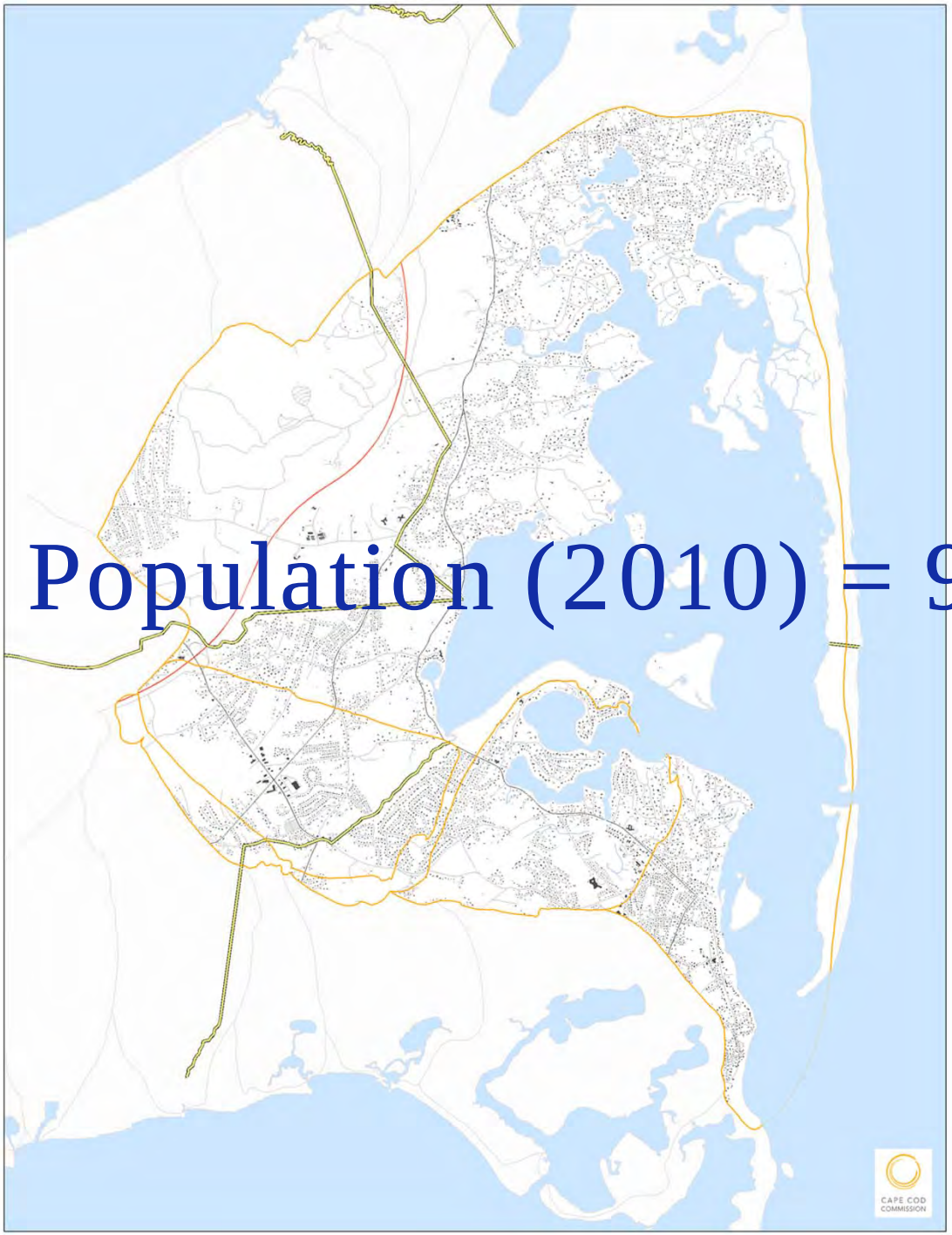

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout


Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

The People

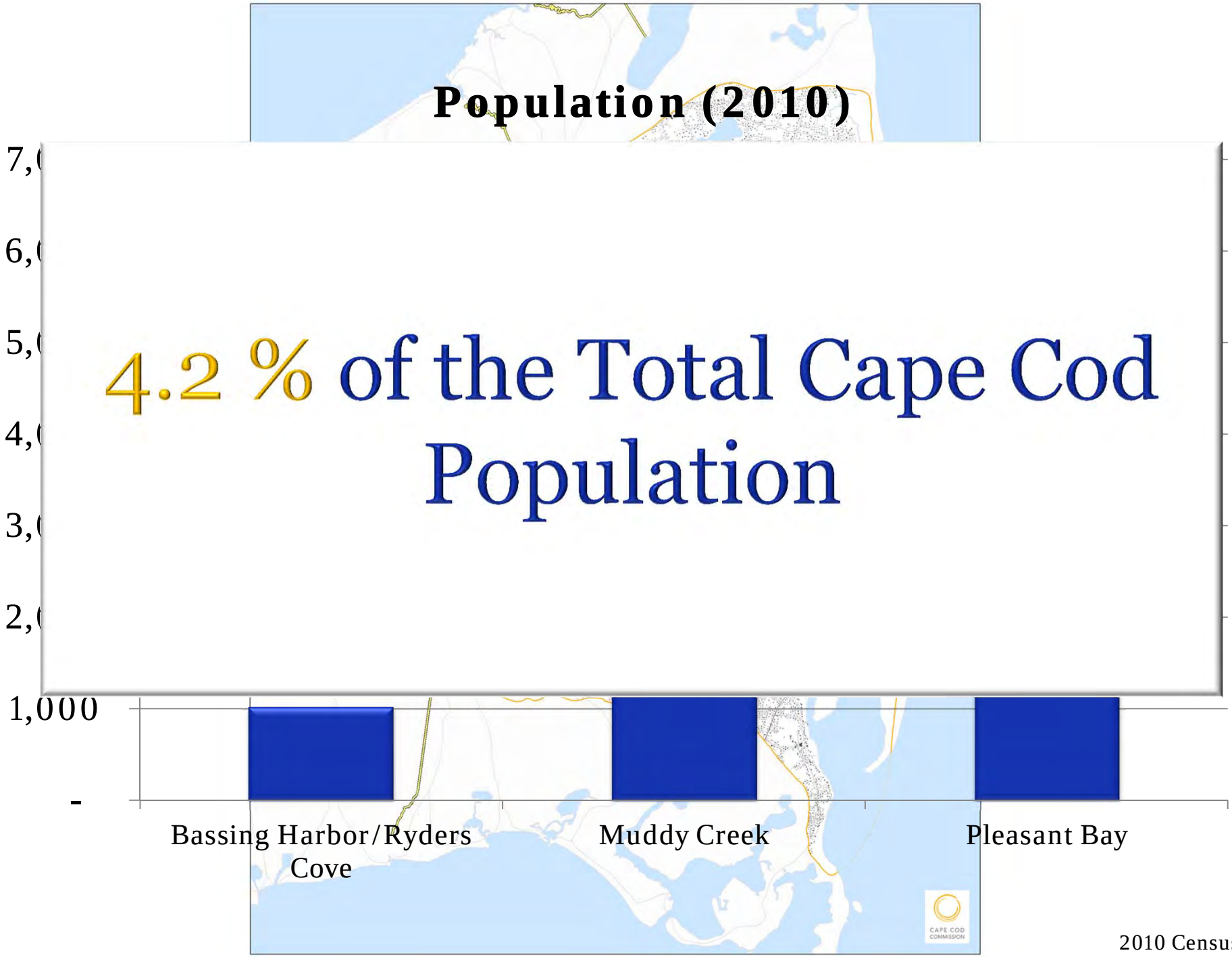
Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay



Total Population (2010) = 9,099

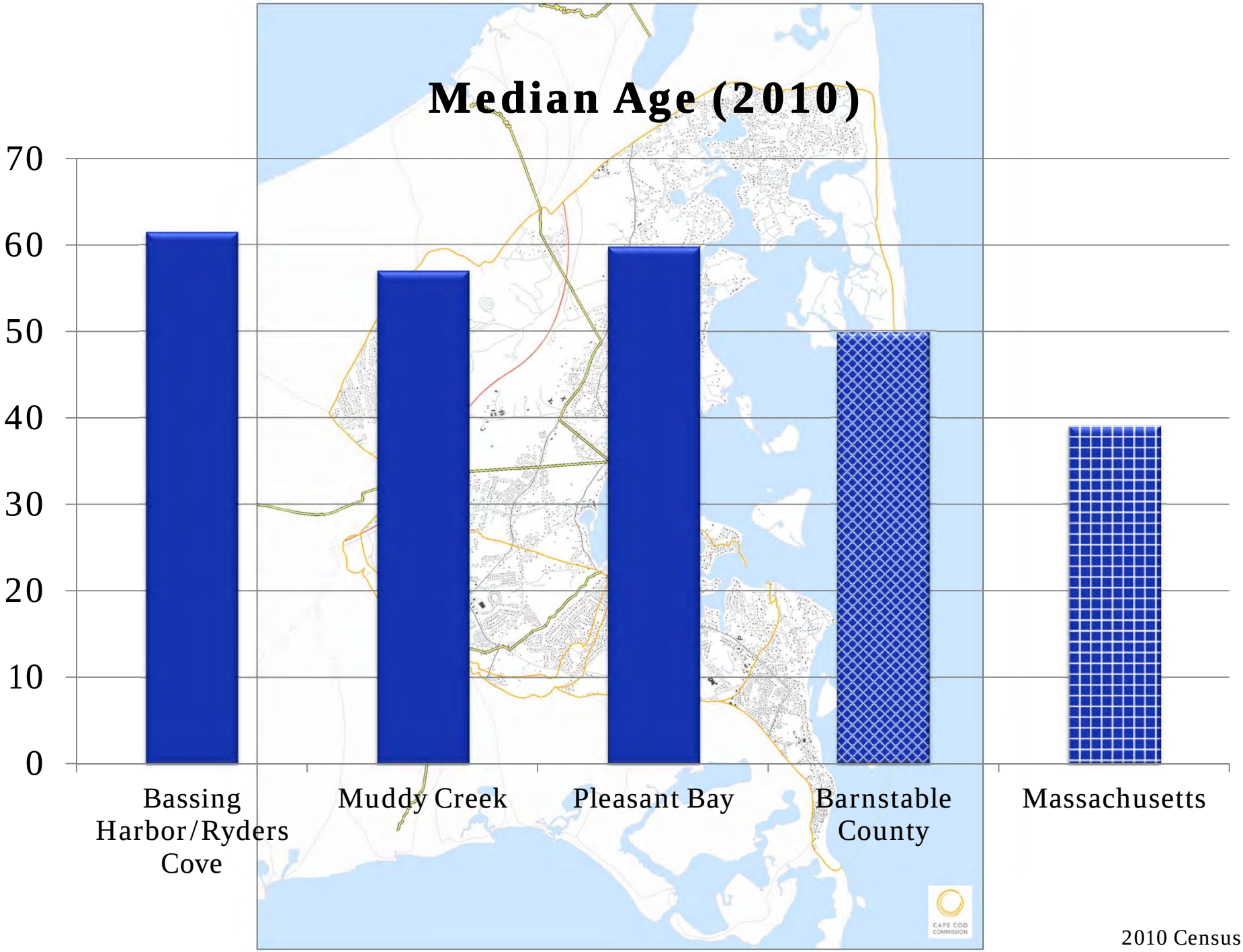
2010 Census

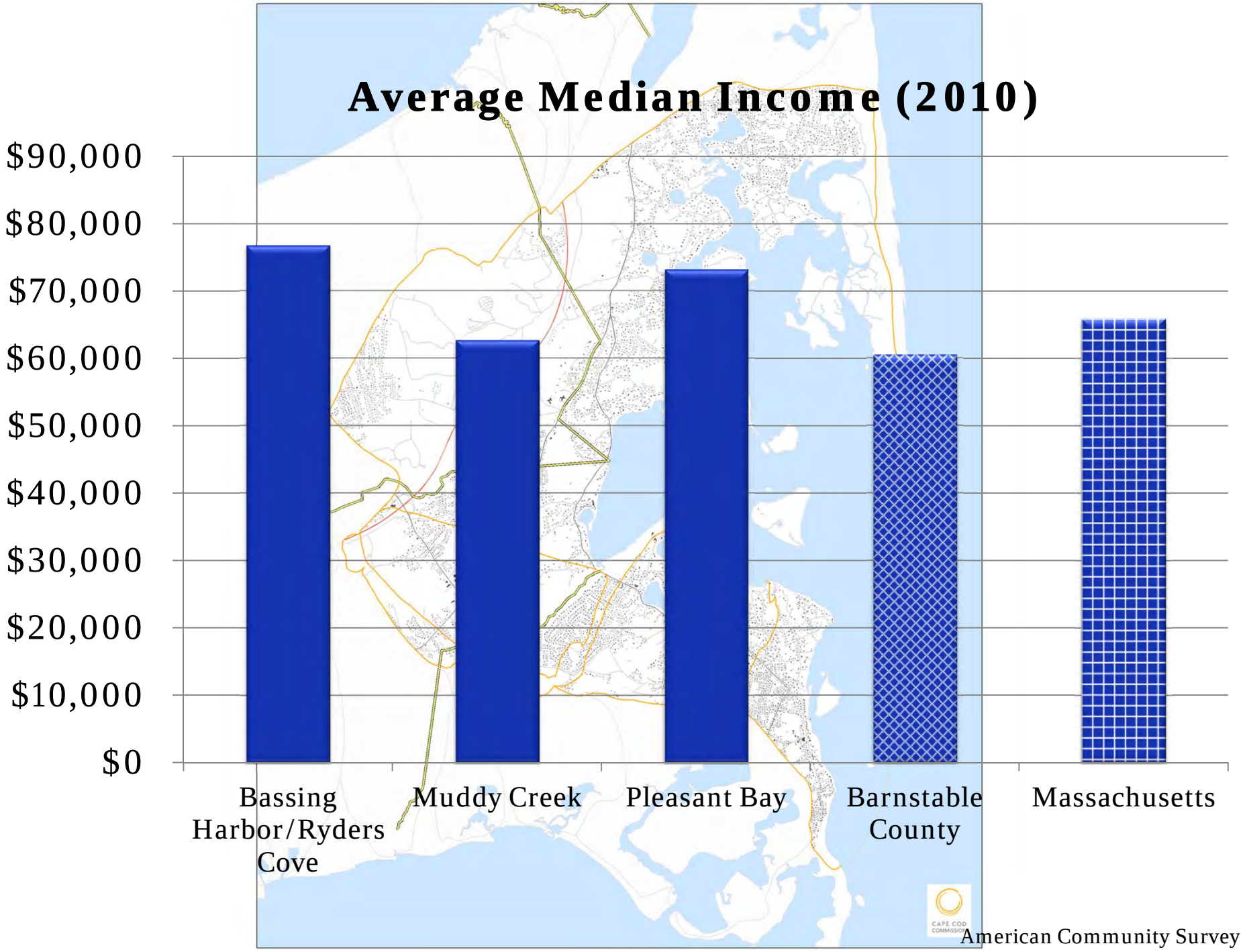
Population (2010)

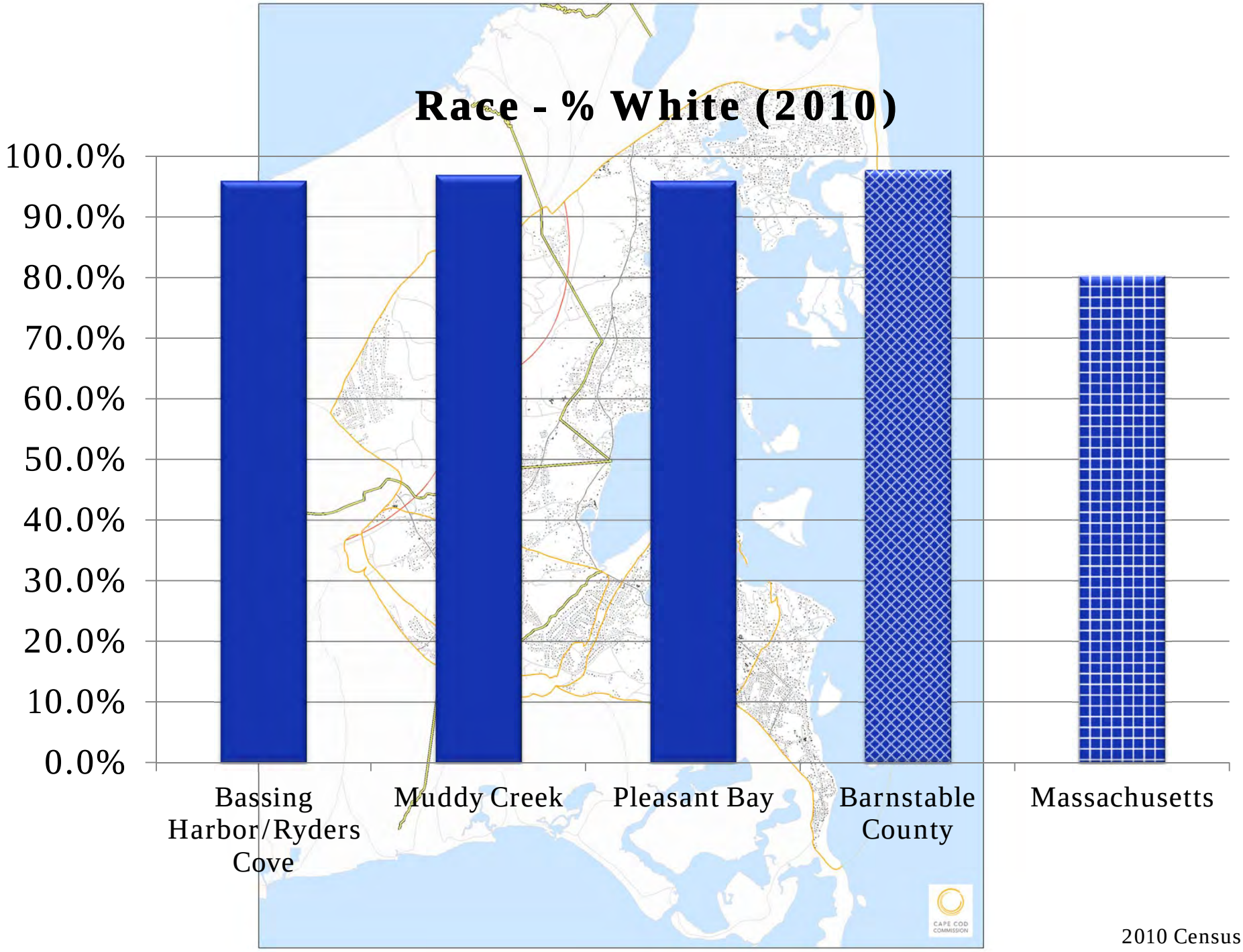


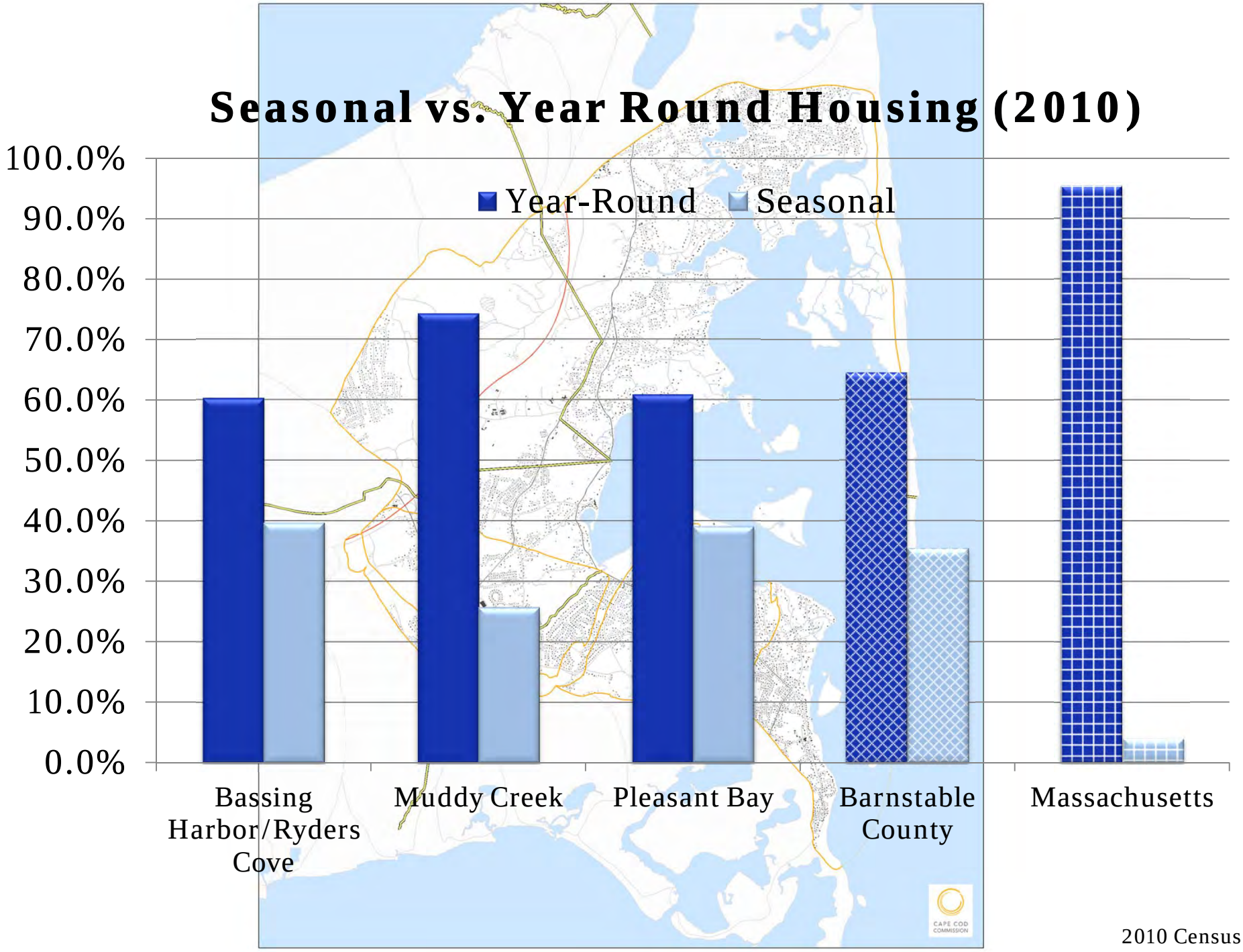
4.2 % of the Total Cape Cod Population

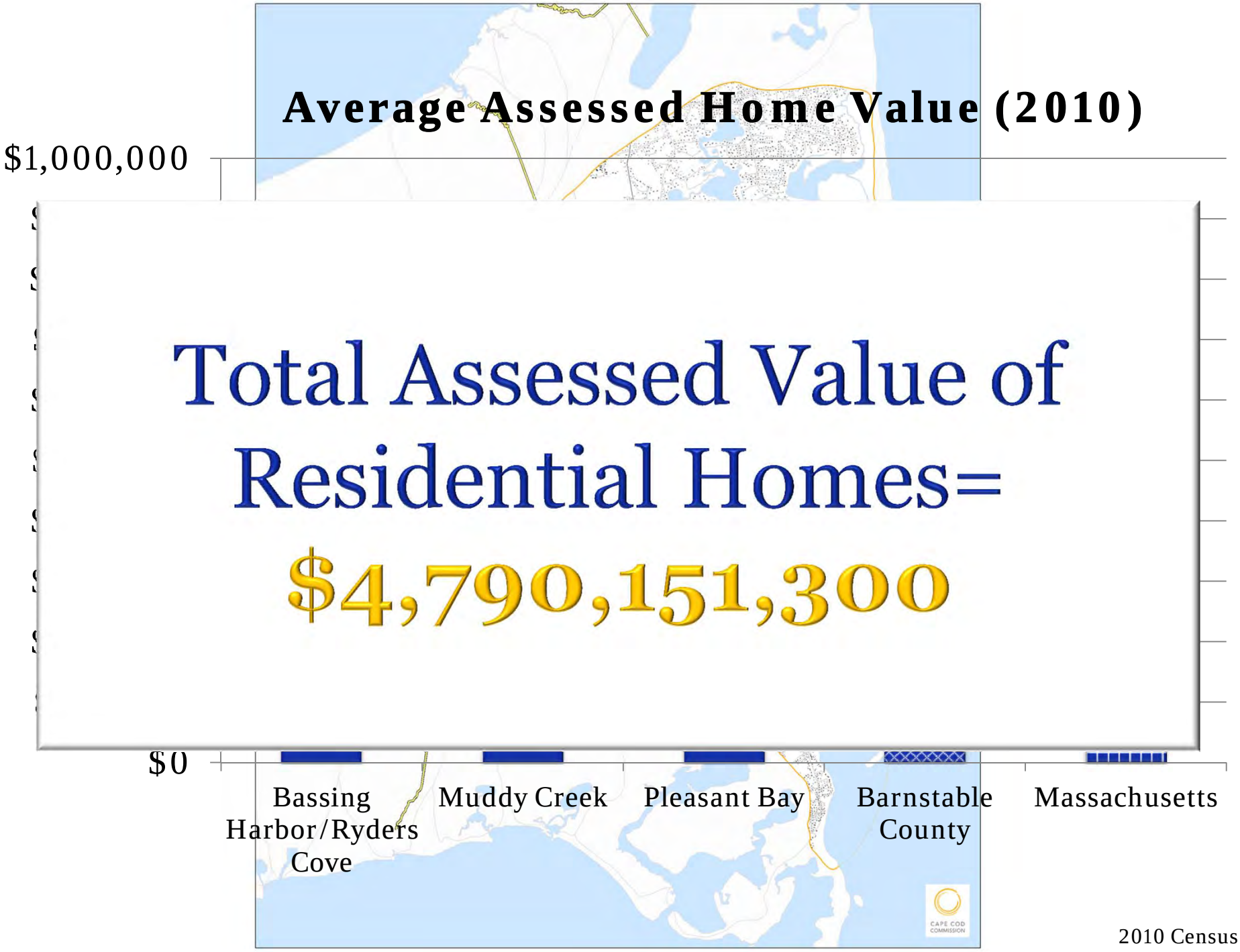
2010 Census


Median Age (2010)
70
60
50
40
30
20
10
0
Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay
Barnstable County
Massachusetts
CAPE COD COMMISSION
2010 Census


Average Median Income (2010)
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay
Barnstable County
Massachusetts
American Community Survey


Race - % White (2010)
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay
Barnstable County
Massachusetts
2010 Census


Seasonal vs. Year Round Housing (2010)
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Year-Round
Seasonal
Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay
Barnstable County
Massachusetts
2010 Census

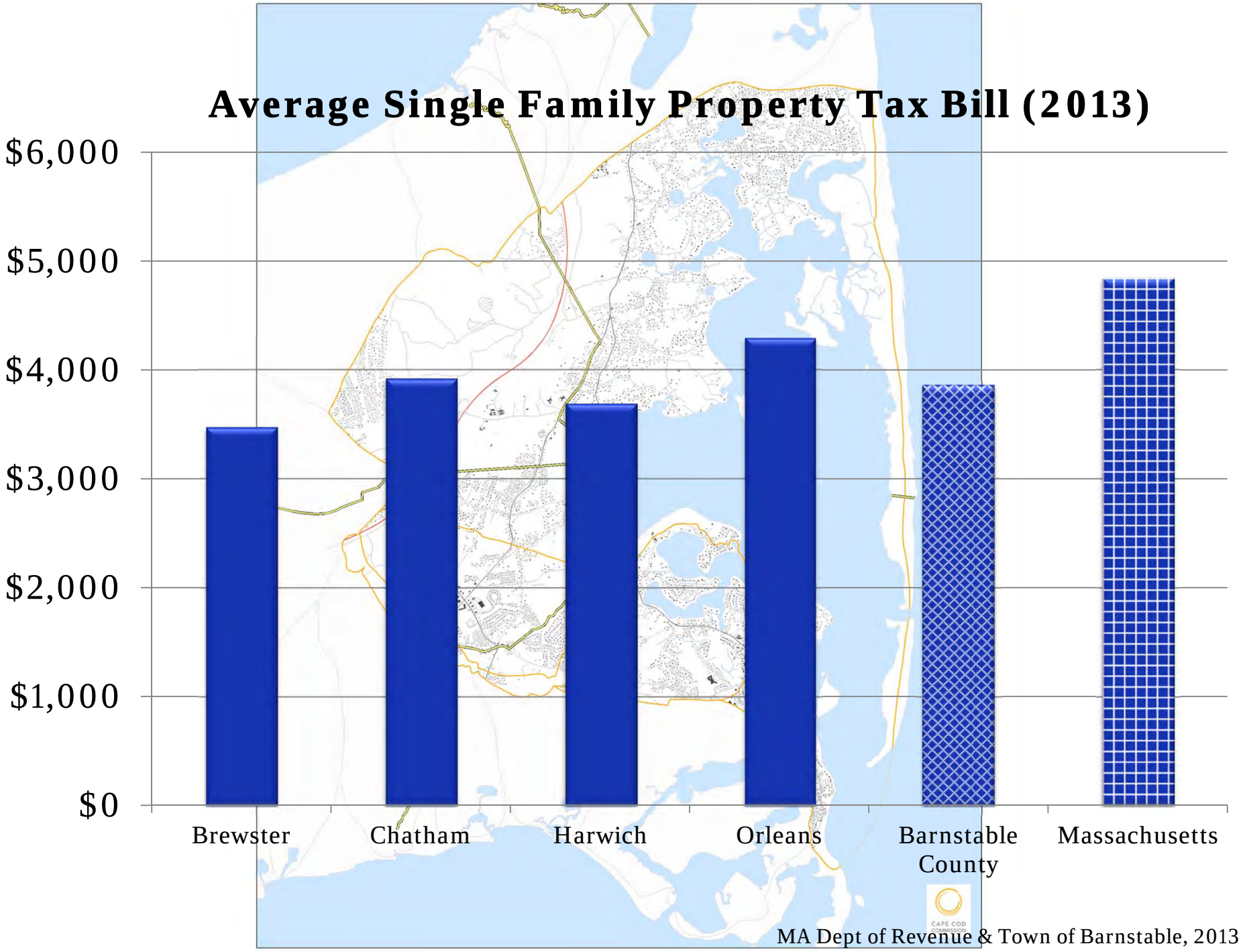


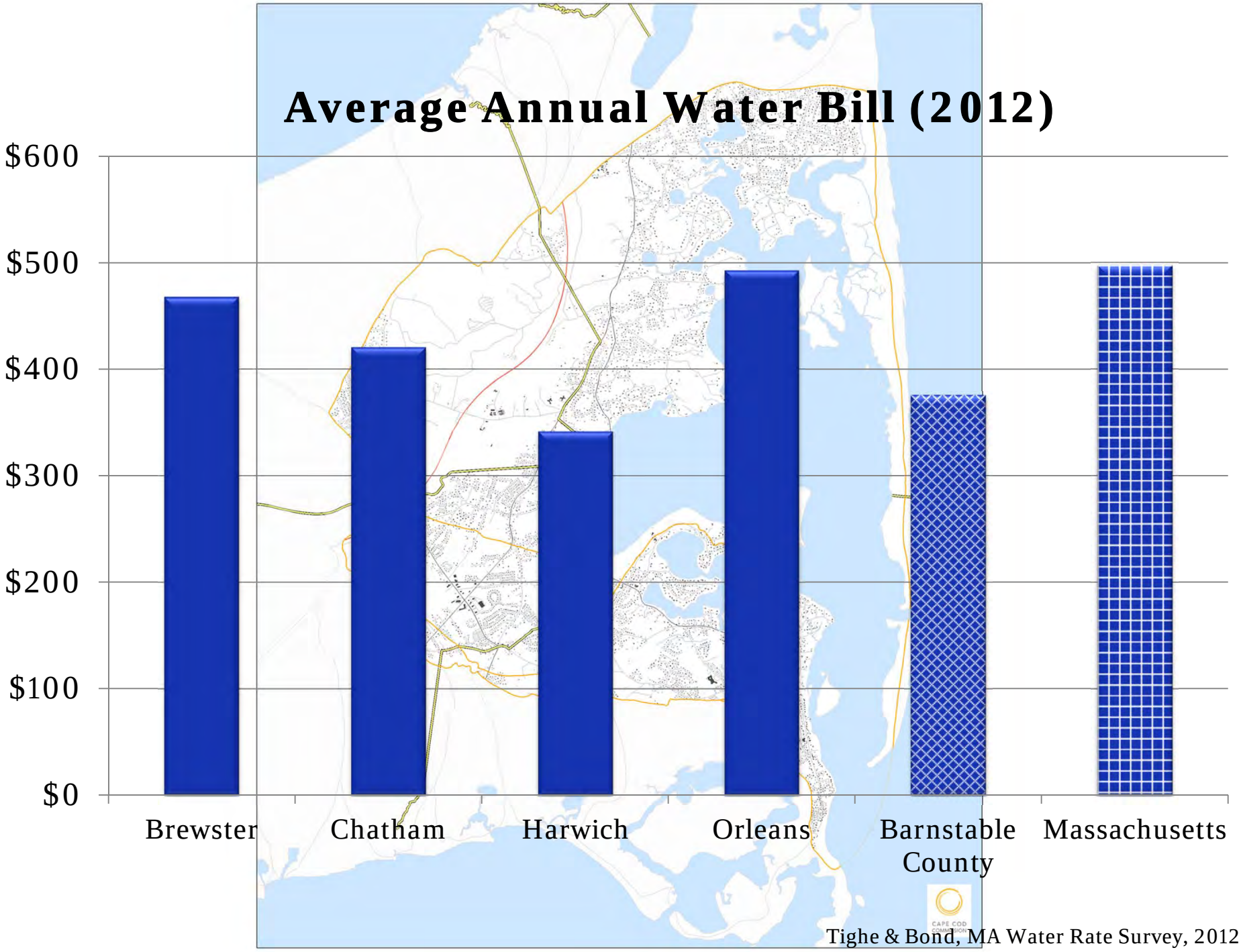
Total Assessed Value of Residential Homes=

$4,790,151,300

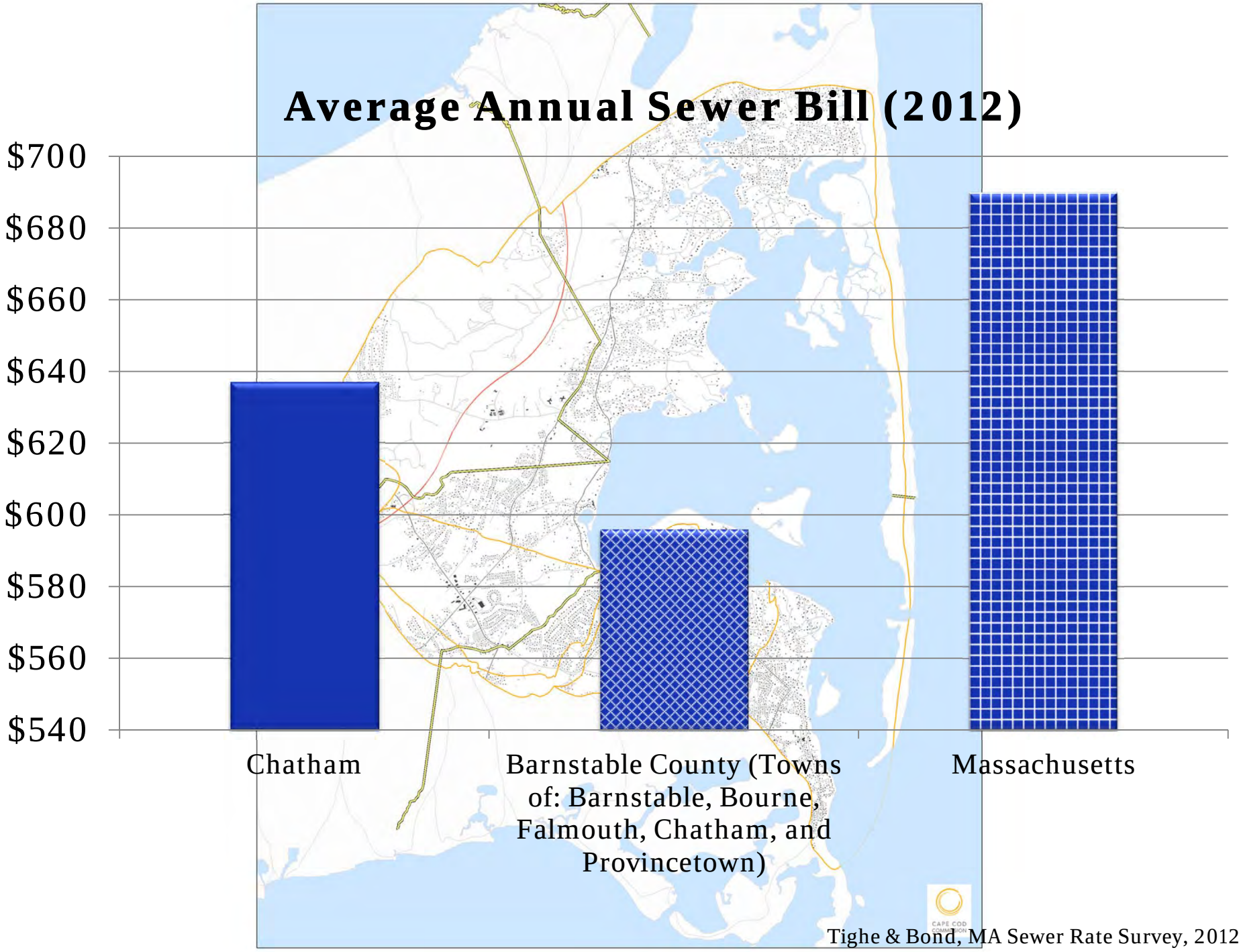
Your Government & Taxes

Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay


Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Brewster
Chatham
Harwich
Orleans
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013



Tighe & Bond, MA Water Rate Survey, 2012

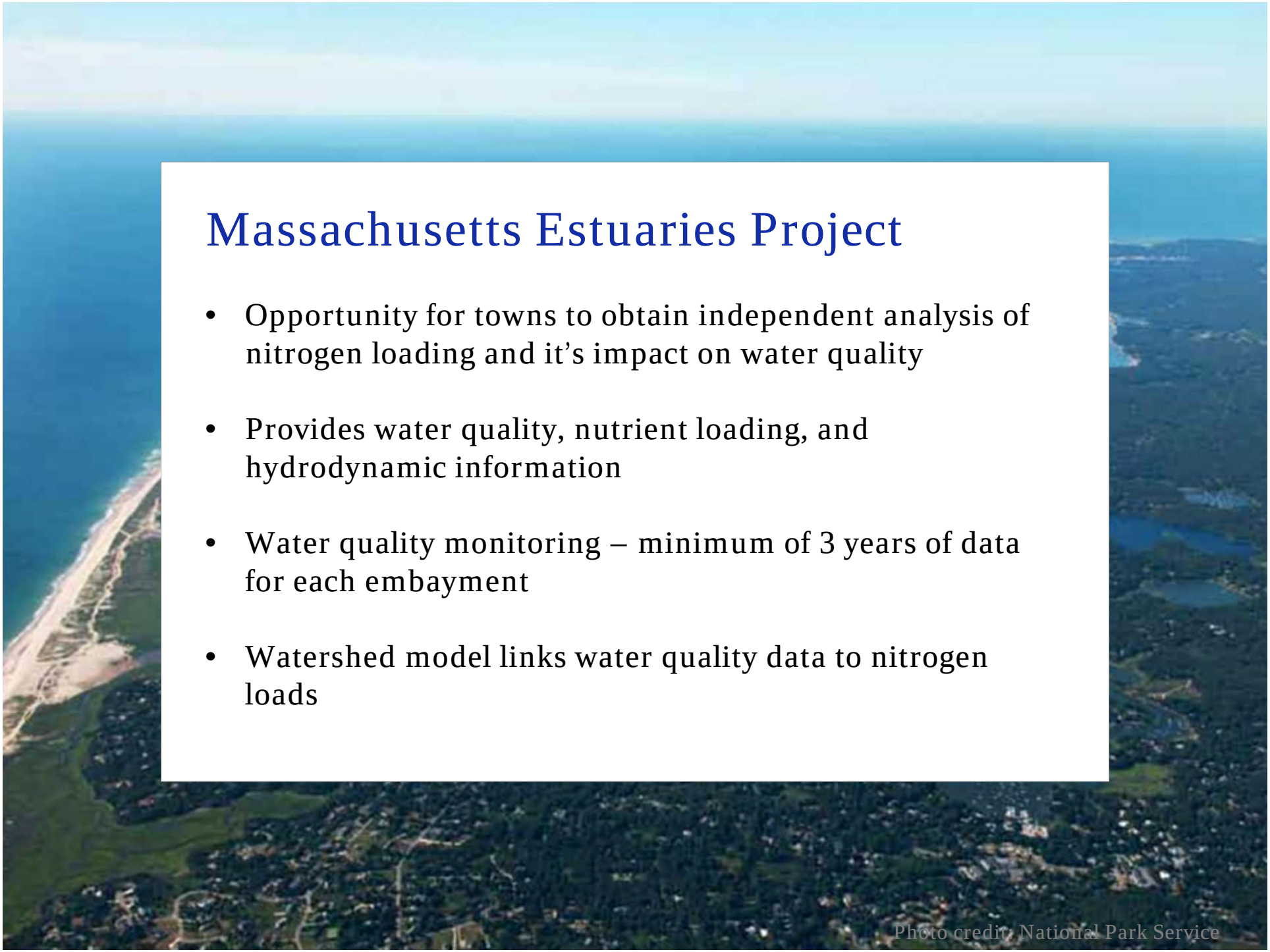


Tighe & Bond, MA Sewer Rate Survey, 2012

The Problem

Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay


Photo credit: National Park Service



Massachusetts Estuaries Project

- Opportunity for towns to obtain independent analysis of nitrogen loading and it's 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

Photo credit: National Park Service

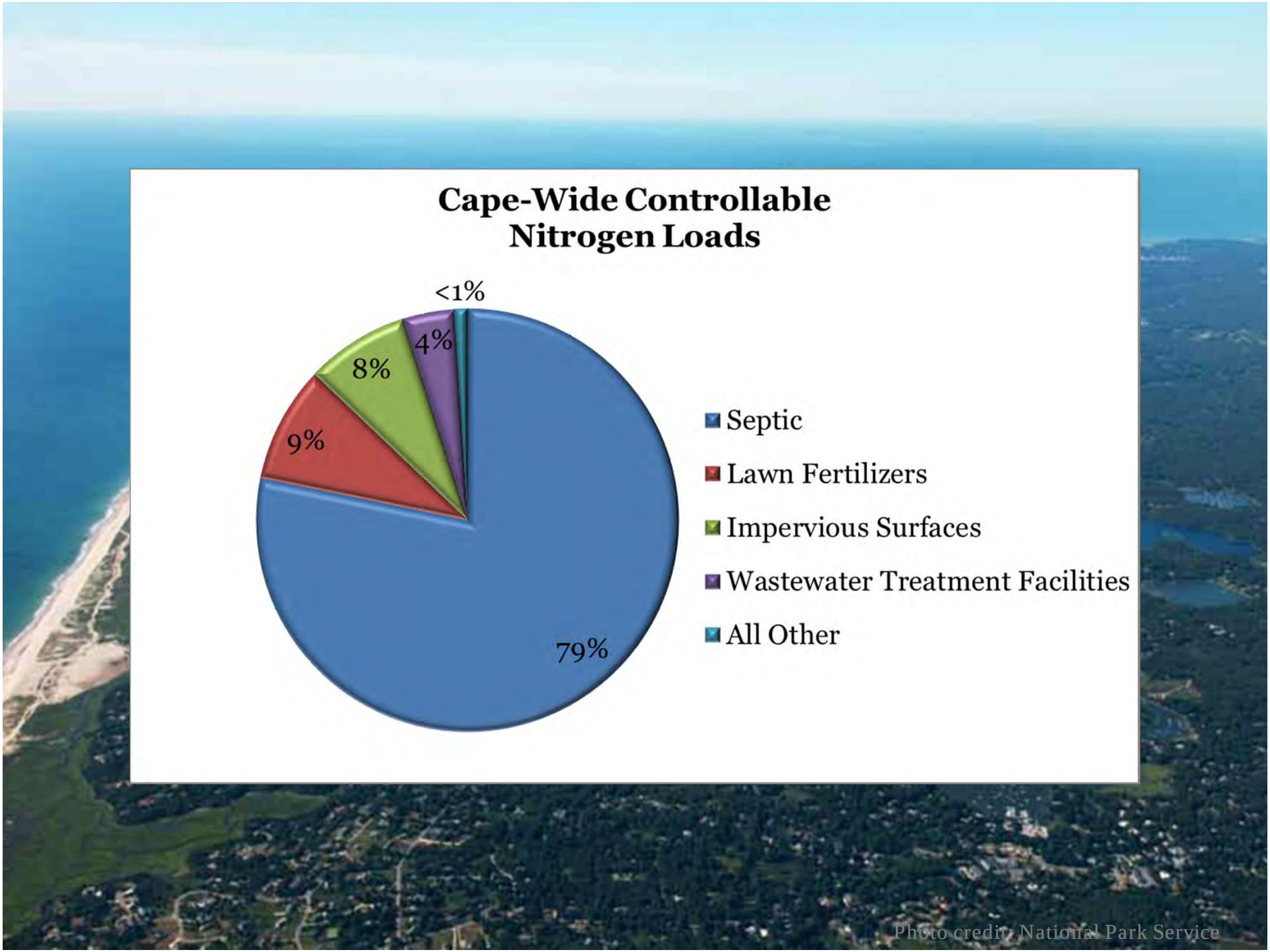
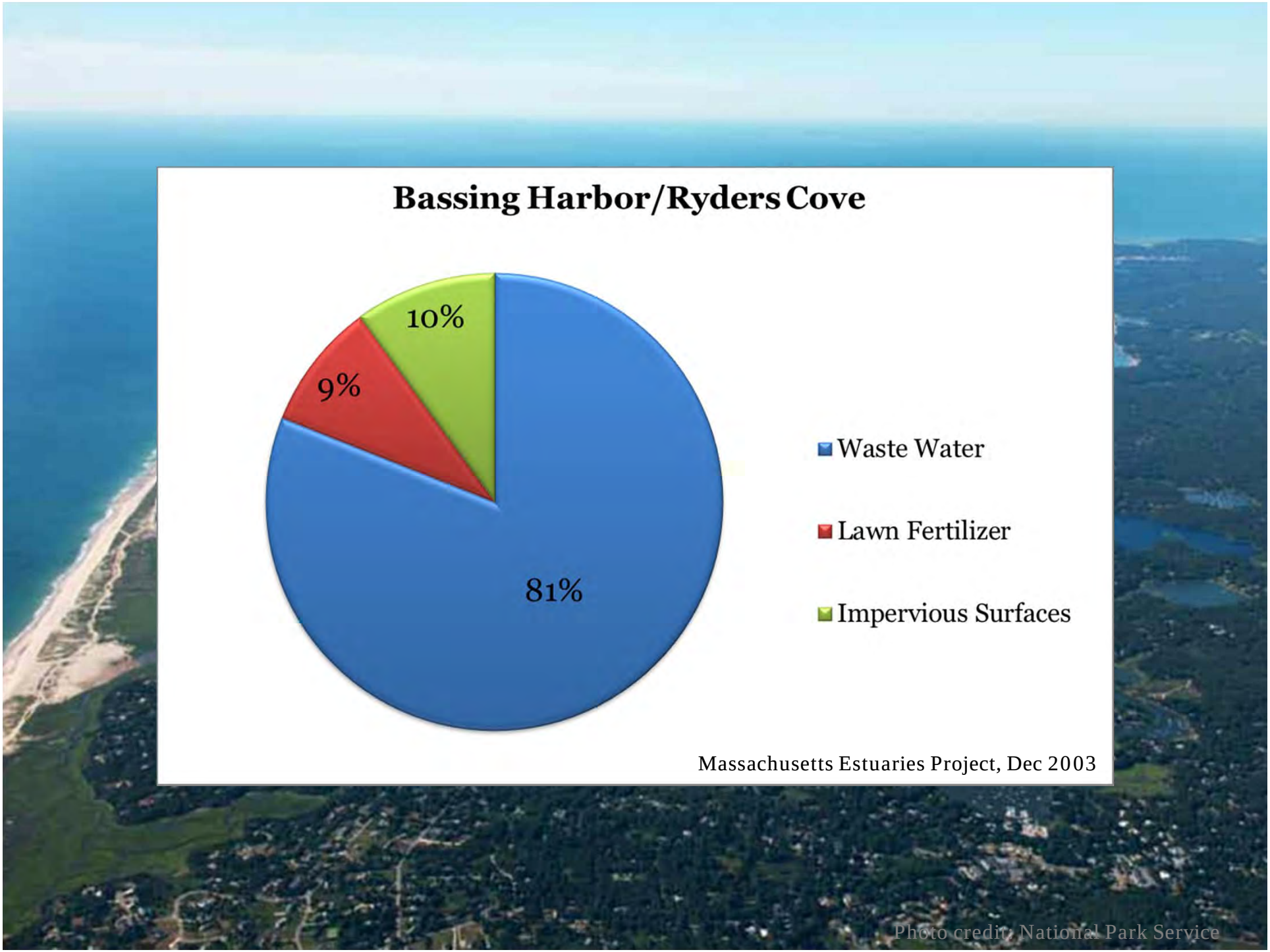
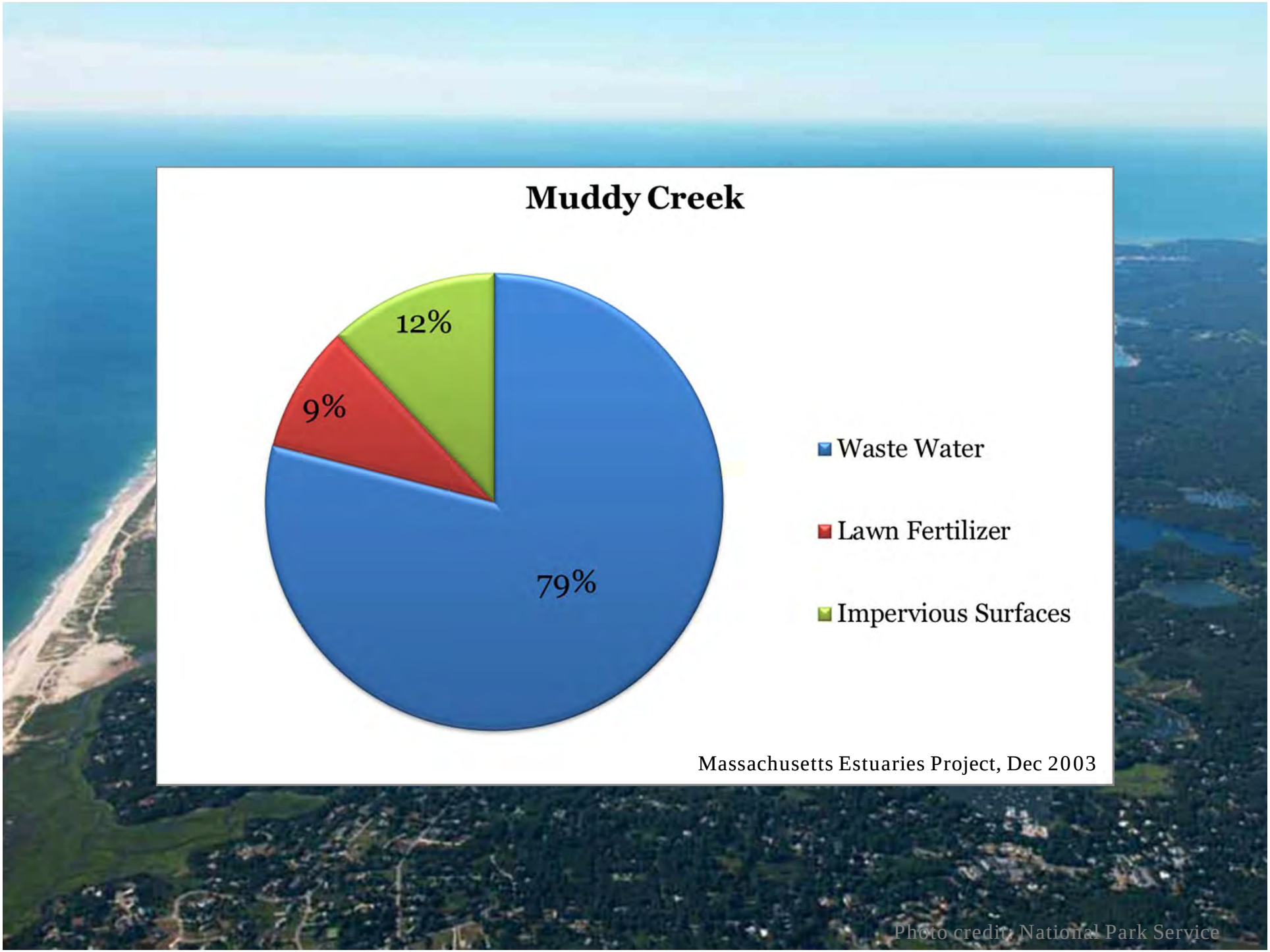
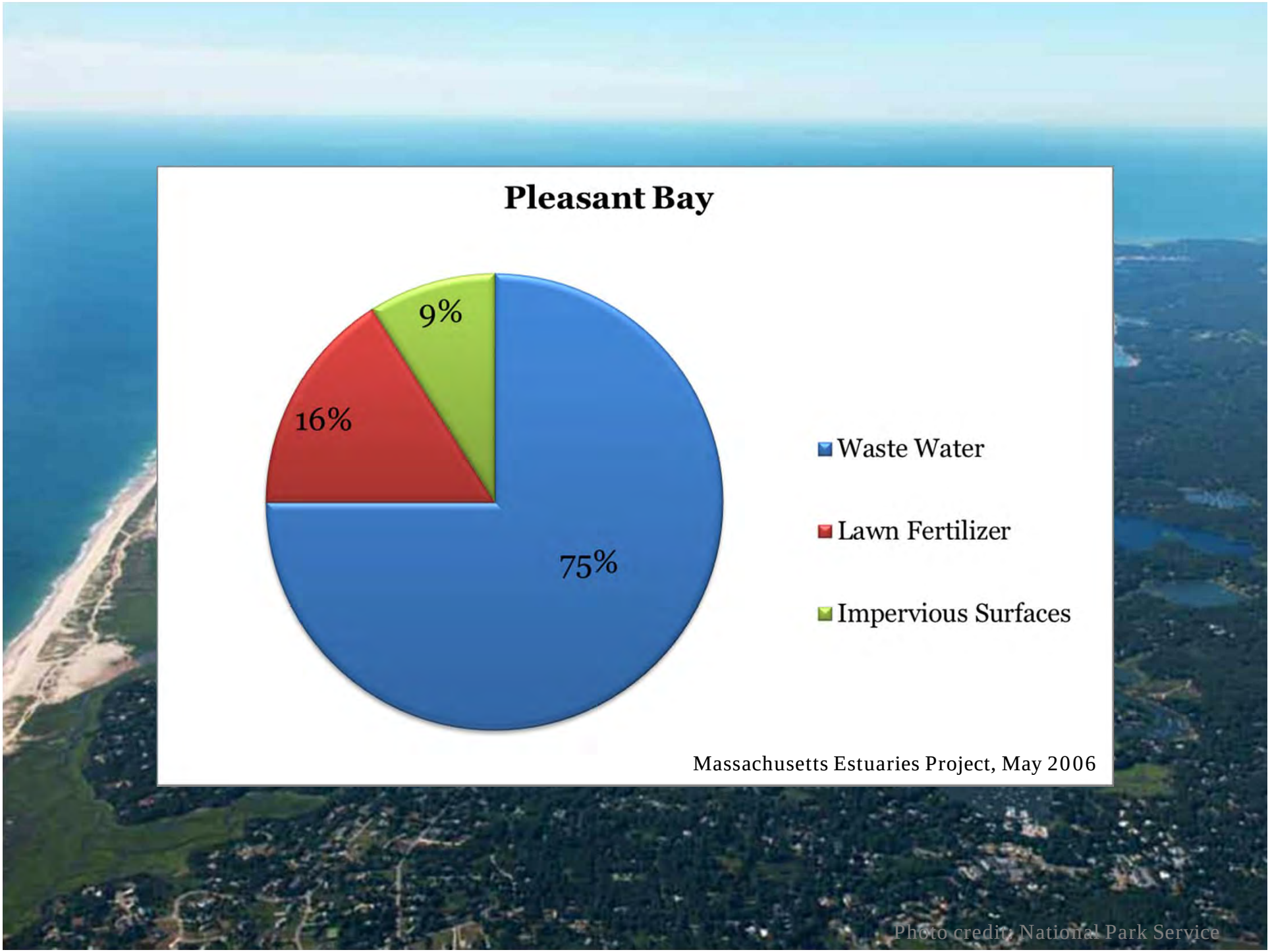


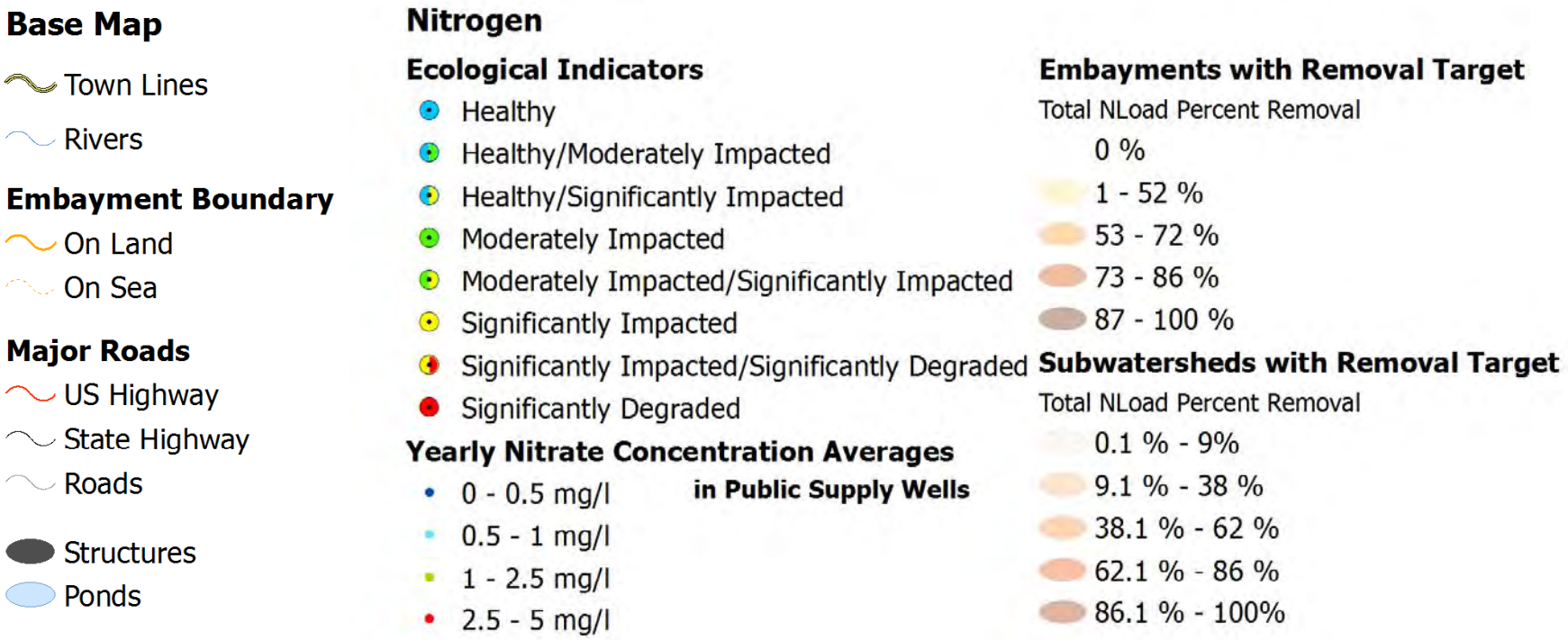
Photo credit: National Park Service


Bassing Harbor/Ryders Cove
10%
9%
81%
Waste Water
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, Dec 2003
Photo credit: National Park Service

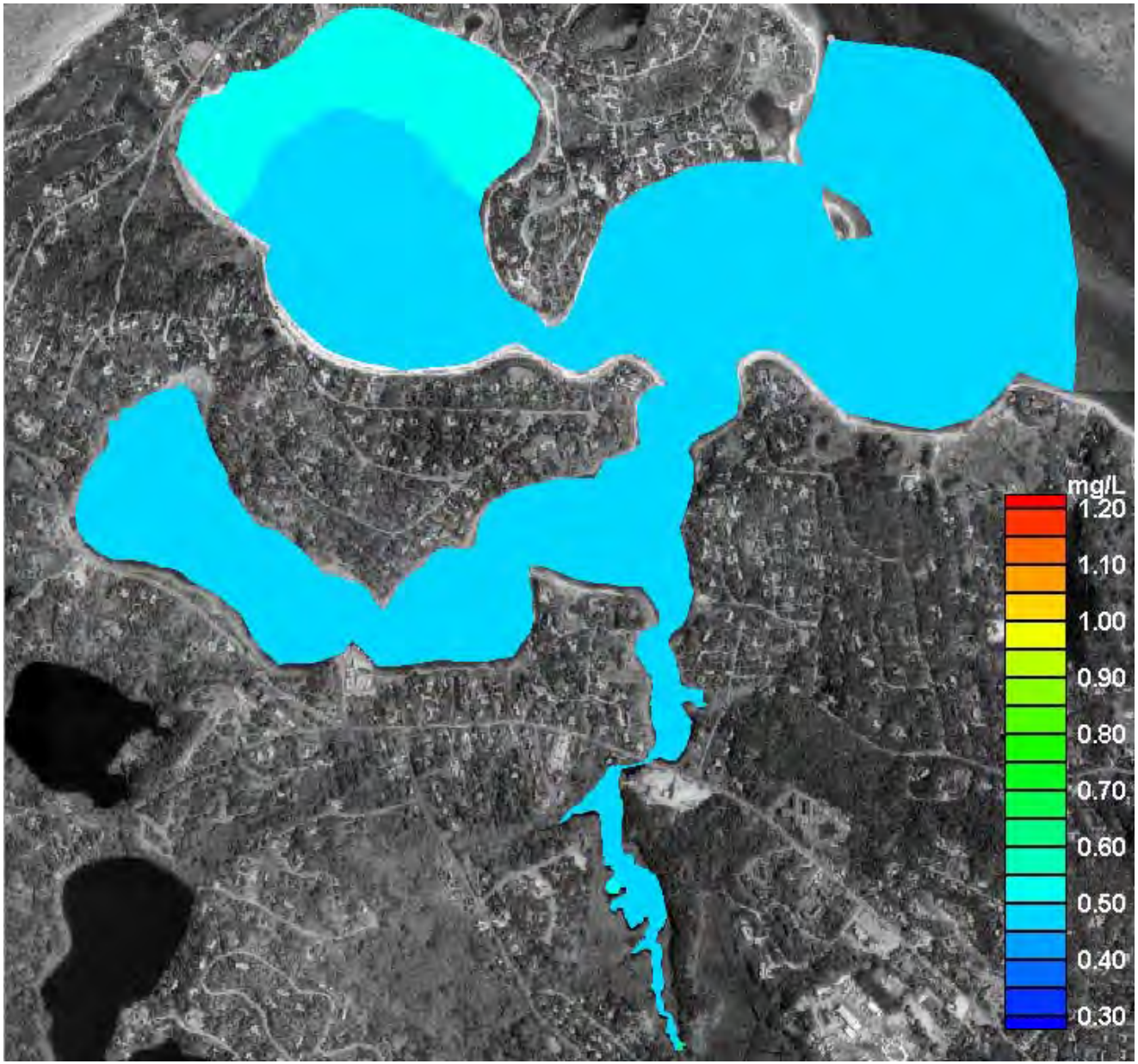

Muddy Creek
12%
9%
79%
Waste Water
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, Dec 2003
Photo credit: National Park Service


Pleasant Bay
9%
16%
75%
Waste Water
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, May 2006
Photo credit: National Park Service

Nitrogen Problem



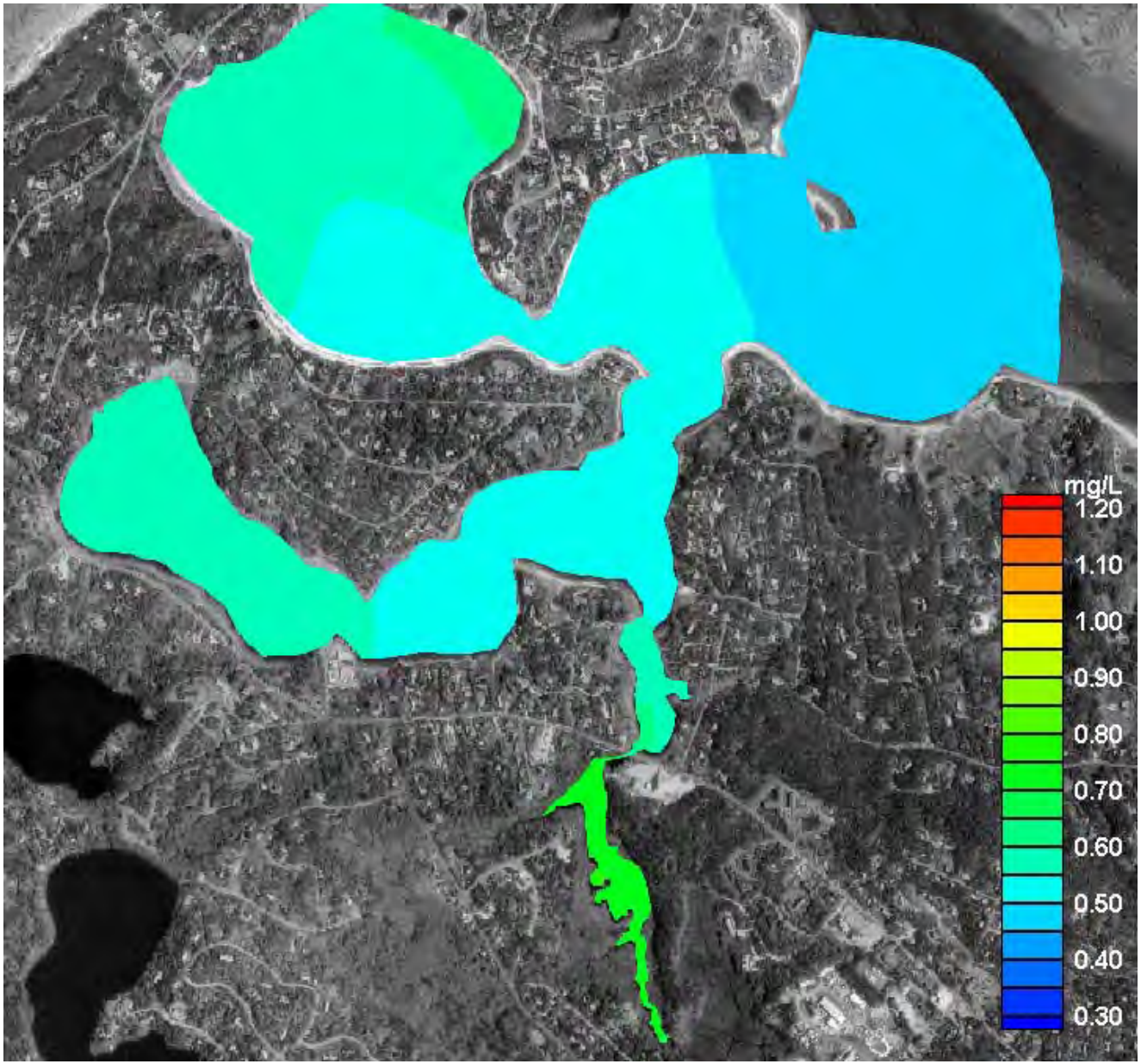
Sources: MassGIS, MEP, CCC



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)

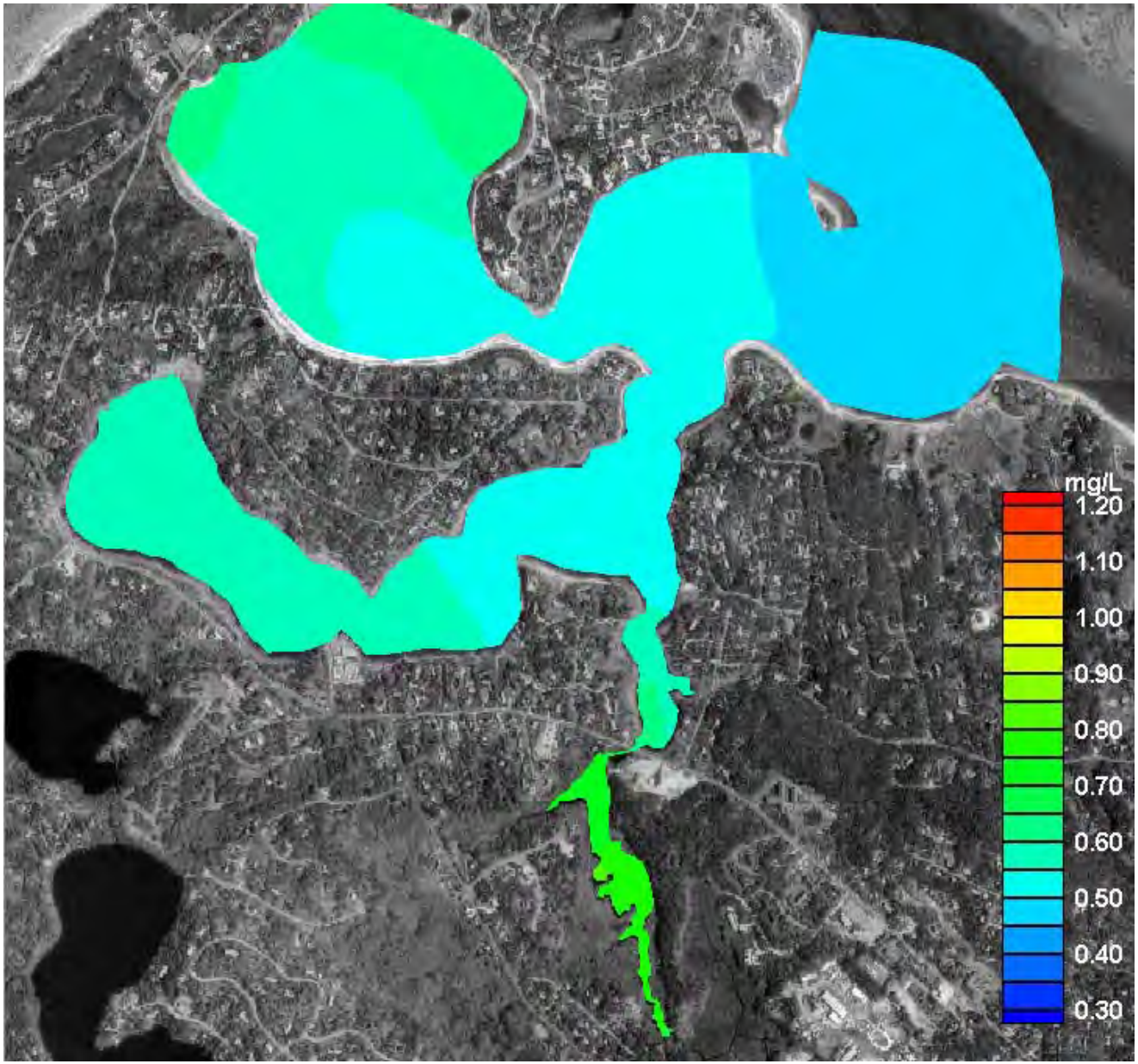
Pre-Colonial Conditions: Bassing Harbor/Ryders Cove



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)

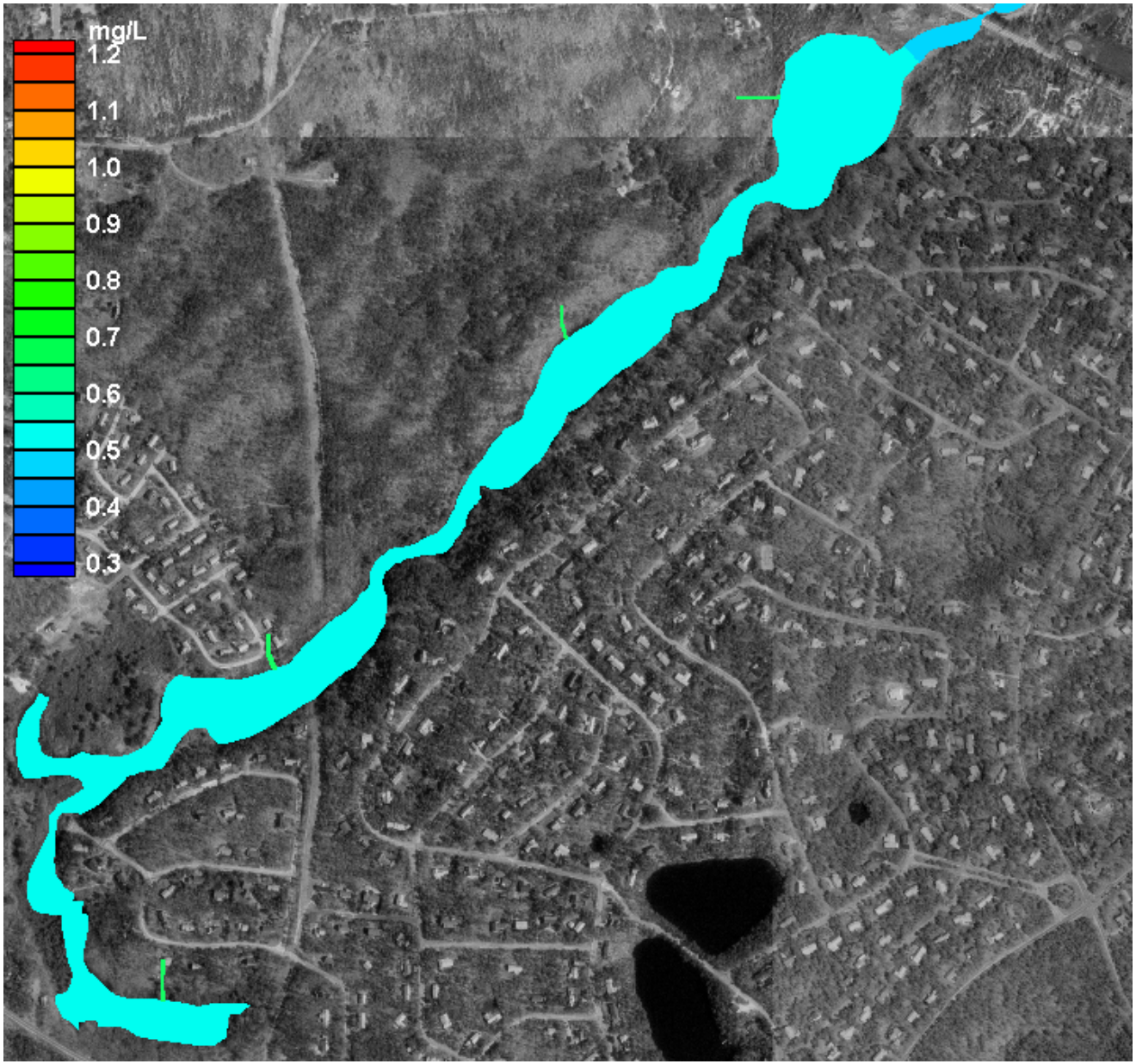
Present Conditions: Bassing Harbor/Ryders Cove



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)

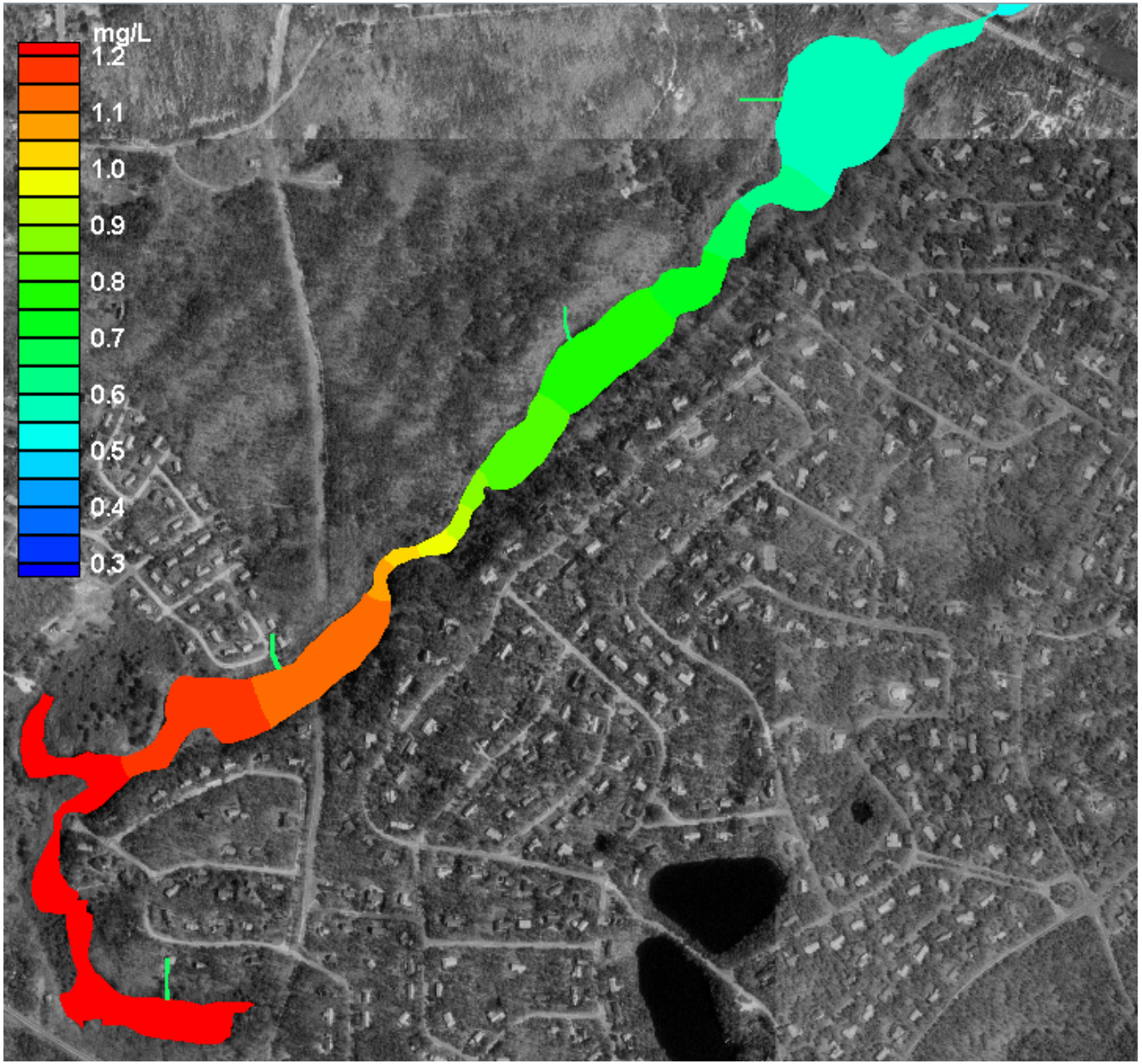
Buildout Conditions: Bassing Harbor/Ryders Cove



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)

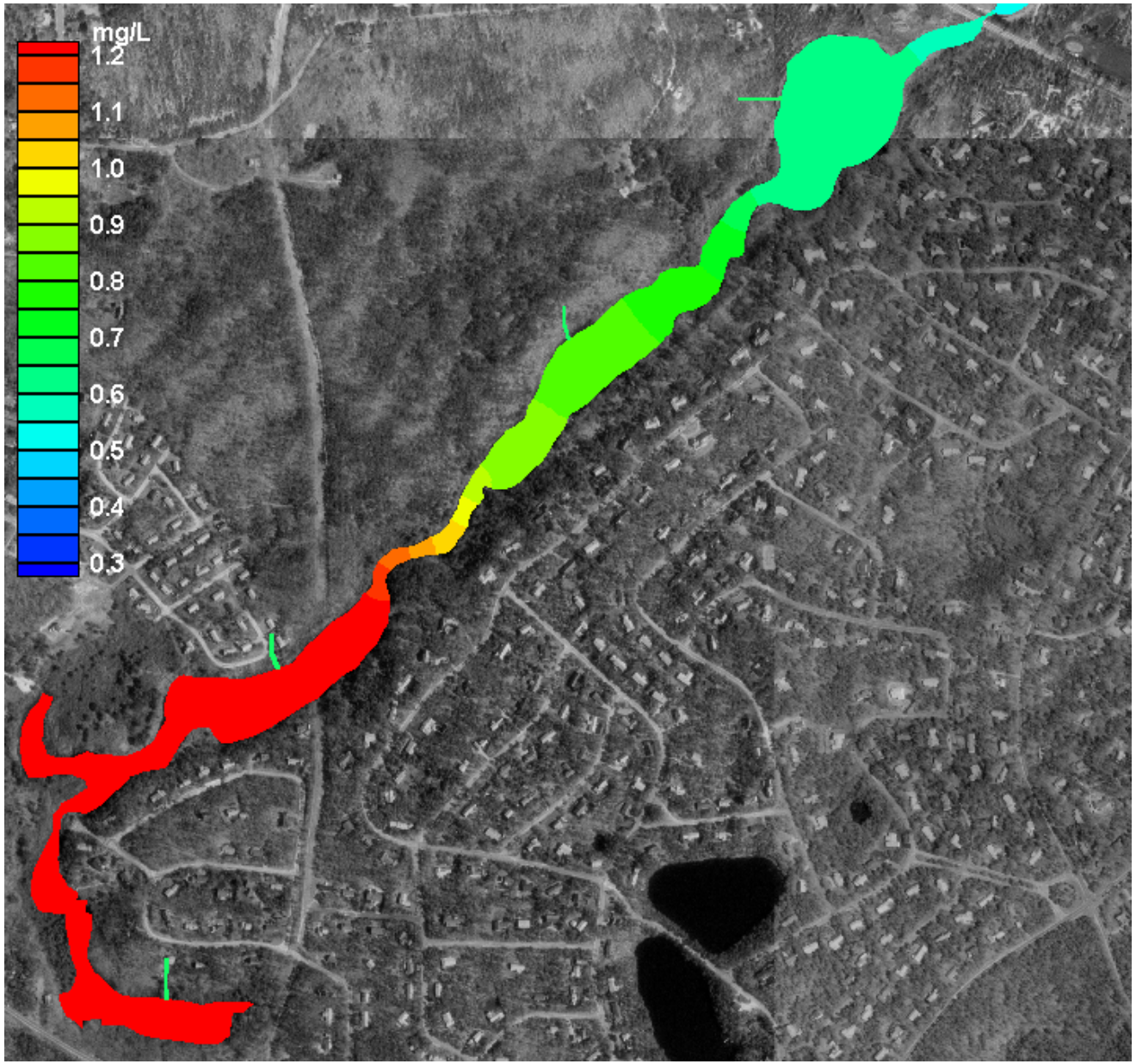
Pre-Colonial Conditions: Muddy Creek



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)

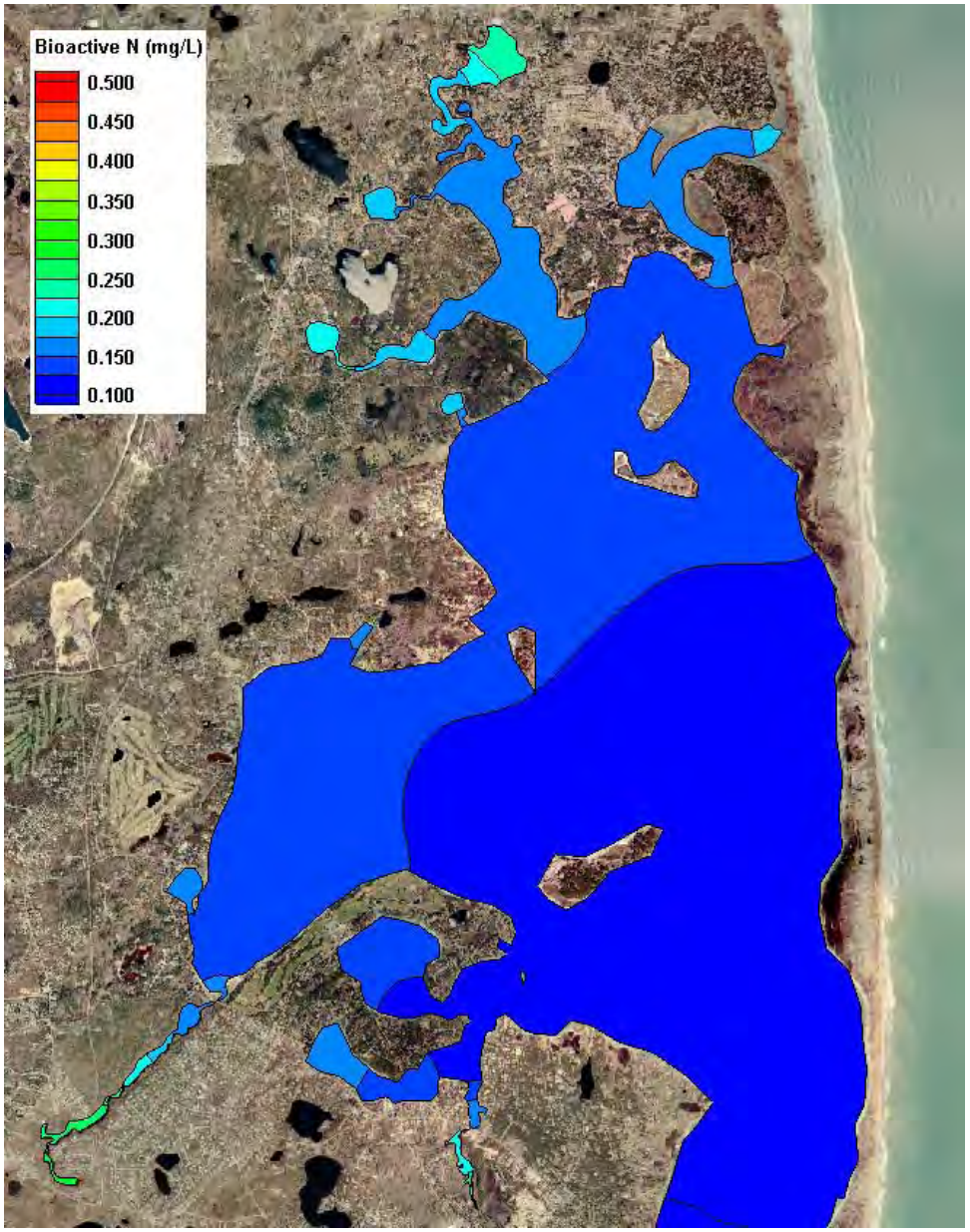
Present Conditions: Muddy Creek



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)

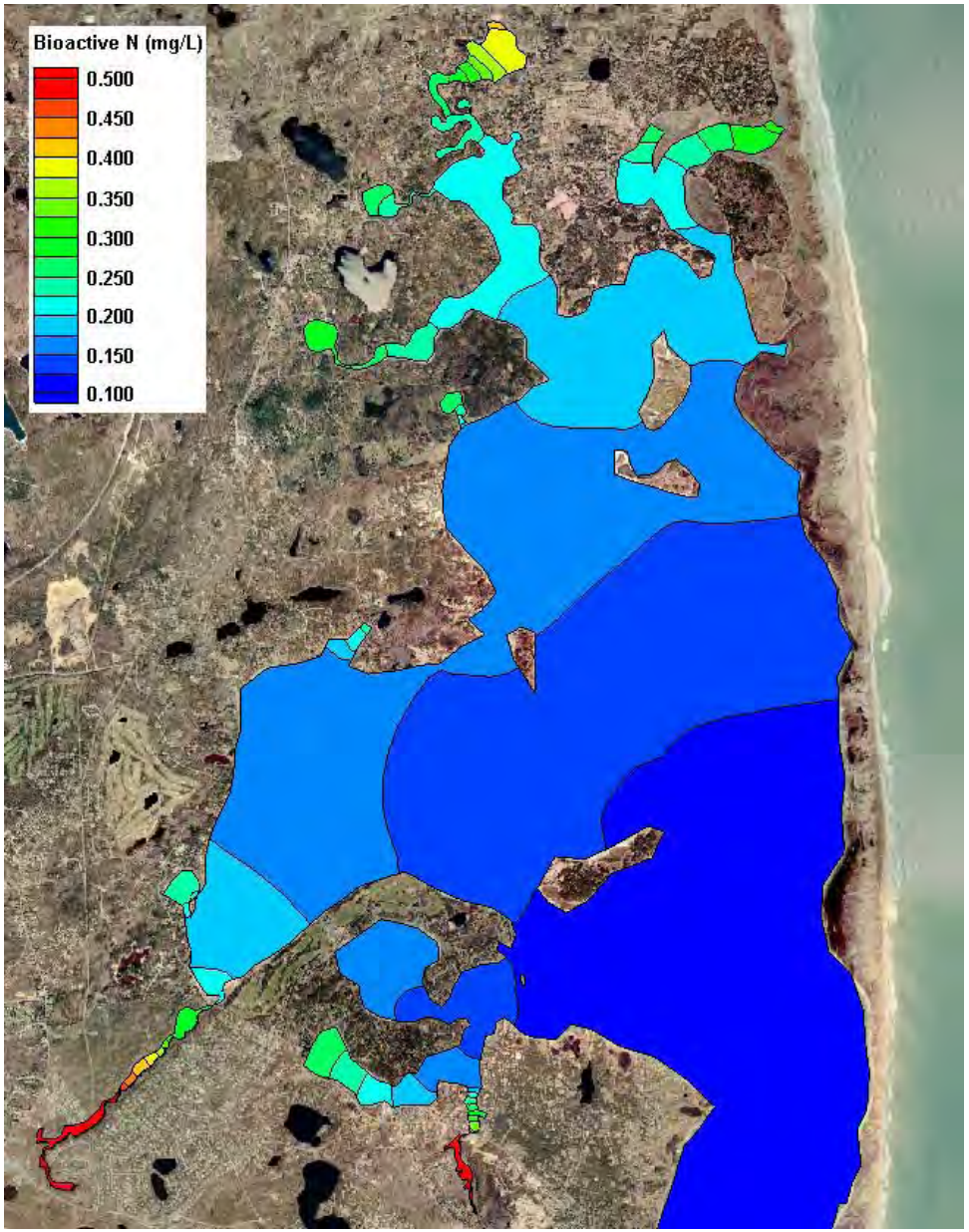
Buildout Conditions: Muddy Creek



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

(Source: MEP 2003)

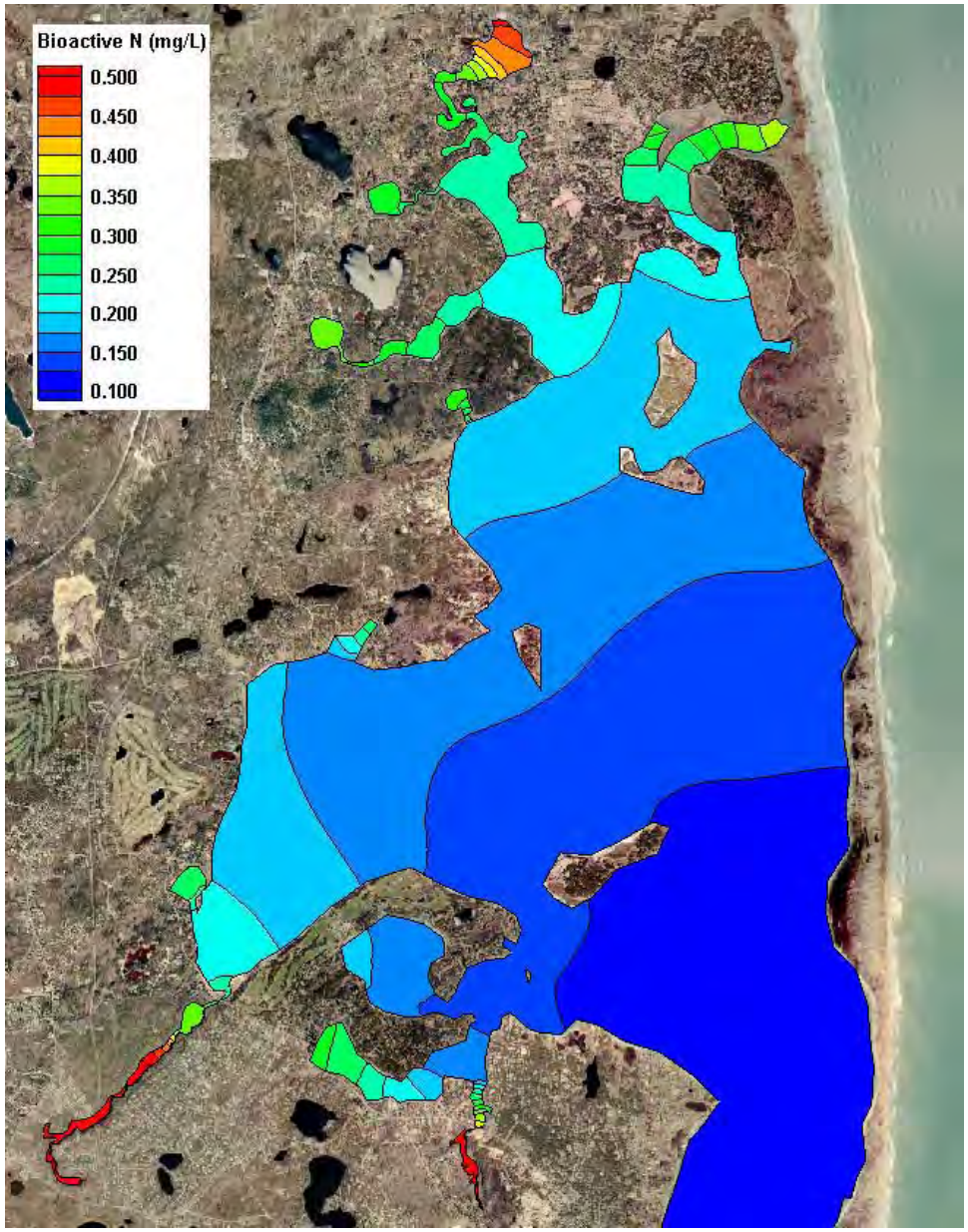
Pre-Colonial Conditions: Pleasant Bay



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

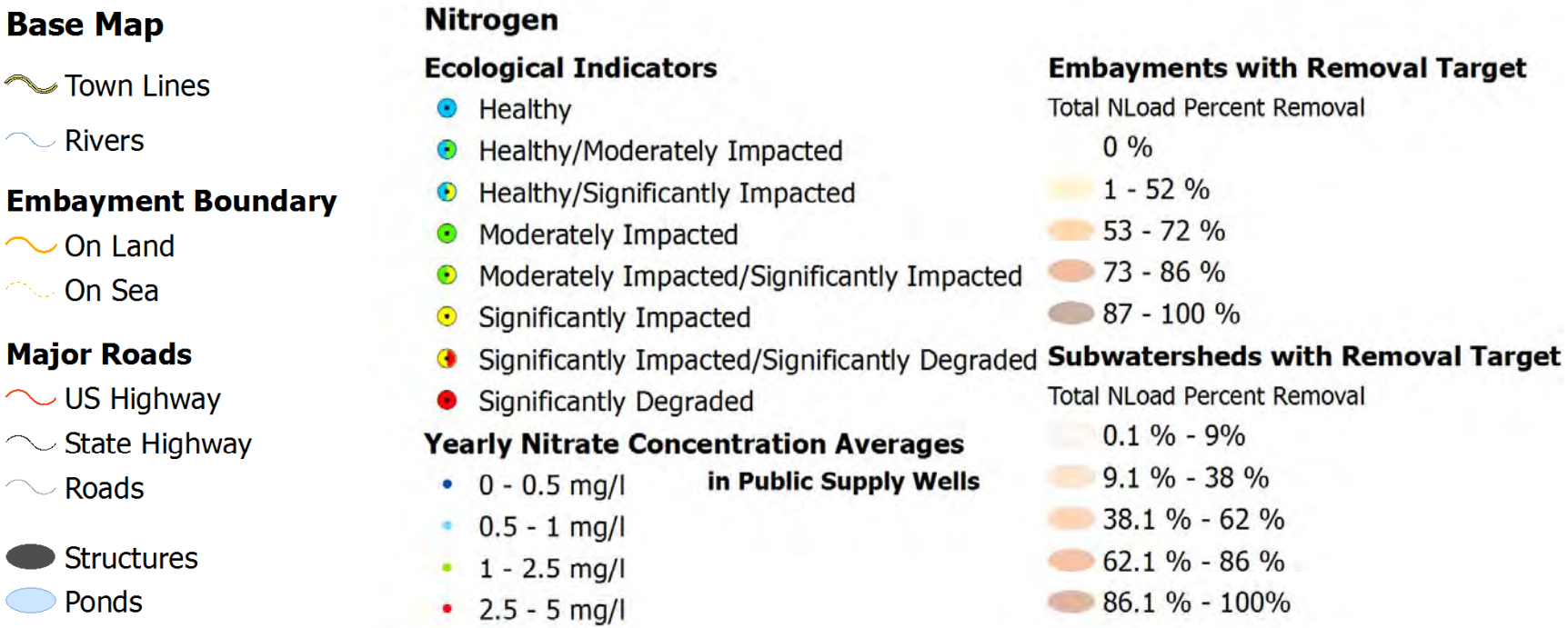


Contour plot of **modeled total nitrogen concentrations (mg/L)** in the Pleasant Bay system, for projected build-out loading conditions.

(Source: MEP 2003)

Buildout Conditions: Pleasant Bay

Nitrogen Problem



Sources: MassGIS, MEP, CCC

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

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

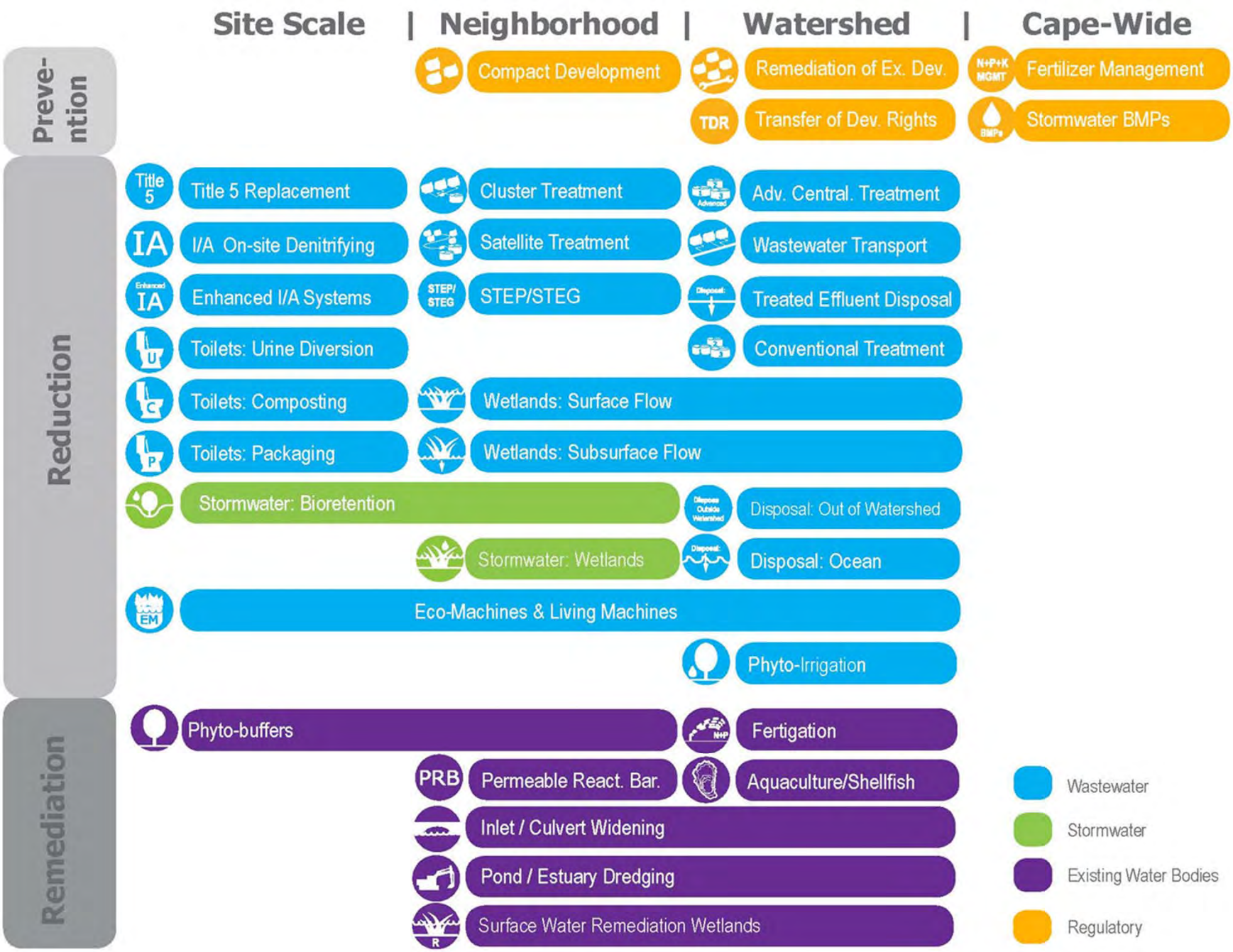
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Bassing Harbor/Ryders Cove
Muddy Creek
Pleasant Bay


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

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

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.[1] 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.[2]

[1] 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.

[2] 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.[3] 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*

[3] Contact Erin Perry (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.[4] 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.

[4] 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.[5] 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,

[5] 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 sewering 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 indicted 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 sewershed 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 Woks 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 sewering 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 sewering 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

NAME	AFFILIATION
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

Cape Cod 208 Area Water Quality Planning
Provincetown Harbor Watershed Working Group

Meeting One
Wednesday, September 18, 2013
Provincetown Town Hall
260 Commercial Street, Provincetown, MA 02657

Meeting Agenda

8:30 am Welcome – *Cape Cod Commission*

8:35 Introductions, confirm working group membership and participation – *Kate Harvey (Facilitator) and Working Group*

9:00 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

9:15 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Cape Cod Commission*

9:30 Review and add to chronology of work to date – *Working Group*

9:45 Discussion: drawing on past work to move forward – *Kate Harvey (Facilitator) 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 - *Kate Harvey (Facilitator) and Working Group*

11:30 Review/Discuss Process Protocols - *Kate Harvey (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

Provincetown Harbor

Baseline Conditions & Needs Assessment

What is the 208 Plan?

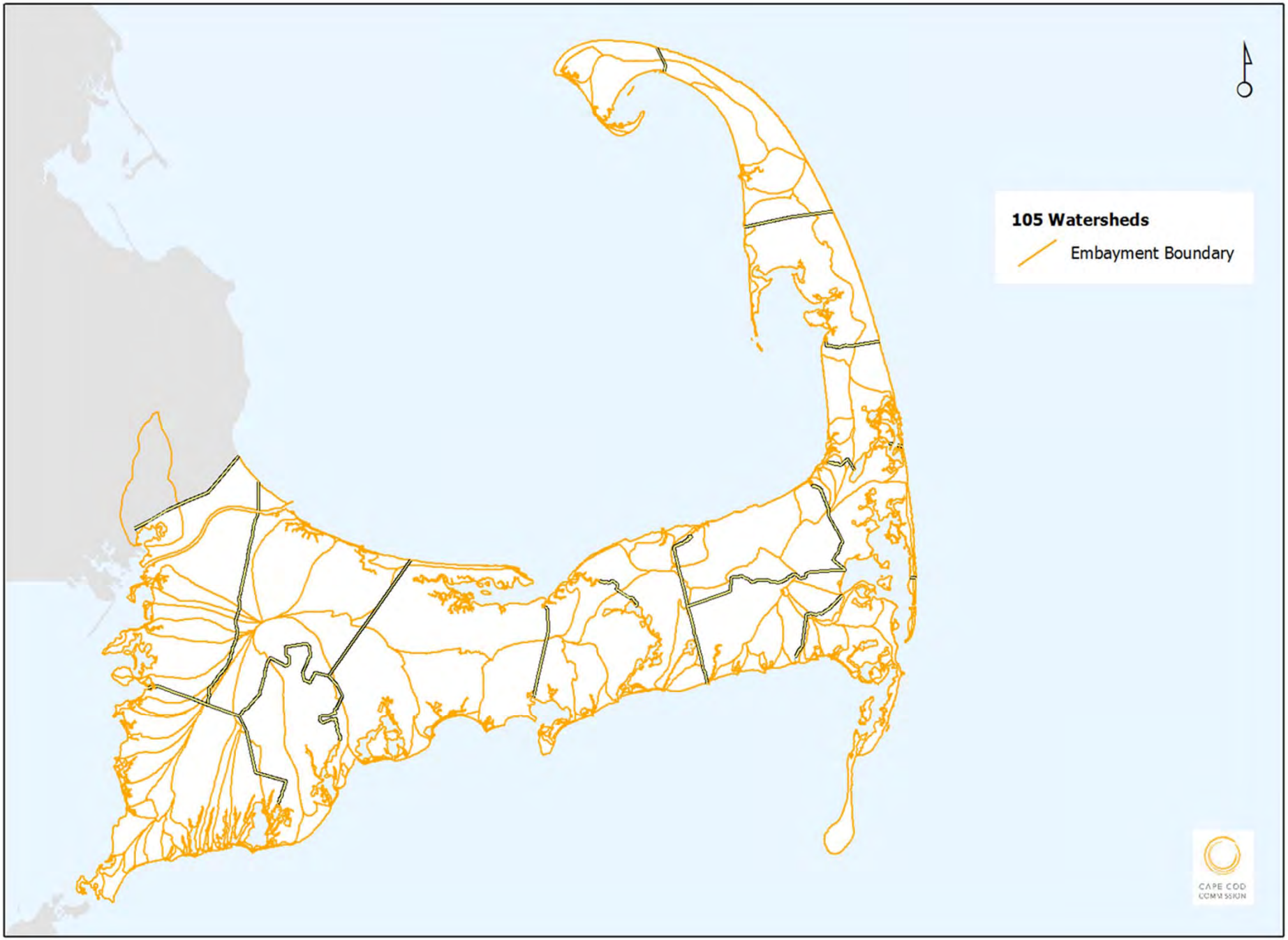
Clean Water Act Section 208

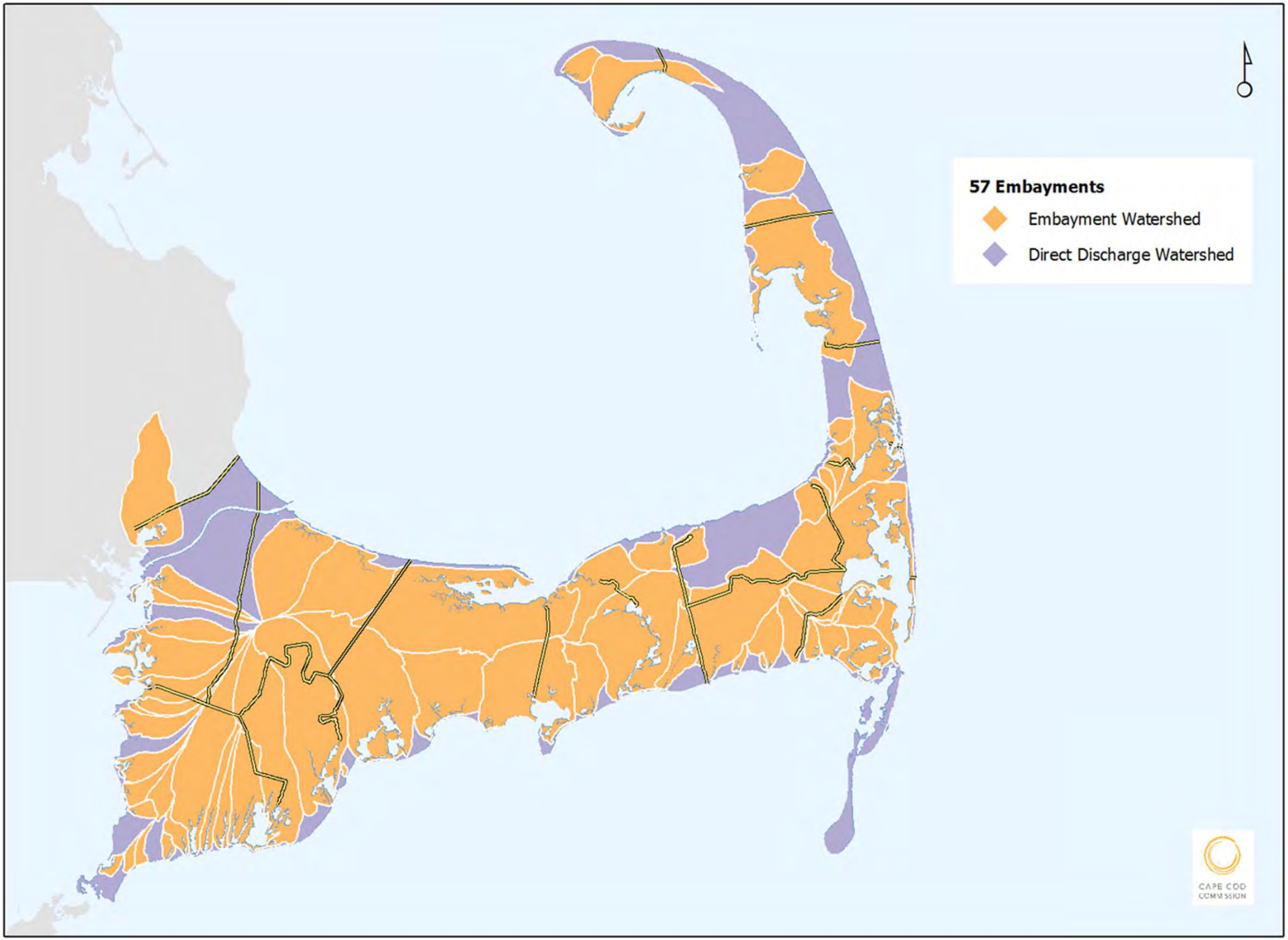
The Commission was directed to update the 1978 Plan

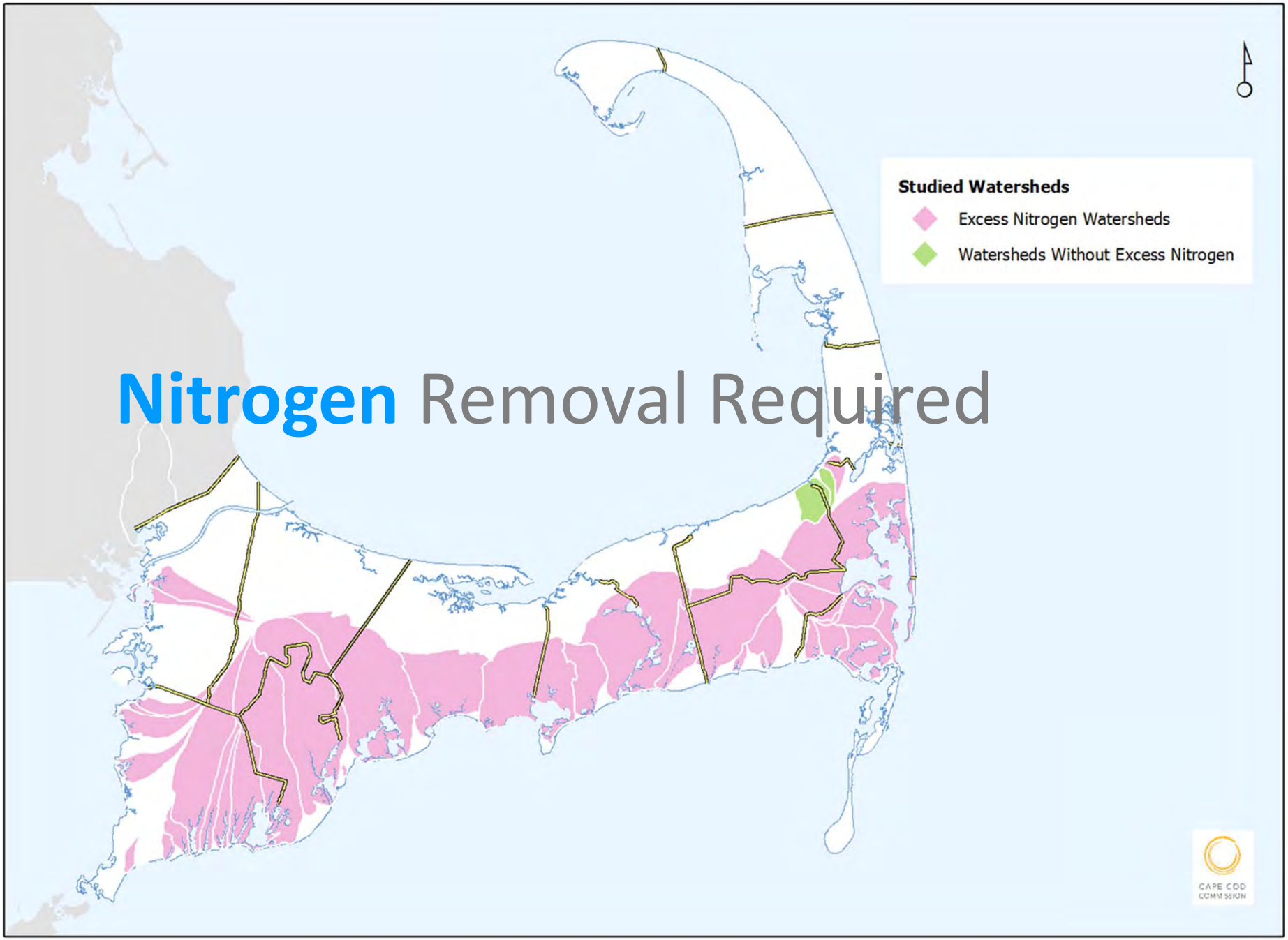
The Commonwealth provided $3 million to fund the project

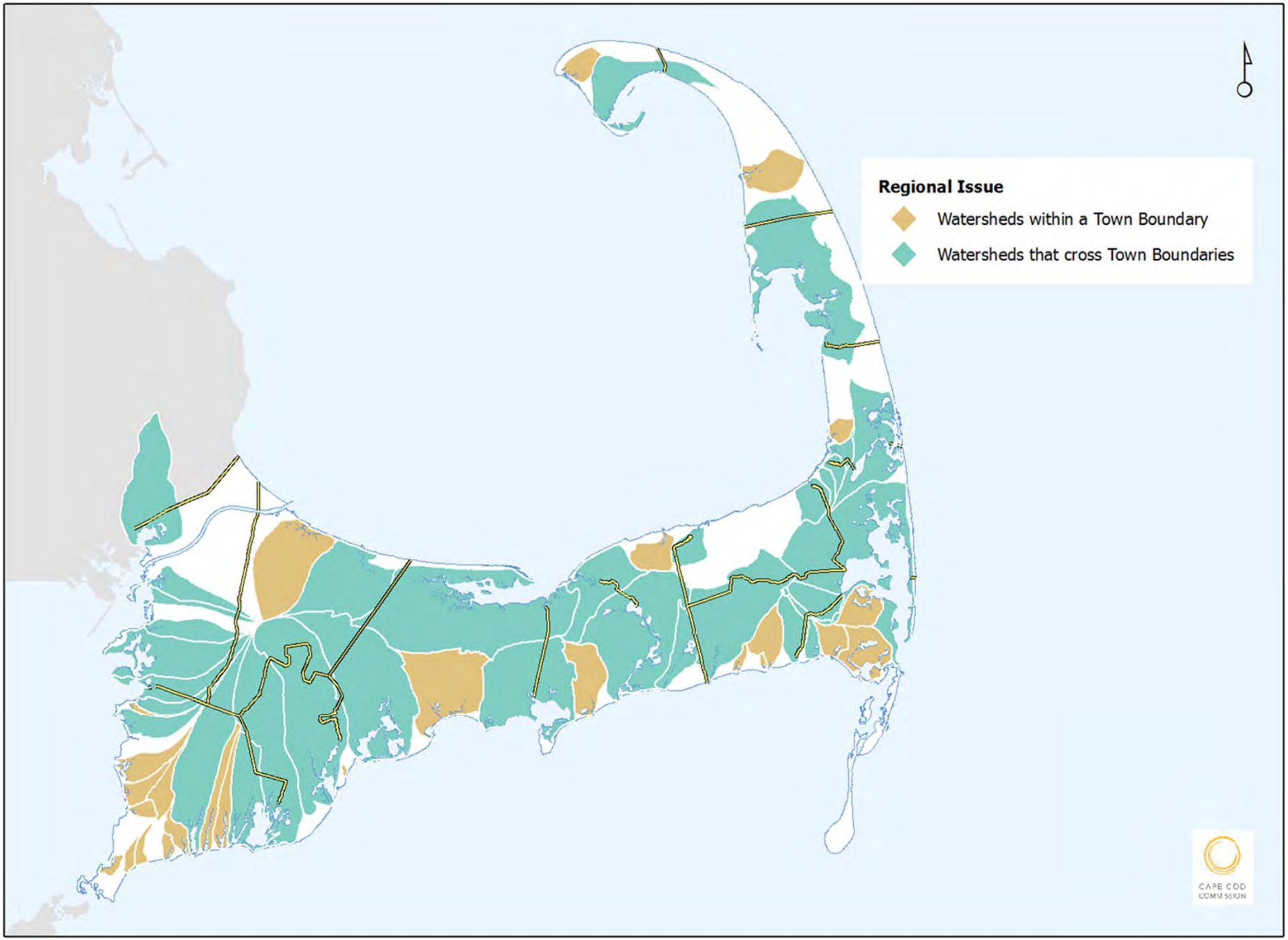
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

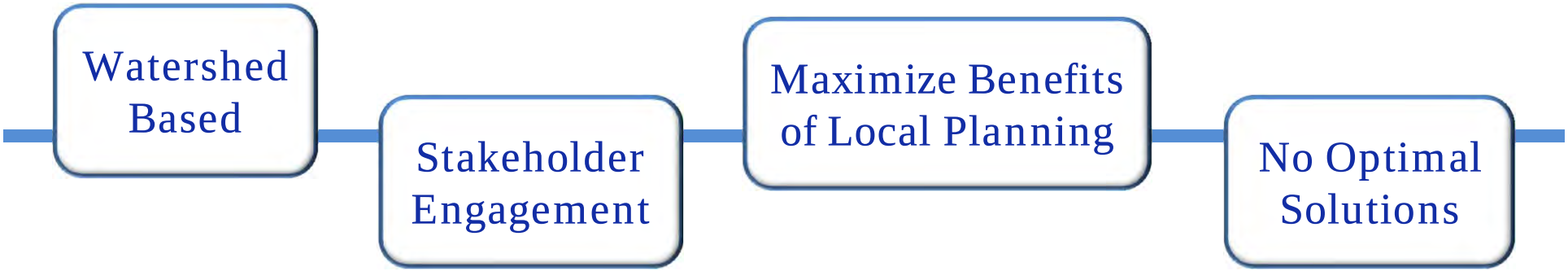

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

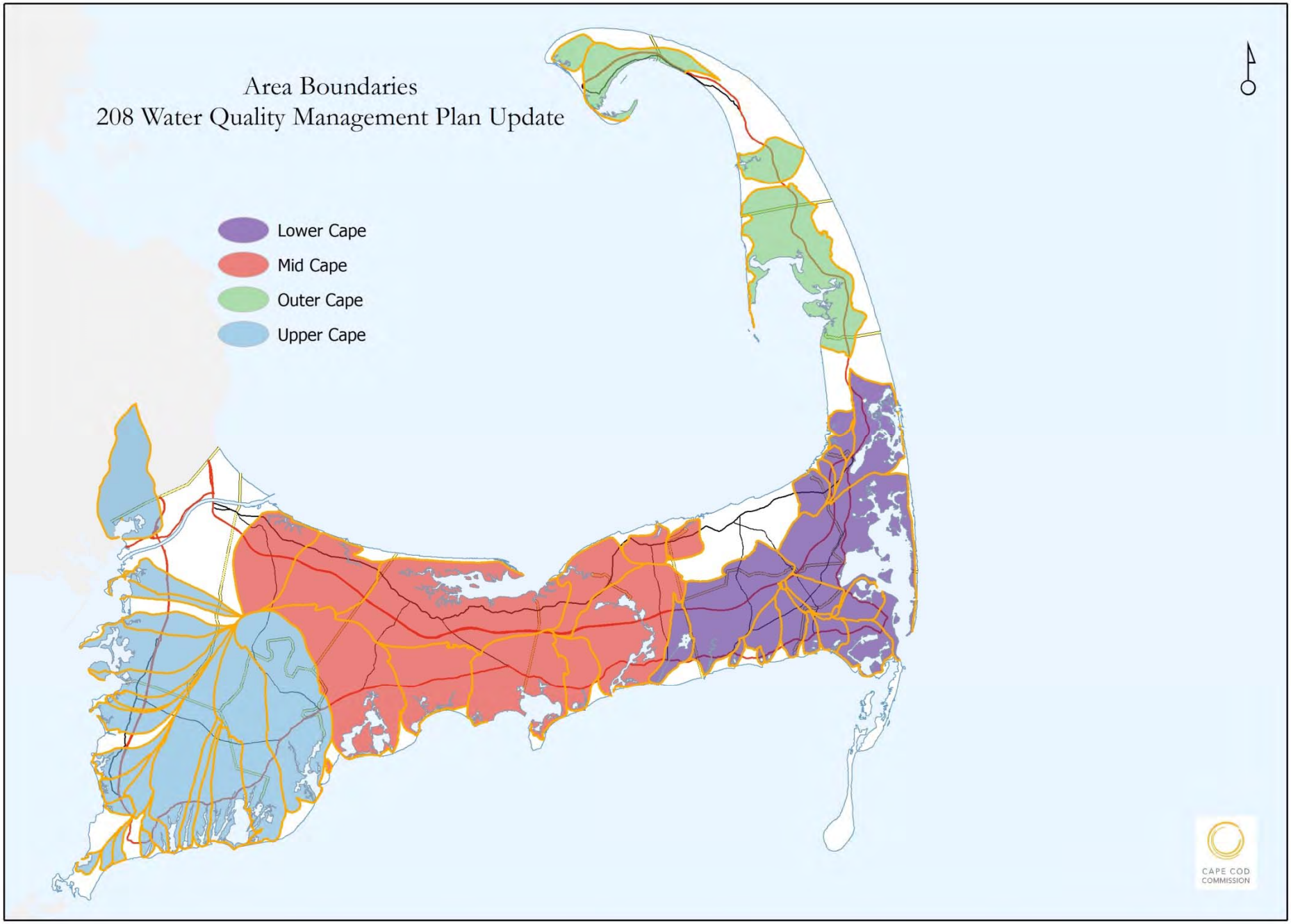

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

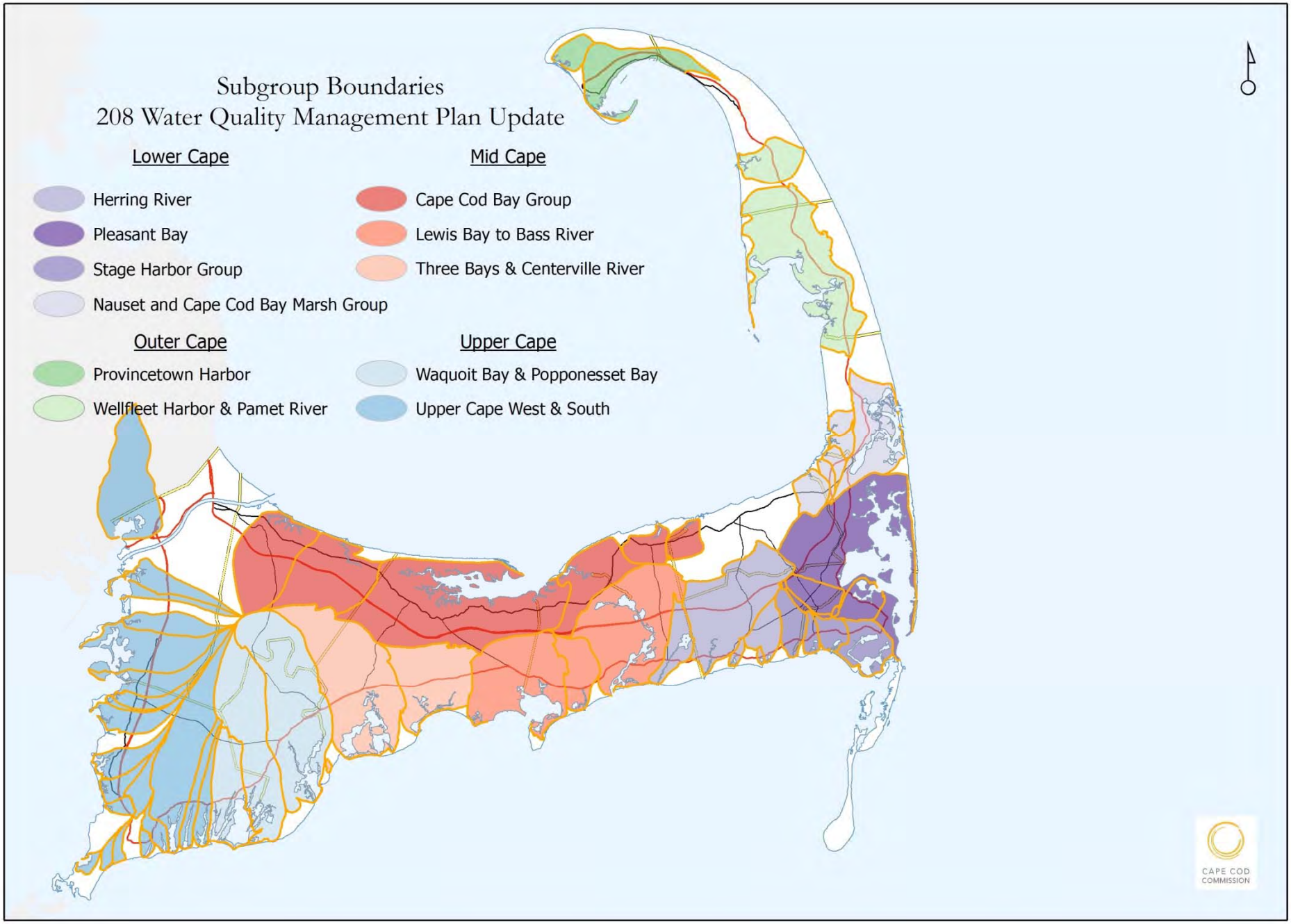

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update



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

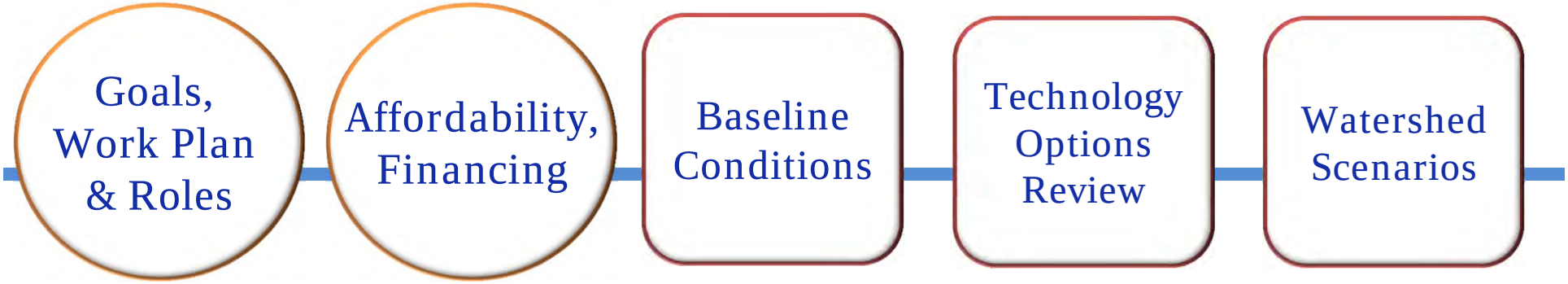

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

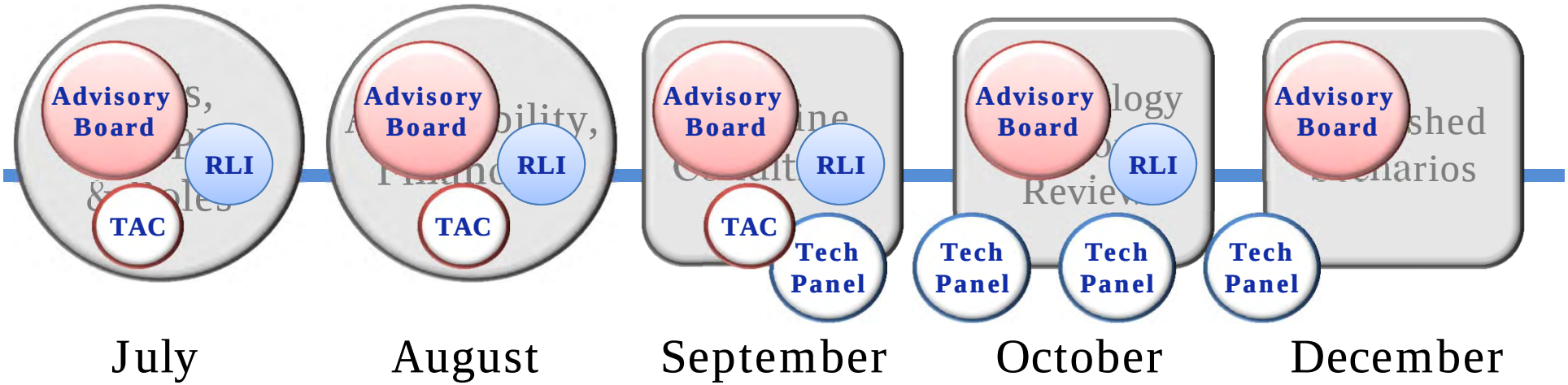
What is the stakeholder process?

Public Meetings

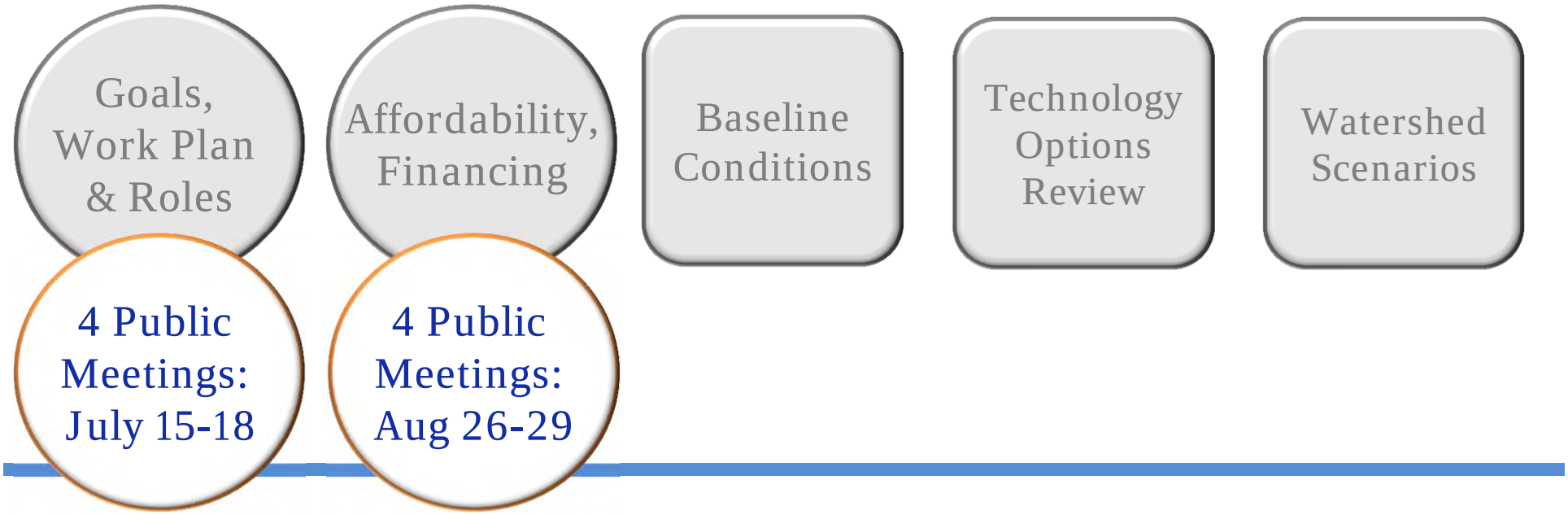
Watershed Working Groups



208 Planning Process



208 Planning Process



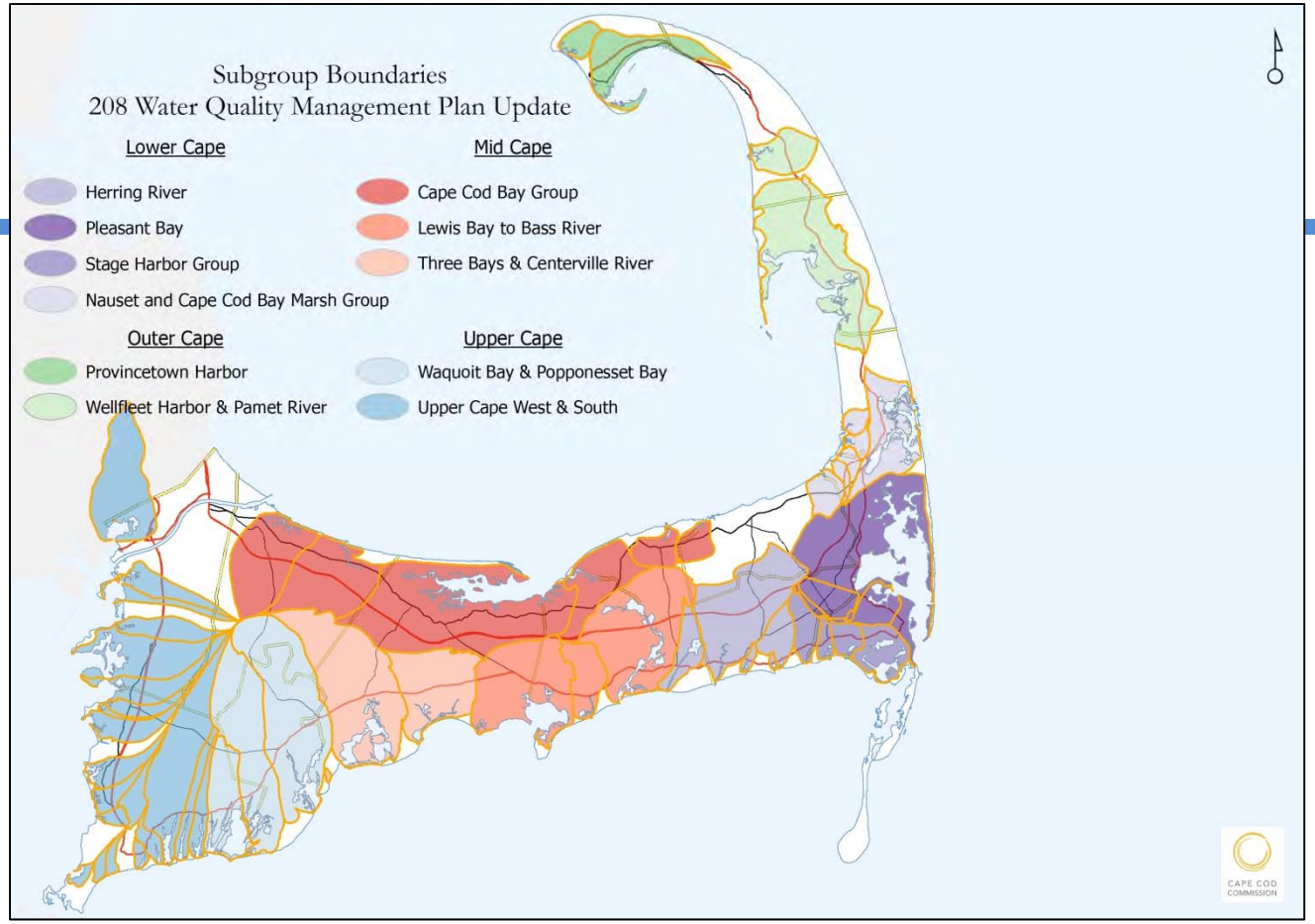
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

Watershed Scenarios



208 Planning Process

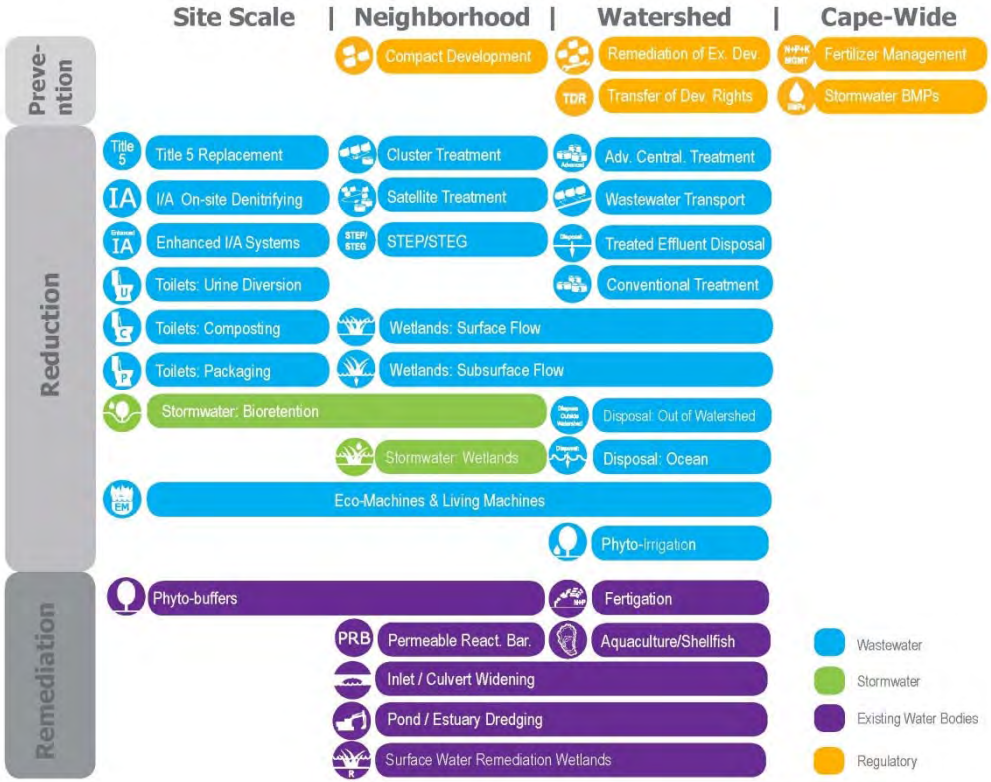
Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios



208 Planning Process

Baseline Conditions

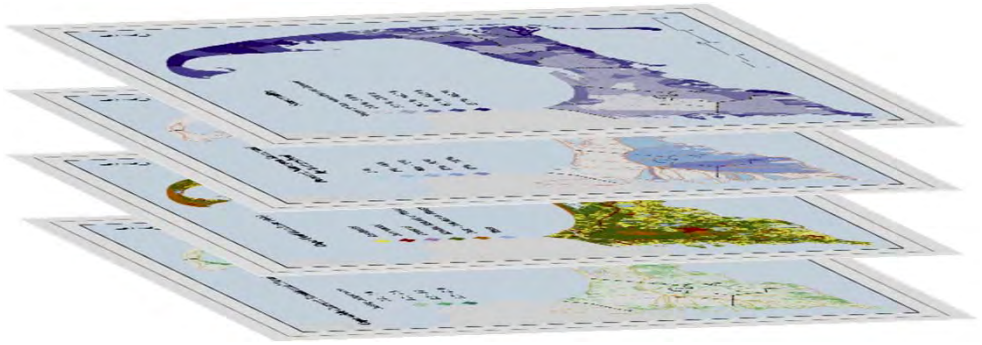
11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11



208 Planning Process

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

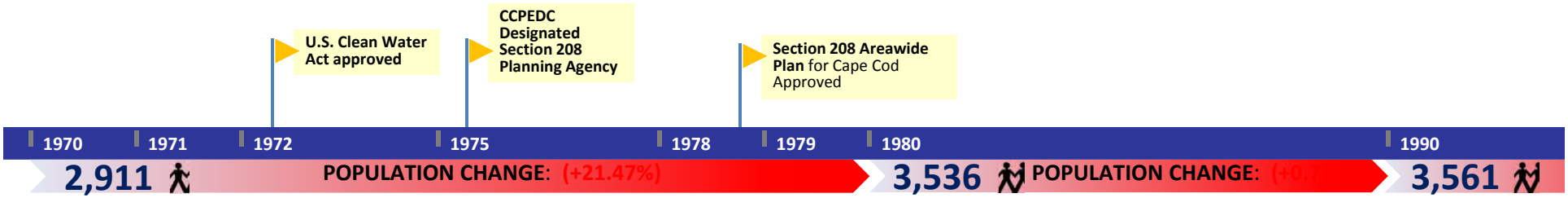
Local Progress to Date

Provincetown Harbor
Hatches Harbor

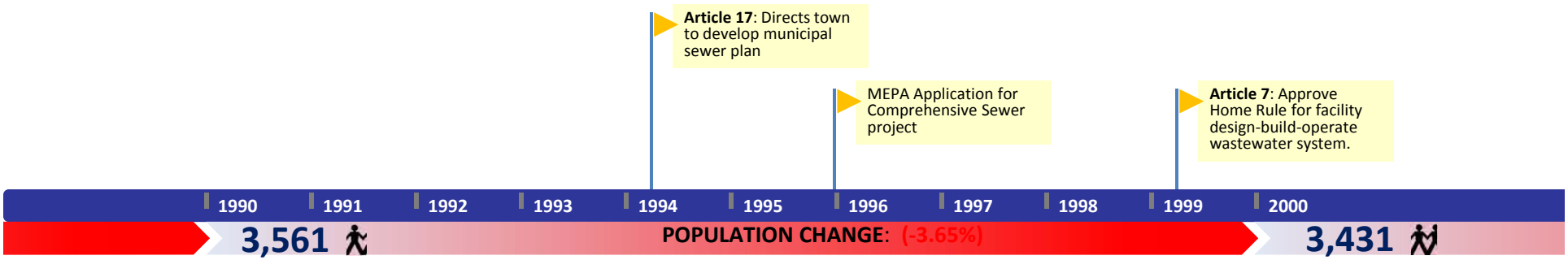
Provincetown

From 1978 Section 208 Plan

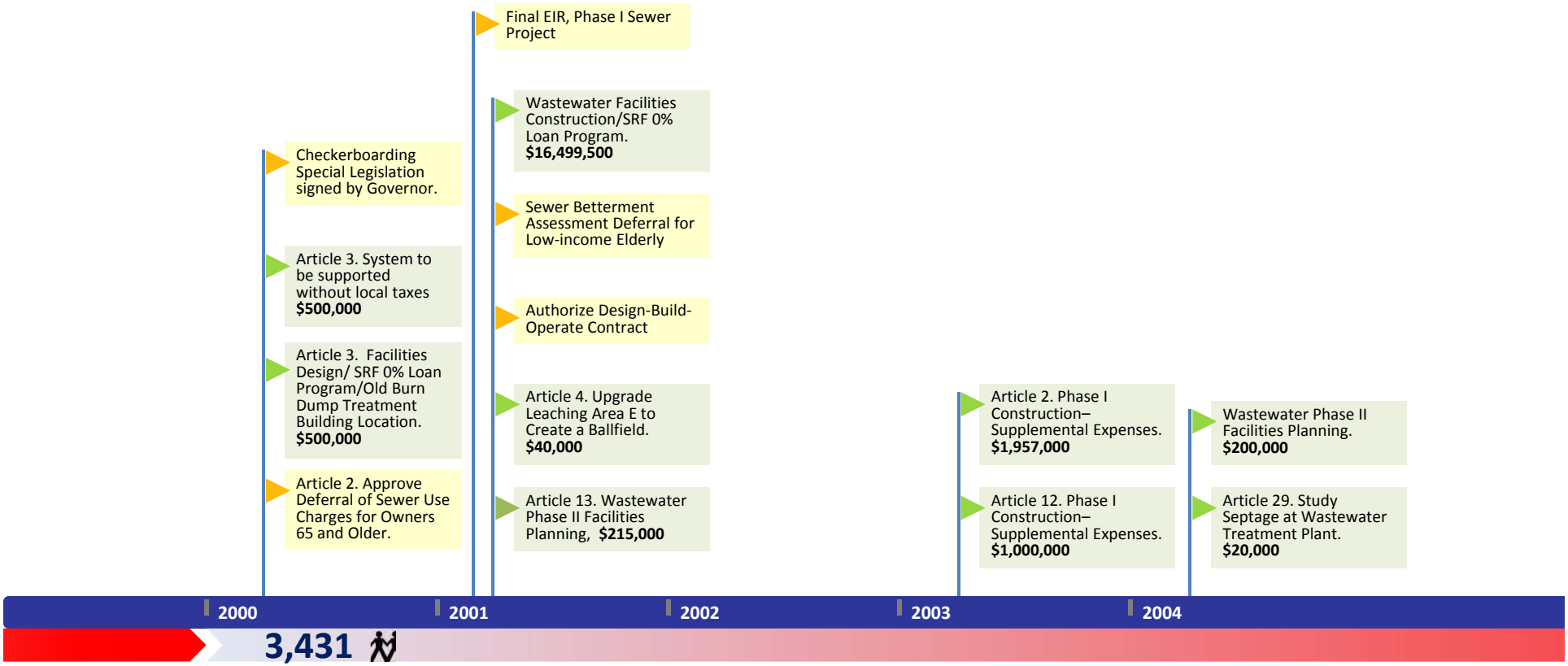
- Provincetown also has a serious wastewater management problem in the downtown area.
- Several private studies of water quality … concluded that contamination threatening public health exists in the harbor. Storm drains have been cited as the major source, to which septic system overflows are believed to be contributors.
- It is public knowledge that failing cesspools are widely used by commercial establishments and are pumped as often as three times a day during the summer.
- It is recommended that if the town fails to initiate a 201 study to update and implement facility plans completed for the town … by 1980, the DEQE should take enforcement action against the town for violations of Title 5.
- Augmentation of water supply to be disposed of on-site will raise the water table in downtown Provincetown, aggravating on-site system problems.
- Finally, the limitations of the water supply must be recognized and firm measures taken to prevent stimulation of growth by sewer construction.



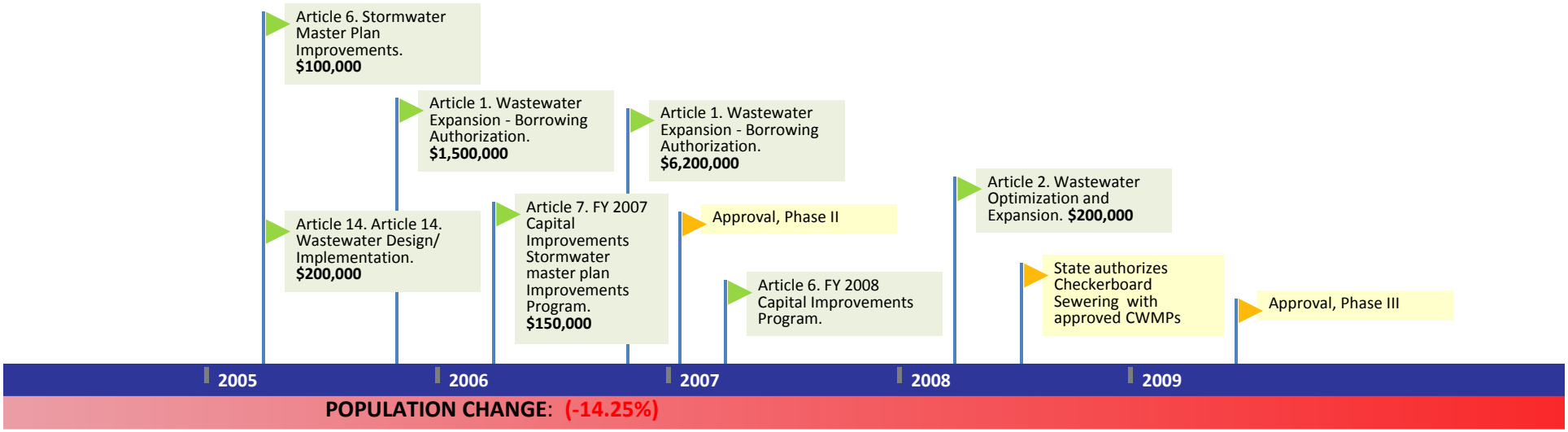
Provincetown: 1970-2013



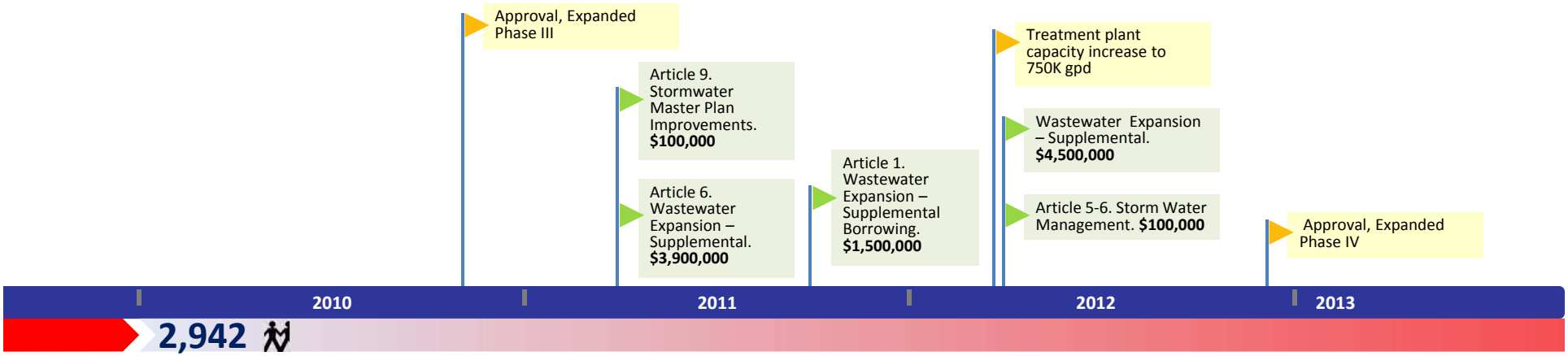
Provincetown: 1970-2013



Provincetown: 1970-2013



Provincetown: 1970-2013



Truro: 1970-2013

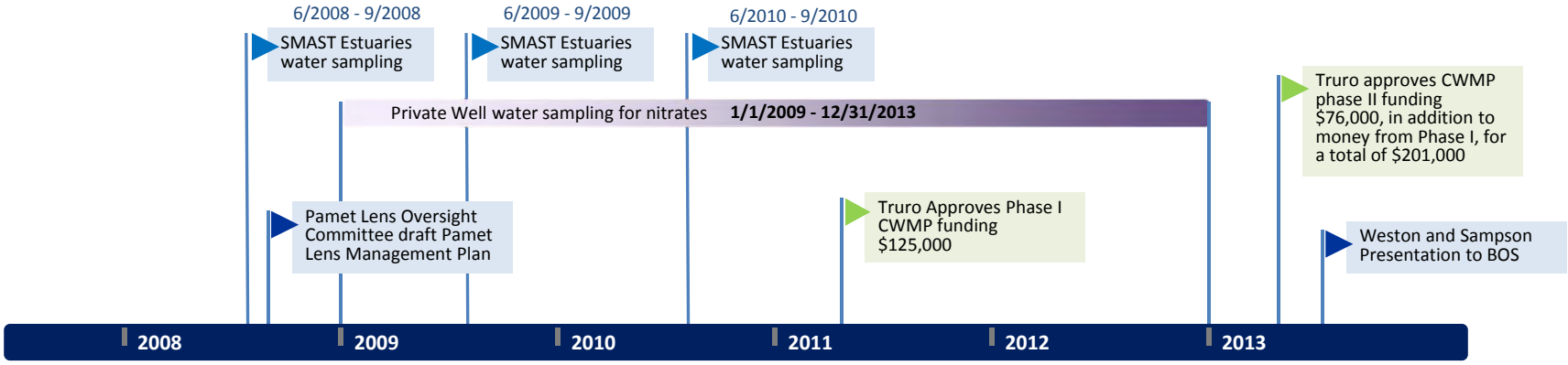
From 1978 Section 208 Plan

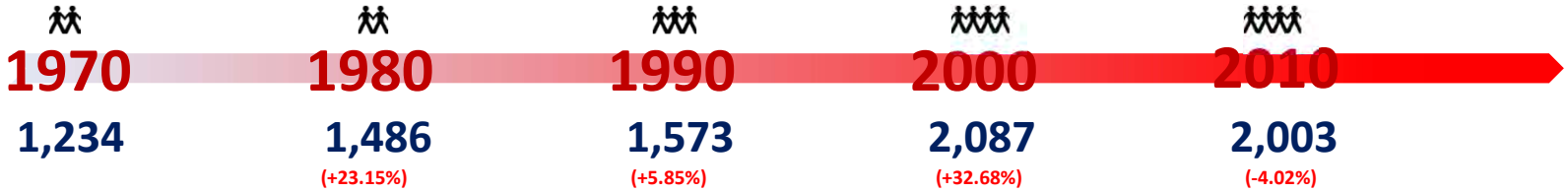
- A recent gasoline spill from a leaking service station storage tank has resulted in contamination of the groundwater approximately 600 feet from the South Hollow Well field.
- Even if the South Hollow Wellfield is put back into production, however, Provincetown presently needs an additional permanent water supply.
- Development of a water supply plan for the outer Cape groundwater basins should be given immediate priority by local, regional and federal agencies.
- Growth controls and water conservation must be given full consideration in such a planning effort to assure that the groundwater resource is not overdeveloped.
- With Truro' s naturally sandy soils, the town's wastewater problems are limited to a small strip of commercial development along a low-lying barrier beach known as Beach Point.

This area of was included in the Sewer Service Areas Map on the basis of the likely cost-effectiveness if a sewer is built for Provincetown.

- Local officials of Truro expressed concern over possible growth impacts of sewering. A means of growth control should be included in any facility plan for this reason.

Further investigation is also recommended of the water quality impacts of the landfill and septage pits.





Did we miss anything?

Your Watersheds

Provincetown Harbor
Hatches Harbor


CAPE COD
COMMISSION


8.4 square miles
CAPE COD COMMISSION


2 Towns
CAPE COD COMMISSION


Cape Cod National Seashore
CAPE COD COMMISSION

Natural Features

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

- Structures
- Ponds

Natural Areas

- Cranberry Bogs
- Wetlands
- Natural Heritage & Endangered Species Program (NHESP) Certified Vernal Pools
- Sea, Lake, & Overland Surges from Hurricanes (SLOSH) Update 2013
- Preliminary FEMA Flood Rate Insurance Map (FIRM) Zones 2013

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

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

Sources: MassGIS, MassDOT, CCC

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

OpenSpace: Level of Protection

- In Perpetuity
- Limited
- None

Landuse Vision Map

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

Sources: MassGIS, MassDOT, CCC

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

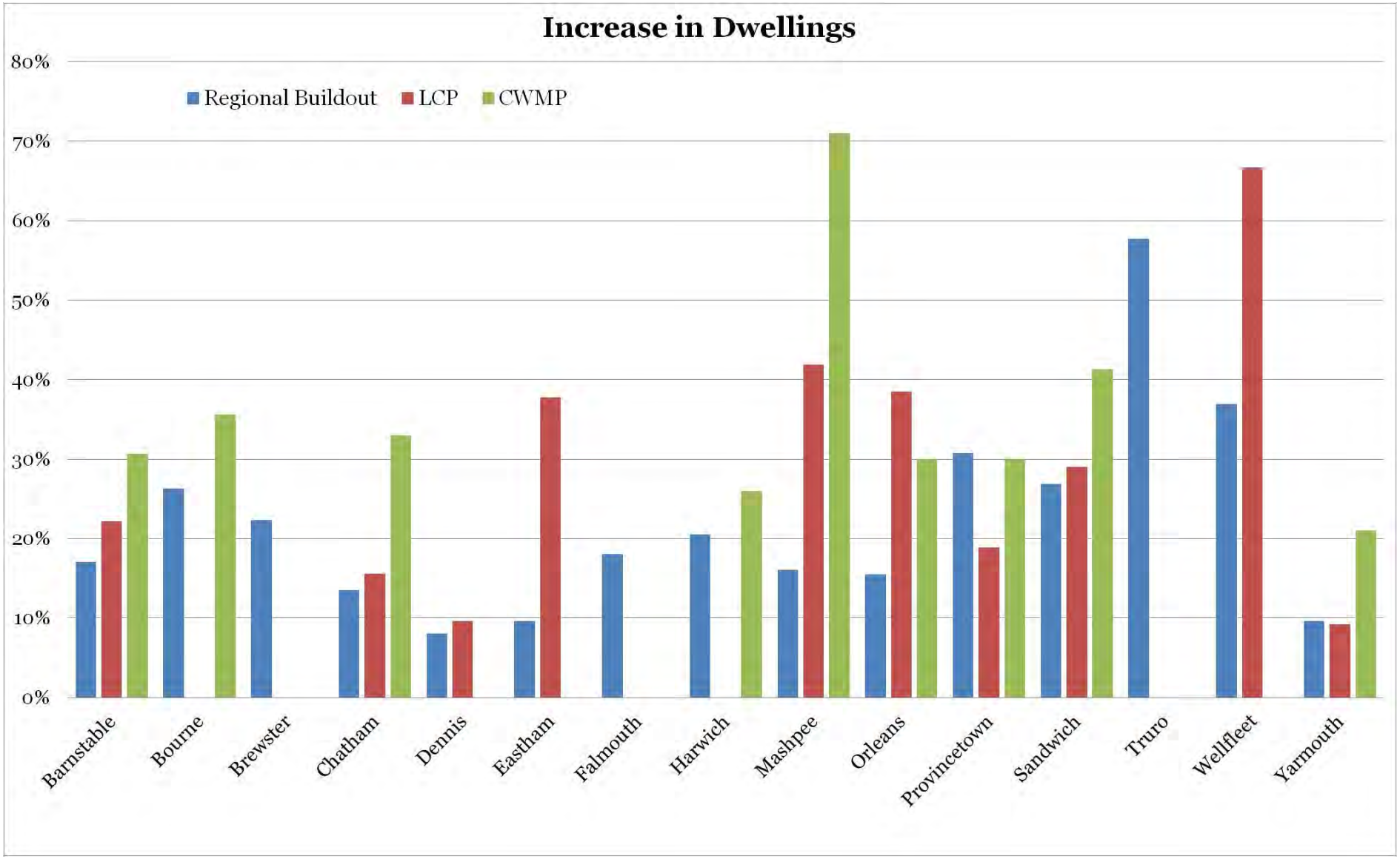
Sources: MassGIS, MassDOT

Density

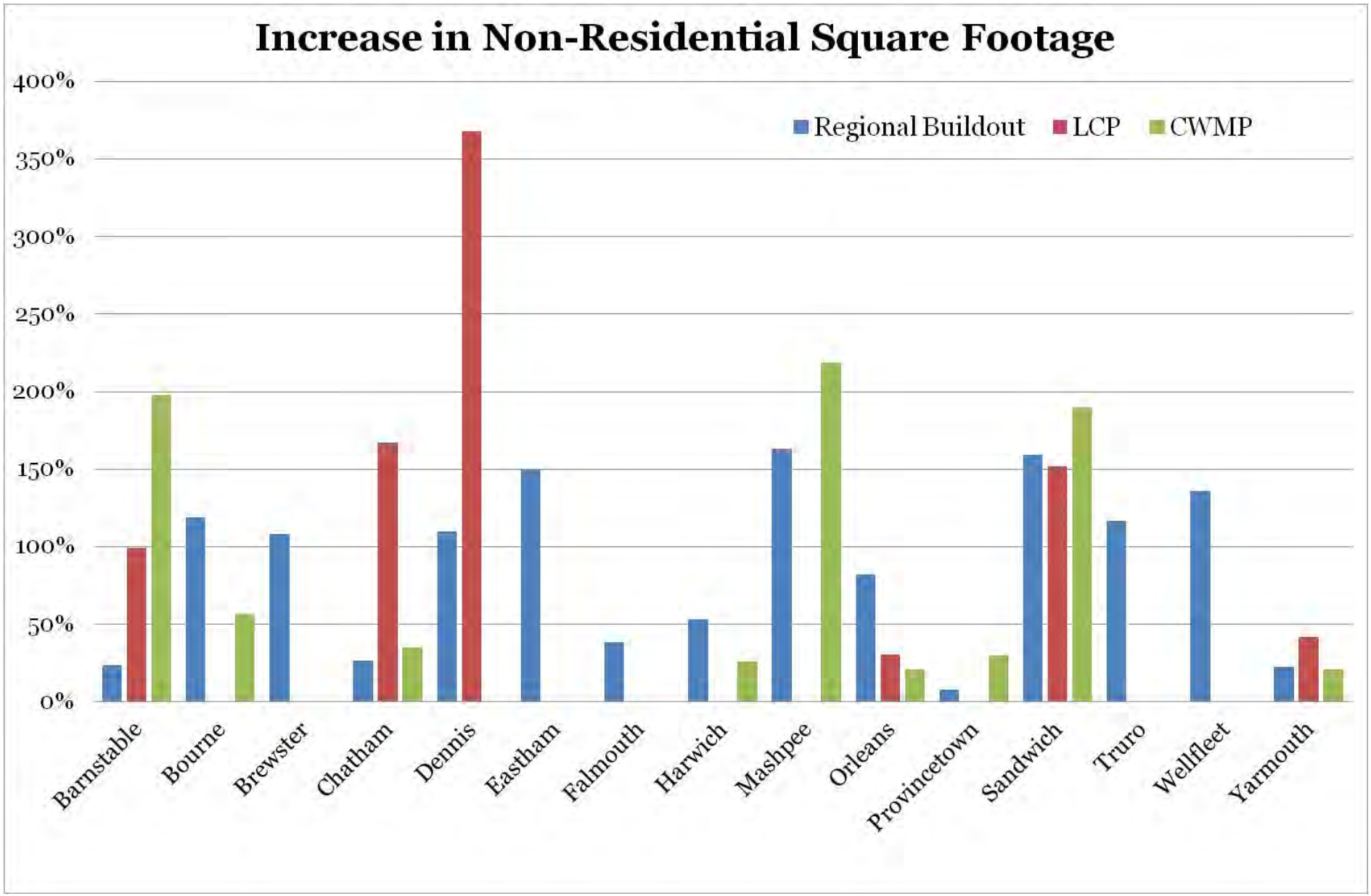
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

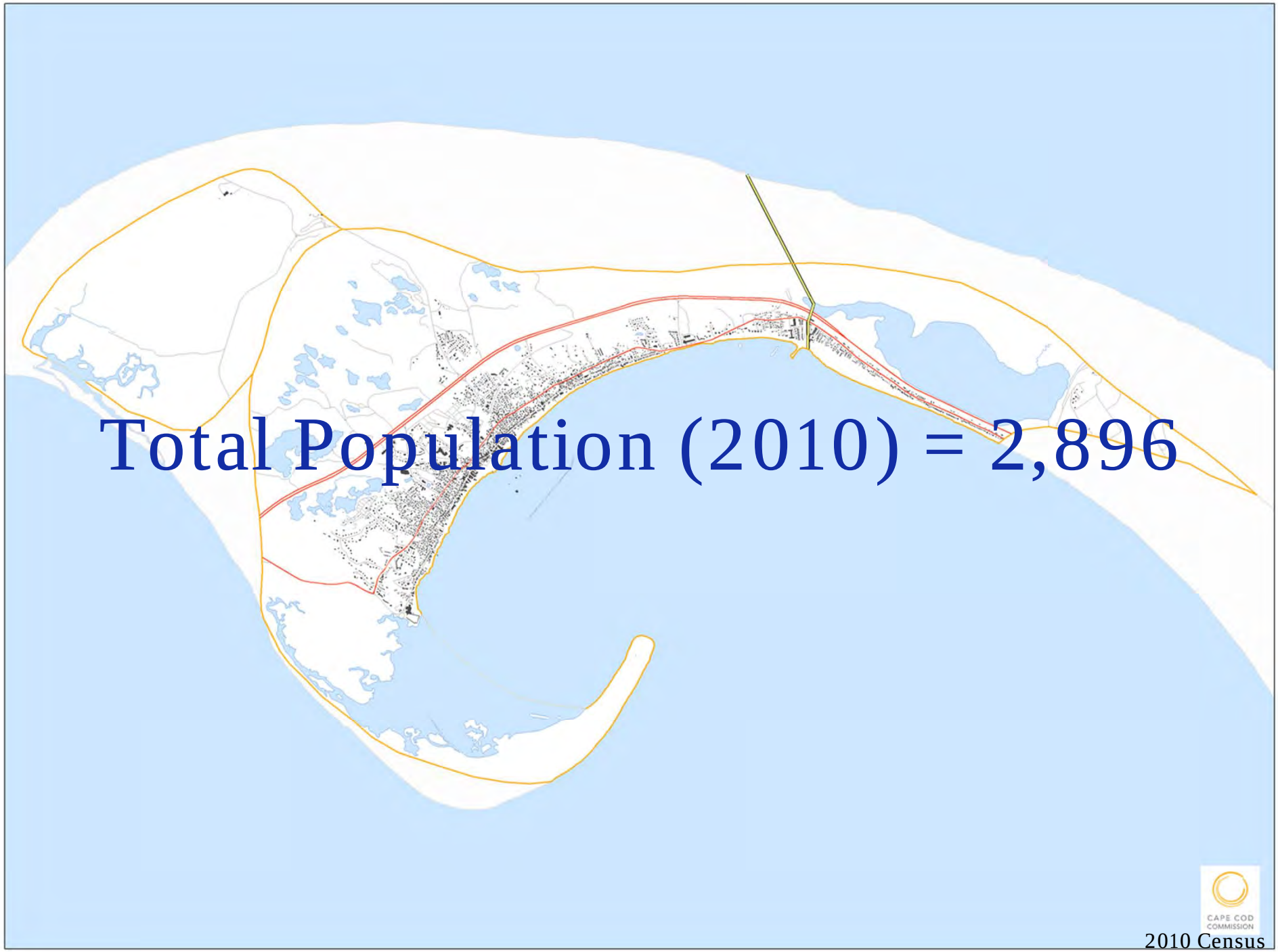

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout

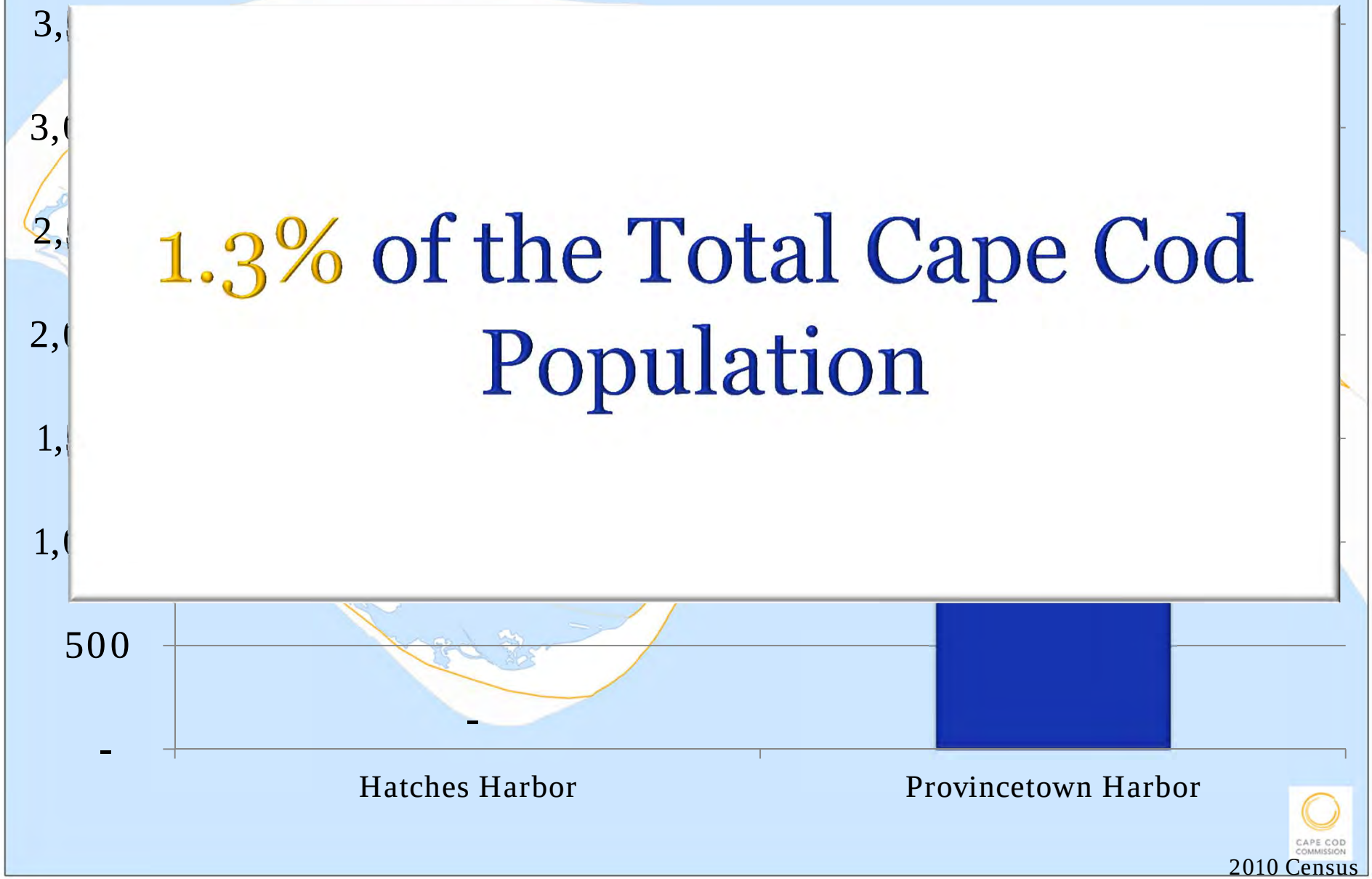

Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

The People

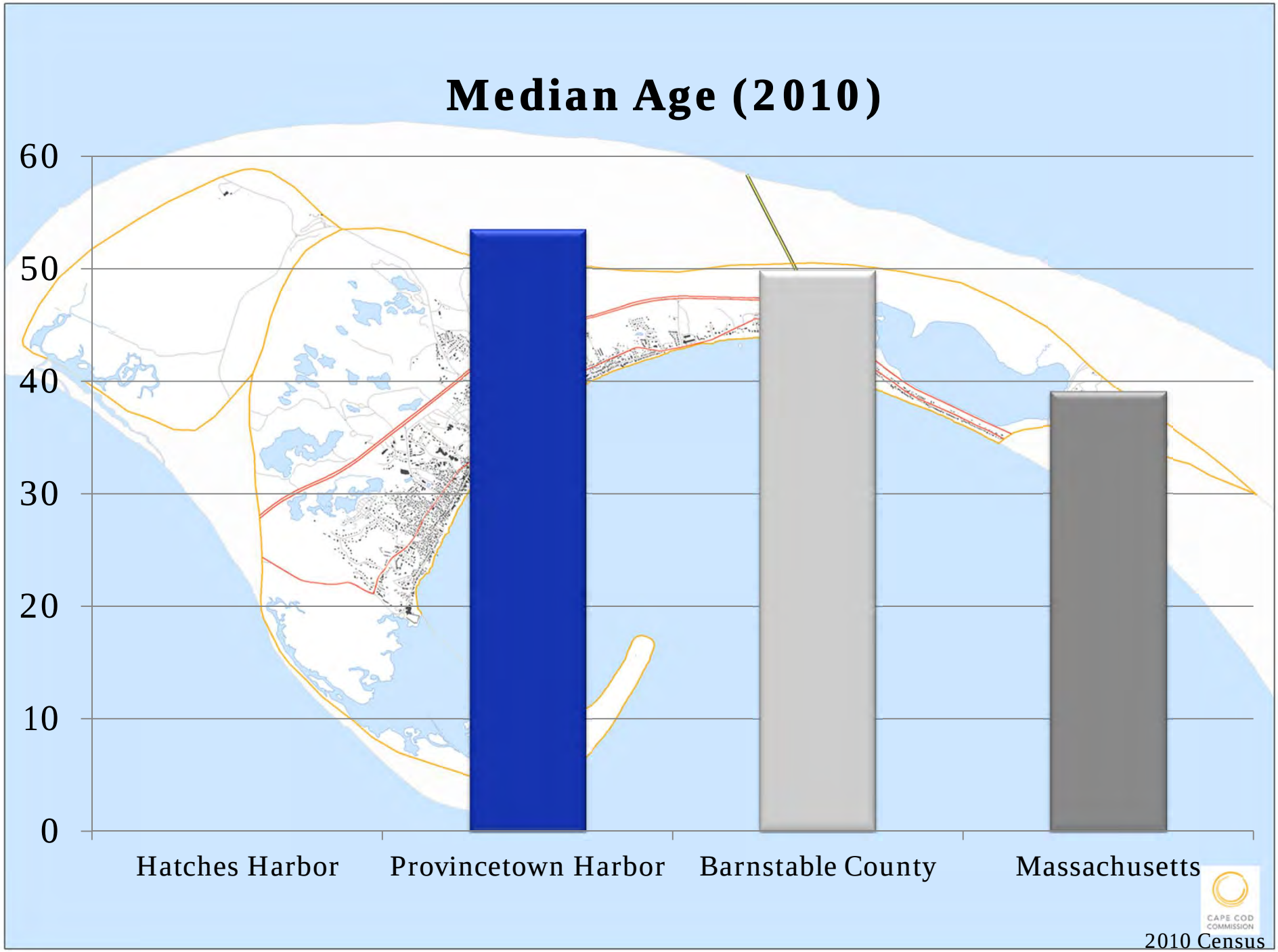
Provincetown Harbor
Hatches Harbor

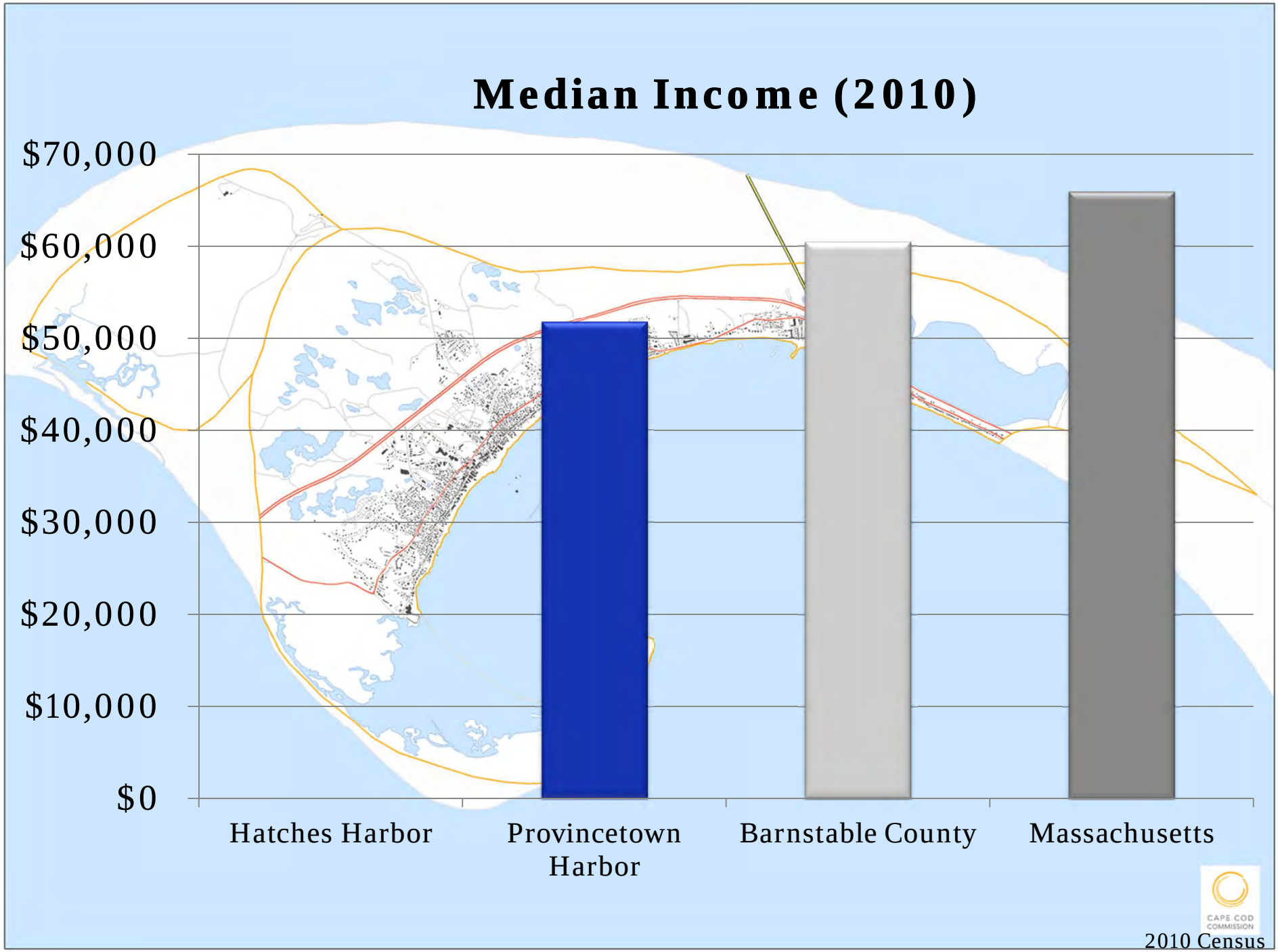

Total Population (2010) = 2,896
CAPE COD COMMISSION
2010 Census

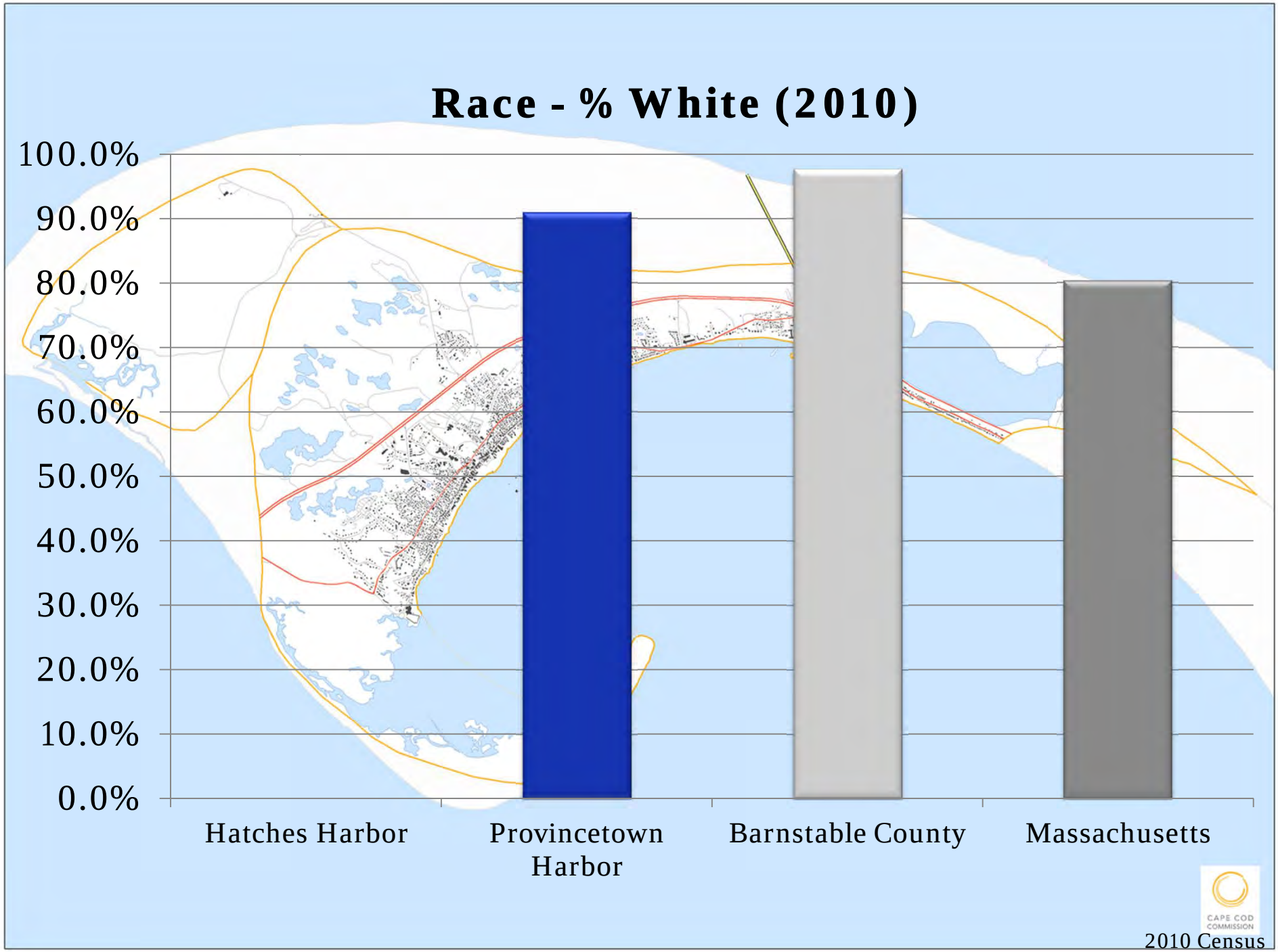
Population (2010)

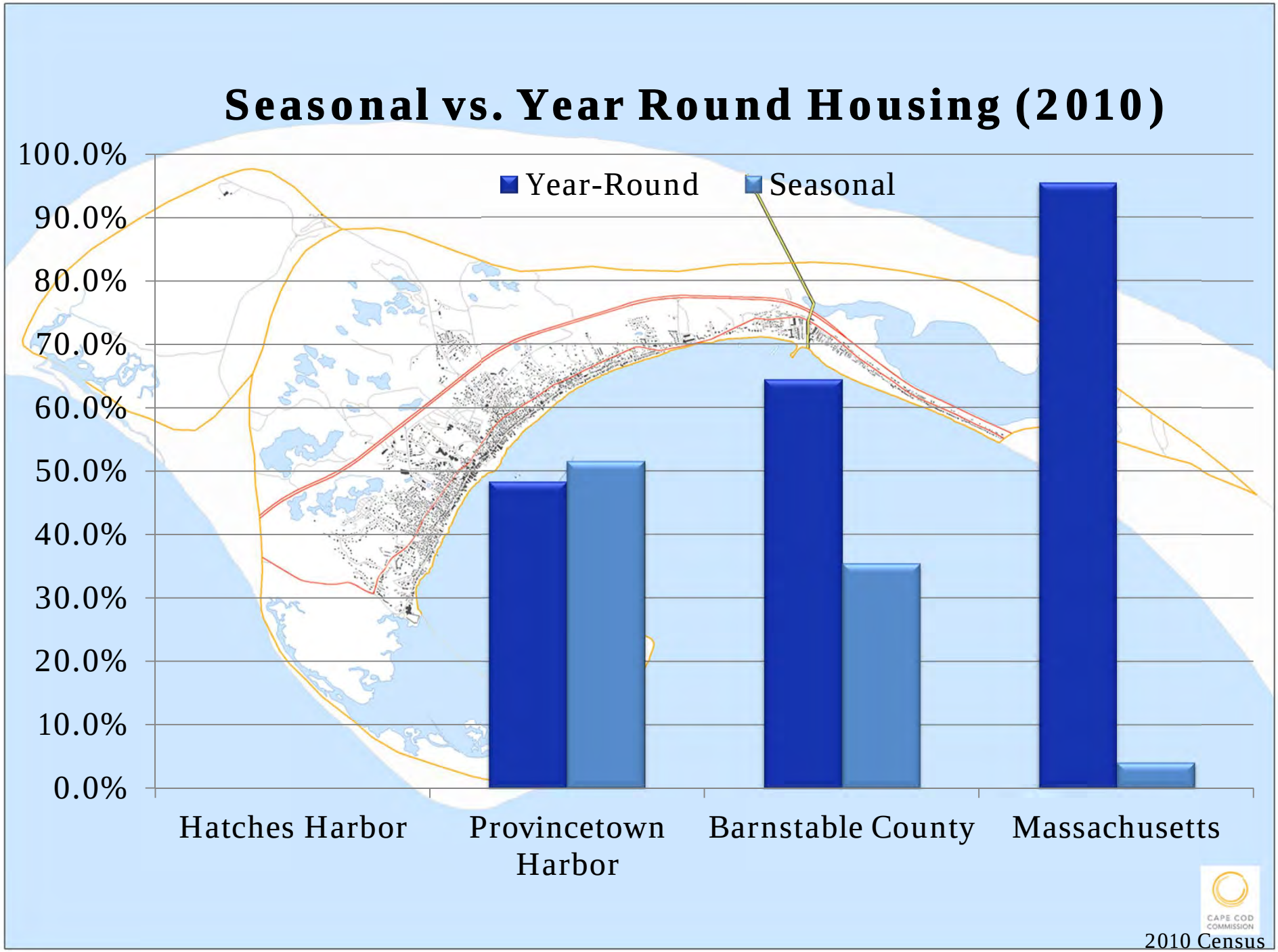


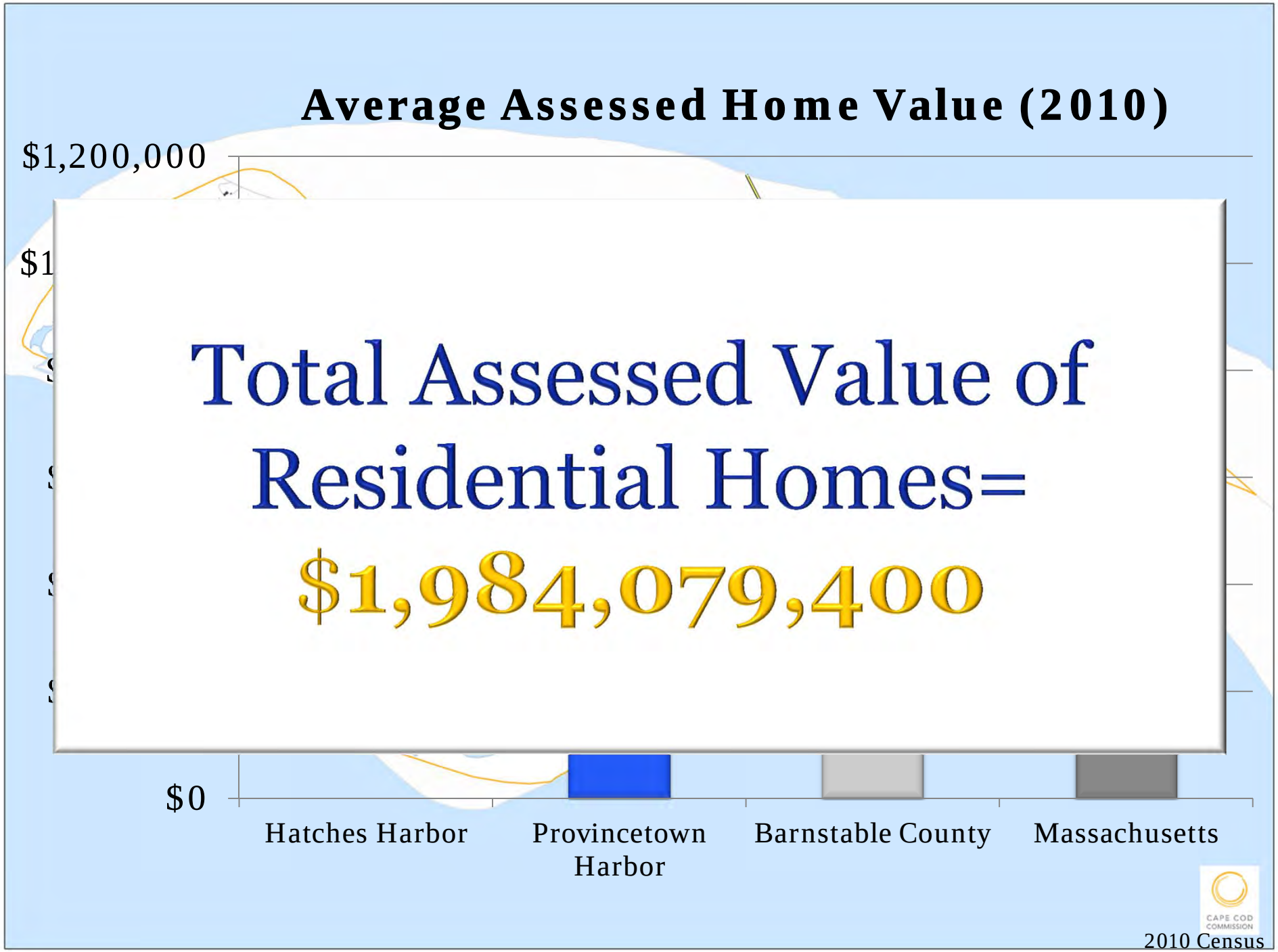
2010 Census


Median Age (2010)
60
50
40
30
20
10
0
Hatches Harbor
Provincetown Harbor
Barnstable County
Massachusetts
CAPE COD COMMISSION
2010 Census


Median Income (2010)
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Hatches Harbor
Provincetown Harbor
Barnstable County
Massachusetts
CAPE COD COMMISSION
2010 Census

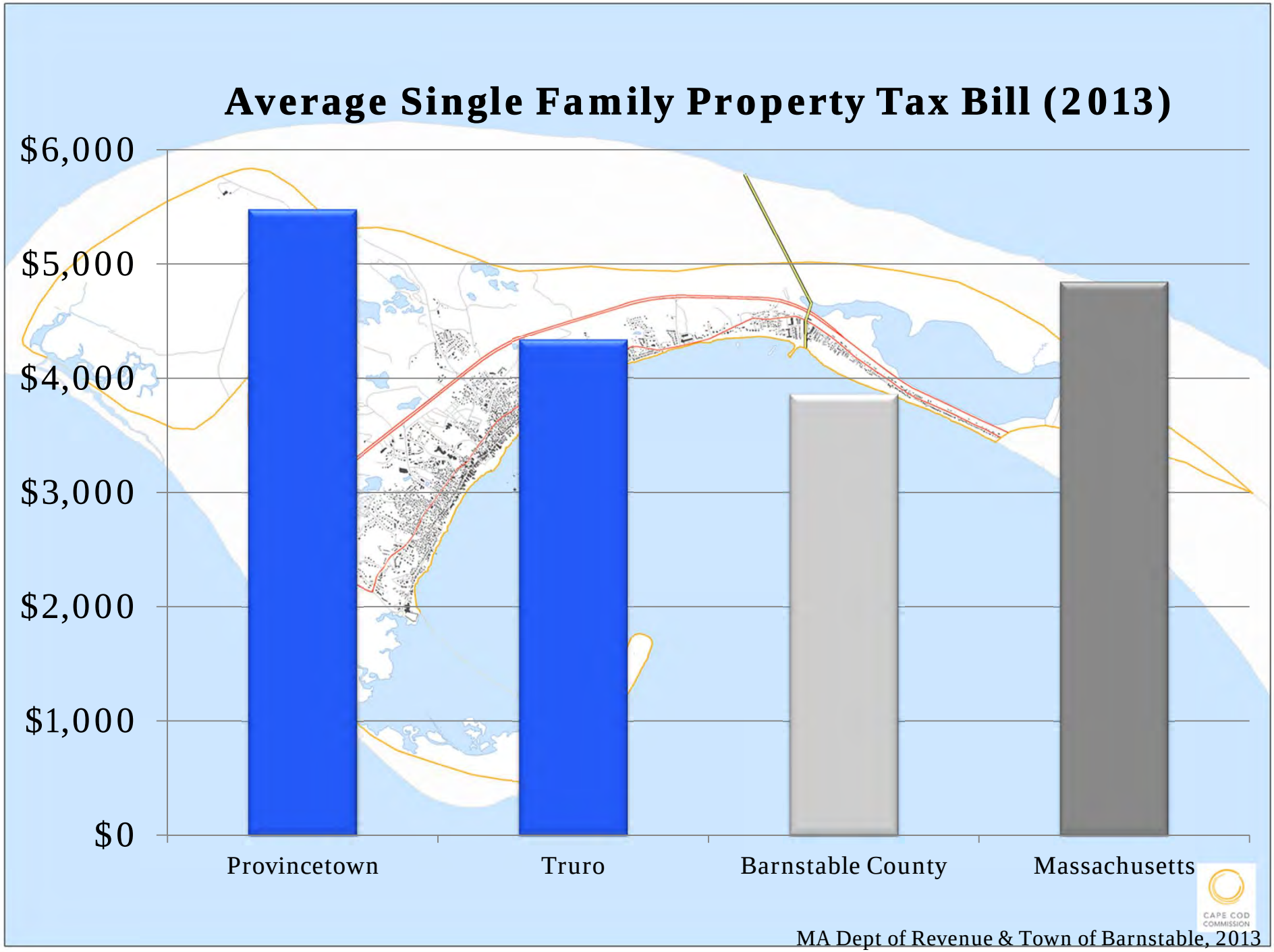

Race - % White (2010)
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Hatches Harbor
Provincetown Harbor
Barnstable County
Massachusetts
CAPE COD COMMISSION
2010 Census

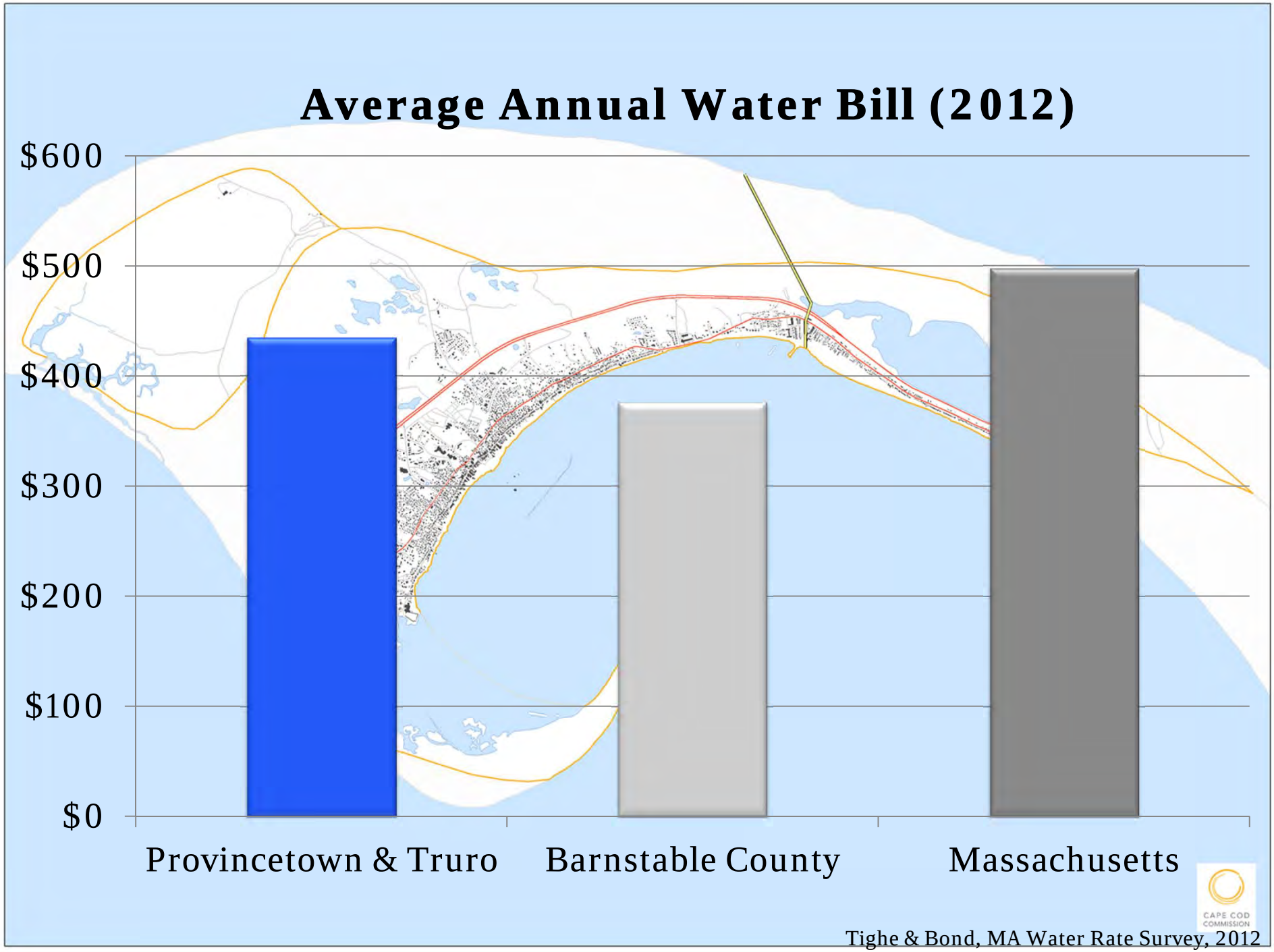

Seasonal vs. Year Round Housing (2010)
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Year-Round
Seasonal
Hatches Harbor
Provincetown Harbor
Barnstable County
Massachusetts
CAPE COD COMMISSION
2010 Census


Average Assessed Home Value (2010)
$1,200,000
$0
Hatches Harbor
Provincetown Harbor
Barnstable County
Massachusetts
Total Assessed Value of Residential Homes=
$1,984,079,400
2010 Census

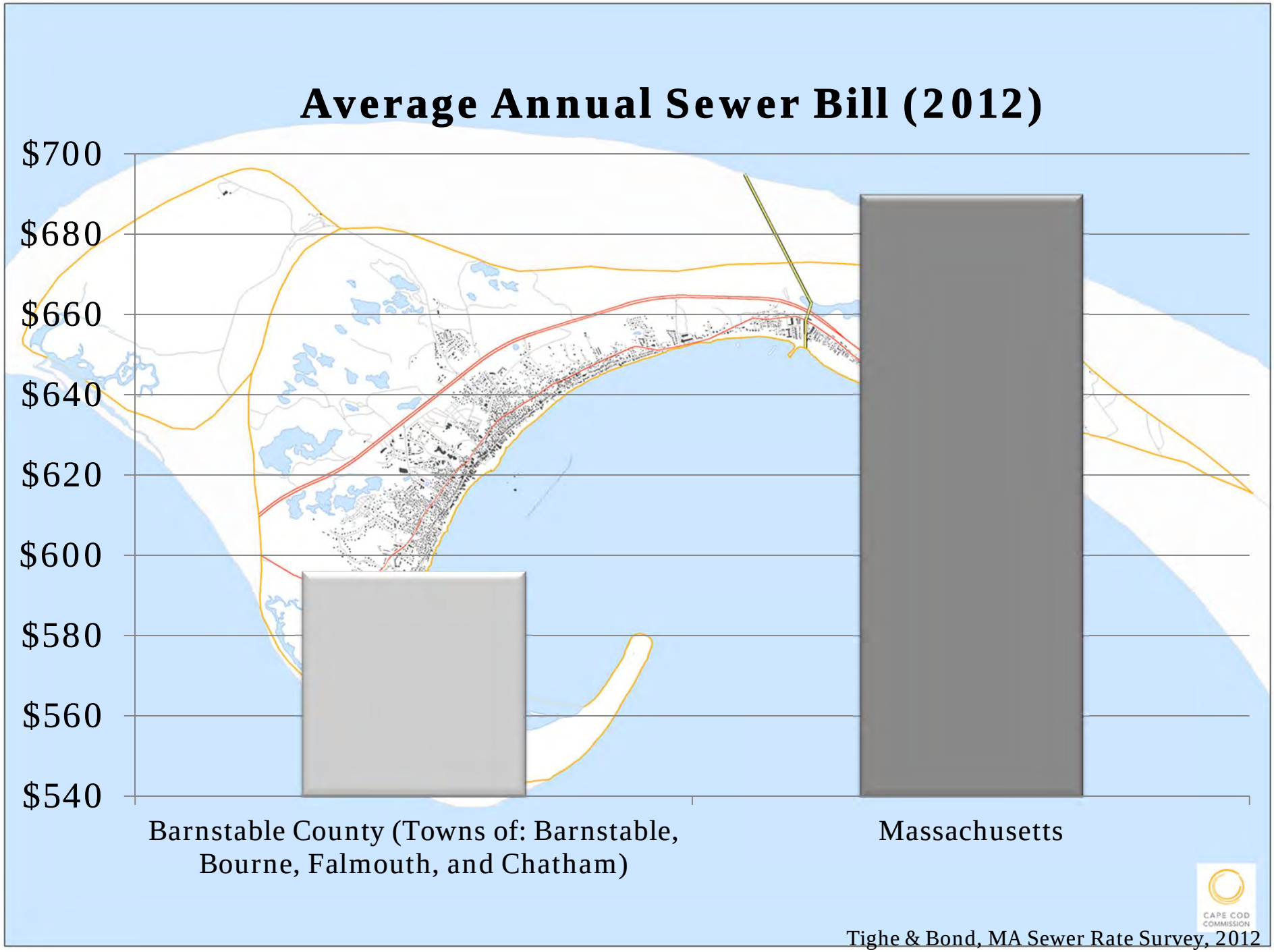
Your Government & Taxes

Provincetown Harbor
Hatches Harbor


Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Provincetown
Truro
Barnstable County
Massachusetts
CAPE COD COMMISSION
MA Dept of Revenue & Town of Barnstable, 2013



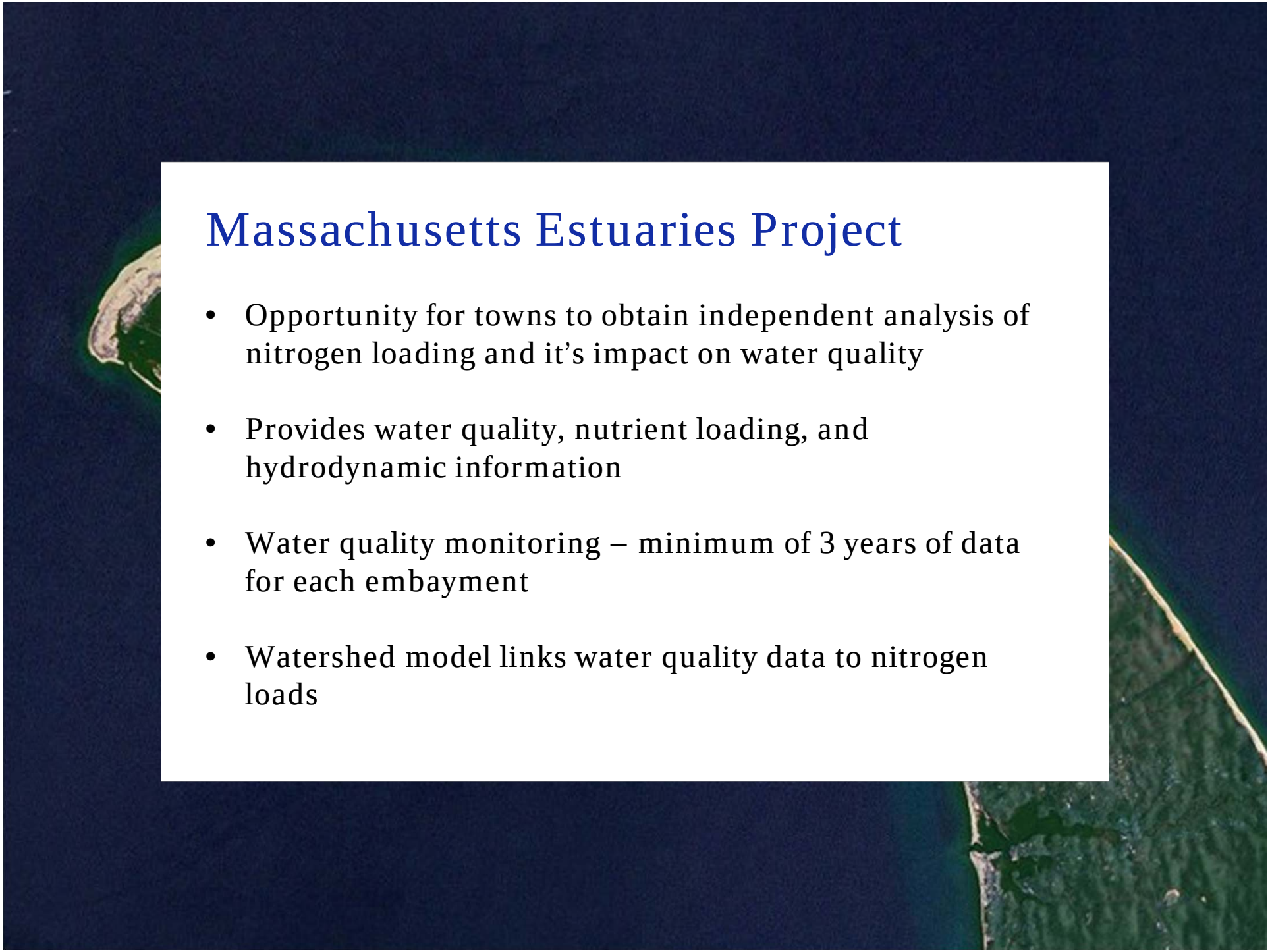
Tighe & Bond, MA Water Rate Survey, 2012


Average Annual Sewer Bill (2012)
$700
$680
$660
$640
$620
$600
$580
$560
$540
Barnstable County (Towns of: Barnstable, Bourne, Falmouth, and Chatham)
Massachusetts
CAPE COD COMMISSION
Tighe & Bond, MA Sewer Rate Survey, 2012

The Problem

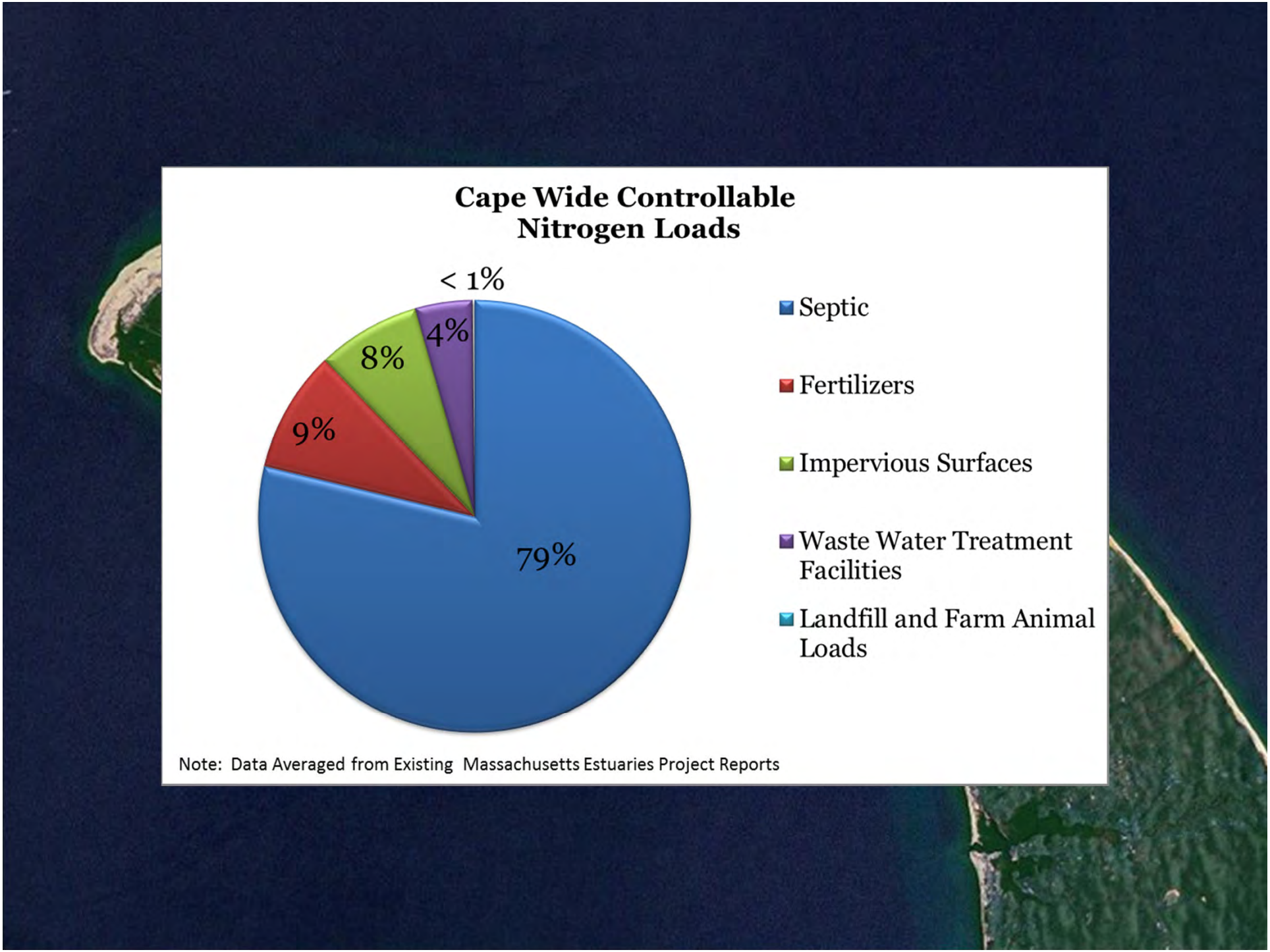
Provincetown Harbor
Hatches Harbor


Photo credit: National Park Service

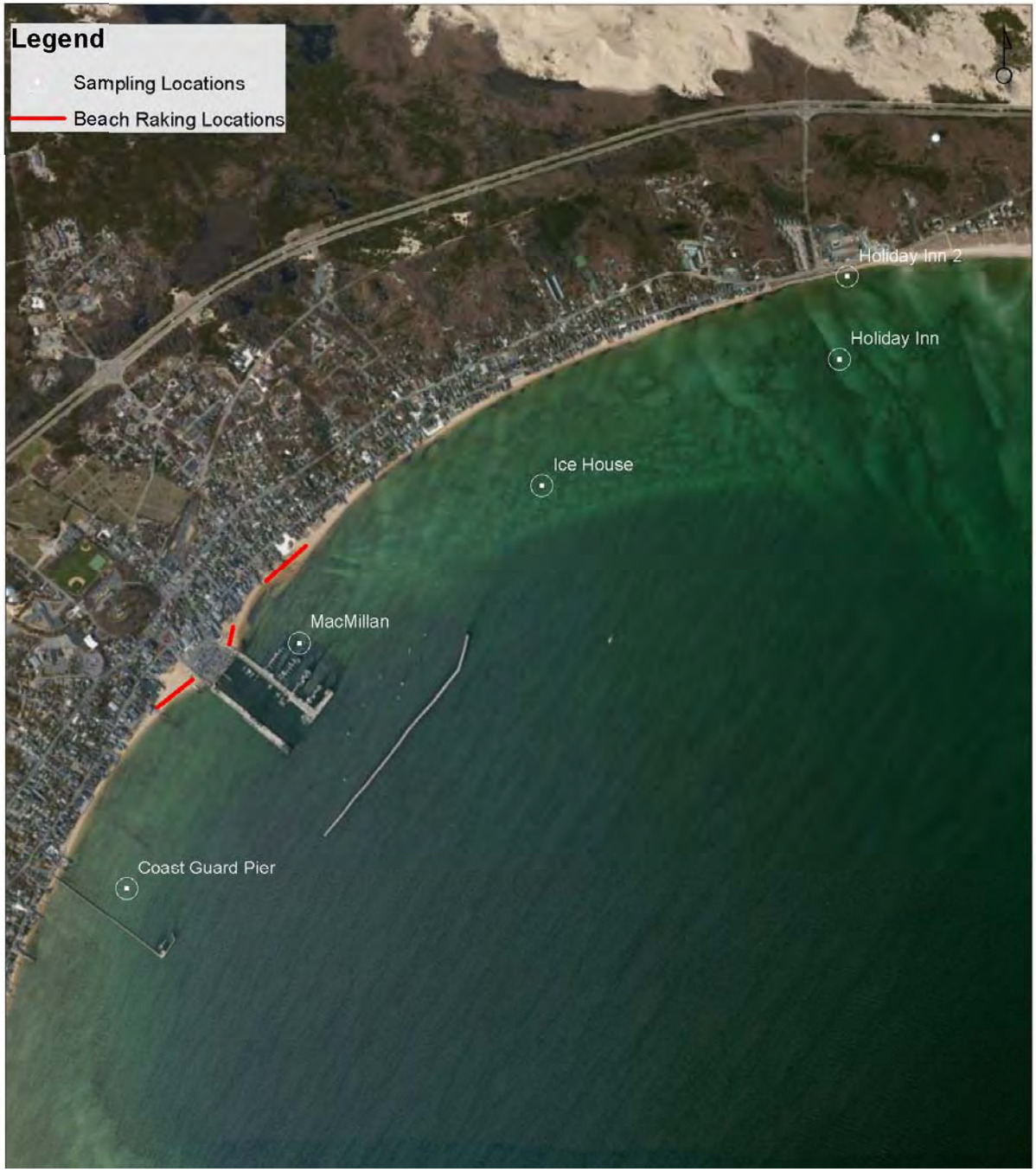


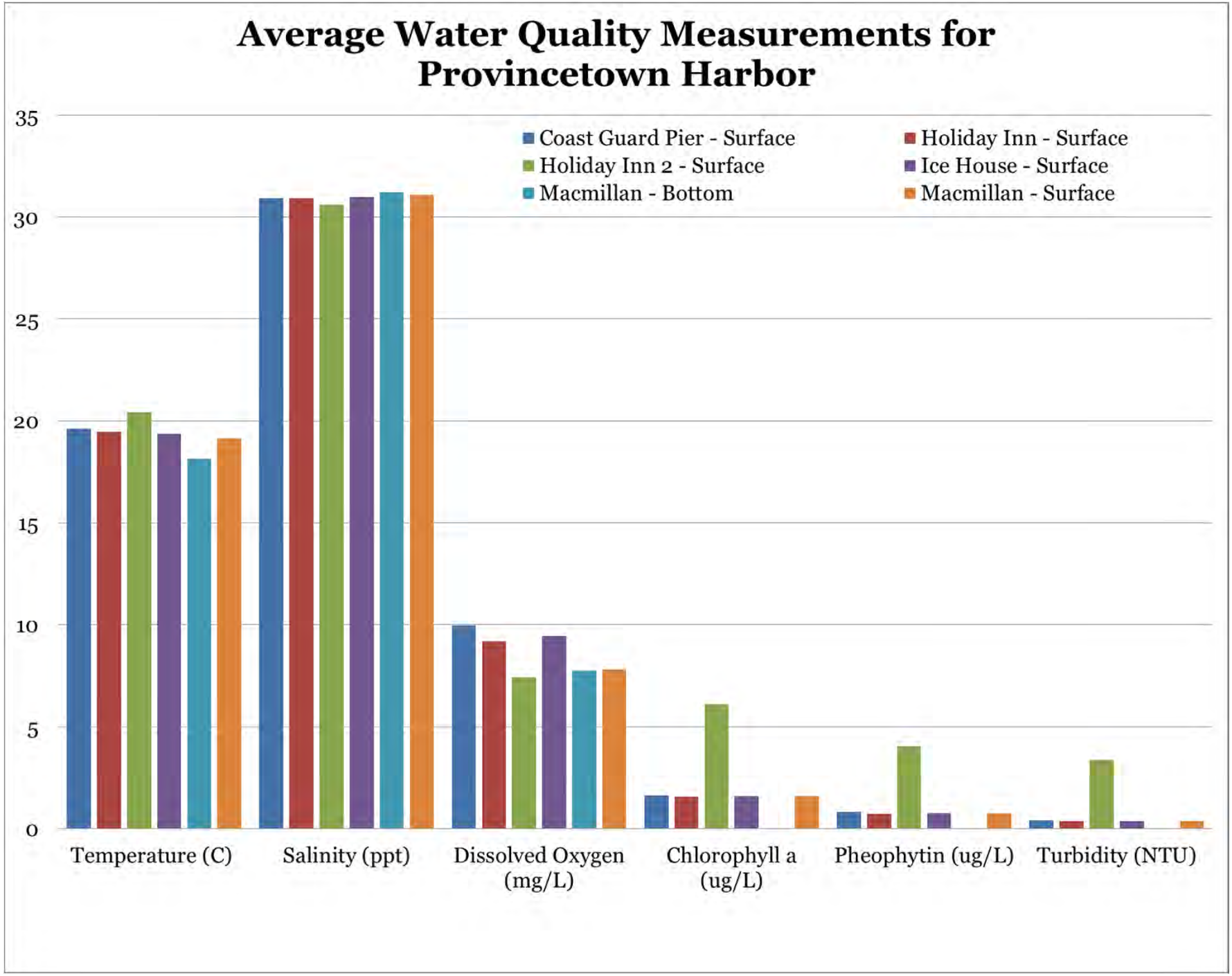
Massachusetts Estuaries Project

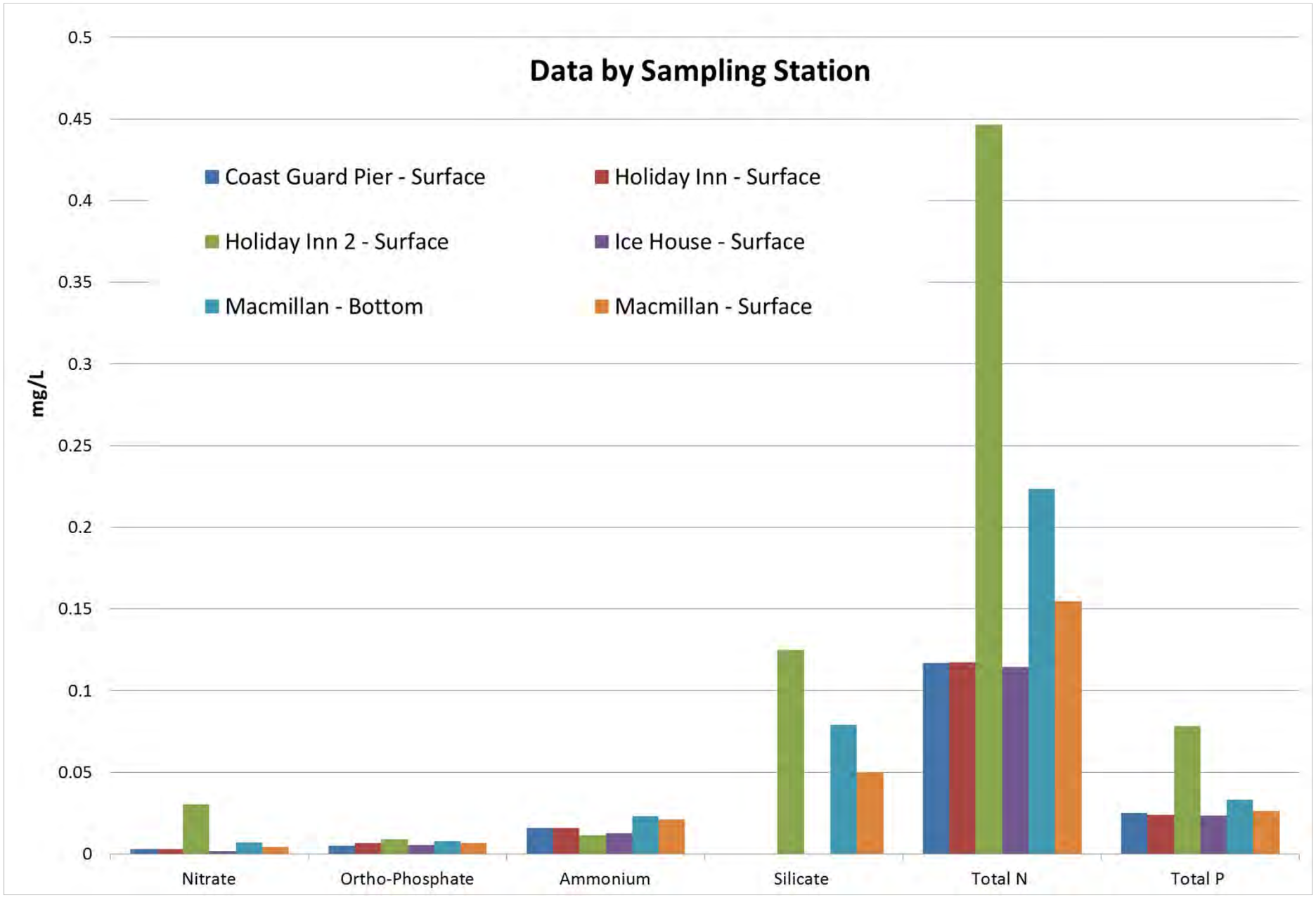
- Opportunity for towns to obtain independent analysis of nitrogen loading and it's impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

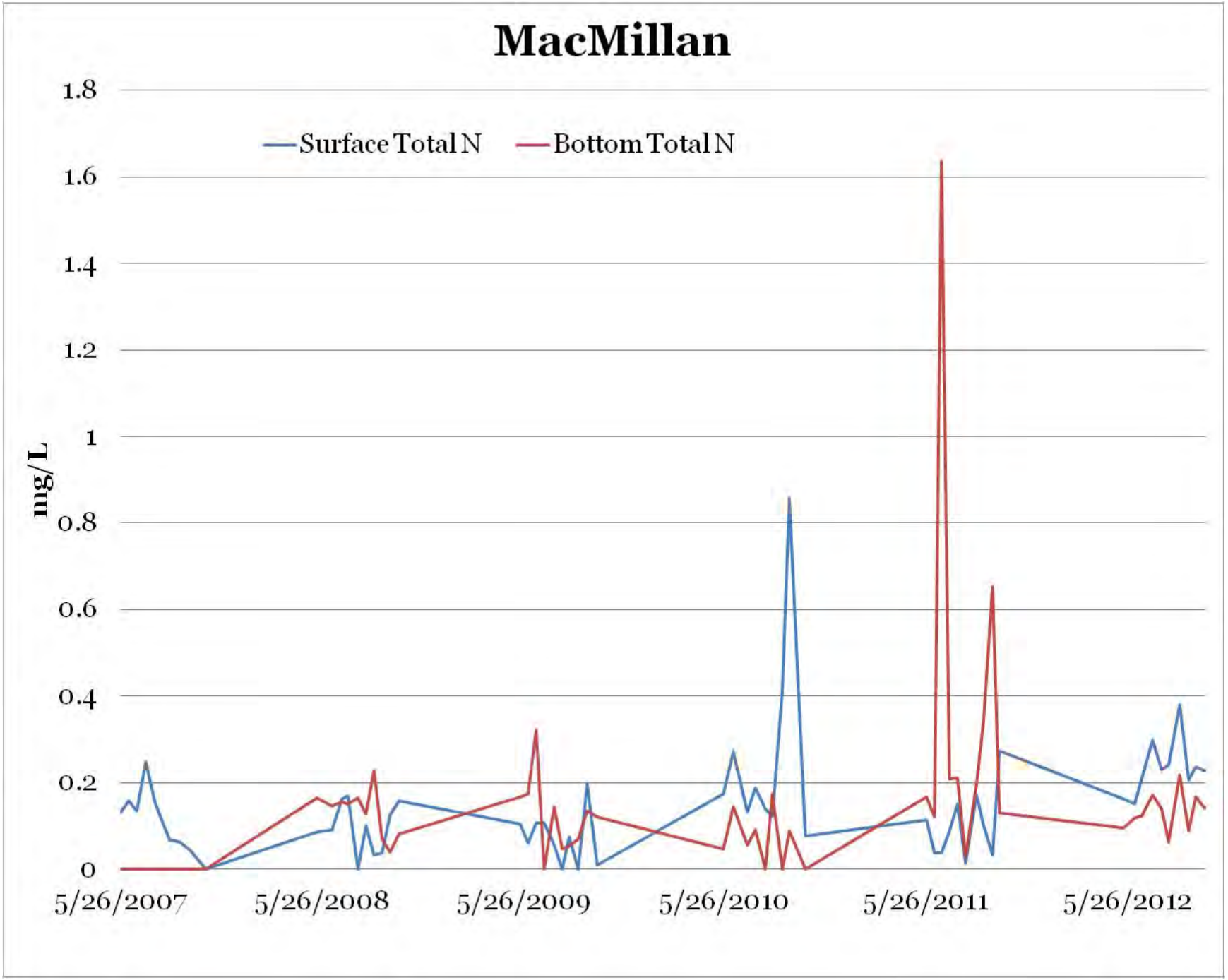

Cape Wide Controllable Nitrogen Loads
< 1%
4%
8%
9%
79%
Septic
Fertilizers
Impervious Surfaces
Waste Water Treatment Facilities
Landfill and Farm Animal Loads
Note: Data Averaged from Existing Massachusetts Estuaries Project Reports

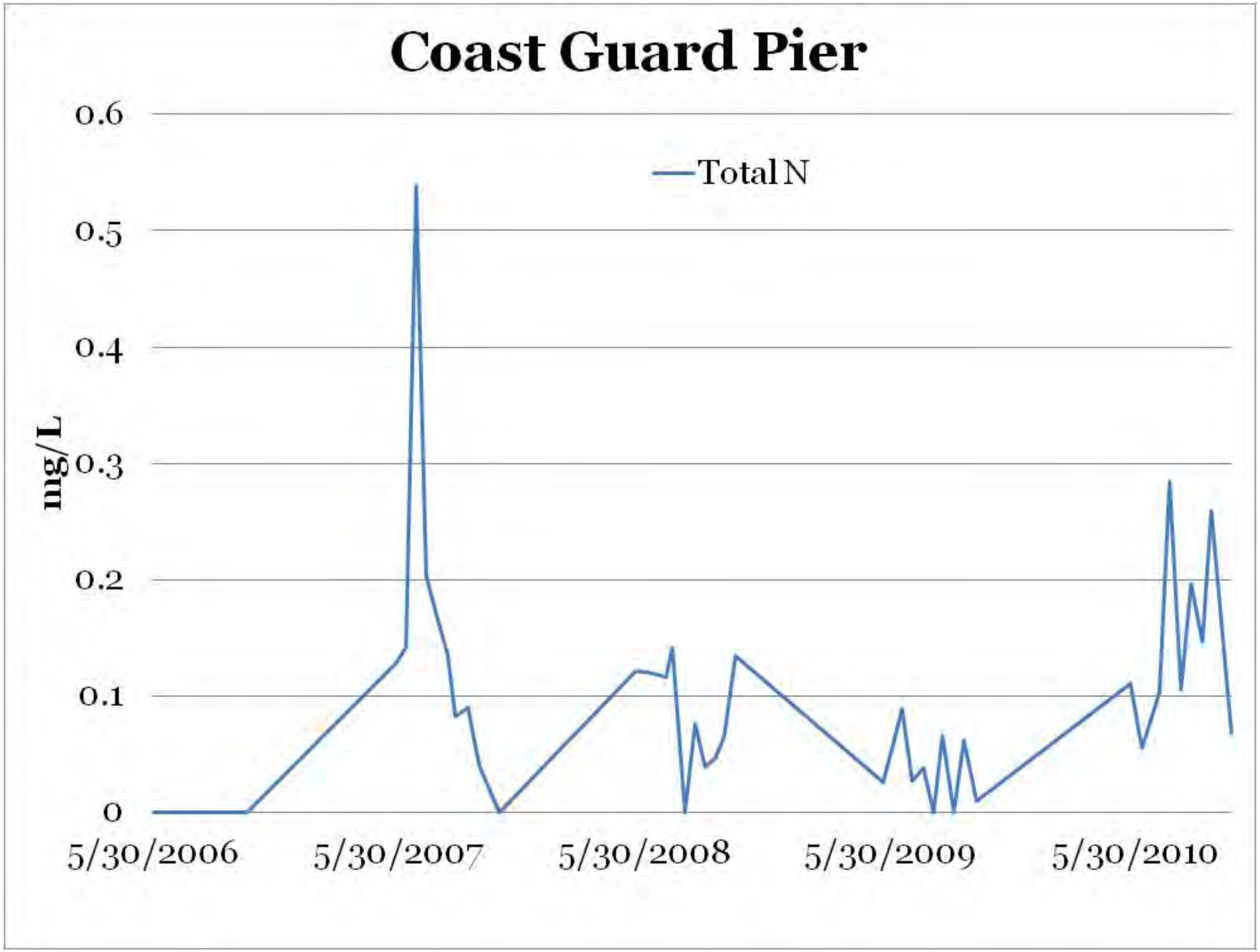
Water Quality Sampling Stations

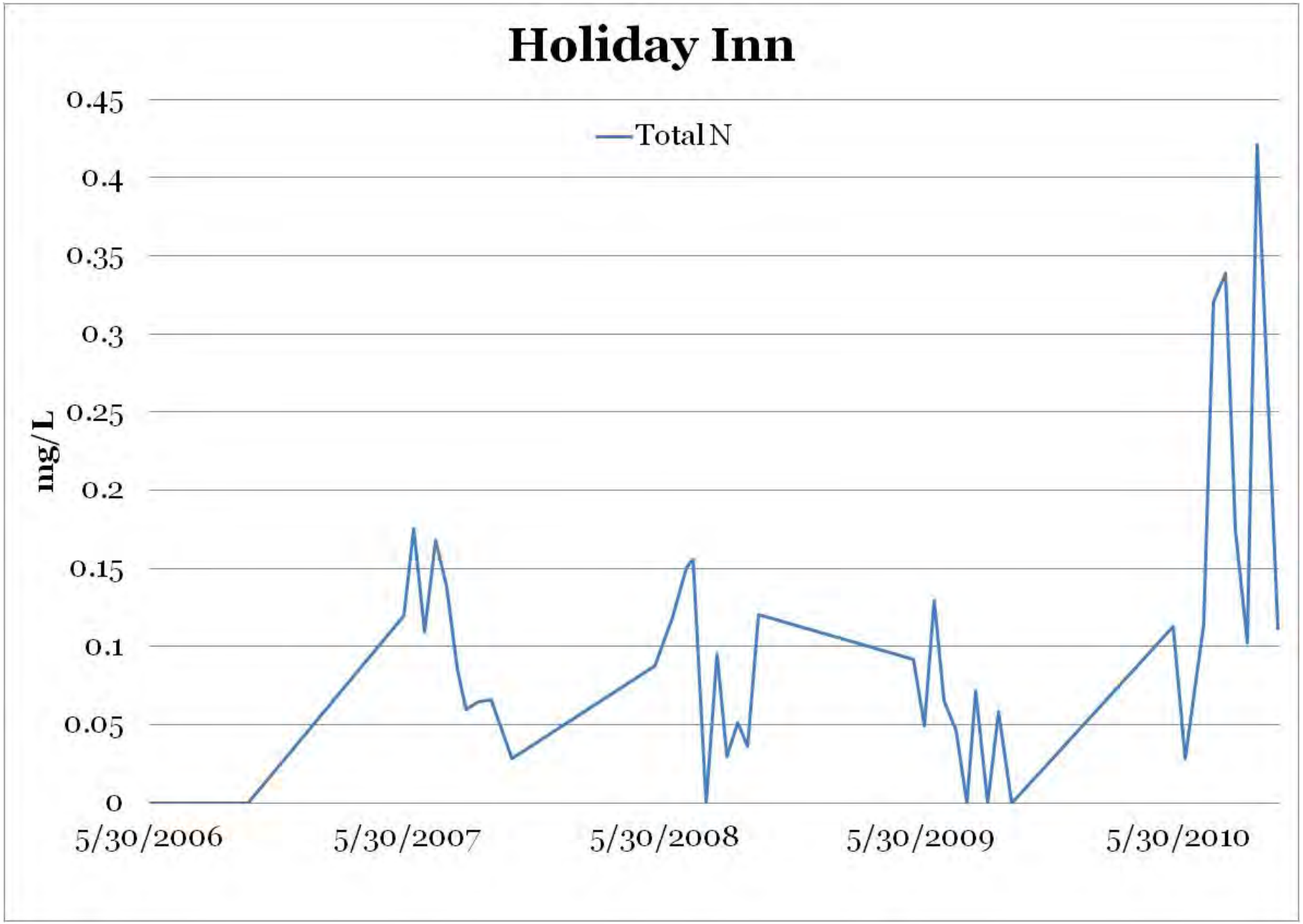


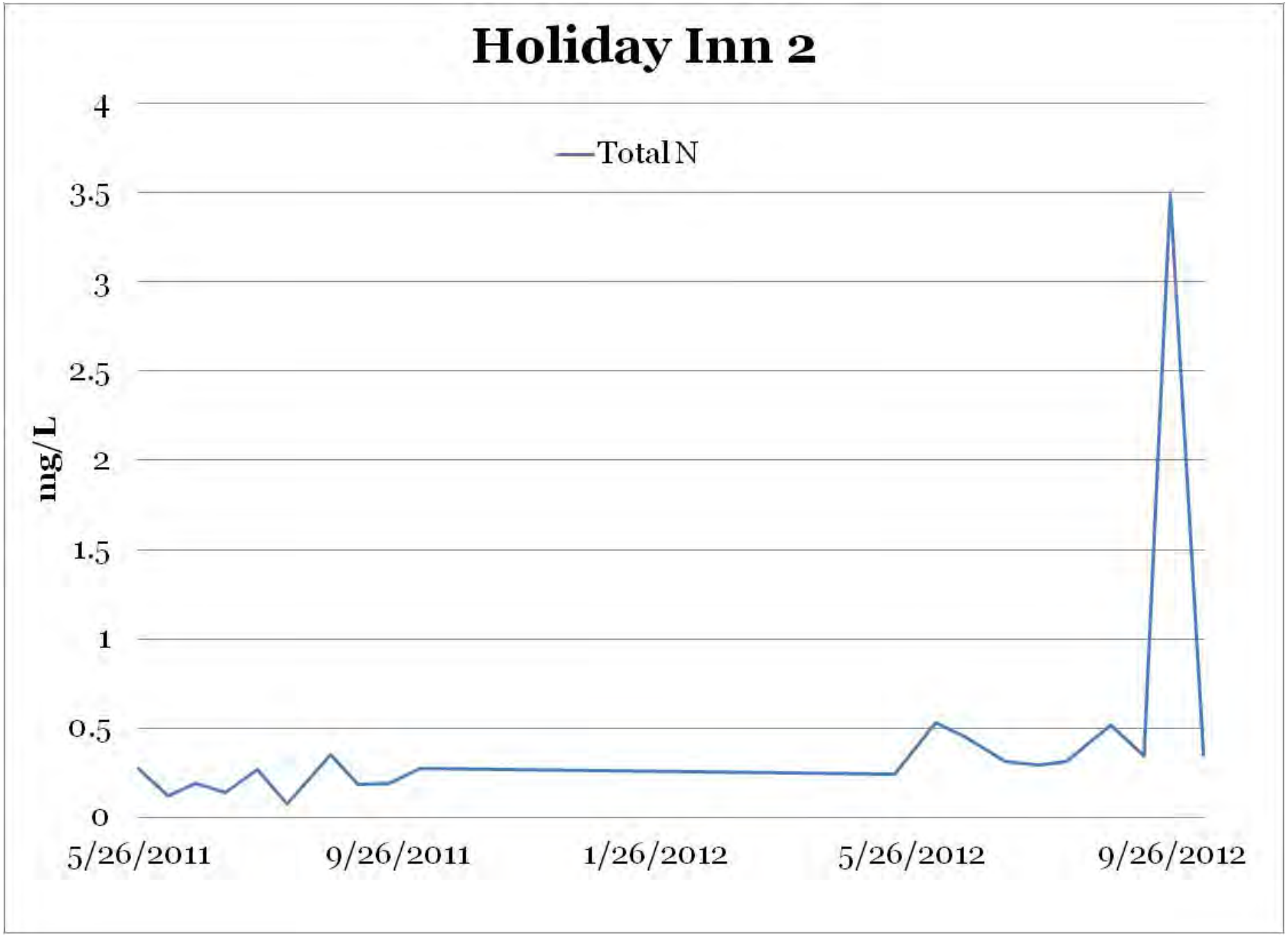

Average Water Quality Measurements for Provincetown Harbor
35
30
25
20
15
10
5
0
Coast Guard Pier - Surface
Holiday Inn - Surface
Holiday Inn 2 - Surface
Ice House - Surface
Macmillan - Bottom
Macmillan - Surface
Temperature (C)
Salinity (ppt)
Dissolved Oxygen (mg/L)
Chlorophyll a (ug/L)
Pheophytin (ug/L)
Turbidity (NTU)

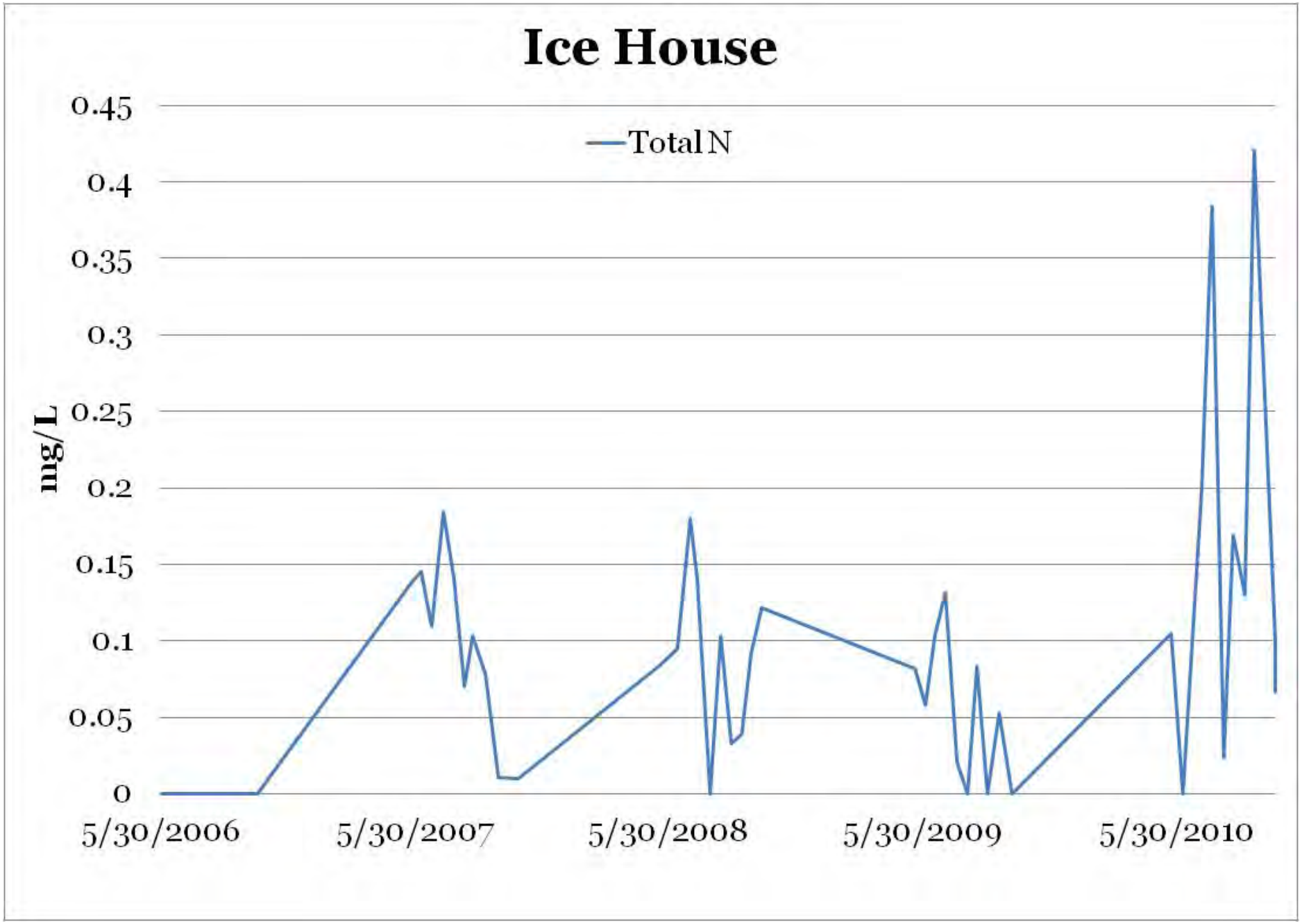

Data by Sampling Station
Coast Guard Pier - Surface
Holiday Inn - Surface
Holiday Inn 2 - Surface
Ice House - Surface
Macmillan - Bottom
Macmillan - Surface
mg/L
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Nitrate
Ortho-Phosphate
Ammonium
Silicate
Total N
Total P


MacMillan
Surface Total N
Bottom Total N
mg/L
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
5/26/2007
5/26/2008
5/26/2009
5/26/2010
5/26/2011
5/26/2012


Coast Guard Pier
Total N
mg/L
0.6
0.5
0.4
0.3
0.2
0.1
0
5/30/2006
5/30/2007
5/30/2008
5/30/2009
5/30/2010

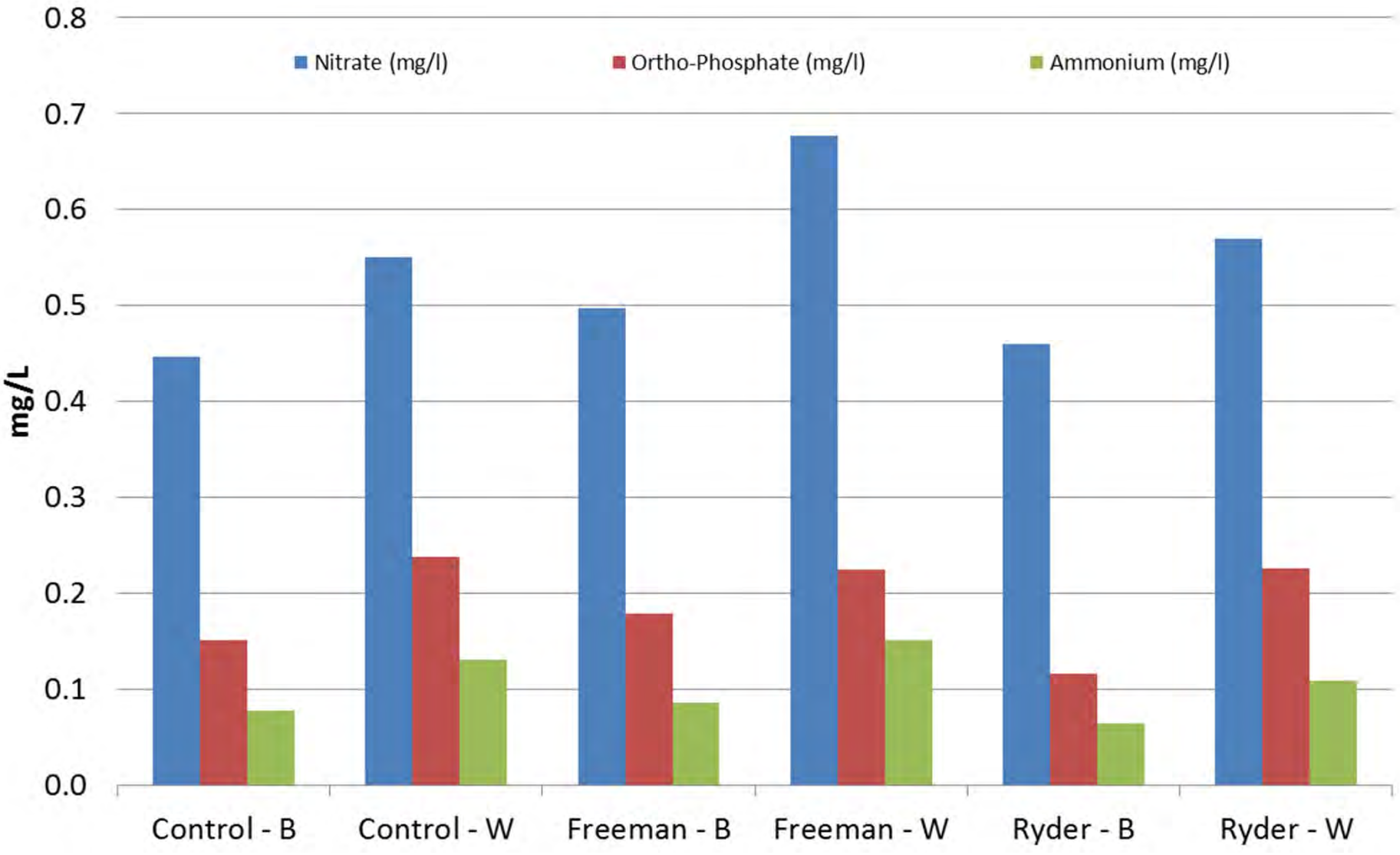

Holiday Inn
Total N
mg/L
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5/30/2006
5/30/2007
5/30/2008
5/30/2009
5/30/2010


Holiday Inn 2
Total N
mg/L
4
3.5
3
2.5
2
1.5
1
0.5
0
5/26/2011
9/26/2011
1/26/2012
5/26/2012
9/26/2012

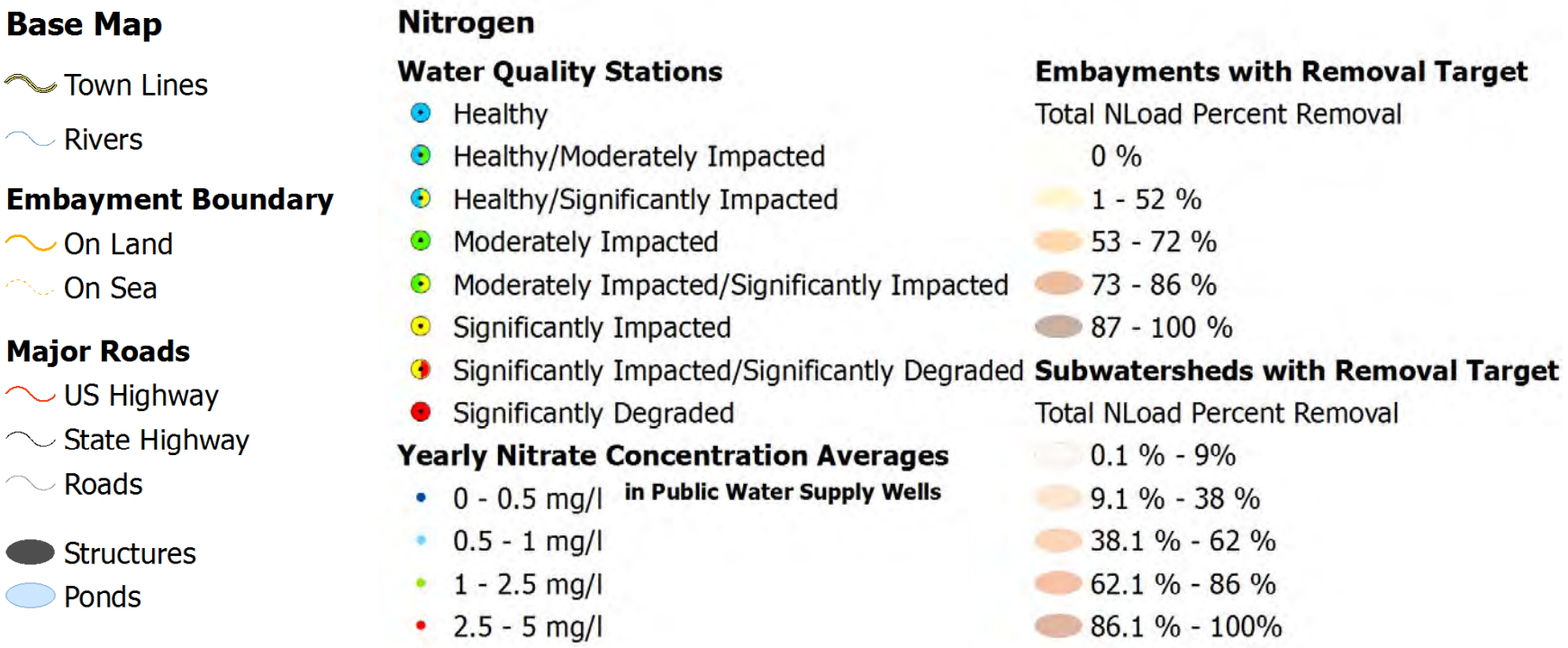

Ice House
Total N
mg/L
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5/30/2006
5/30/2007
5/30/2008
5/30/2009
5/30/2010

Averaged Pore Water Quality Measurements for Beaches along Provincetown Harbor

Stations denoted "B" and "W" are located below and within the wrack line, respectively.



Nitrogen Problem



Sources: MassGIS, MEP, CCC

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

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Provincetown Harbor
Hatches Harbor

Existing Infrastructure

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

- Structures
- Ponds

Existing Conditions

- Approx. Locations of Loans Issued for Title 5 Repair
- Potential Title 5 Compliance Issues
- Wastewater Treatment Facility
- Groundwater Discharge Points
- Sewered Parcels

Enhanced Attenuation Sites

- Pipe
- Stormwater

Public Supply Wells

- Public Water Supply Well
- Small Volume Wells, Non-Transient
- Proposed Public Water Supply Well
- Surface Water Supply
- Small Volume Wells, Transient

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

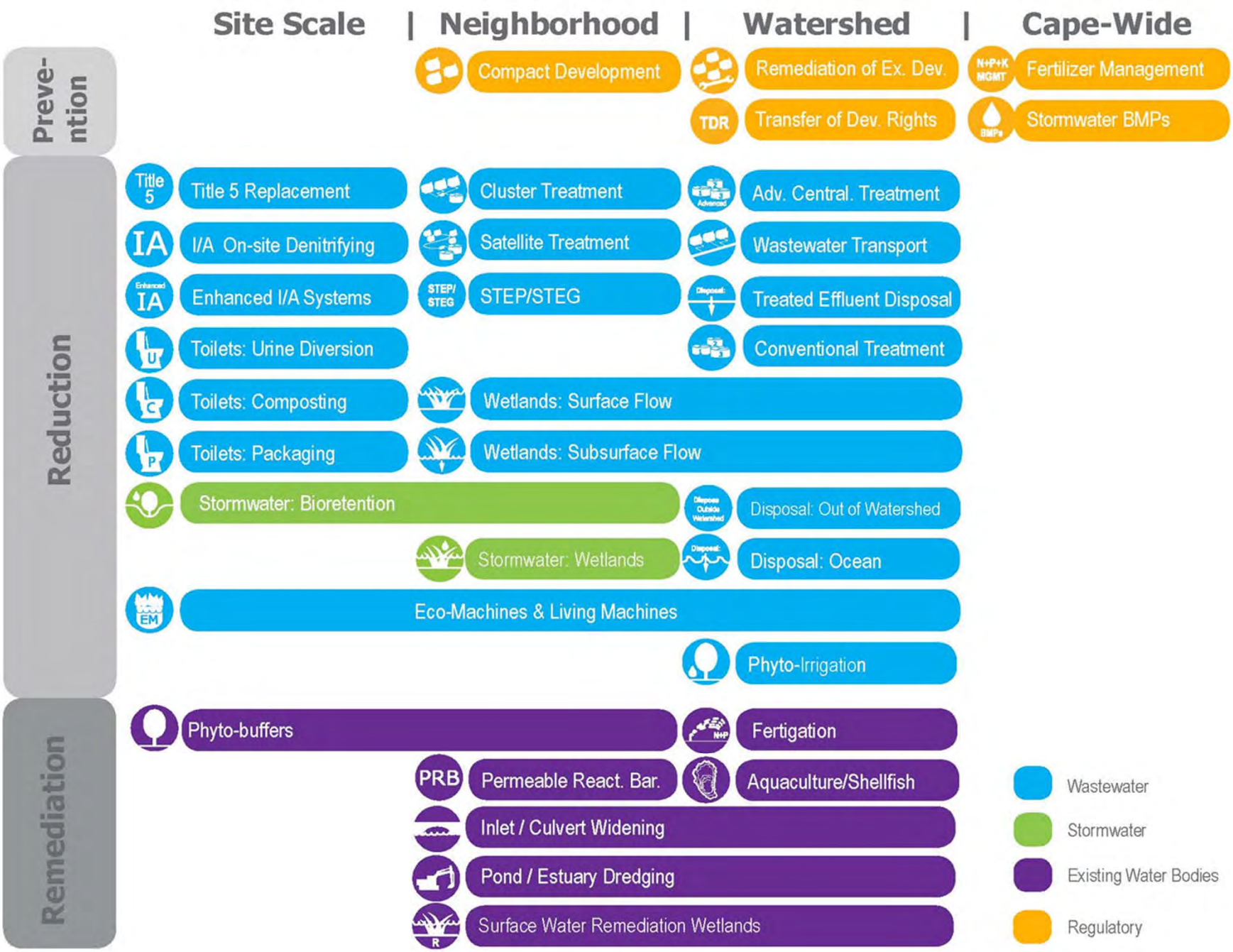
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Provincetown Harbor
Hatches Harbor


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

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

http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/provincetown-harbor

Provincetown Harbor
Hatches Harbor

Cape Cod 208 Area Water Quality Planning
Provincetown Harbor Watershed Working Group

Meeting One
Wednesday, September 18, 2013
Provincetown Town Hall
260 Commercial Street, Provincetown, MA 02657

MEETING SUMMARY DRAFT

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 31, 2013
8:30 am-12:30 pm
Provincetown 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 31 meeting. (Technology fact sheets will be distributed in early October)
- Cape Cod Commission
  - Review data additions suggested by Working Group (p. 6), with specific focus on:
    - Contact Brian Carlson to acquire additional historical information on water quality studies, human indicator points, and nonpoint source tracking.
    - Contact Charlene Greenhalgh to update the Truro chronology.
    - Verify the seasonal and year round data numbers.
    - Verify the average single family property tax bill in Provincetown and Truro with David Guertin and Charlene Greenhalgh
    - Verify the average annual water bill estimates with David Guertin
    - Obtain the average sewer bill estimate from Provincetown
    - Map golf courses in the Provincetown and Hatches Harbors Managed Surfaces GIS layer.
    - Update existing and proposed infrastructure for stormwater projects and for Phase 3 sewer construction developments.
    - Add 'in lake management' options to the technology matrix.
- CBI
  - Distribute the link to the slides and notes from the Cape Cod Commission's affordability/financial presentation.
  - Distribute September meeting summary.
  - Distribute meeting materials for October meeting: fact sheets and agendas

WELCOME AND INTRODUCTIONS

Mr. David Gardner, Provincetown Assistant Town Administrator, welcomed the members of the Provincetown Harbor Watershed Working Group. Appendix A contains a list of the group members who were in attendance. All meeting documents and presentations for the Provincetown Harbor Watershed Working Group are located here: http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/provincetown-harbor

Ms. Kate Harvey, Facilitator from the Consensus Building Institute (CBI), described CBI's role and the member selection process.[1] She noted that the Cape Cod National Seashore (CCNS) would participate in the working group, but the CCNS representative was not present due to a schedule conflict. She then described the role of Mr. Scott Horsely, Area Manager for the Outer Cape. Mr. Horsely will attend the stakeholder workshops and prepare materials for subsequent workshops. In Spring 2014, he will work with the Cape Cod Commission staff to draft a comprehensive Cape-wide plan that combines the specific recommendations from the Provincetown Harbor Watershed Working Group with the recommendations of the other 11 watershed working groups on the Cape.

She 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.

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.

[1] CBI's role and the participant selection process are described in detail in the Draft Process Protocols located at:. http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/provincetown-harbor

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.[2] As previously noted, the September working group meetings were focused on baseline conditions. During the next working group meeting 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 TAC, which is a committee of the Cape Cod Water Protection Collaborative. The Technology Panel consists of academic and research institutions, state watershed managers, and consultants.

LOCAL PROGRESS TO DATE

On two separate chronologies, Mr. Horsley highlighted past actions that had been taken in Provincetown and Truro that would either protect or inhibit water quality in Hatches Harbor and Provincetown Harbor.[3] Working group members 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. Participants made the following comments and suggestions on the Provincetown chronology:

- Include the drinking well site development and investigations completed in the North Union Field Well Area.
- Several water quality studies, human indicator points and non point source tracking reports could be added.
- Include information about the freshwater ponds. For example, The Board of Health is testing water quality in Shank Painter Pond due to degrading water quality.
- Add the construction of the drainage pipe near Brown street that drains into Shank Painter Pond

Participants made the following comments and suggestions on the Truro chronology:

[2] Contact Erin Perry (eperry@capecodcommission.org) if you would like to schedule an Affordability and Financing presentation.

[3] Detailed chronologies are available in the Provincetown Baseline Data Presentation located here: http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/provincetown-harbor

- Include the Army Corps of Engineers' modeling of East Harbor Lagoon/Pilgrim Lake to open a culvert in this area.
- Check some of the descriptions for accuracy.
- Include bathing and *E.Coli* data collection from Beach Point.

Reflecting on the chronologies, the members identified the following lessons learned that should be remembered while developing the 208 Plan Update:

- Special considerations like opt-out clauses may move a project forward, but they can result in negative financial impacts and challenging political battles.
- Density must be considered when evaluating options.
- Be willing to consider emerging technologies even if they may not seem popular at the moment.
- Consider population growth projections.
- Include a public education component to ensure citizens understand the implication of not protecting water quality.
- Create integrated planning solutions that link the completion of multiple projects simultaneously.
- Acceptance of project components/requirements can be facilitated by state mandates.
- Privatization of solutions can also produce positive results.

BASELINE CONDITIONS

Mr. Horsely 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 Hatches Harbor and Provincetown Harbor. Working group members and members of the public are encouraged to view the layers on the Cape Cod Commission website.[4] 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.

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

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

fertilizer applications. Golf courses will be mapped in the Provincetown Harbor and Hatches Harbor layer.

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. Landuse Vision Map data delineates economic centers; industrial and service trade areas, village boundaries, resource protection areas, other designations, and undesignated lands.

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

Density and Buildout Layers – The density layer shows the current per acre density of existing dwelling units in quarter square mile grids. The regional buildout layer shows the maximum potential buildout over a 20-25 year time horizon using the towns zoning regulations and normalizing that data by applying state designated zoning layers. Mr. Horsley emphasized that buildout scenarios are an art, not a science, and that there are many ways to conduct a buildout analysis. He illustrated this point by showing a slide that depicted differences between the Regional Buildout, the Comprehensive Waste Management Plan buildout, and the Local Comprehensive Planning Buildout for communities across the Cape. He explained that the Cape Cod Commission's approach to the buildout analysis enables comparison of potential buildout across the entire Cape, but eliminates some detail on the local level. Mr. Horsely noted that density is a critical component to the 208 Update Plan since 30% growth will increase capital costs by 40%.

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. Approximately 2,896 people, or 1.3% of Cape Cod's total population, live in the Provincetown Harbor watershed. Those living in Provincetown Harbor are 54 years of age on average and the average median income is slightly more than $50,000. Over 90% of the population in the watershed is white. Provincetown Harbor has a year round population of approximately 48% and a seasonal population of approximately 51%. The total assessed value of residential homes in the study area is 1.9 billion dollars. The average single-family property tax bill (2013) is approximately $5,500 in Provincetown, which is higher than the average in the Commonwealth, and $4,300 in Truro, which is lower than the average in the Commonwealth. The annual water bill is approximately $670 in Provincetown and Truro.

Working group members made the following comments on the social data inputs:

- The seasonal and year round housing data appear to be inaccurate – seasonal residency should be much higher. In some places in Truro, homes were not occupied during the census, so nobody was counted. A working group member suggested that seasonality can also be determined by water consumption, trash weight, or parking.

- The average single-family tax bill in Truro seems higher than expected.
- The average annual water bill data for Provincetown seems inaccurate. Provincetown's average annual water bill is approximately 80-90 dollars.

THE PROBLEM

Mr. Horsely explained that eutrophication from nitrogen loading in coastal estuaries and phosphorous loading in ponds and lakes is the primary problem to solve. In many areas of the Cape, the Massachusetts Estuary Project (MEP) provides three years of nutrient loading, water quality monitoring data, and hydrodynamic information to link water quality data to nitrogen loads. However, site specific MEP data does not exist for Provincetown and Hatches Harbors.

Mr. Horsely 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 wasterwater treatment facility effluent and natural sources comprise the remaining one percent. In response to a question about whether nitrogen from rainfall could enhance vegetative coverage in the wetland, Mr Horsely said it could but the 208 Update will not focus on uncontrollable nitrogen from sources like rainfall. Mr. Horsely presented data collected on the average porewater (water between grains of sand) quality measurements. This data is collected every couple of weeks in a study to determine whether or not wrack is increasing the nutrient load in porewater.

Ponds and lake data in the Provincetown and Hatches Harbors watersheds is available from the Pond and Lake Stewardship Project (PALS), but this data has yet to be analyzed in the Provincetown and Hatches Harbor watersheds. The ponds in these watersheds are unique and cannot be easily categorized into the typical trophic status.

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 offered a few caveats with the data: 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 more likely to exhibit compliance issues due to the small size of the land parcels, shallow depth to groundwater at the parcel locations, soil structure, 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.

EXISTING AND PROPOSED SOLUTIONS

Mr. Horsely 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 sewershed phasing, if applicable. They requested group members provide additional information on planned stormwater upgrades to existing infrastructure. A group member said Provincetown has a list of areas planned for stormwater upgrades, which they are completing at a rate of one to two projects per year.

WORKING GROUP FEEDBACK

Ms. Harvey prompted the group to think about additional information that should be included on these data layers or in the analysis as well as corrections that should be made to the data. Group member suggested the following:

- Include town information on infrastructure upgrades/treatments
- Include buildout data from Truro Comprehensive Plan
- Check the seasonal population data to ensure accuracy
- Include herbicides and pesticide application data
- Include data on boat use in the harbor and boat pump outs
- Include Shank Painter Pond/Quaking Bogs
- Verify inclusion of the East Harbor culvert
- Update the Truro Average Property Tax Bill estimate
- Double-check the water bill data
- Obtain sewer bill data from Provincetown
- Include SMAST data for Provincetown Harbor and Hatches Harbor
- Utilize Administrative Consent Orders to identify Title 5 failures
- Include data from the sewering addition of 3A, 3B, and 3C in Provincetown
- Utilize nitrogen data found in the 'Rolan or Sunny'
- Include Truro and Provincetown's designated offshore aquaculture areas.

Ms. Harvey then asked group members to identify any key challenges or needs they foresee in Provincetown and Hatches Harbors. The members suggested the following challenges and needs:

- Shank Painter Pond
- Jurisdictional issues at Beach Point / East Harbor
- Bird impacts at Hatches Harbor
- Seasonal variation in population is challenging due to concentration in Provincetown and Beach Point.
- Healthy shellfish beds
- Bathing beach issues
- Obtaining support from second homeowners for actions to improve water quality
- Codes (e.g. plumbing)
- Funding in the form of debt relief and the political process
- Long-term maintenance of the harbor and related monitoring requirements of the buildings not connected to the sewer system
- Development on Provincetown Harbor
- Contaminants of emerging concern
- Land management plantings to remove nitrogen

NEXT STEPS

Mr. Horsely 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. He noted that the packaging toilets option would likely be removed from the matrix. 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.

- A group member suggested adding 'in lake management options' such as alum treatments to the matrix.
- Another group member suggested adding natural ecosystem remediation techniques.

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

1) Establish targets and articulate project goals.
2) Identify priority geographic areas
3) Determine which management activities should definitely be implemented. These might be the easiest and least costly management activities that should be undertaken regardless of other management actions.
4) Assess alternative options to implement at the watershed or embayment scale
5) Assess options to implement at the site-level
6) Examine priority collection/high density areas
7) Consider traditional sewering or other grey infrastructure management options

In response to the alternatives screening process, one group member suggested the group must keep cost in mind as they asses the options and develop a plan. He suggested that the plan must be presentable in a cost-benefit format to help garner support for it.

OPERATING PROTOCOLS

Ms. Harvey briefly reviewed the draft protocols and requested the group members suggest changes to the groundrules. She reiterated the primary role of the group members is to provide guidance on the development of solutions to address the water quality issues specific to their watershed. In response to a question posed by a group member, Ms. Harvey confirmed that in addition to the meeting summaries for this group, group members will also have access to the other groups' meeting summaries.

PUBLIC COMMENTS

The facilitator opened the floor for public comments of three minutes or less each. No members of the public commented, but working group participants made the following announcements.

- NSTAR intends to spray a mixture of five different herbicides on the foliage in the power line right of ways. Community members can voice their opinion about the application of herbicides by commenting on the NSTAR Vegetation Management plan.

- It would be good to give NSTAR an alternative to herbicides. Our neighbors have found an alternative in oil of clove, with peppermint, and other natural ingredients. It is good to protest the use of herbicides, but they need alternatives to help control the mosquito population.

Appendix A
Attendance

Name	**Affiliation**
Elaine Anderson	Provincetown Board of Selectmen
Joe Buteau	Energy Committee, Truro
Brian Carlson	Conservation Agent, Provincetown
Amy Costa	Provincetown Center for Coastal Studies
Laurie Demolino	Board of Health, Provincetown
Paul DeRuyter	Whaler's Wharf
David Gardner	Assistant Town Manager, Provincetown
Charleen Greenhalgh	Town Planner, Truro
David Guertin	Director, Provincetown Department of Public Works
Jerry Irmer	Provincetown Harbor Committee
Laura Kelly	Owner, Littlefield Landscapes, Wellfleet
Rex McKinnsey	Provincetown Harbor Master
Ed Nash	Golf Superintendents Association
Pat Pajaron	Health Agent, Truro
Jonathan Sinaiko	Water and Sewer Board Chairman
Dan Milz	PhD Candidate, University of Chicago
Staff	
Tom Cambareri	Water Resources Program Manager, Cape Cod Commission
Jay Detjens	GIS Analyst, Cape Cod Commission
Scott Horsely	Area Manager, Cape Cod Commission
Erin Perry	Special Projects Coordinator, Cape Cod Commission
Kate Harvey	Facilitator, Consensus Building Institute
Eric Roberts	Facilitator, Consensus Building Institute

Cape Cod 208 Area Water Quality Planning
Stage Harbor Watershed Working Group

Meeting One
Thursday, September 26, 2013
Chatham Community Center, 702 Main St., Chatham, MA 02633
8:30 am - 12:30 pm

8:30 Welcome – *Cape Cod Commission*

8:35 Introductions, confirm working group membership and participation – *Stacie Smith* (*Facilitator, Consensus Building Institute) and Working Group*

9:00 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

9:15 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Patty Daley (Area Manager*, *Cape Cod Commission)*

9:30 Review and add to chronology of work to date – *Working Group*

9:45 Discussion: drawing on past work to move forward – *Stacie Smith* (*Facilitator, Consensus Building Institute) and Working Group*

10:00 Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Patty Daley (Area Manager*, *Cape Cod Commission)*

10:45 Break

11:00 Discussion of Baseline Conditions - *Stacie Smith* (*Facilitator, Consensus Building Institute) and Working Group*

11:30 Framework for Moving Forward: Preview Meetings 2 and 3 – *Patty Daley (Area Manager*, *Cape Cod Commission)*

12:00 Review/Discuss Process Protocols - *Stacie Smith* (*Facilitator, Consensus Building Institute Facilitator and Working Group*

12:10 Public Comments

12:30 Adjourn

Stage Harbor Group

Baseline Conditions & Needs Assessment

What is the 208 Plan?

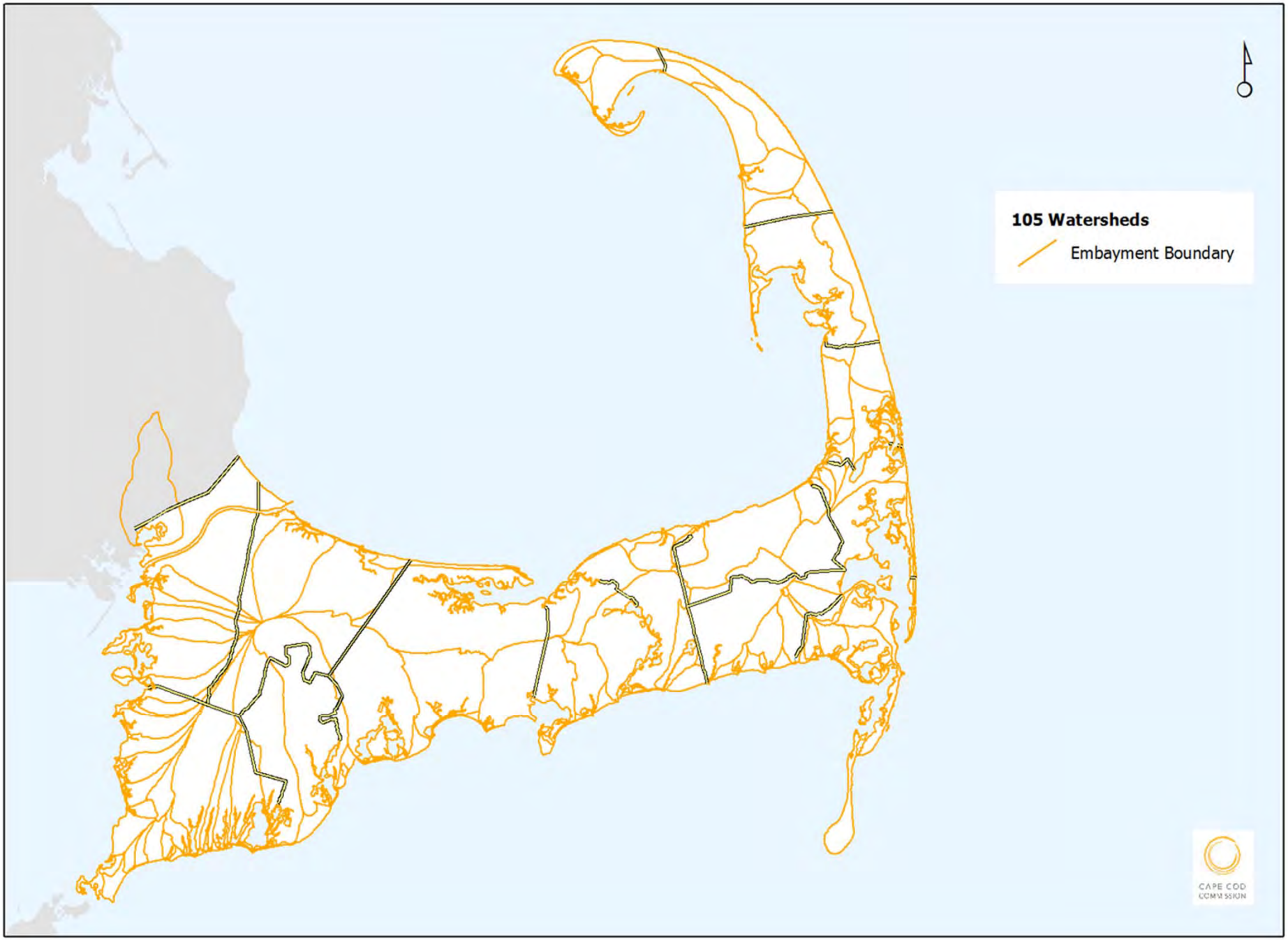
Clean Water Act Section 208

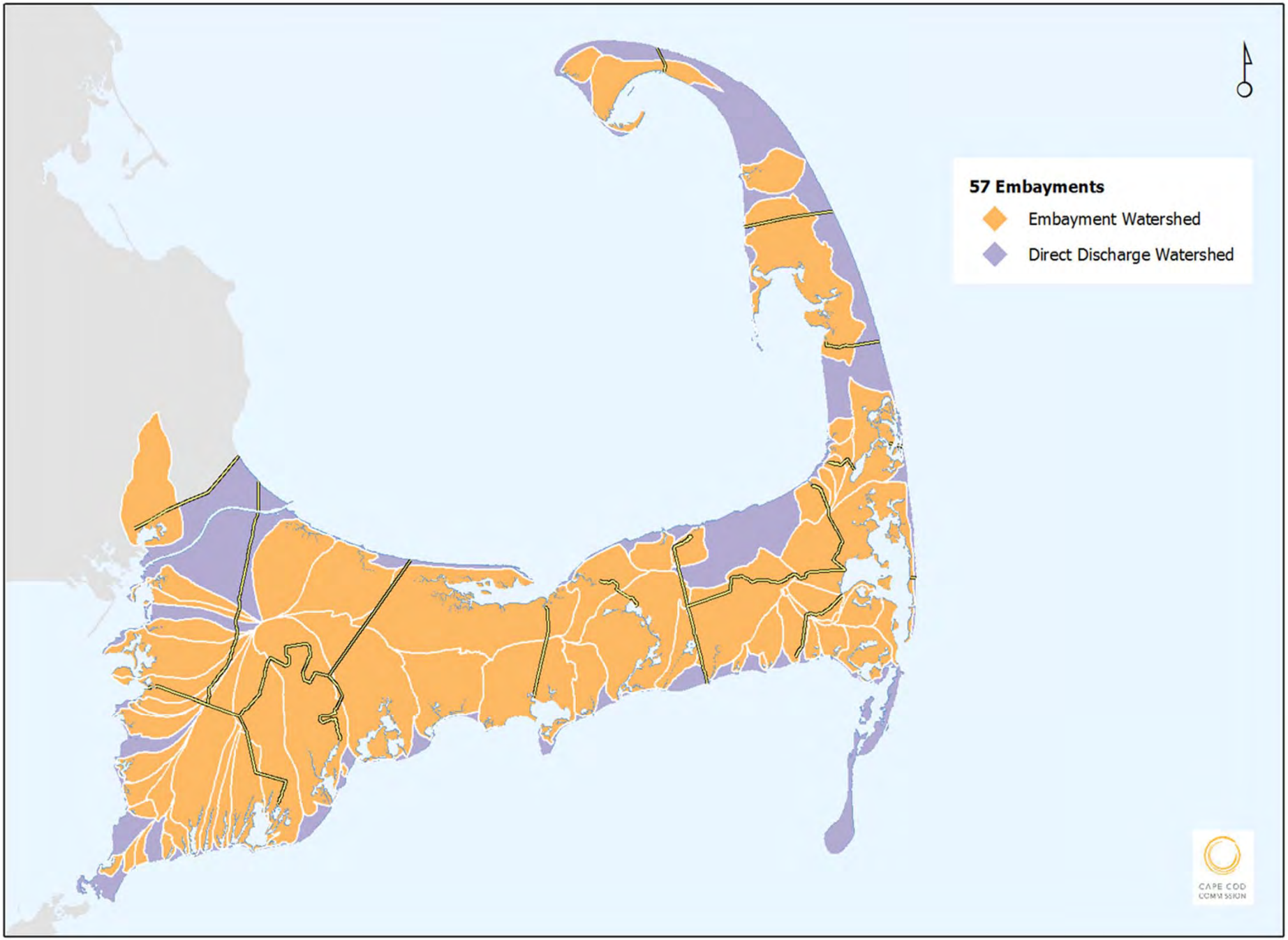
The Commission was directed to update the 1978 Plan

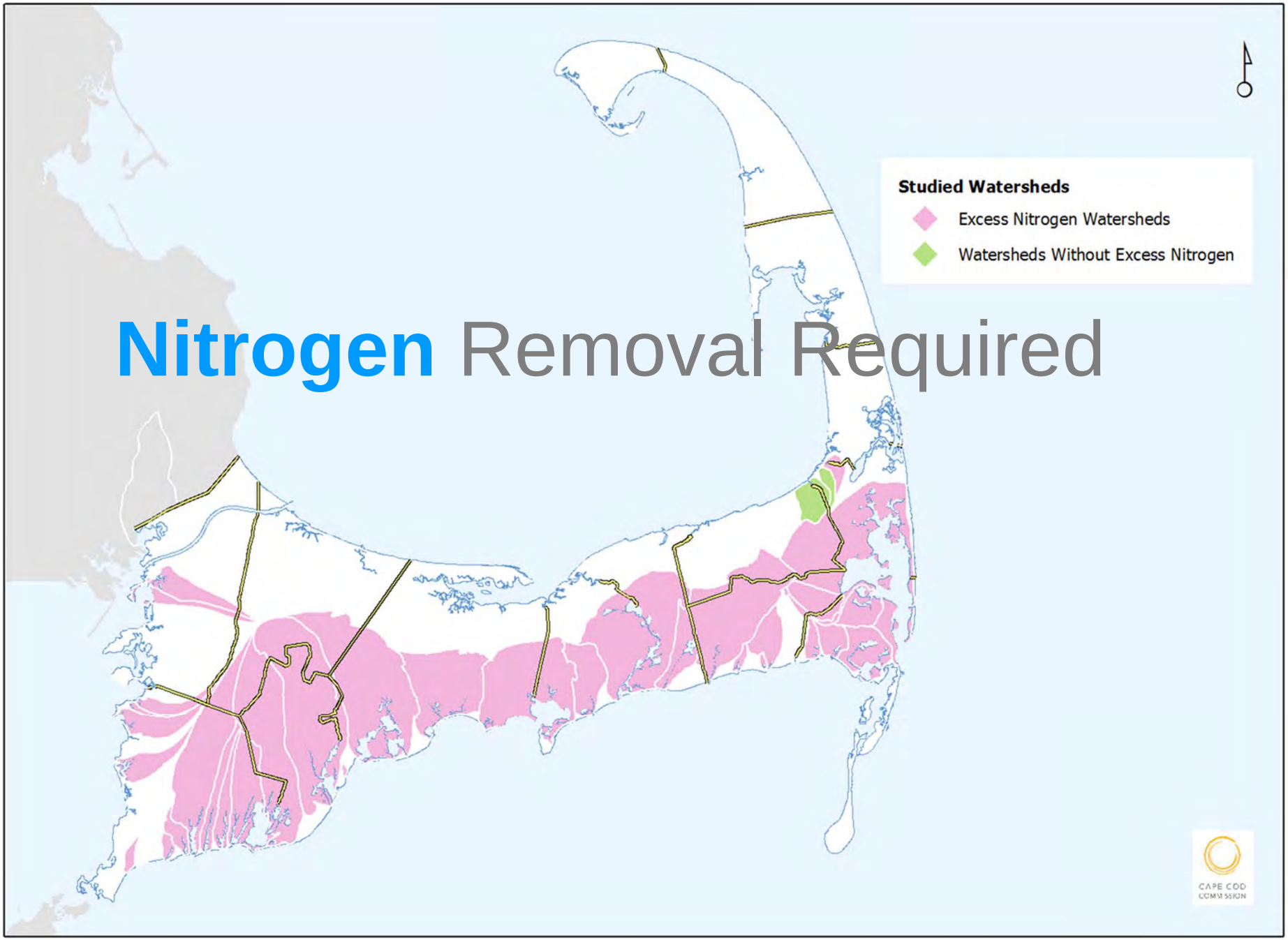
The Commonwealth provided $3 million to fund the project

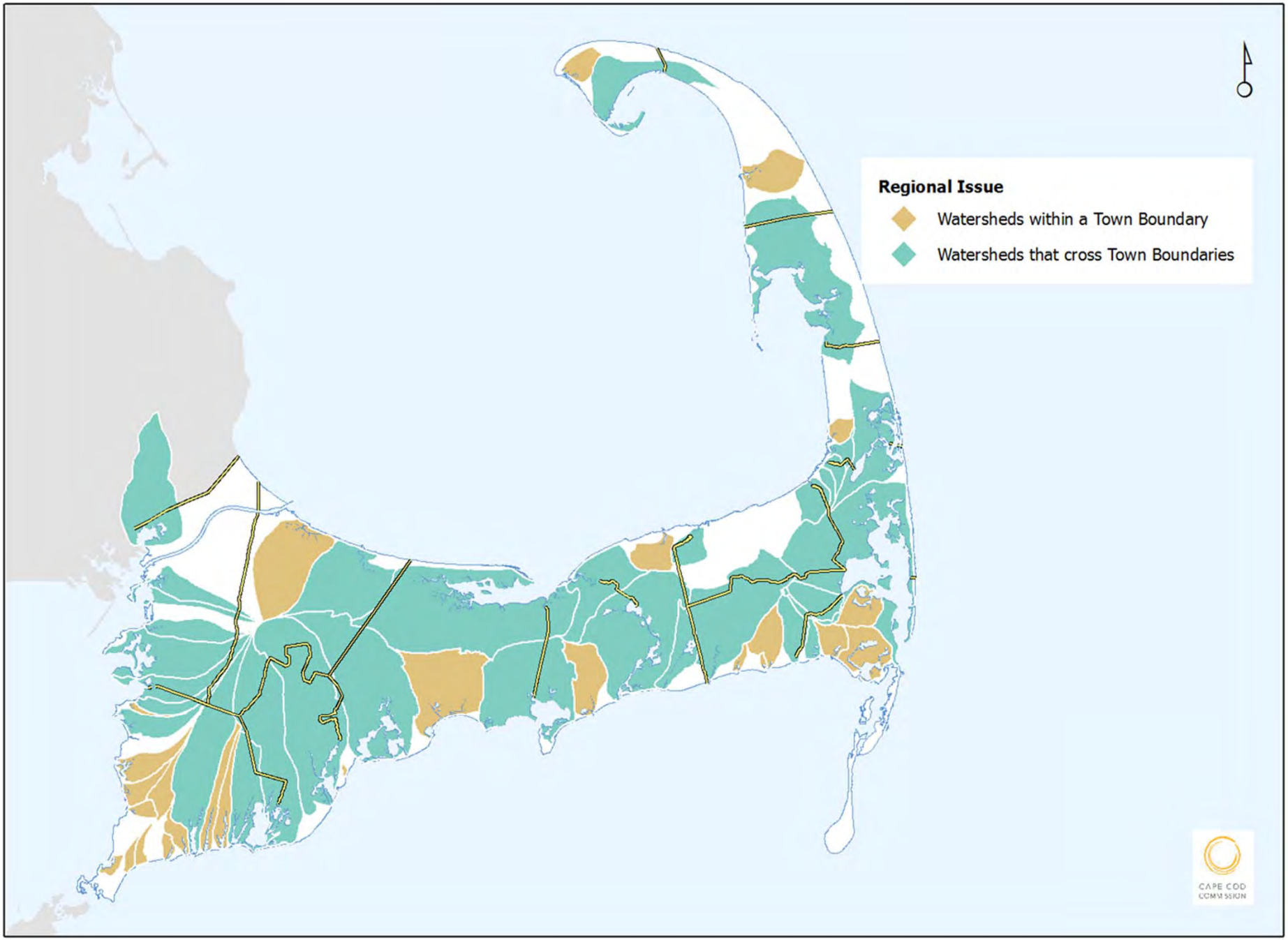
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

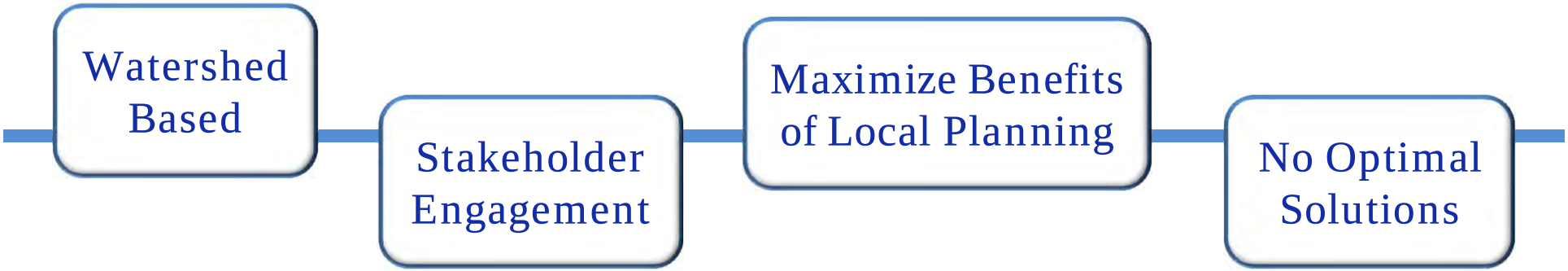

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

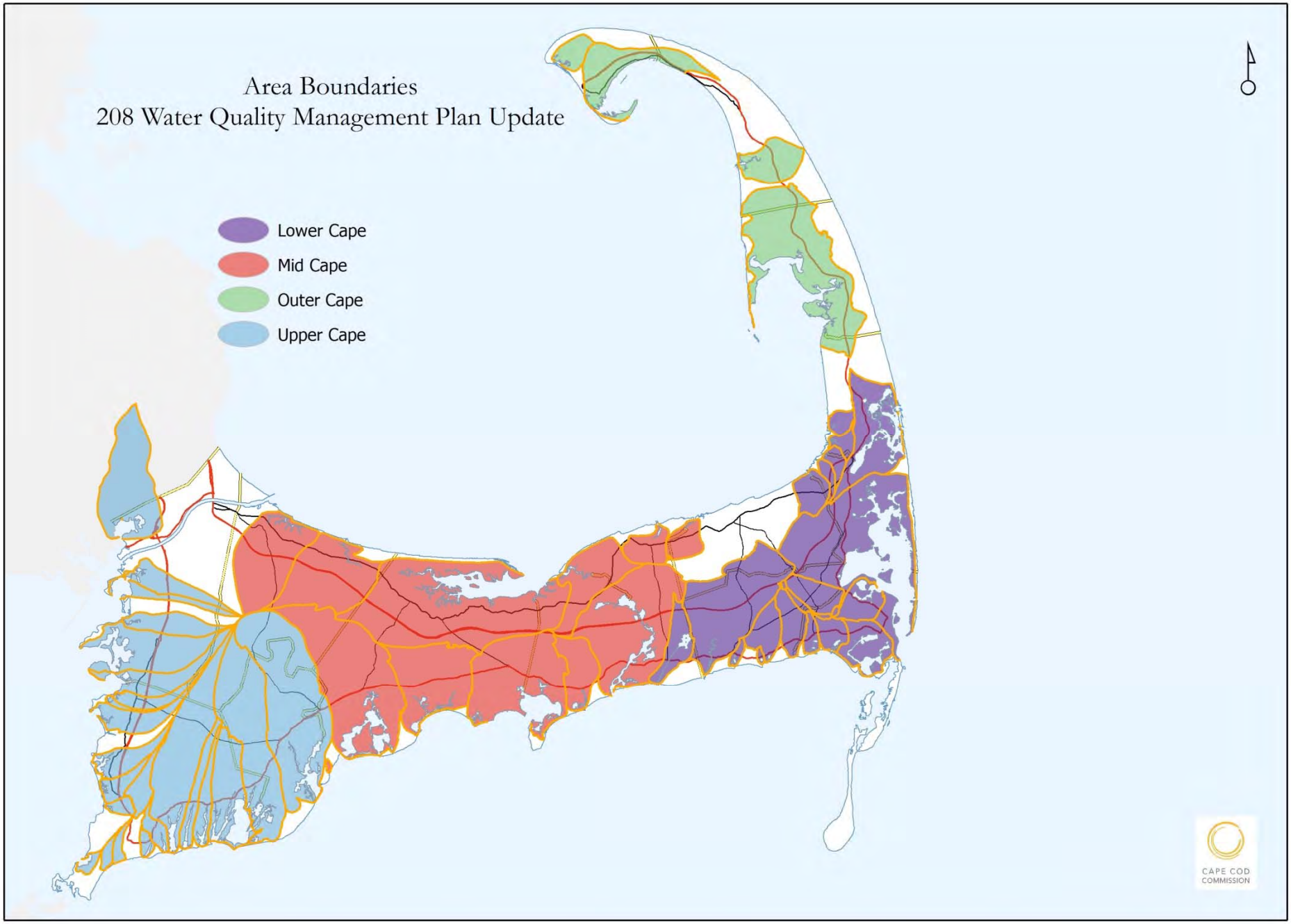

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

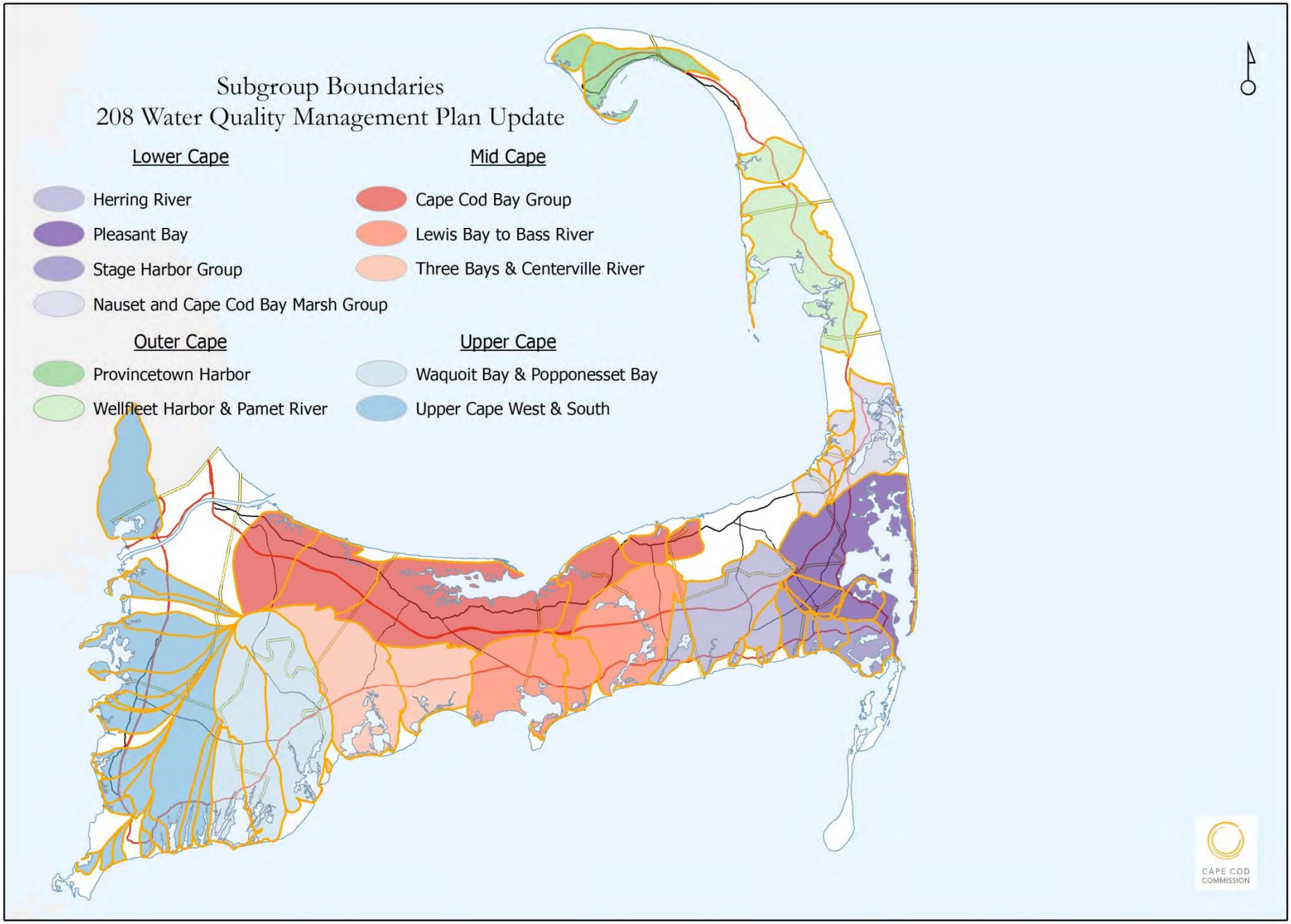

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

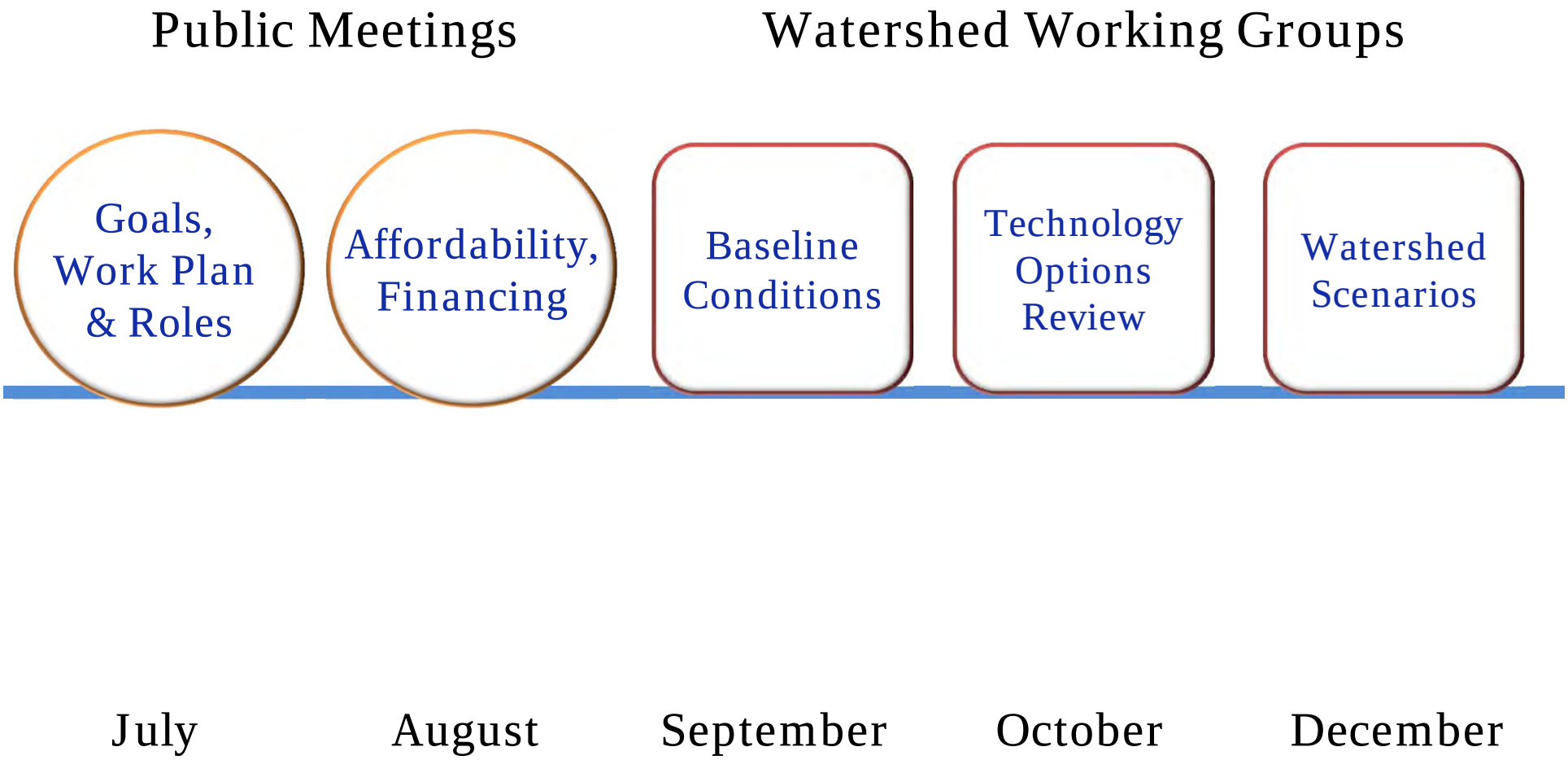


Goal:
To generate a series of approaches in each watershed that will meet water quality standards

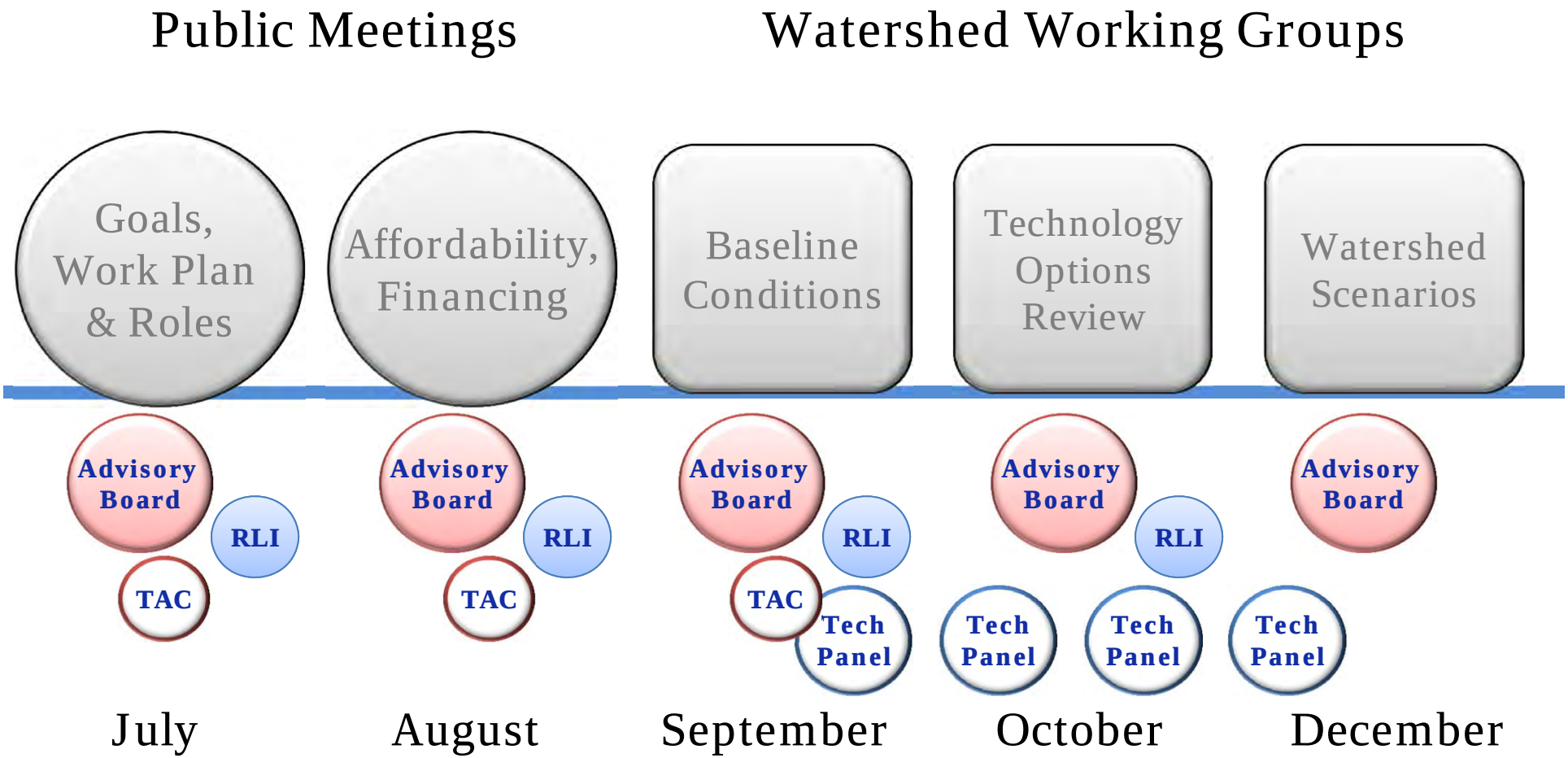

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

What is the stakeholder process?



208 Planning Process



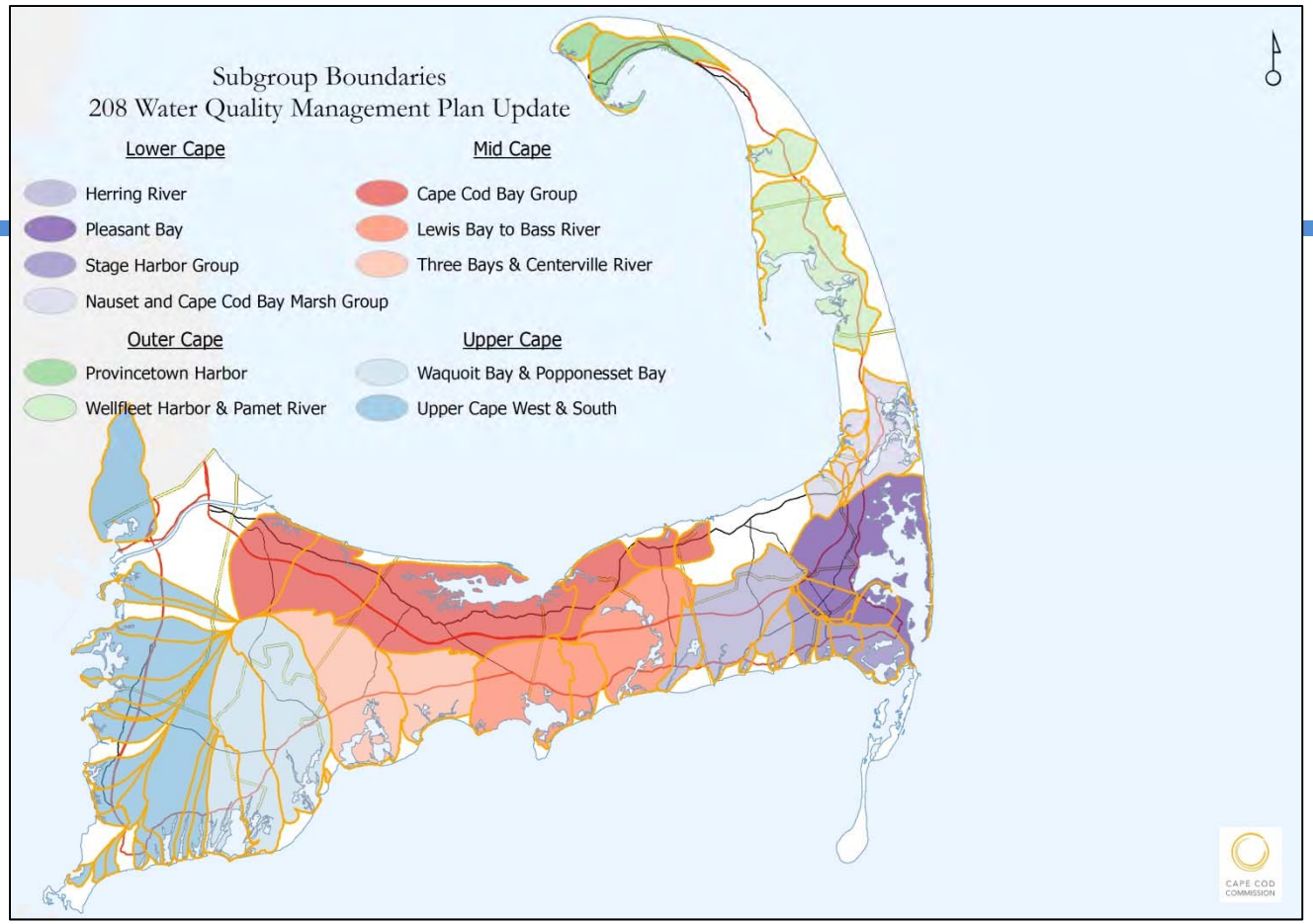
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



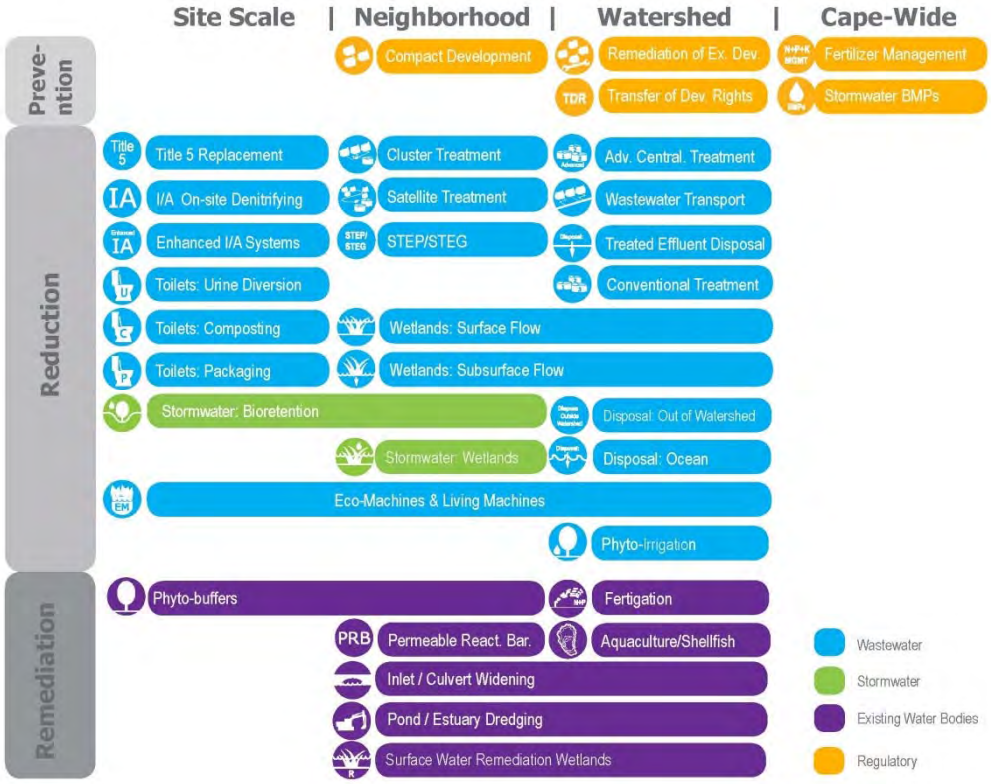
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5



208 Planning Process

Baseline Conditions

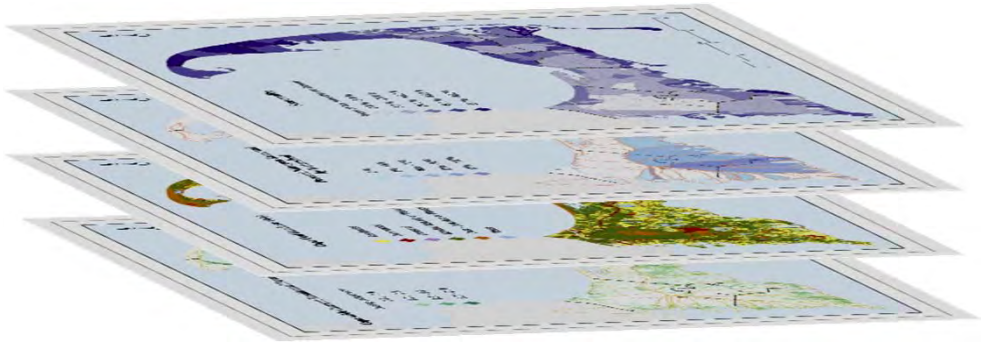
11 Working Group Meetings: Sept 18-27

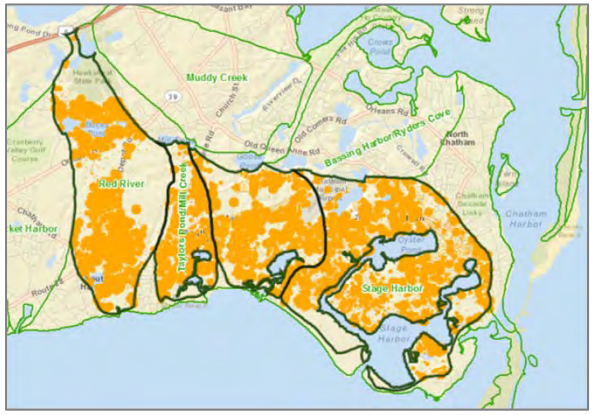
Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11





208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Goal of Today's Meeting:

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

208 Planning Process

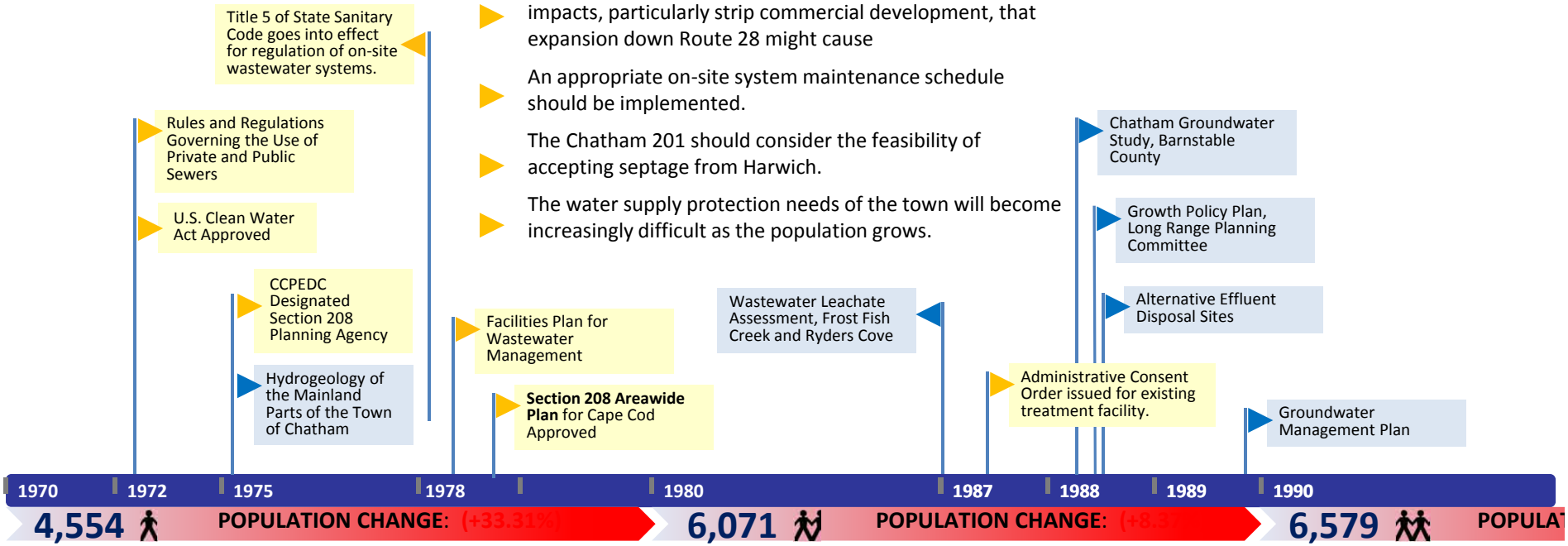
Local Progress to Date

Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek

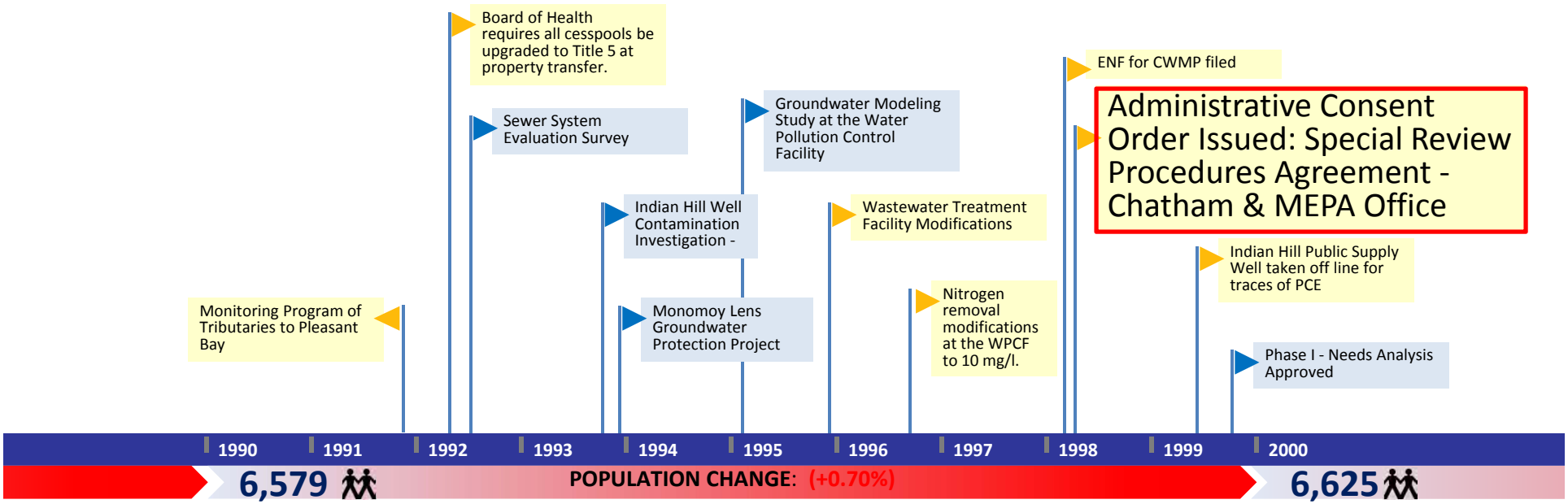
Chatham

From 1978 Section 208 Plan

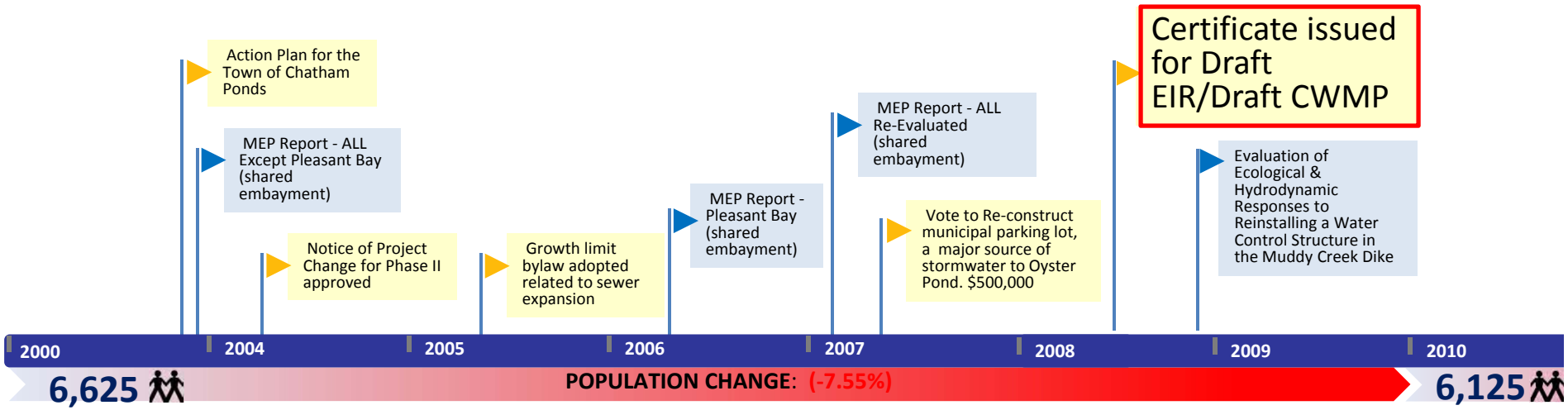
- A study is needed to examine the present capacity of the town's sewage treatment plant and the possible need to expand the present collection system.
- The 201 facility plan should be town-wide in scope and should fully evaluate all problem areas in the town including coastal water problems.
- The 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.



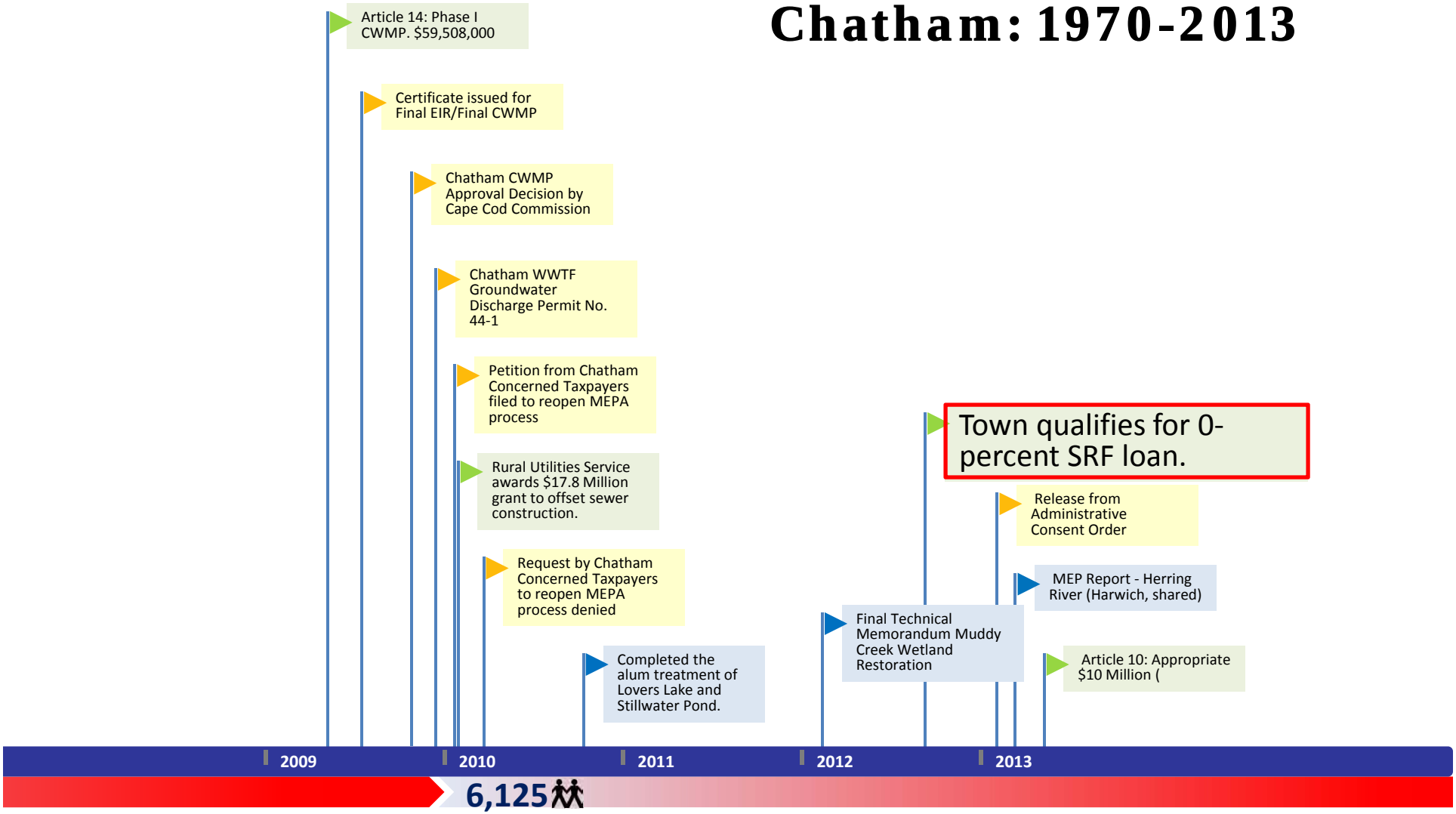
Chatham: 1970-2013



Chatham: 1970-2013



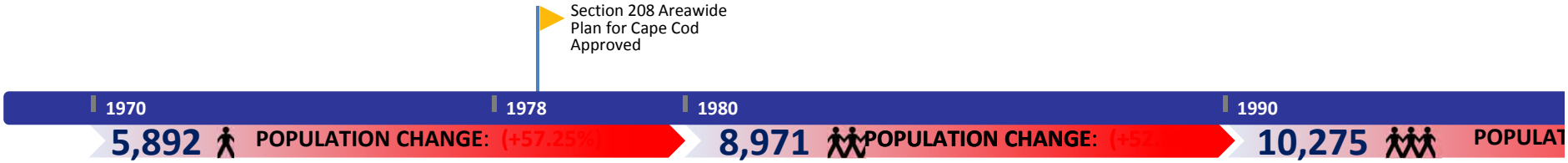
Chatham: 1970-2013



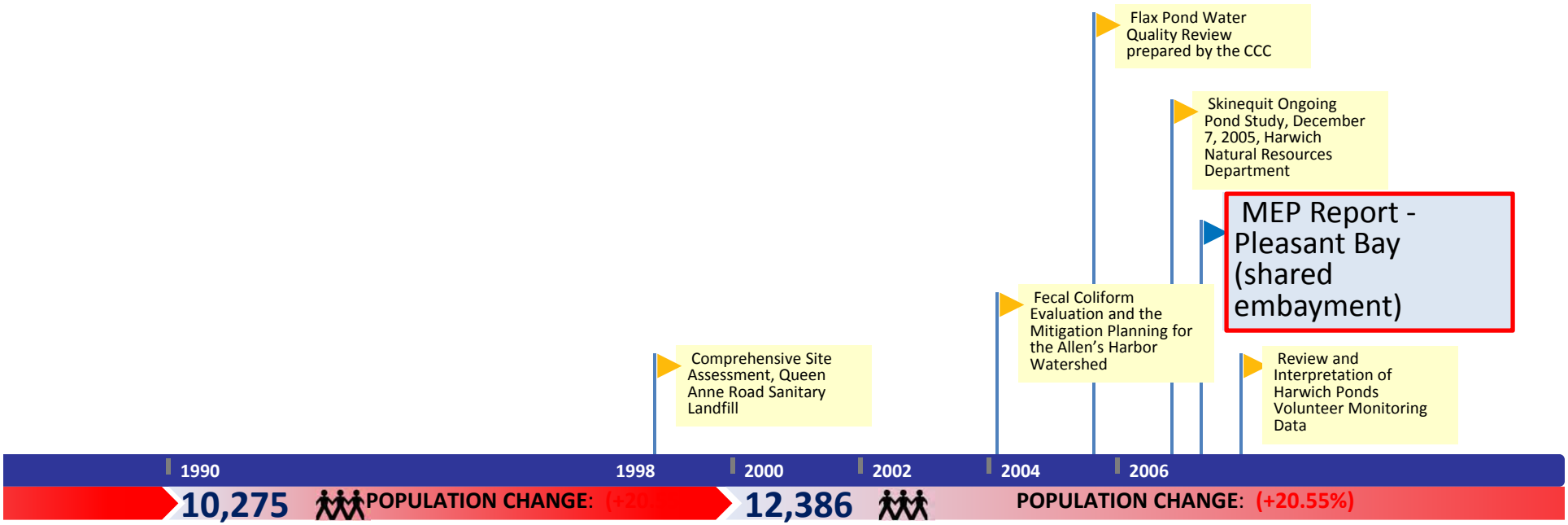
Harwich

From 1978 Section 208 Plan

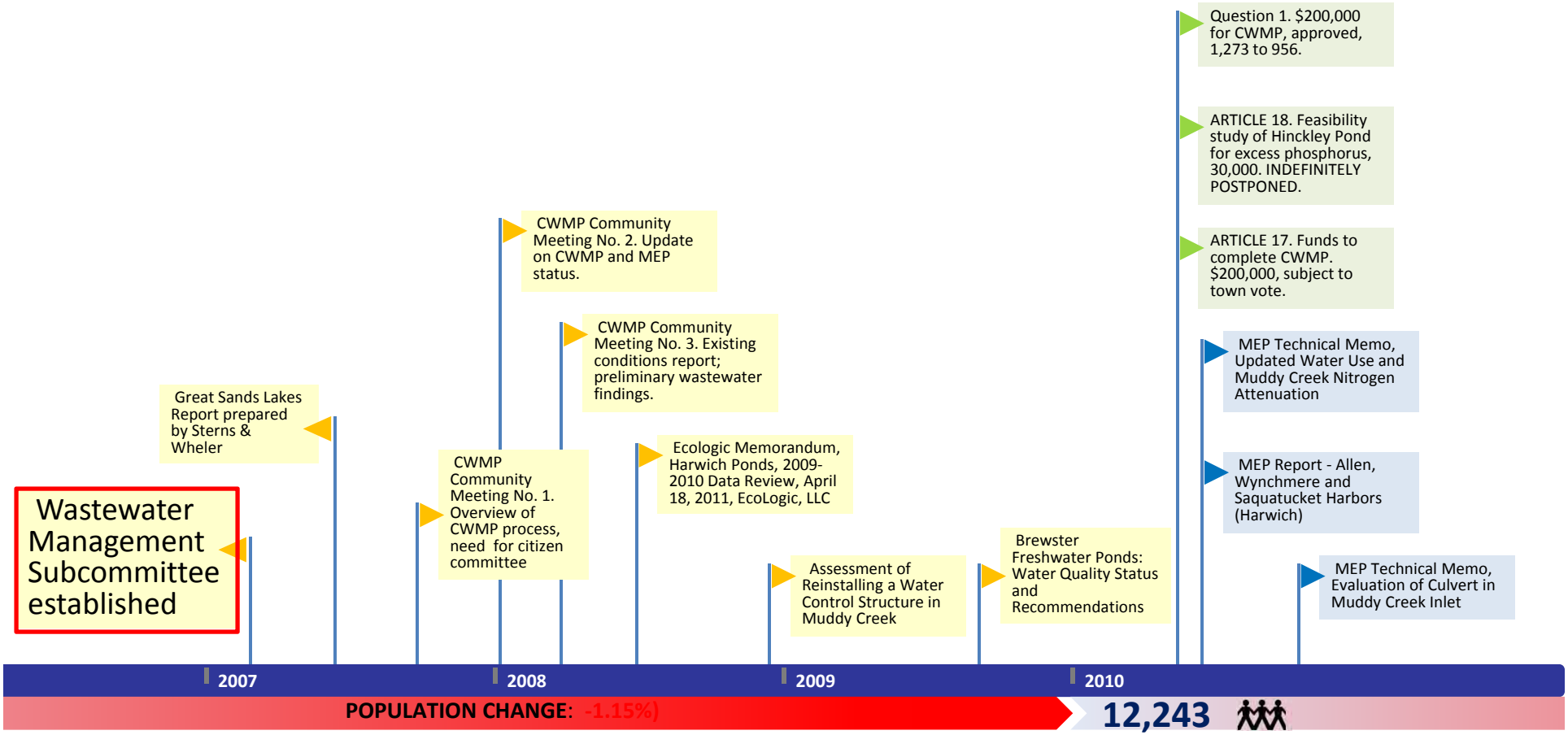
- That the town recognize that the Category 2 problem areas on the south side of town need special attention.
- It is also suggested that the town consider establishing "Seasonal Residential Districts" in this area to control the conversion of seasonal dwellings to year-round occupancy.
- The 208 plan 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.



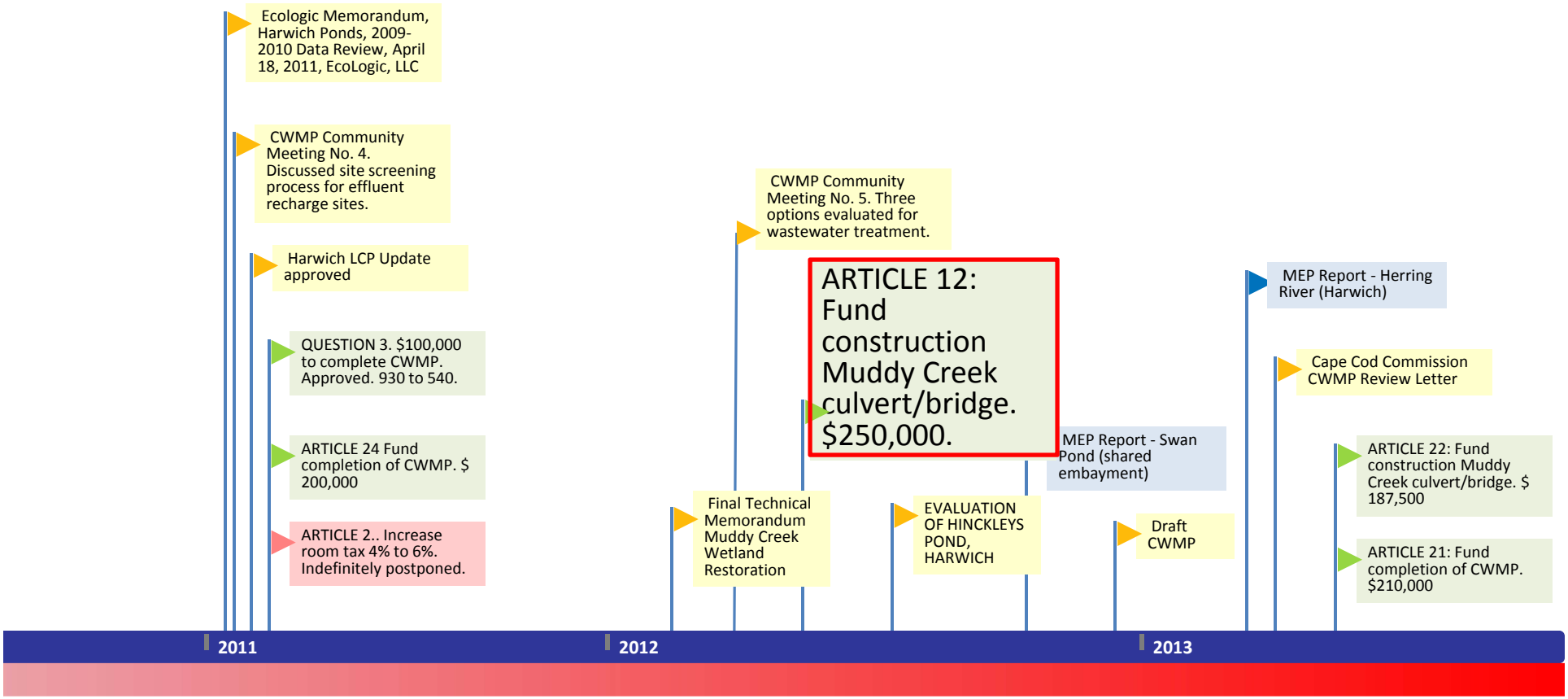
Harwich: 1970-2013



Harwich: 1970-2013



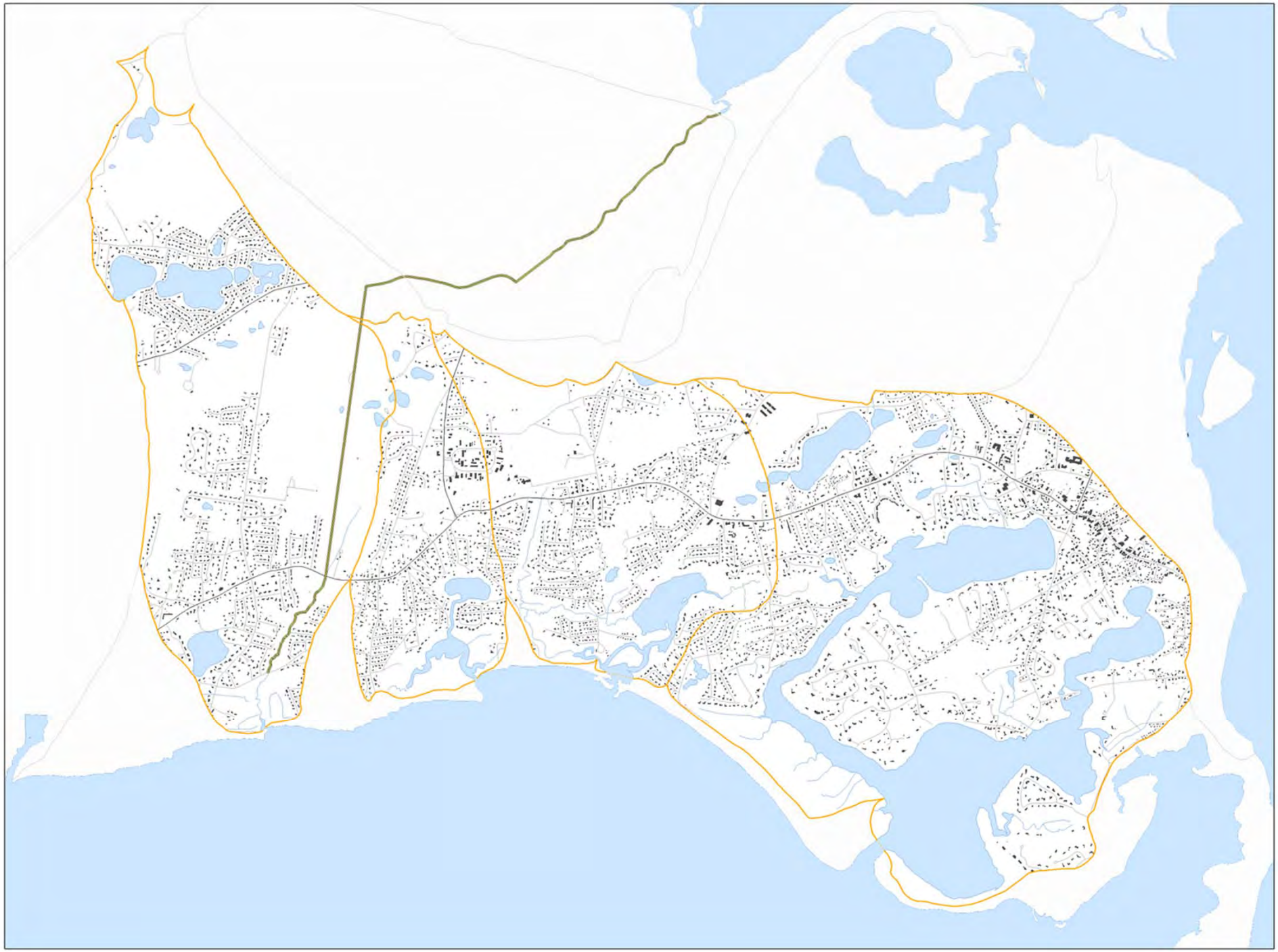
Harwich: 1970-2013



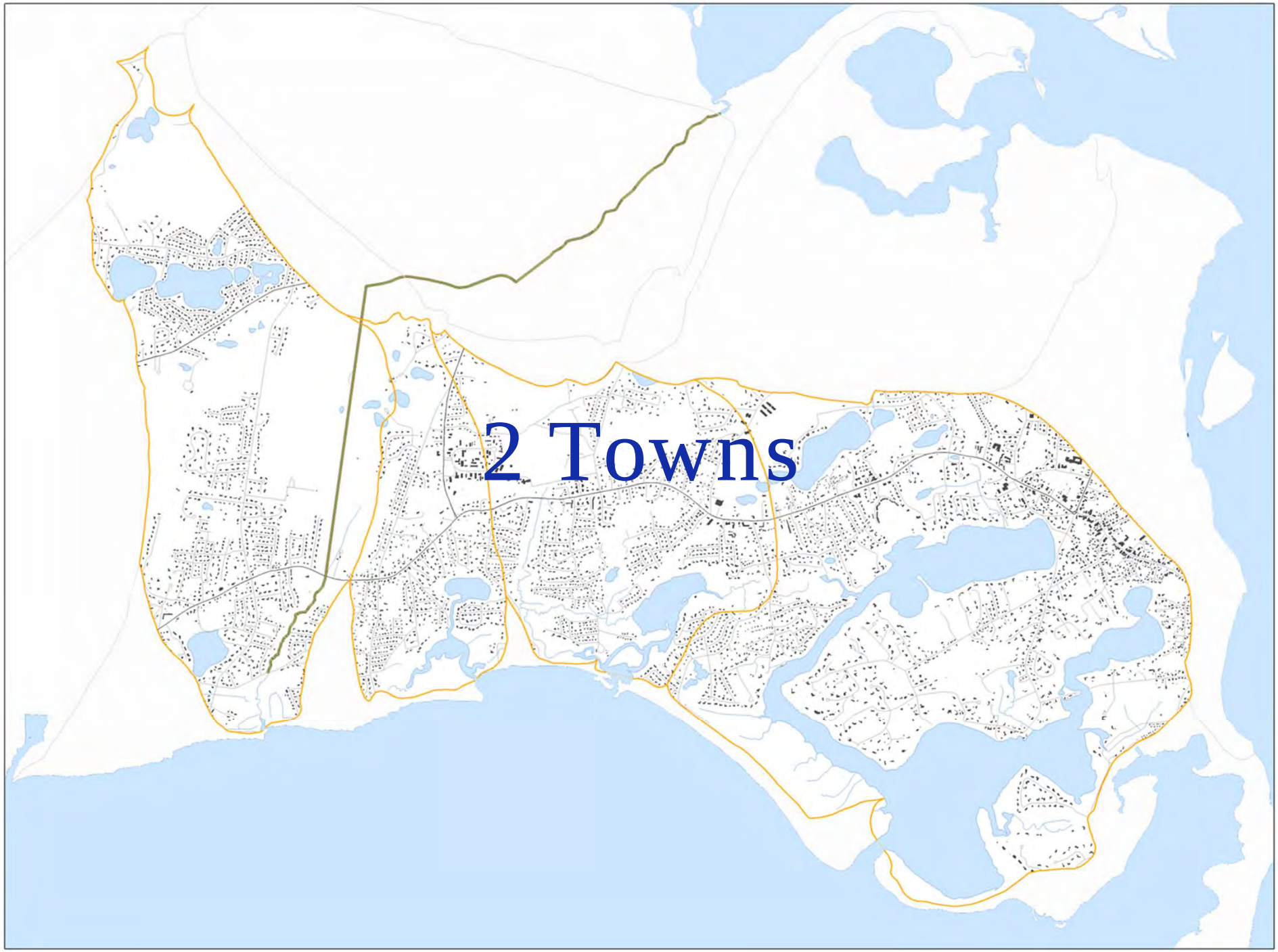
Did we miss anything?

Your Watersheds

Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek




8.8 square miles


2 Towns

Natural Features

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

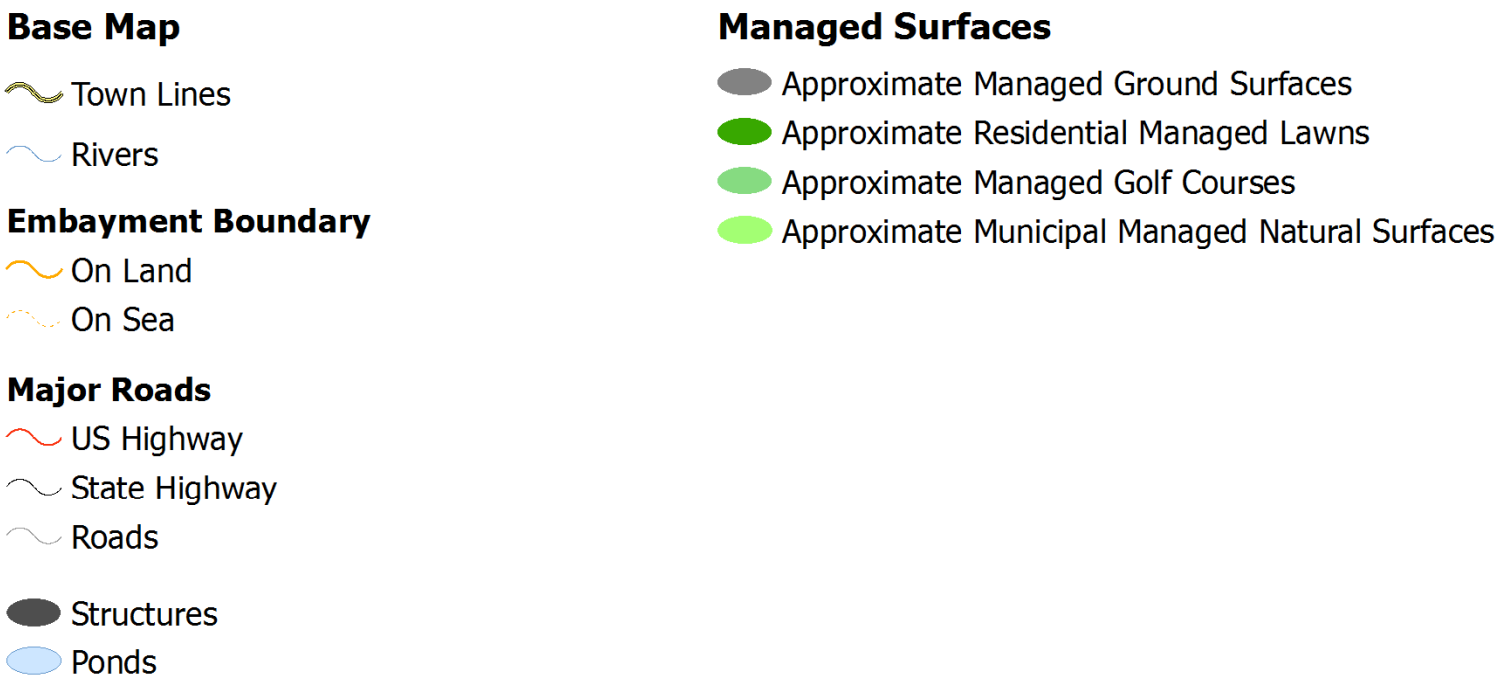
- Structures
- Ponds

Natural Areas

- Natural Heritage & Endangered Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

Managed Surfaces



Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

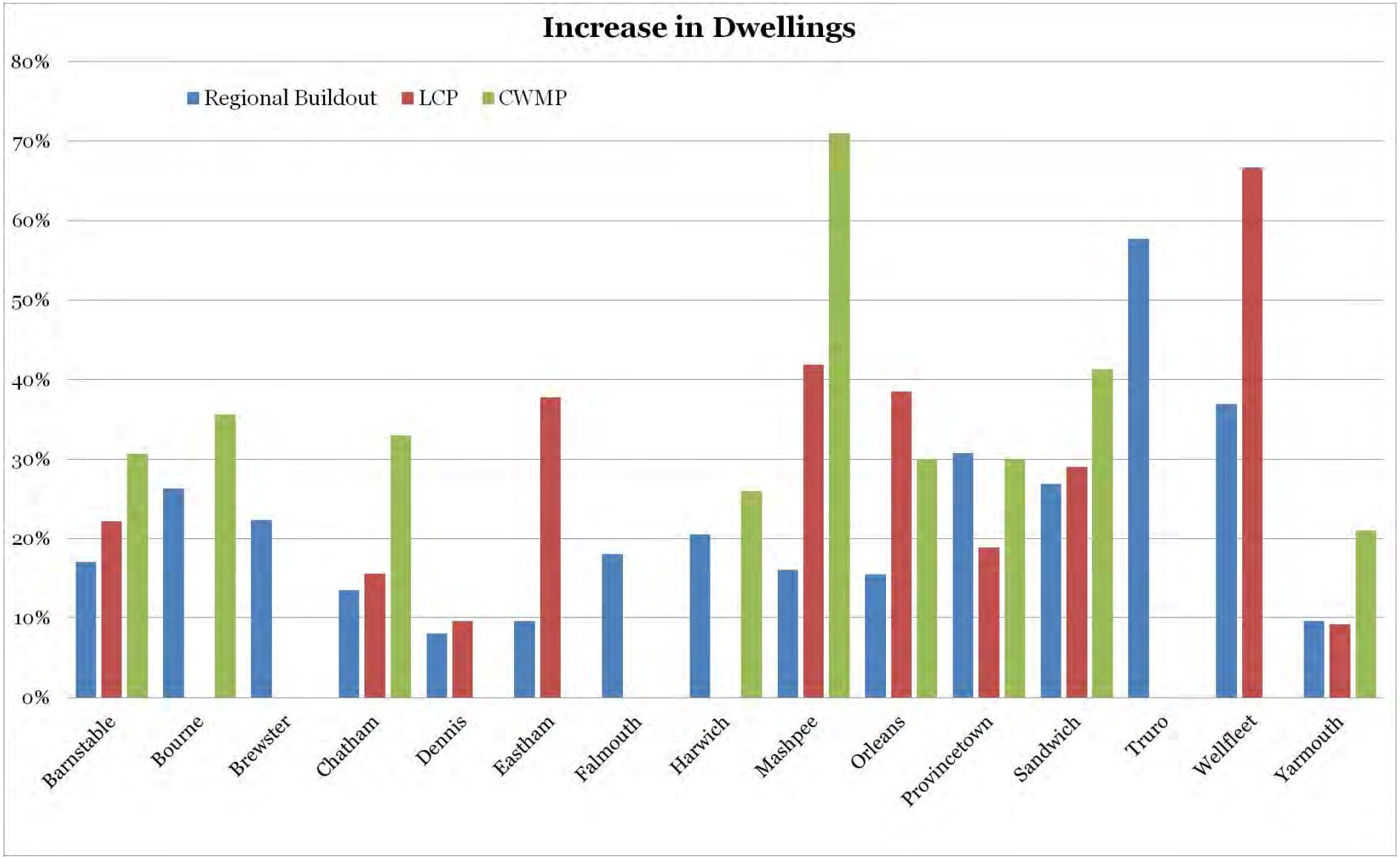
Sources: MassGIS, MassDOT

Density

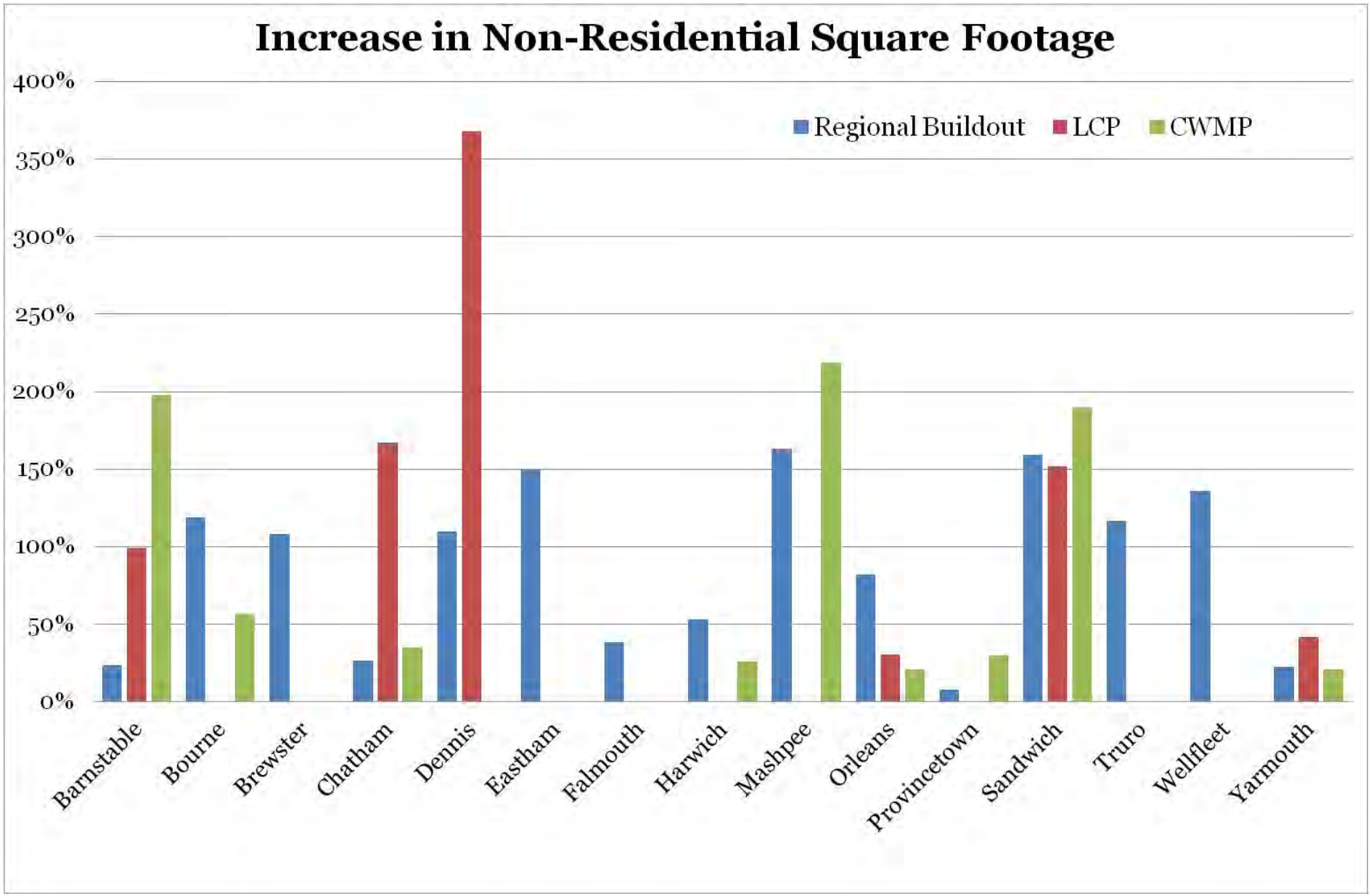
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

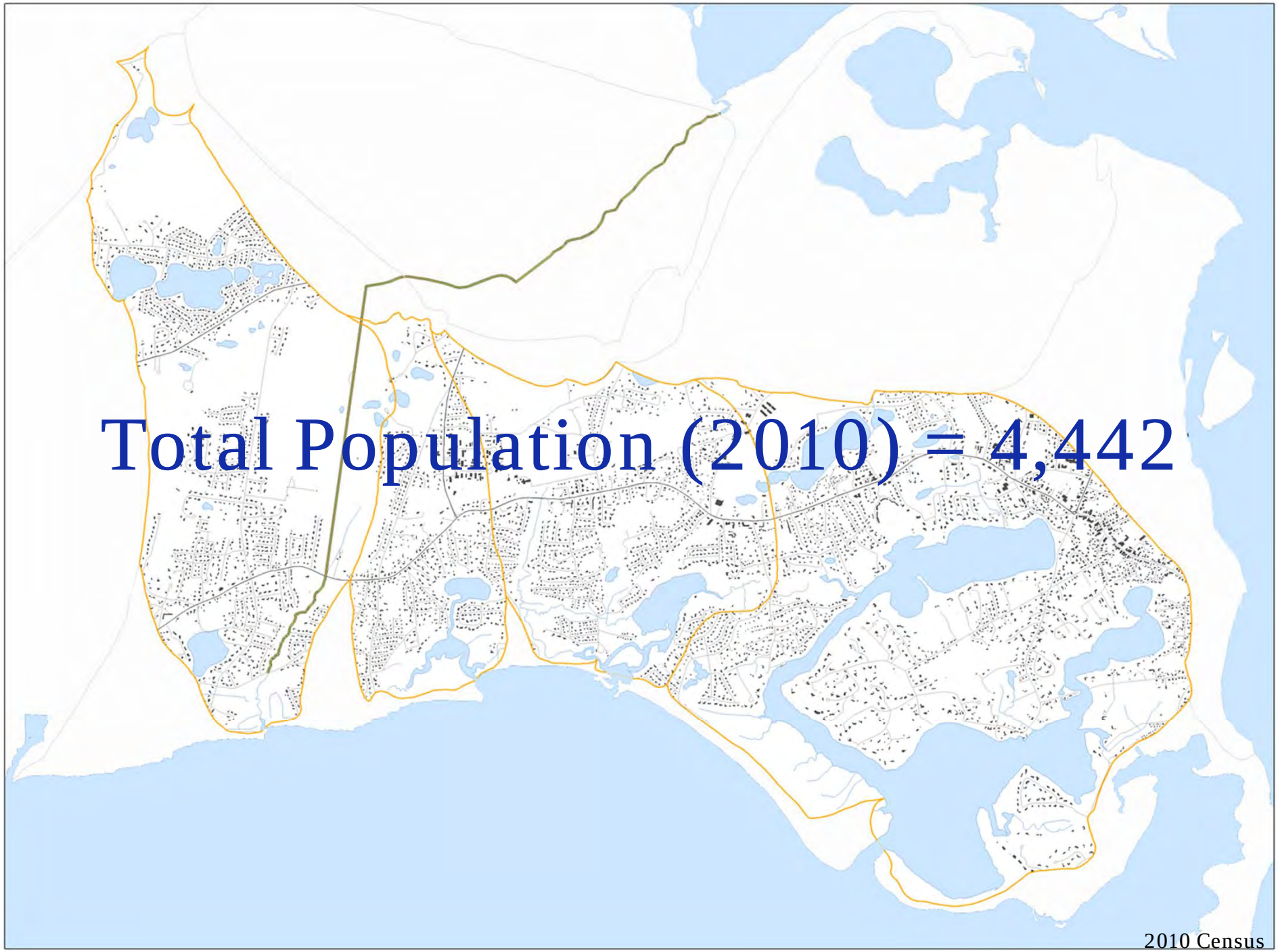

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout

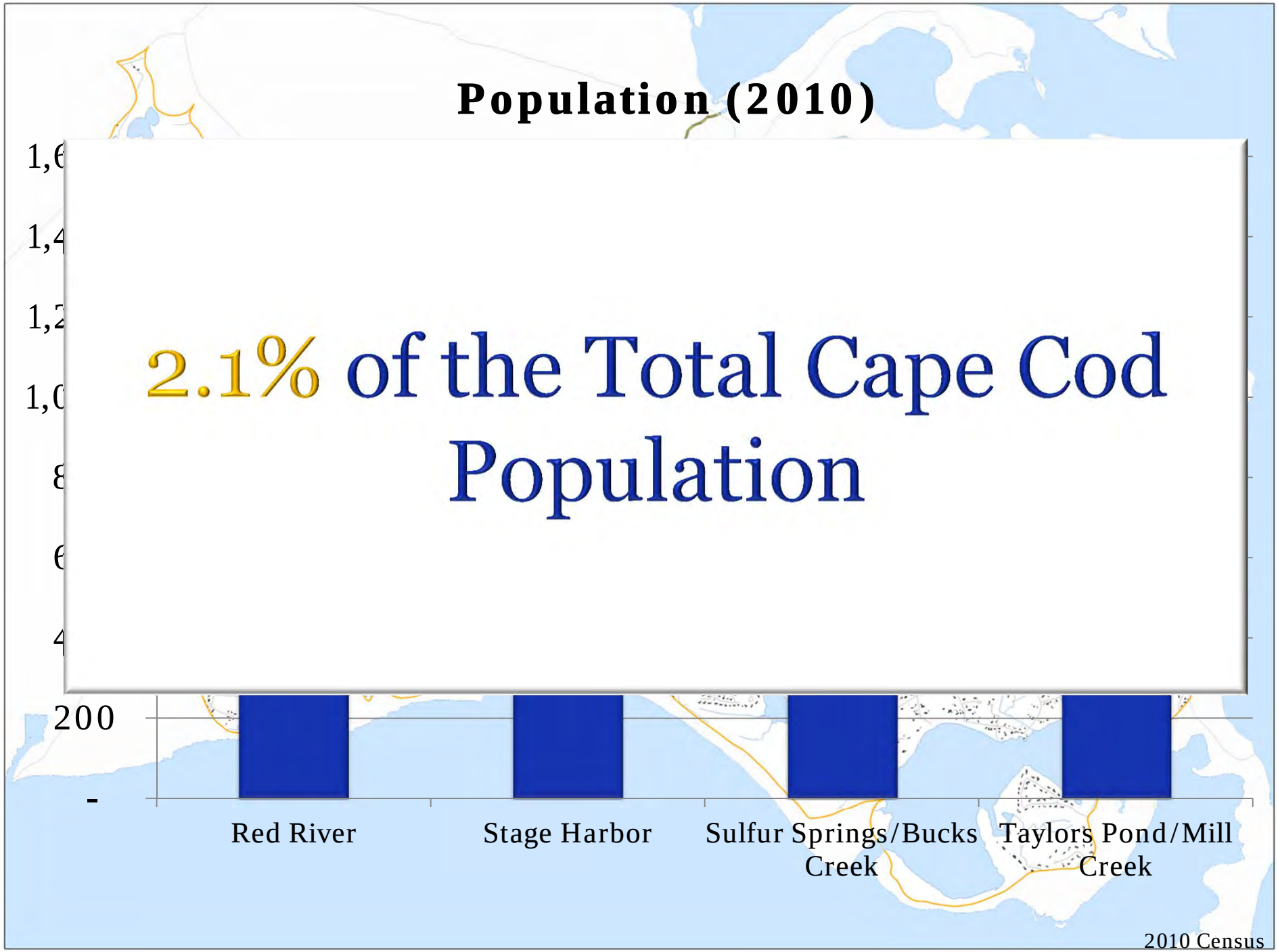

Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

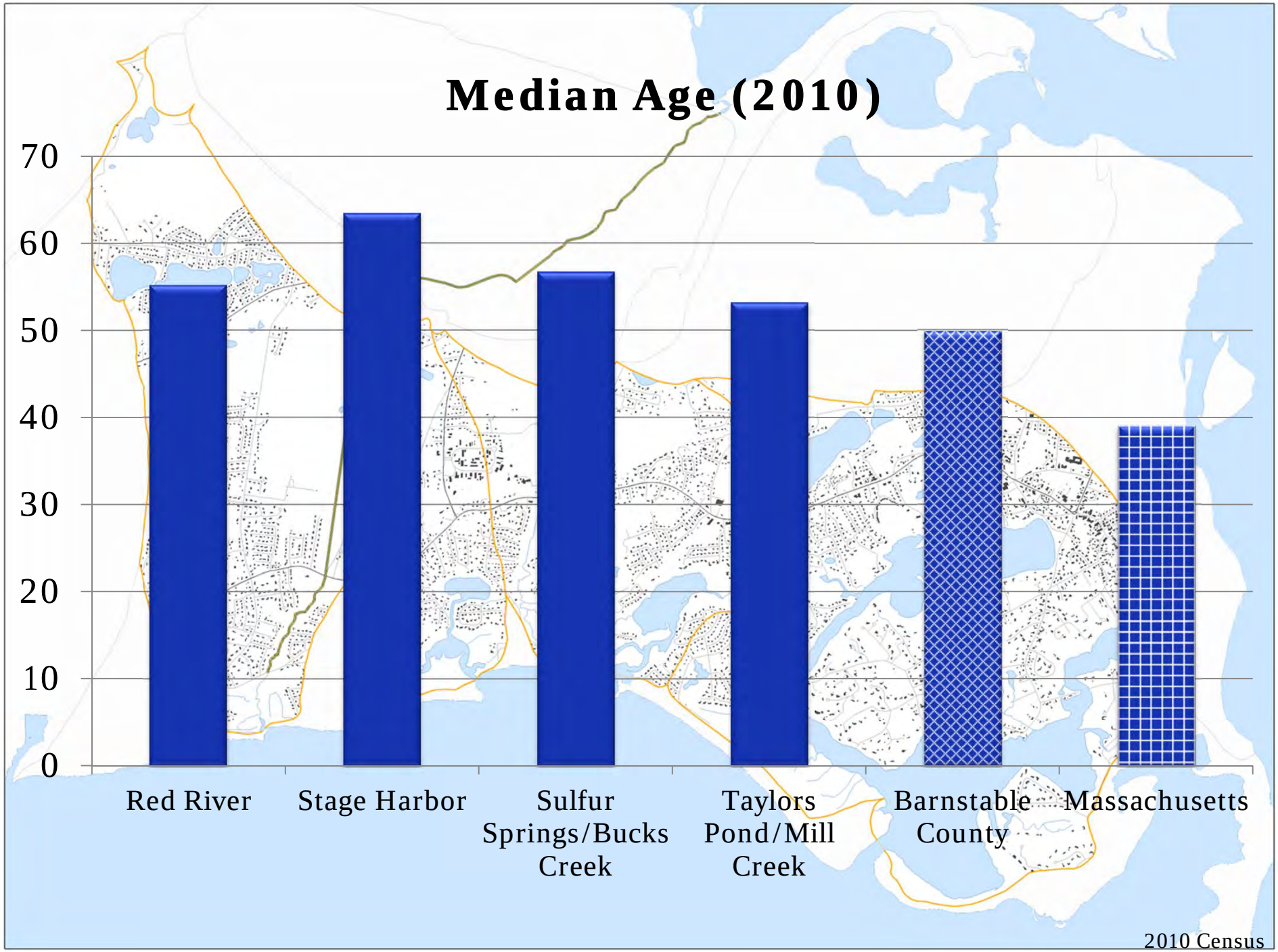
The People

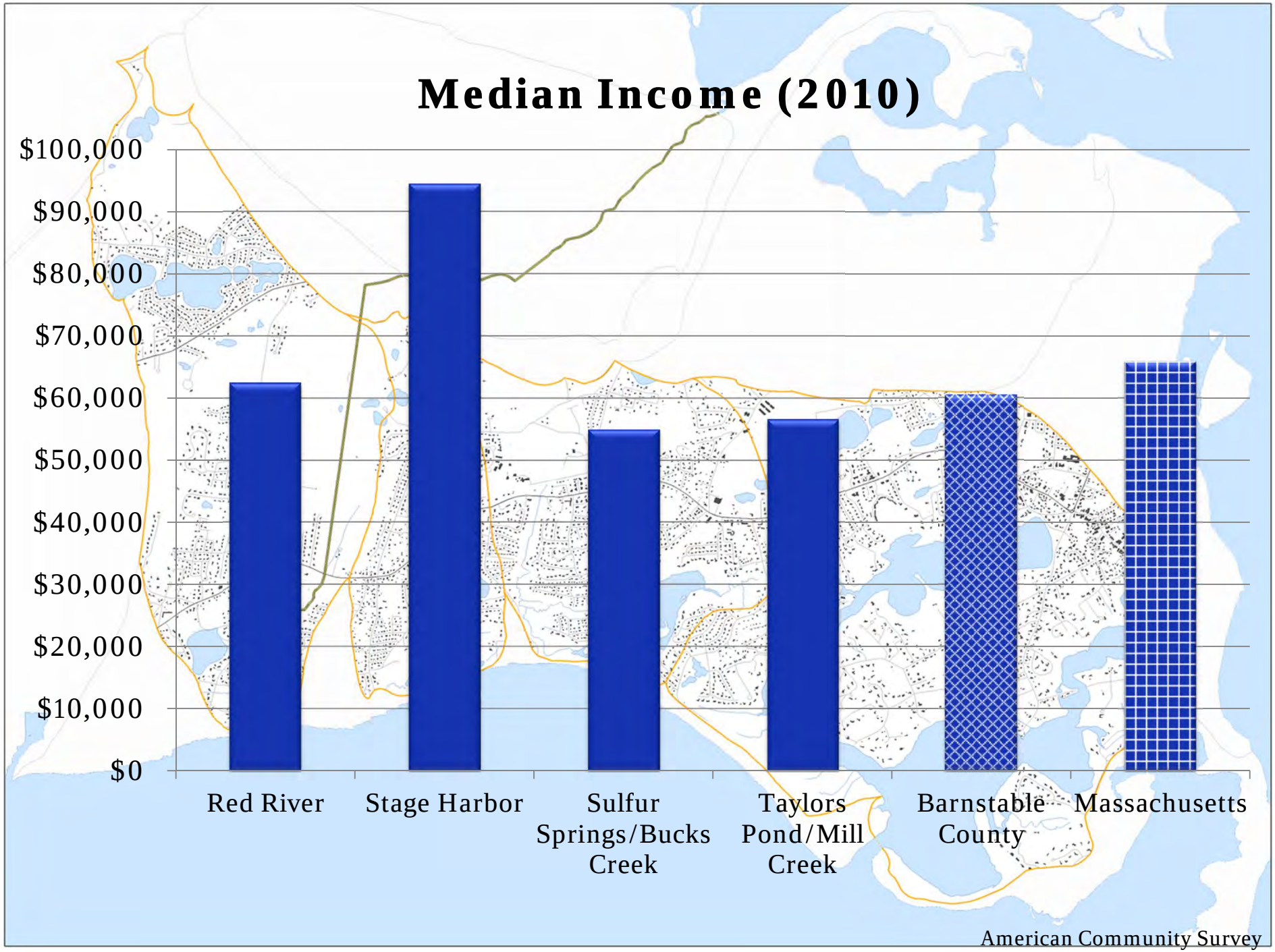
Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek

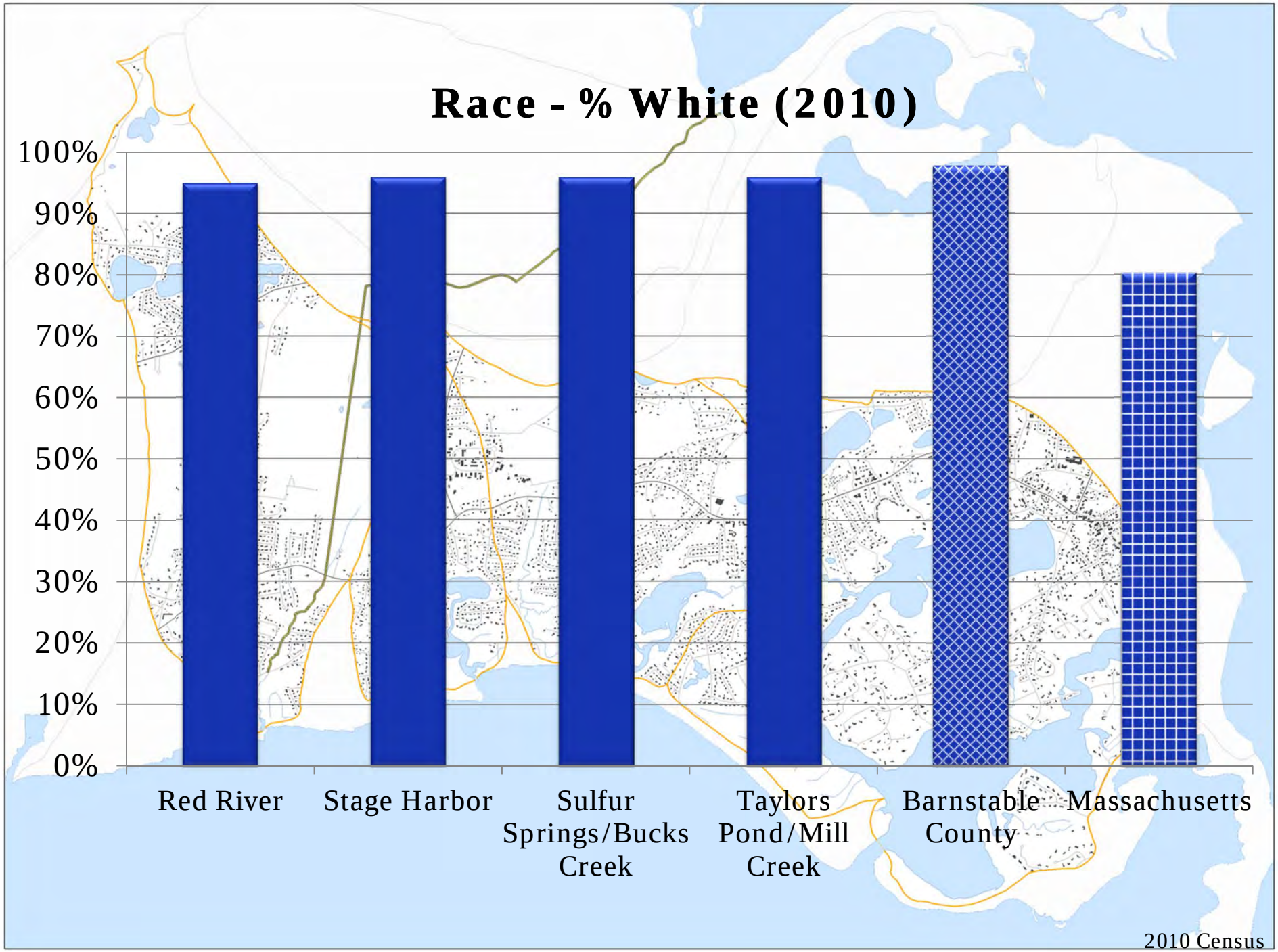

Total Population (2010) = 4,442
2010 Census

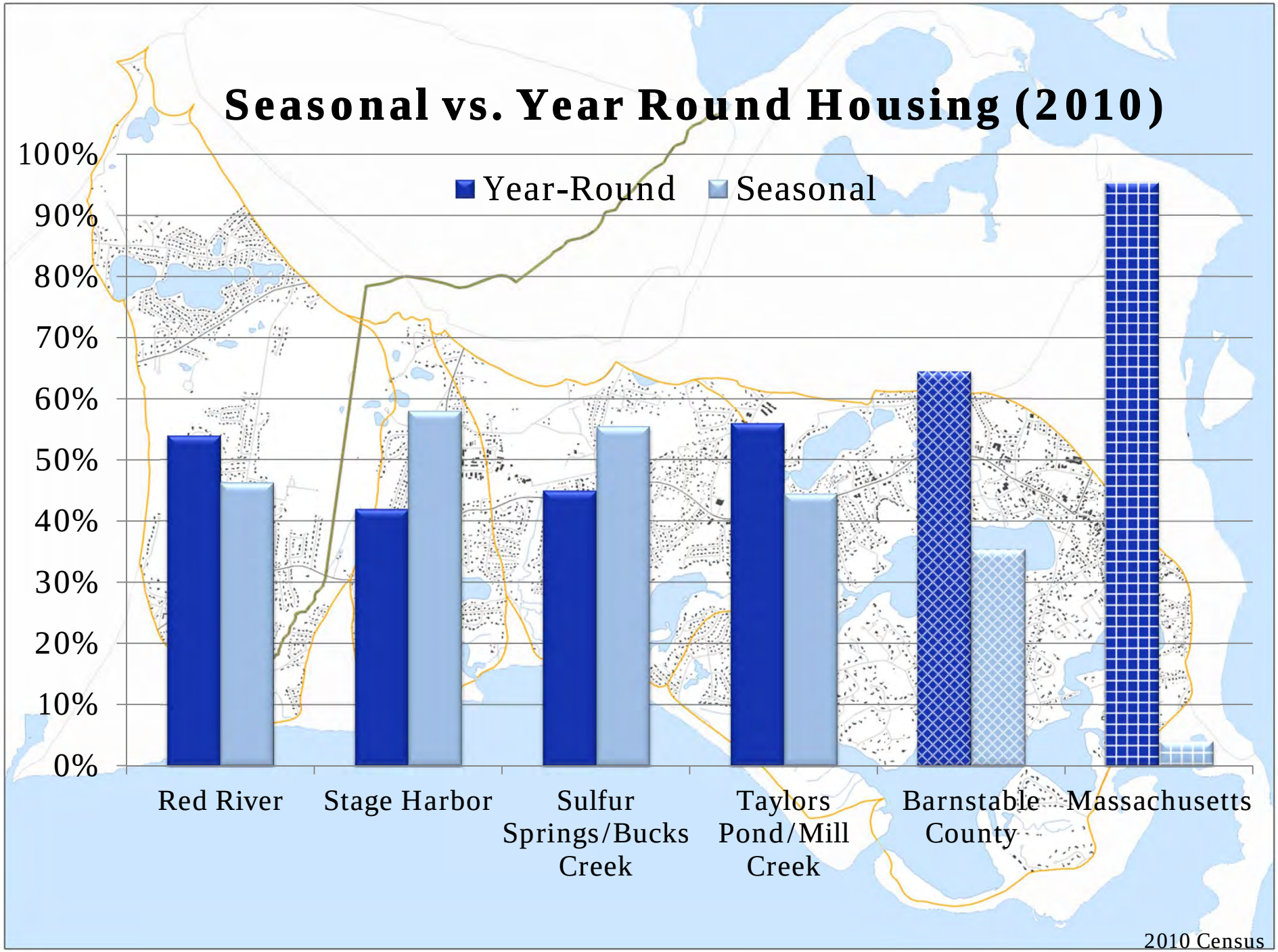
Population (2010)

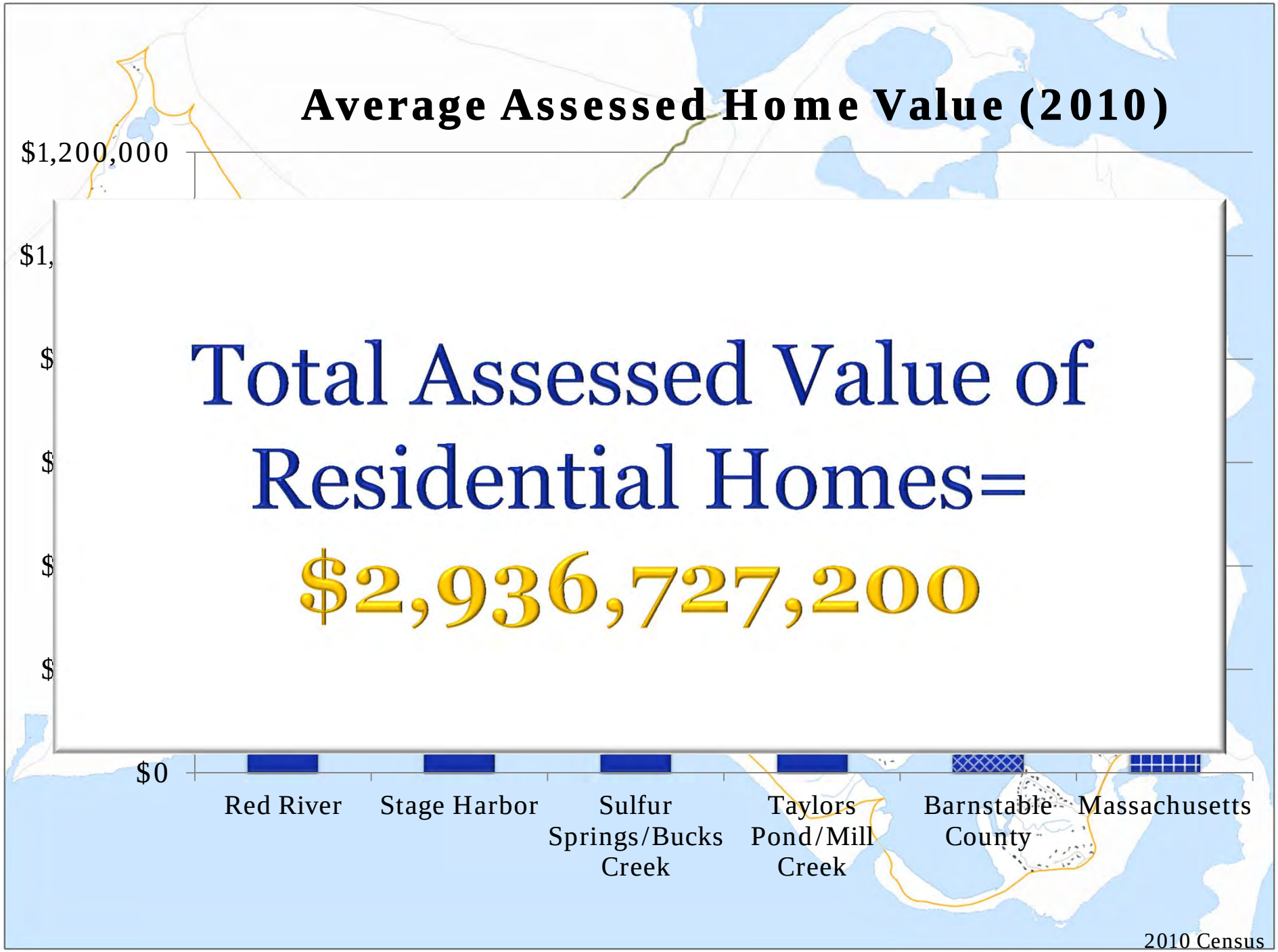



Median Age (2010)
70
60
50
40
30
20
10
0
Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek
Barnstable County
Massachusetts
2010 Census


Median Income (2010)
$100,000
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek
Barnstable County
Massachusetts
American Community Survey


Race - % White (2010)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek
Barnstable County
Massachusetts
2010 Census


Seasonal vs. Year Round Housing (2010)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Year-Round
Seasonal
Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek
Barnstable County
Massachusetts
2010 Census

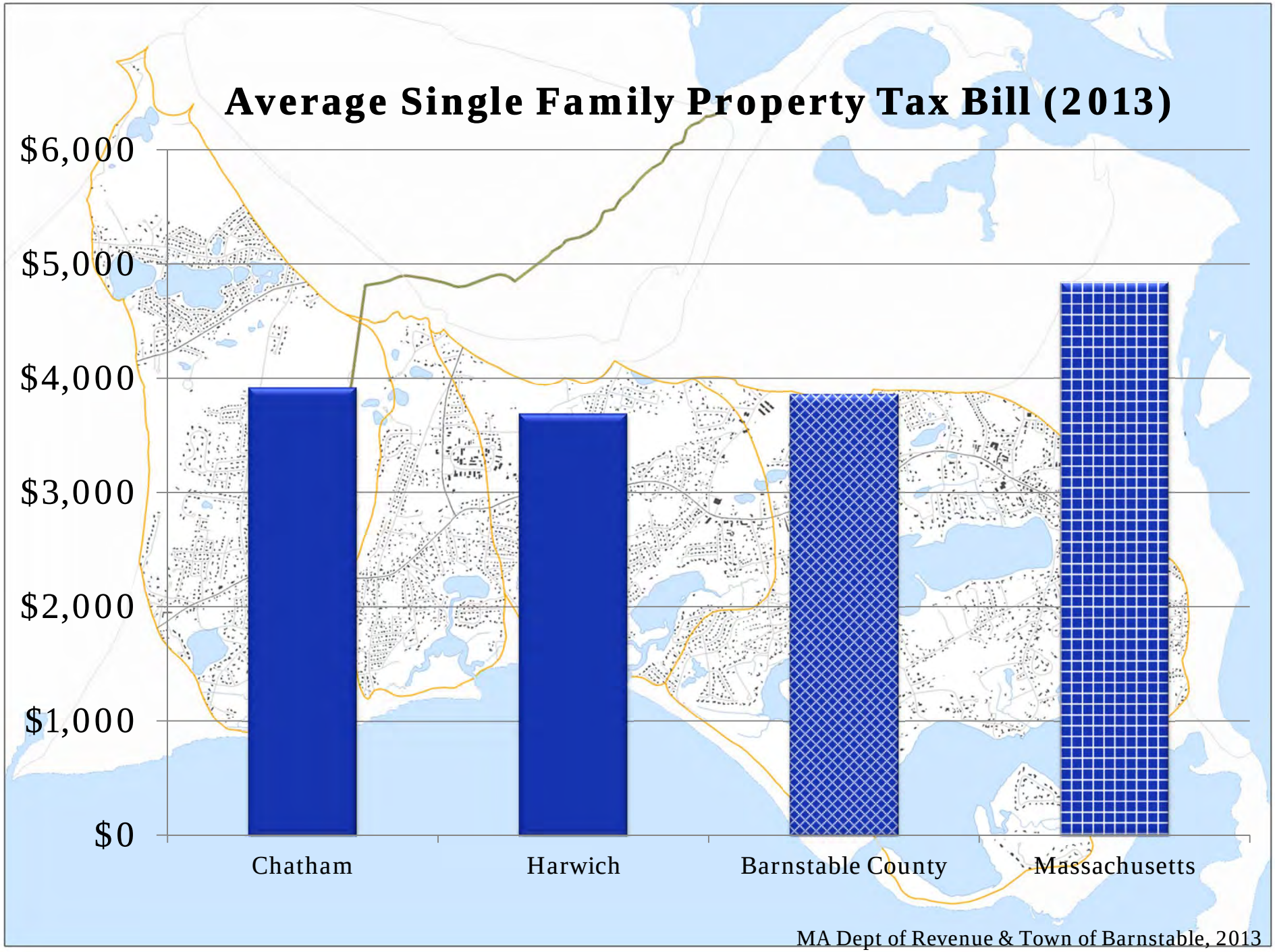


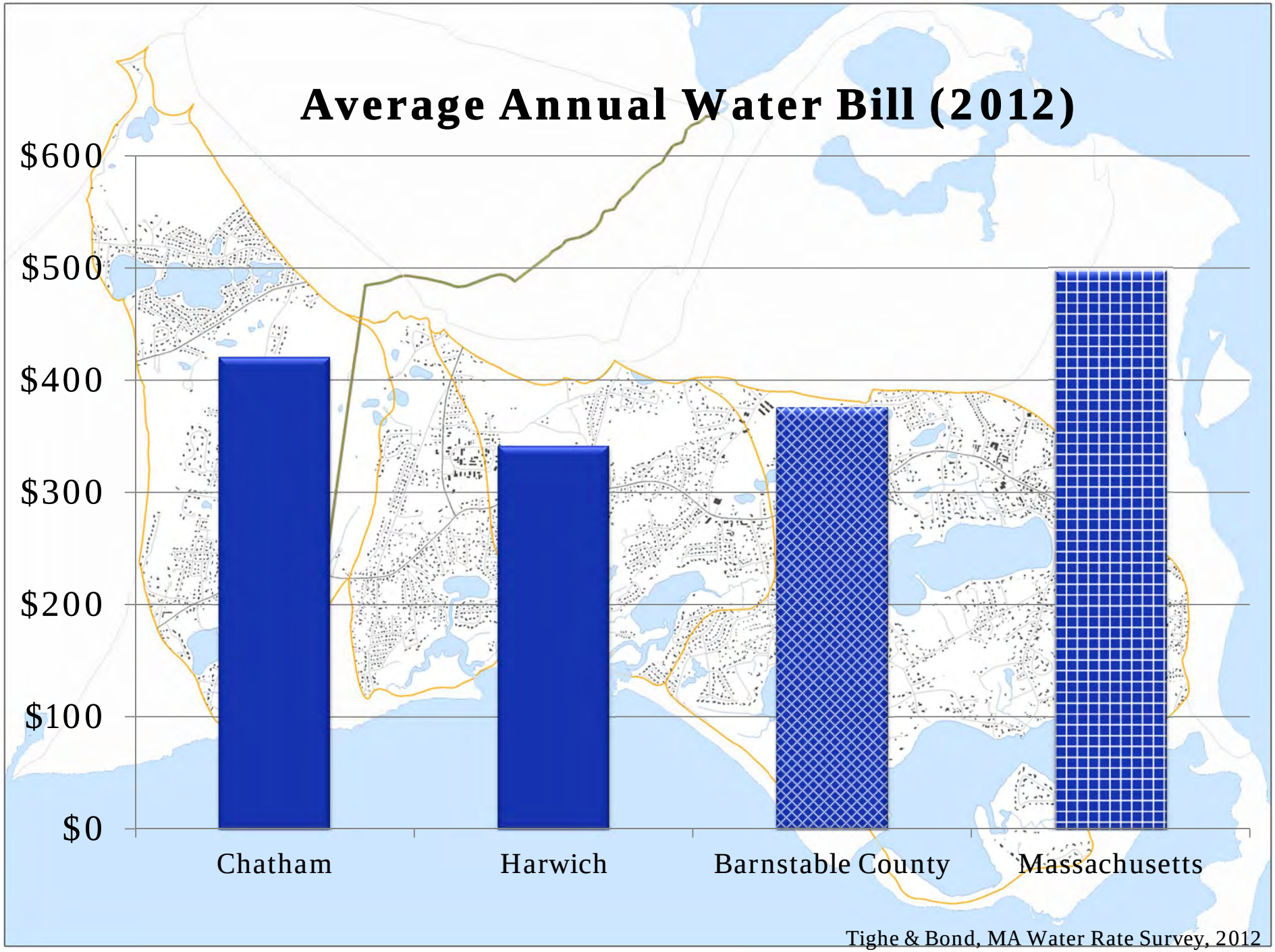
Total Assessed Value of Residential Homes=

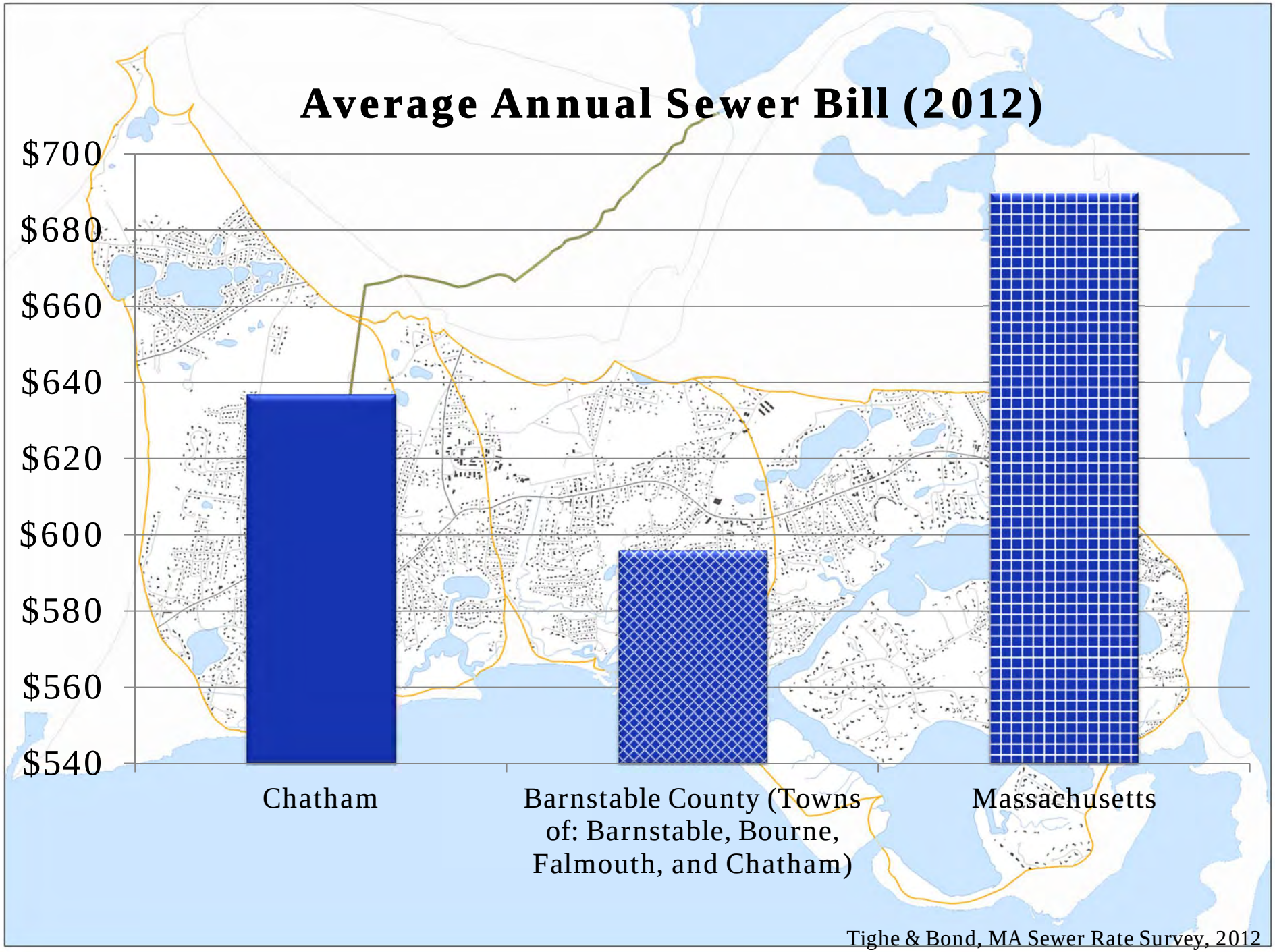
$2,936,727,200

Your Government & Taxes

Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek


Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Chatham
Harwich
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013

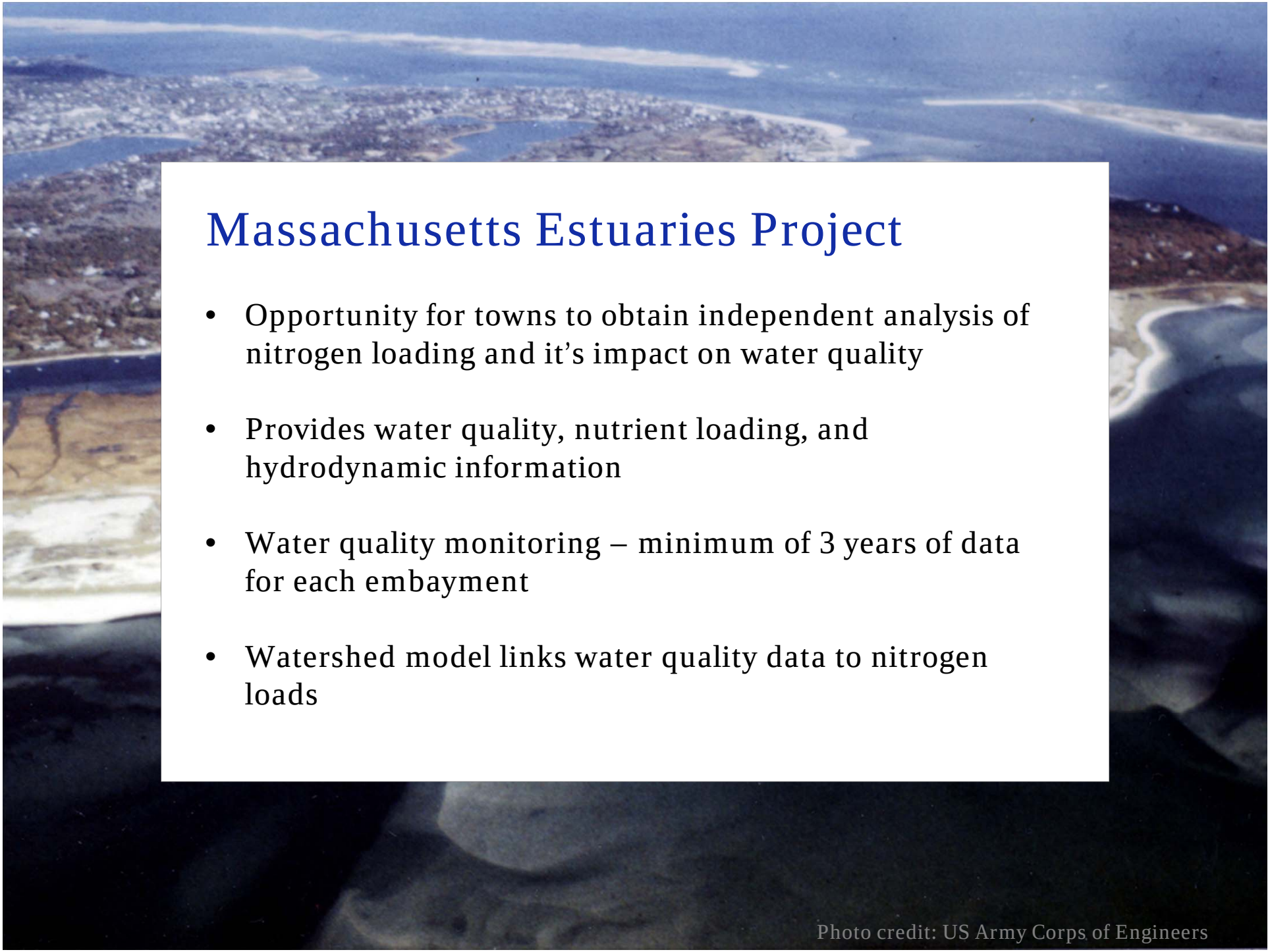

Average Annual Water Bill (2012)
$600
$500
$400
$300
$200
$100
$0
Chatham
Harwich
Barnstable County
Massachusetts
Tighe & Bond, MA Water Rate Survey, 2012


Average Annual Sewer Bill (2012)
$700
$680
$660
$640
$620
$600
$580
$560
$540
Chatham
Barnstable County (Towns of: Barnstable, Bourne, Falmouth, and Chatham)
Massachusetts
Tighe & Bond, MA Sewer Rate Survey, 2012

The Problem

Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek

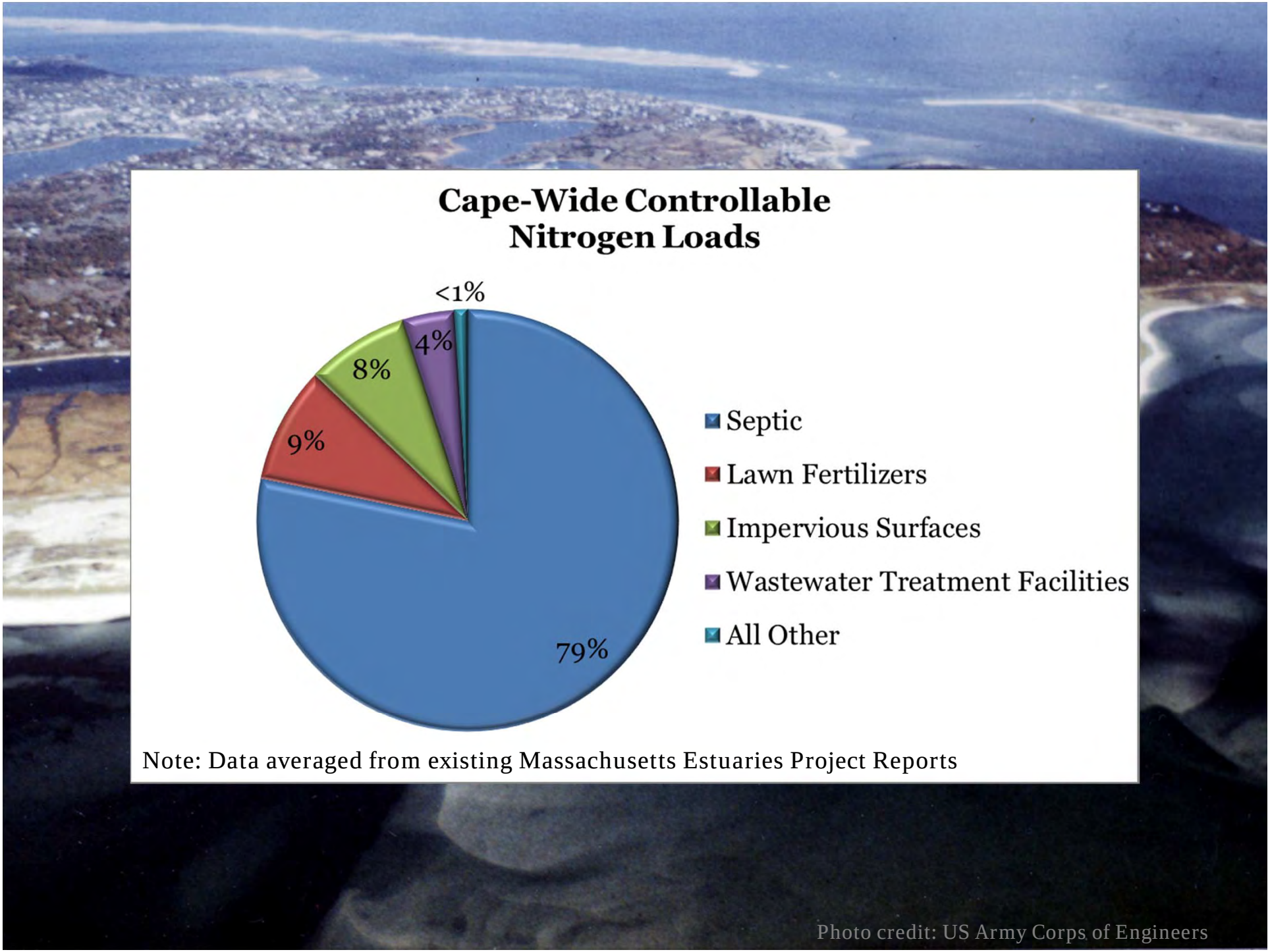

Photo credit: US Army Corps of Engineers

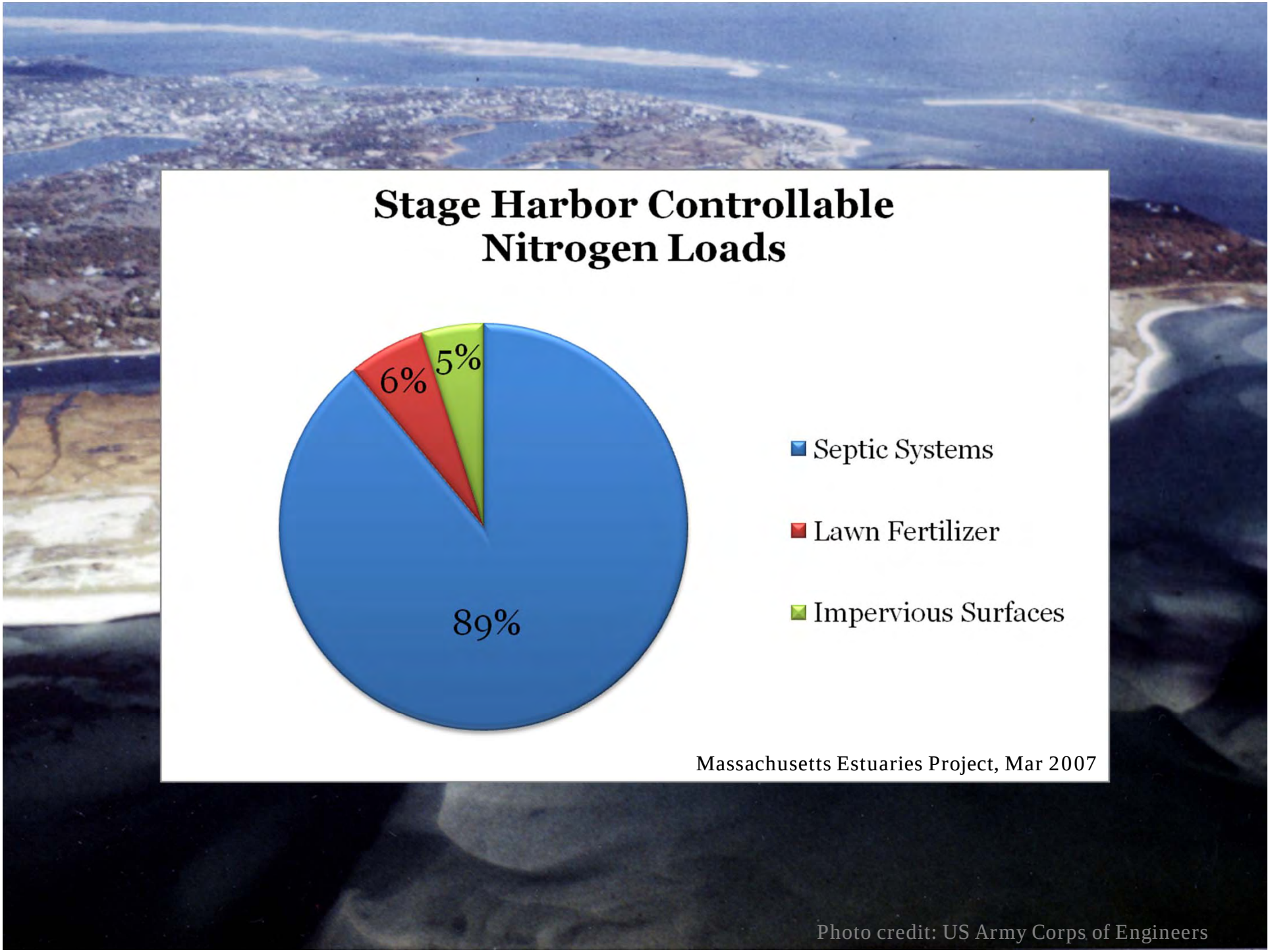


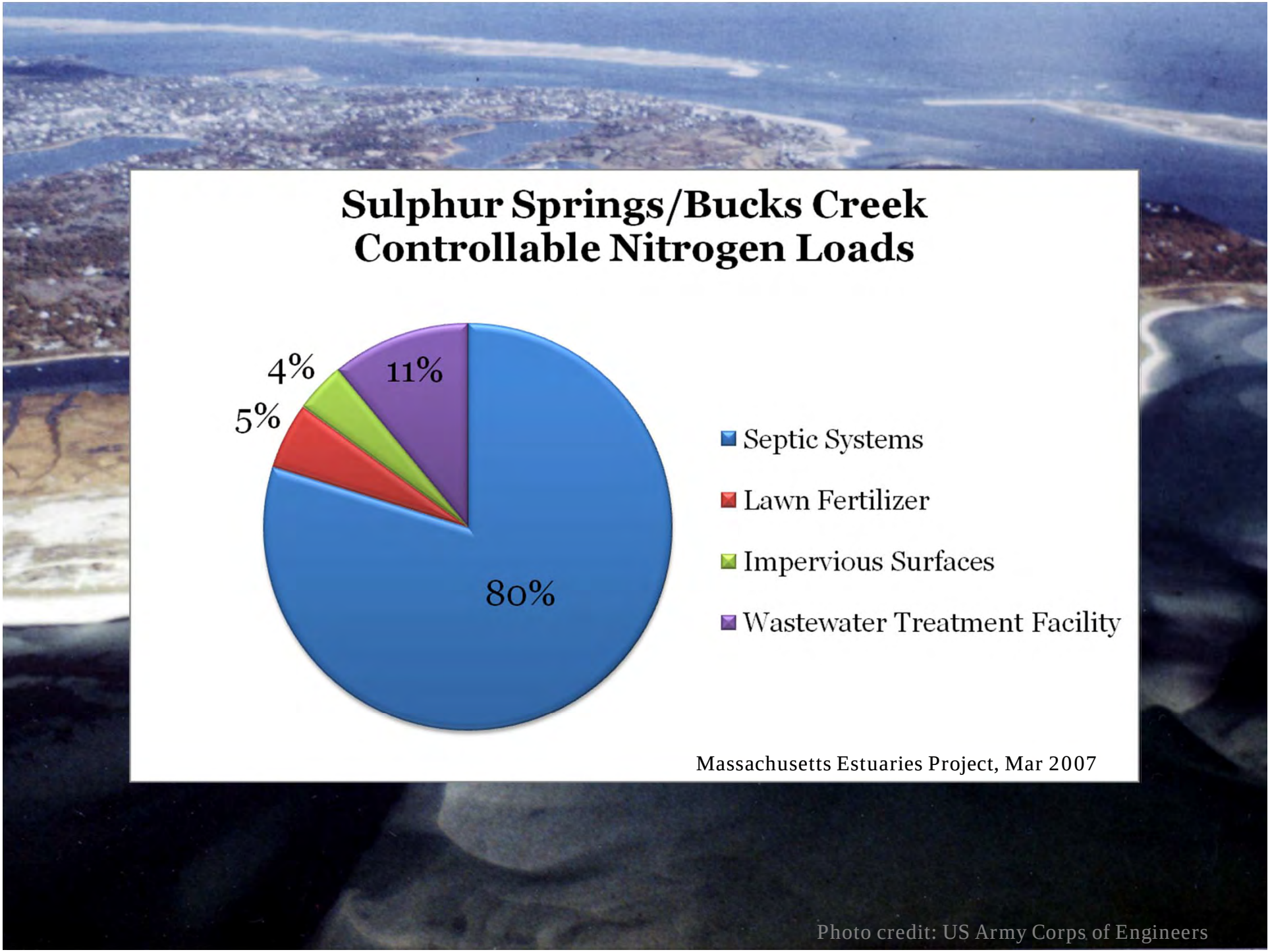
Massachusetts Estuaries Project

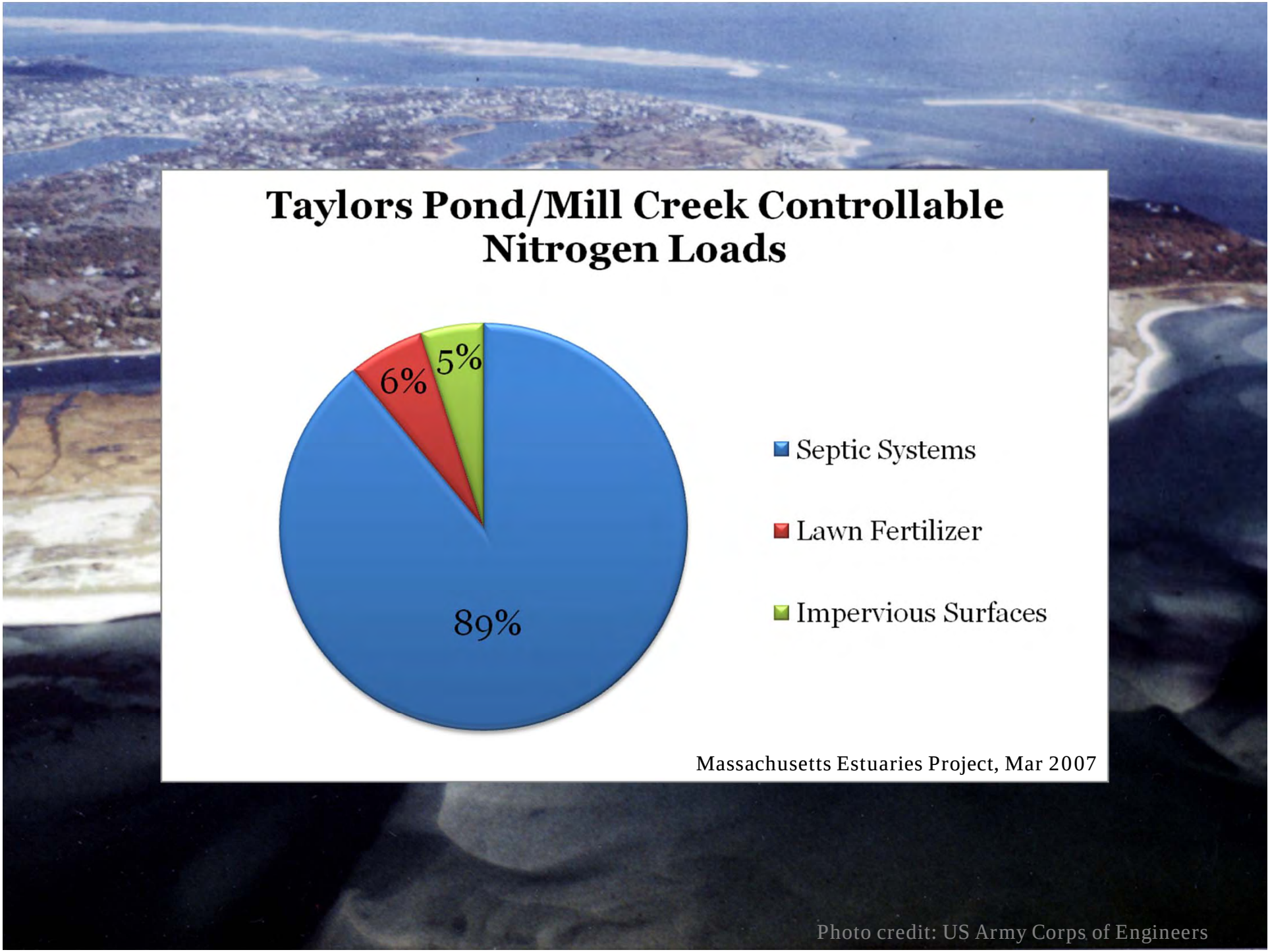
- Opportunity for towns to obtain independent analysis of nitrogen loading and it's impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

Photo credit: US Army Corps of Engineers

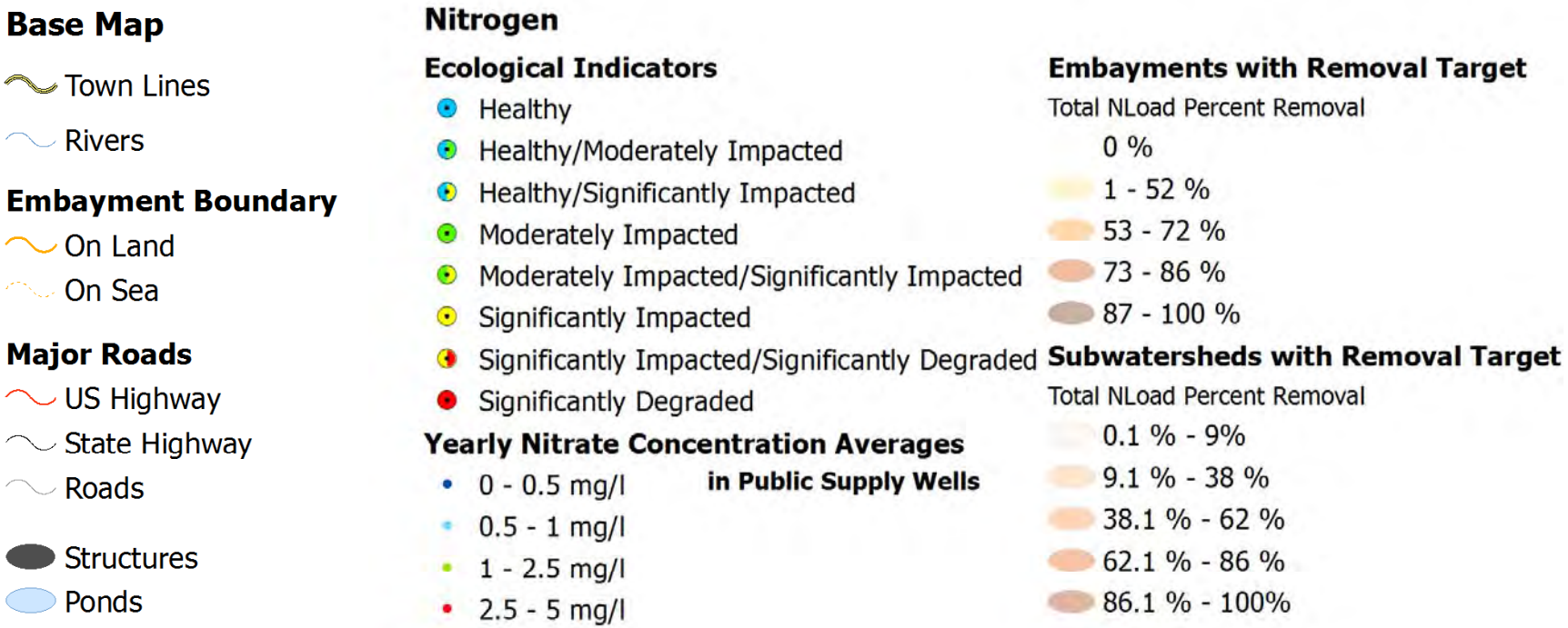

Cape-Wide Controllable Nitrogen Loads
<1%
4%
8%
9%
79%
Septic
Lawn Fertilizers
Impervious Surfaces
Wastewater Treatment Facilities
All Other
Note: Data averaged from existing Massachusetts Estuaries Project Reports
Photo credit: US Army Corps of Engineers


Stage Harbor Controllable Nitrogen Loads
6%
5%
89%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, Mar 2007
Photo credit: US Army Corps of Engineers

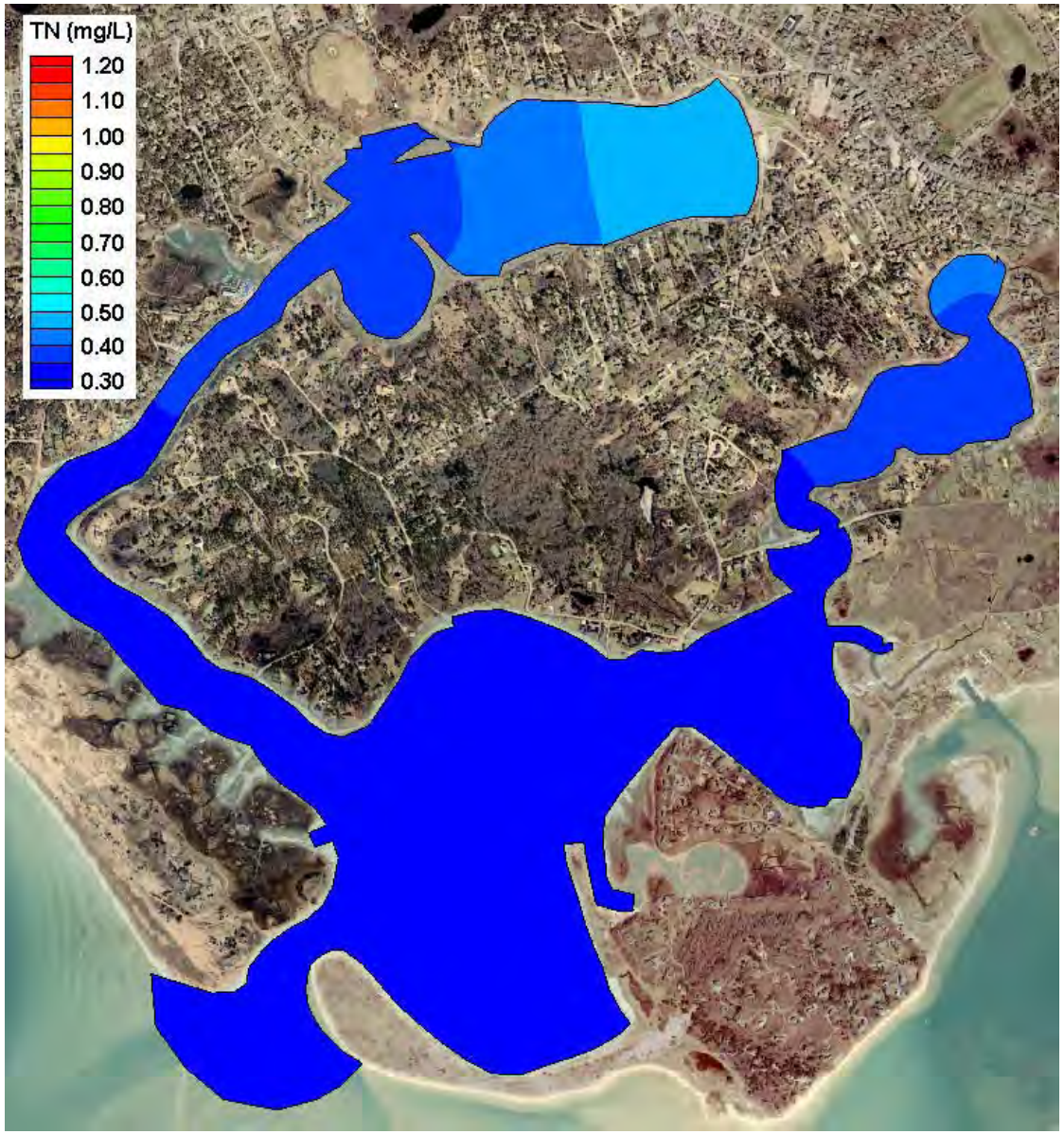

Sulphur Springs/Bucks Creek
Controllable Nitrogen Loads
4%
11%
5%
80%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Wastewater Treatment Facility
Massachusetts Estuaries Project, Mar 2007
Photo credit: US Army Corps of Engineers


Taylors Pond/Mill Creek Controllable Nitrogen Loads
6%
5%
89%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, Mar 2007
Photo credit: US Army Corps of Engineers

Nitrogen Problem



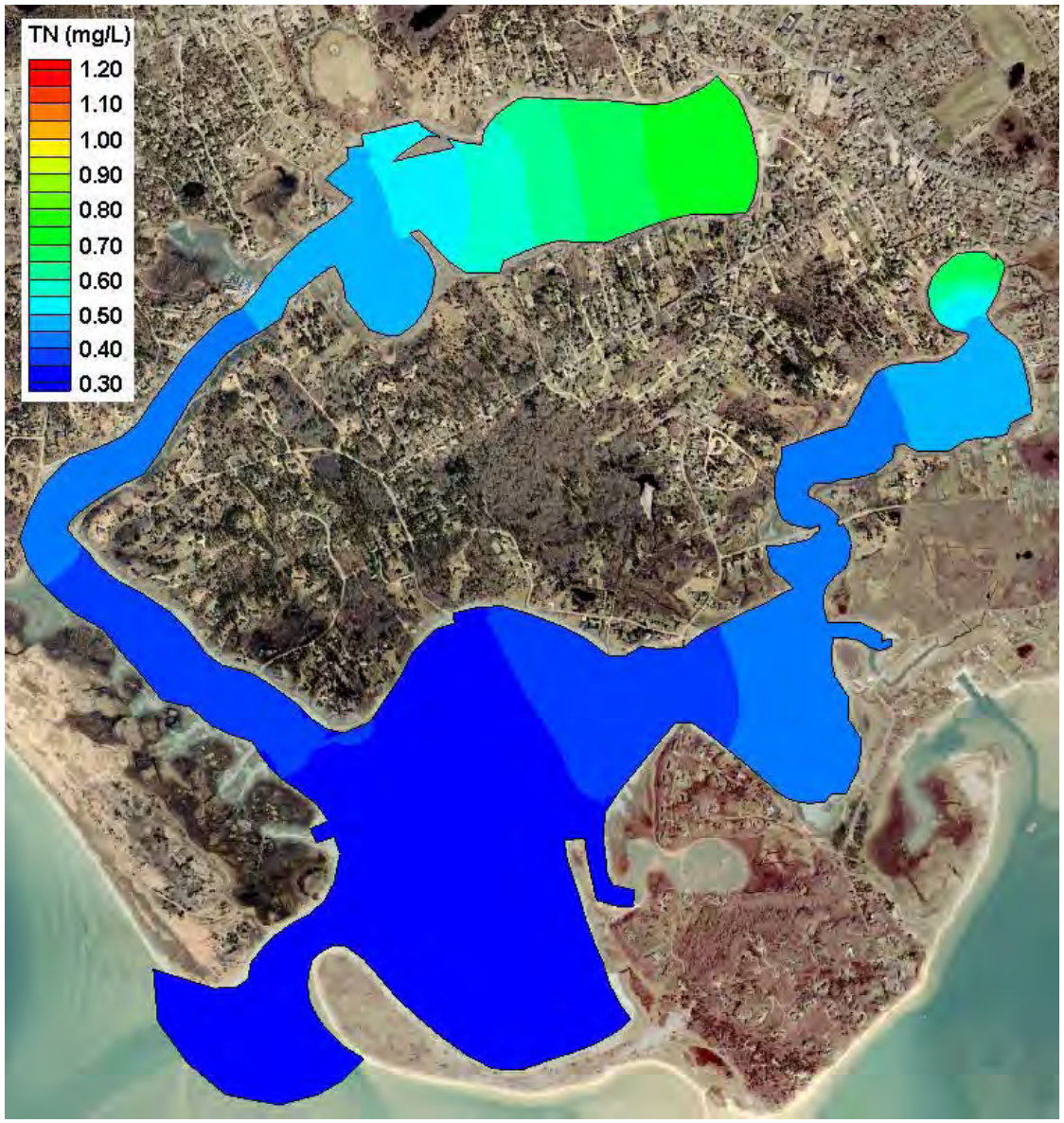
Sources: MassGIS, MEP, CCC



Contour Plot of modeled **total nitrogen concentrations (mg/L)** in the Stage Harbor system, for no anthropogenic loading conditions.

(Source: MEP 2007)

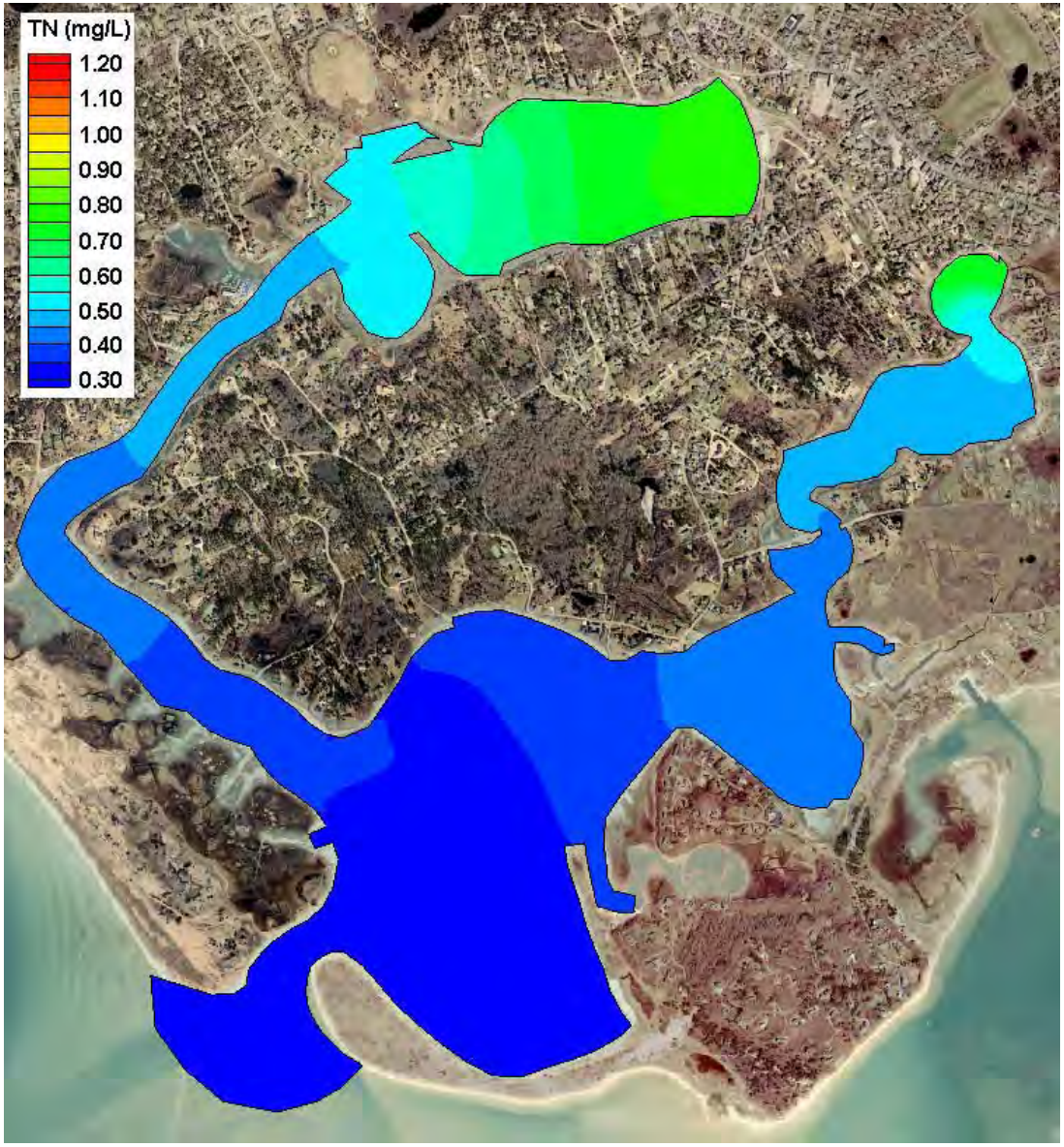
Pre-Colonial Conditions: Stage Harbor



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

(Source: MEP 2007)

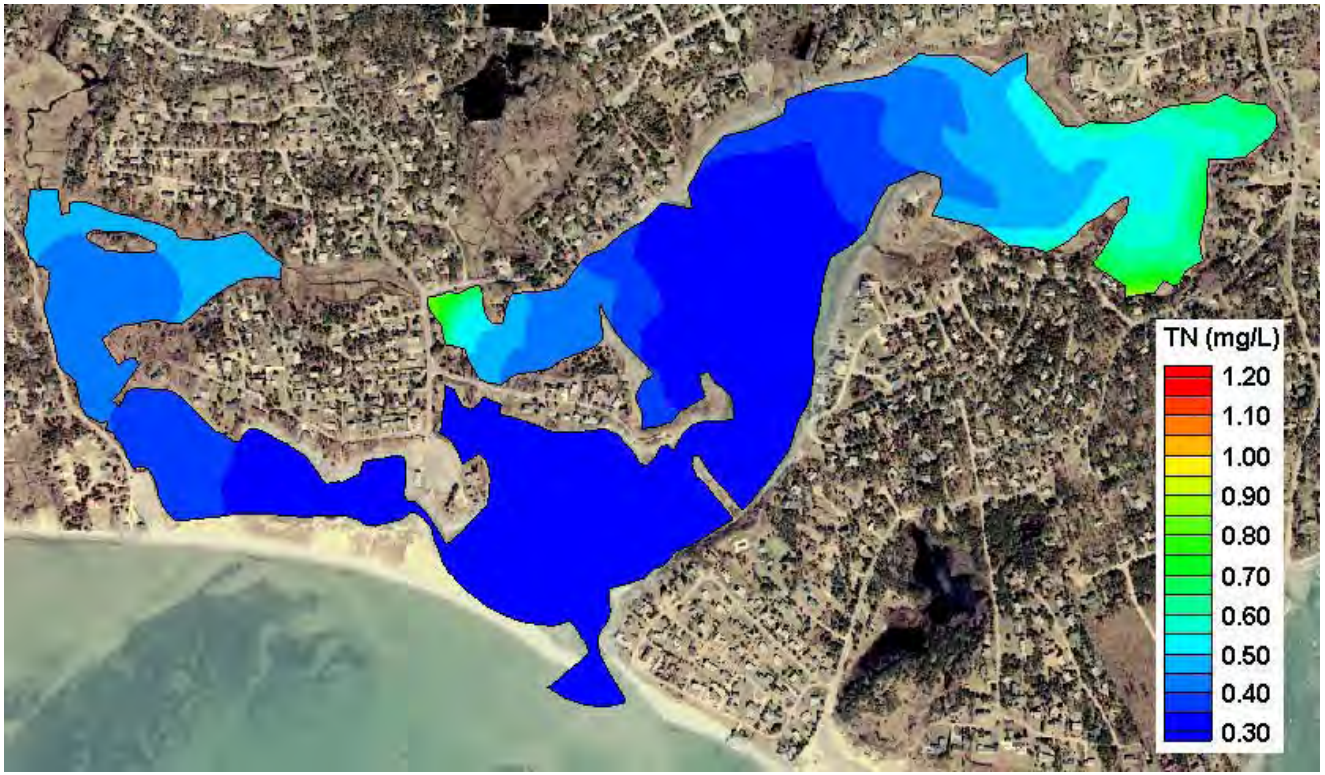
Present Conditions: Stage Harbor



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Stage Harbor system, for projected build out loading conditions.

(Source: MEP 2007)

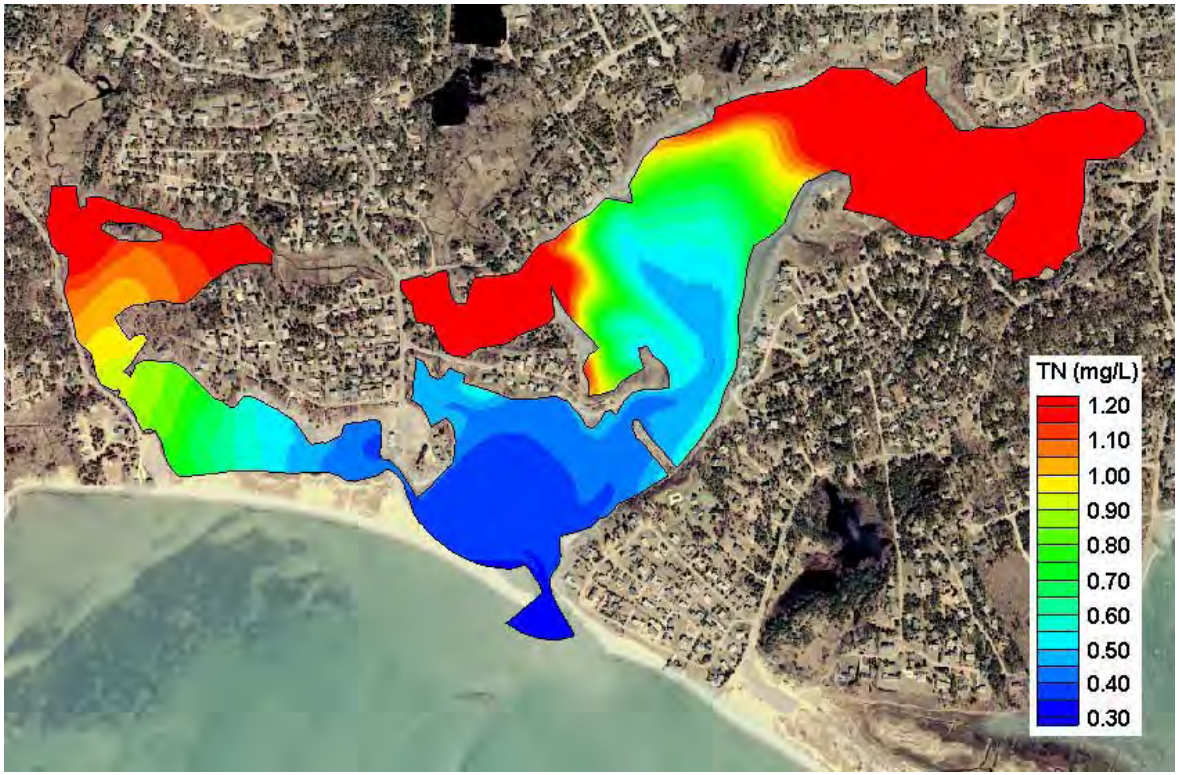
Build-out Conditions: Stage Harbor



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Sulphur Springs/Cockle Cove Creek system, for no anthropogenic loading conditions.

(Source: MEP 2007)

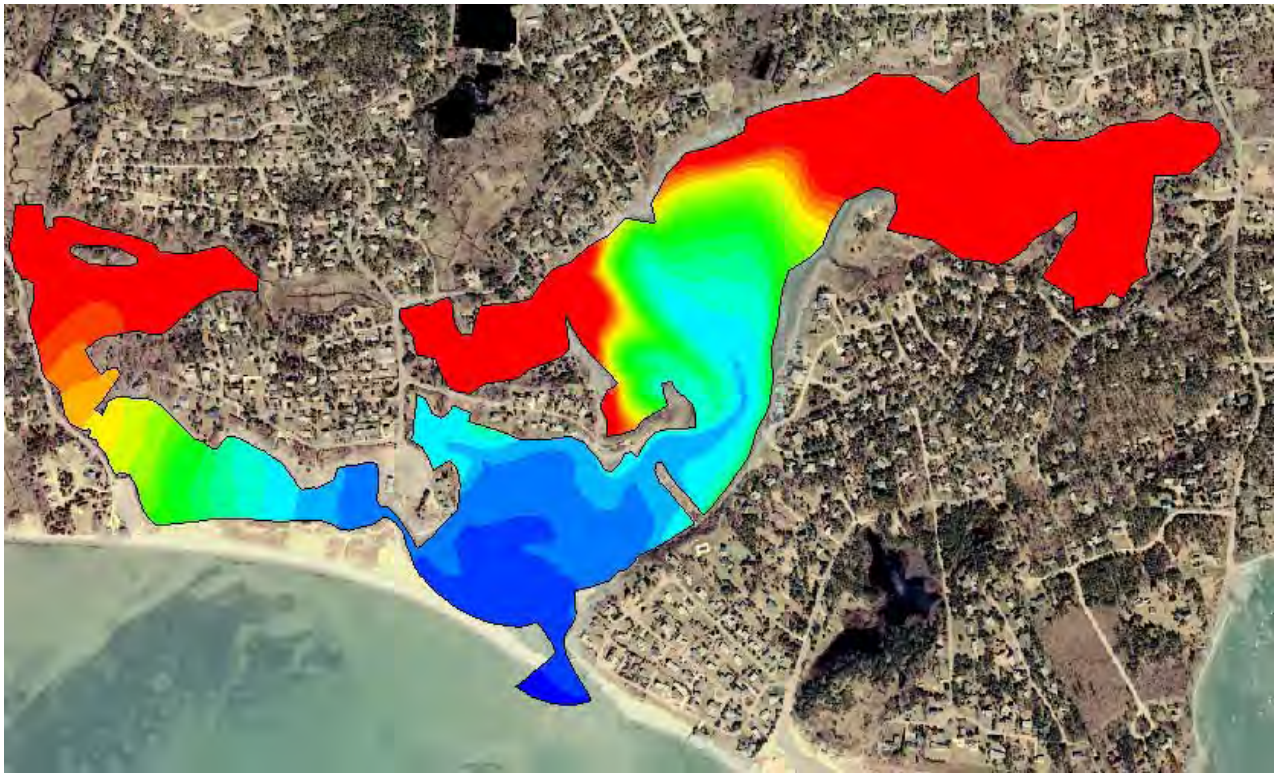
Pre-Colonial Conditions: Sulfur Springs/Bucks Creek



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Sulphur Springs/Cockle Cove Creek system, for present loading conditions.

(Source: MEP 2007)

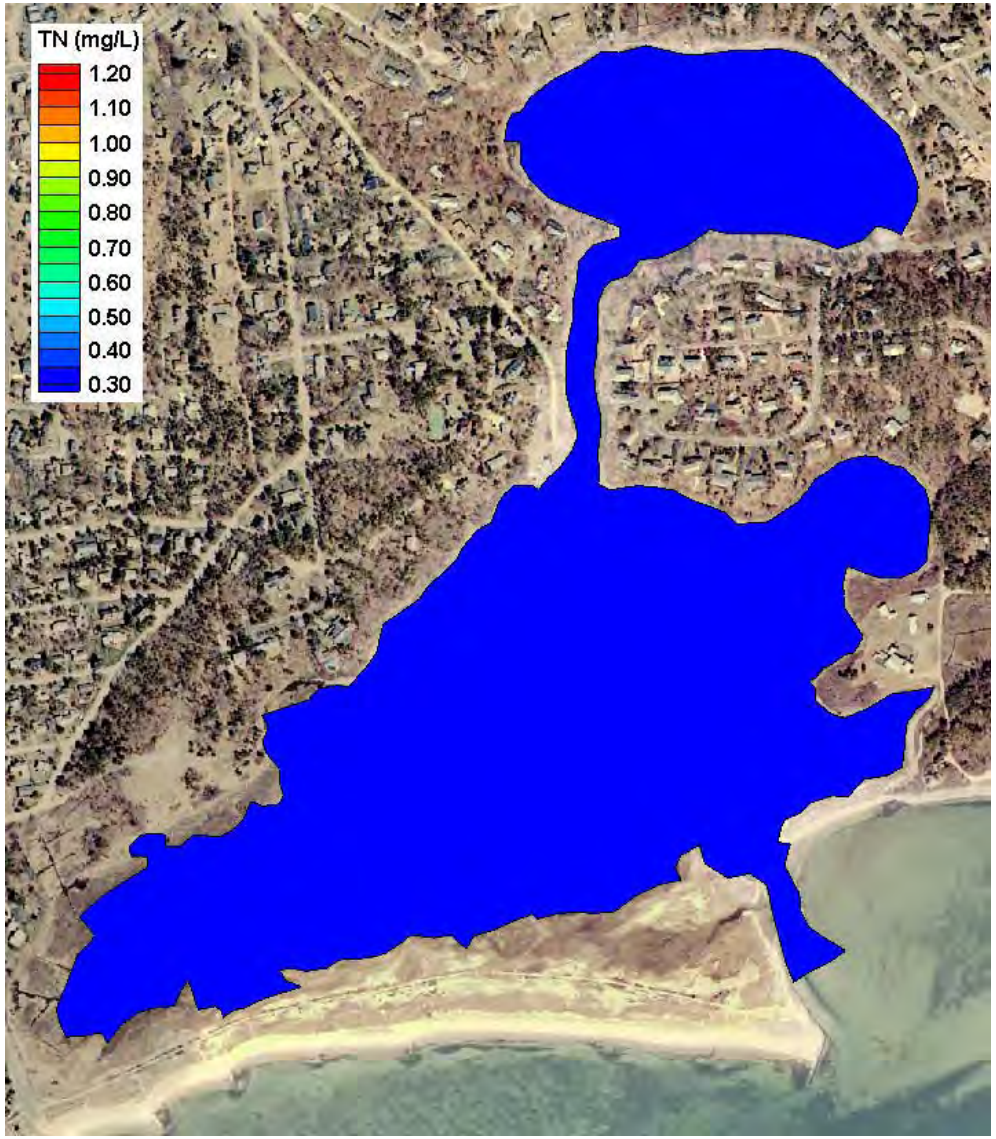
Present Conditions: Sulfur Springs/Bucks Creek



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Sulphur Springs/Cockle Cove Creek system, for projected build out loading conditions

(Source: MEP 2007)

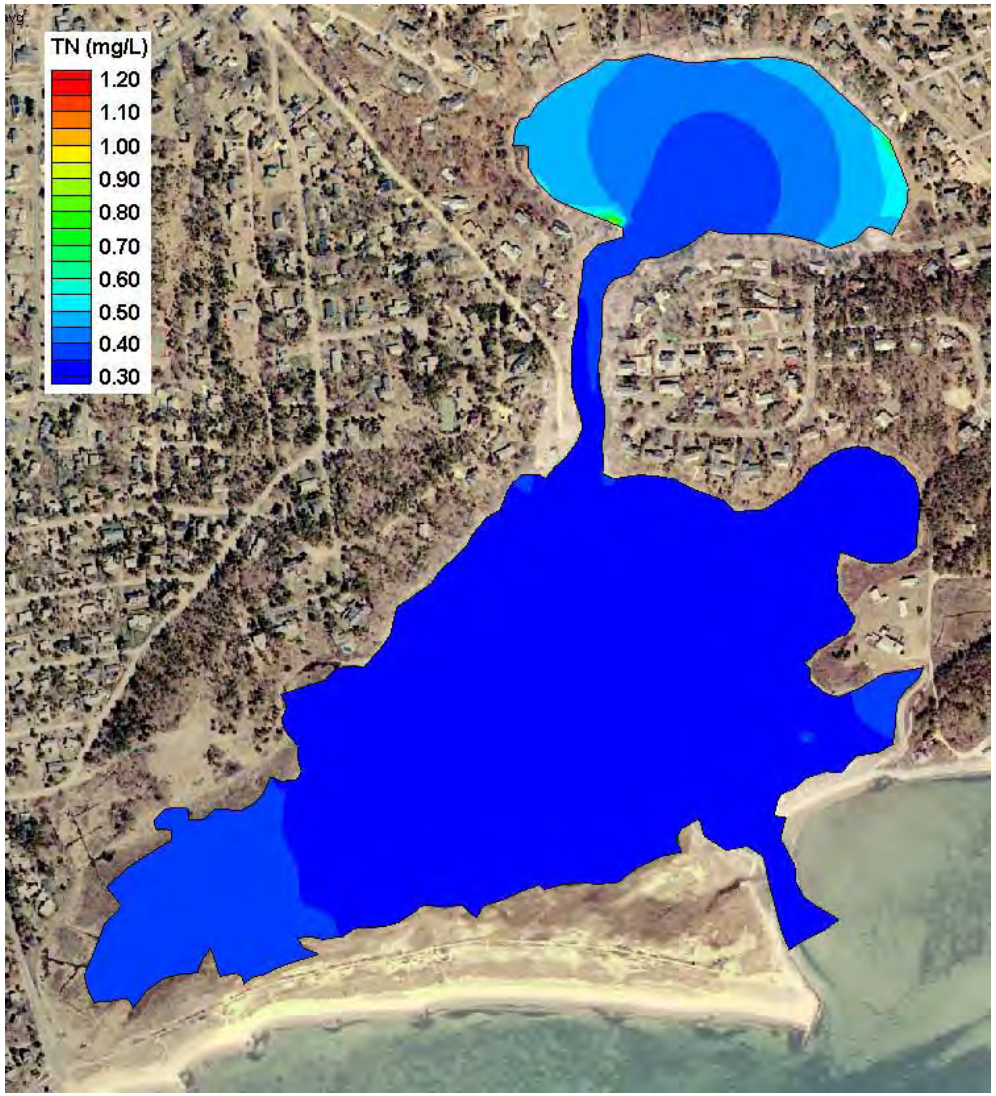
Build-out Conditions: Sulfur Springs/Bucks Creek



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Taylors Pond/Mill Creek system, for no anthropogenic loading conditions.

(Source: MEP 2007)

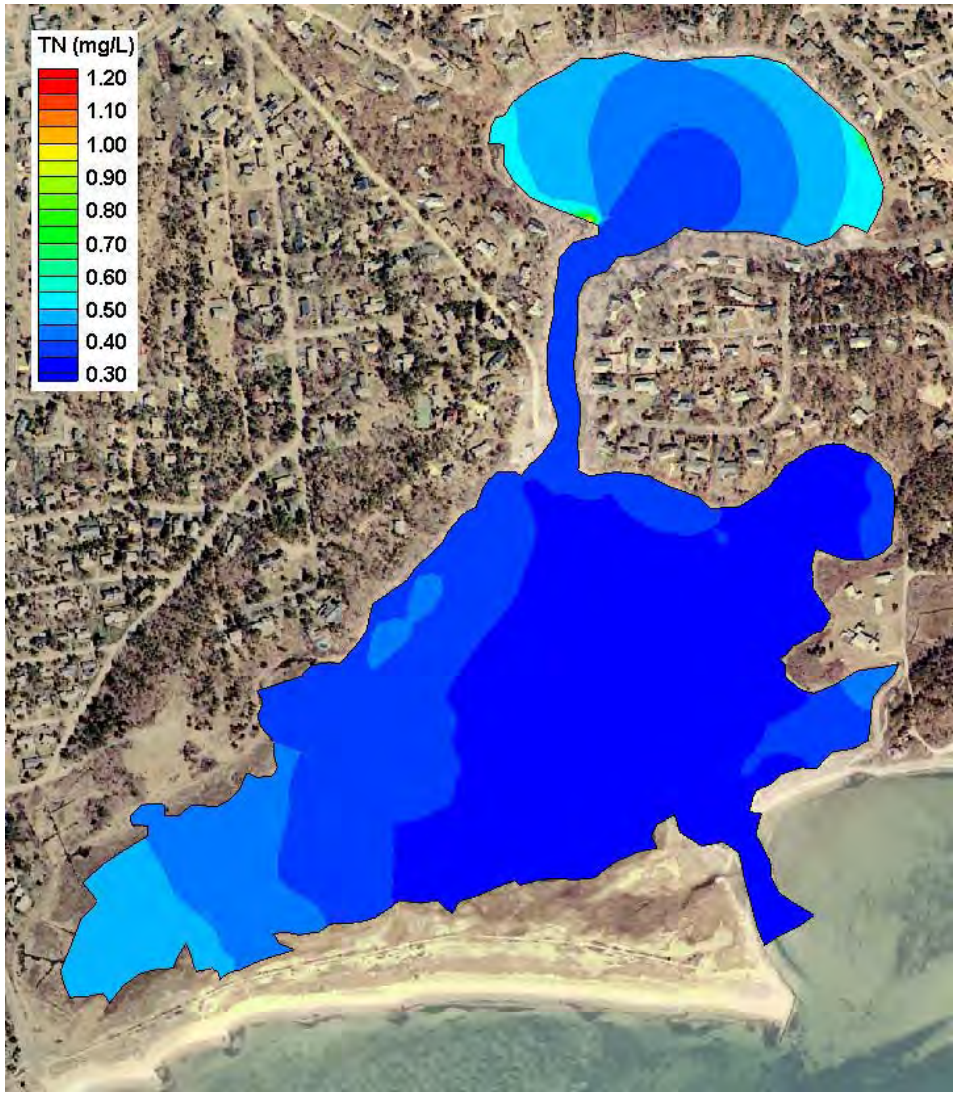
Pre-Colonial Conditions: Taylors Pond/Mill Creek



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Taylors Pond/Mill Creek system, for present loading conditions.

(Source: MEP 2007)

Present Conditions: Taylors Pond/Mill Creek

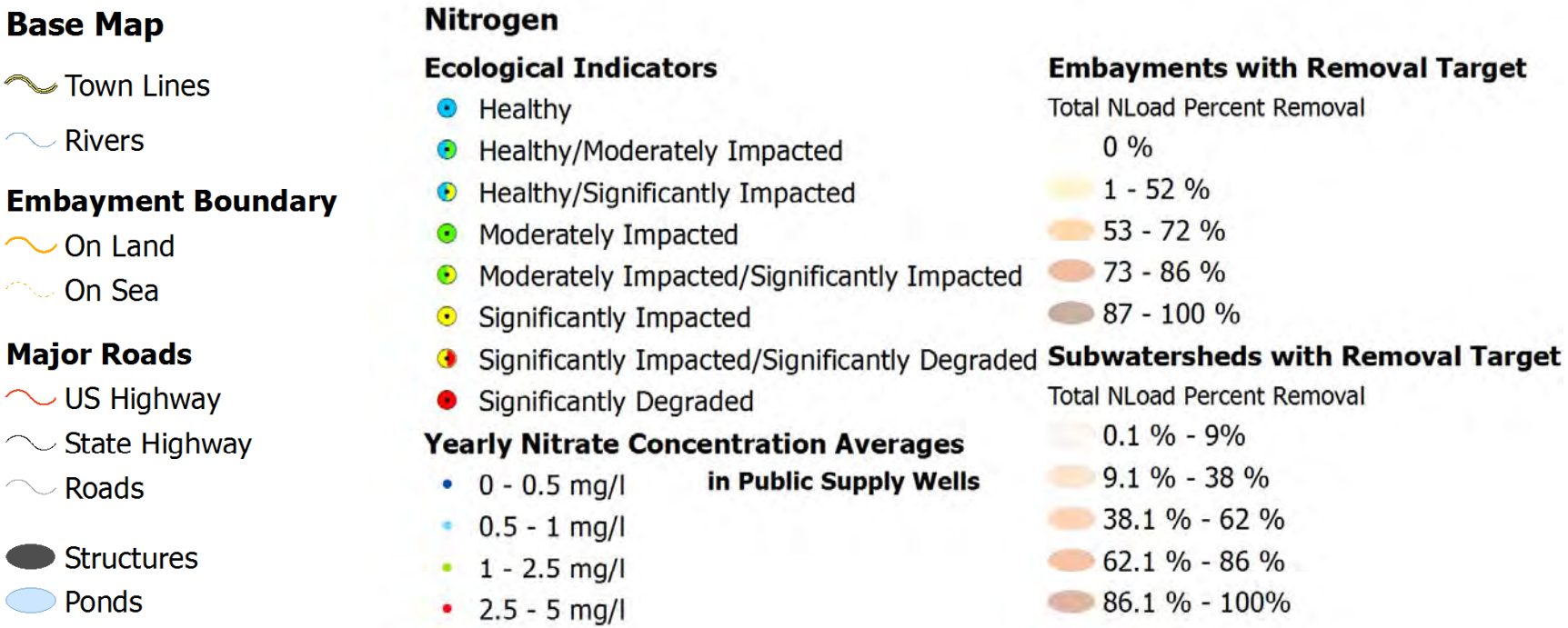


Contour Plot of **modeled total nitrogen concentrations (mg/L)** in the Taylors Pond/Mill Creek system, for projected build out loading conditions.

(Source: MEP 2007)

Build-out Conditions: Taylors Pond/Mill Creek

Nitrogen Problem



Sources: MassGIS, MEP, CCC

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

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill 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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

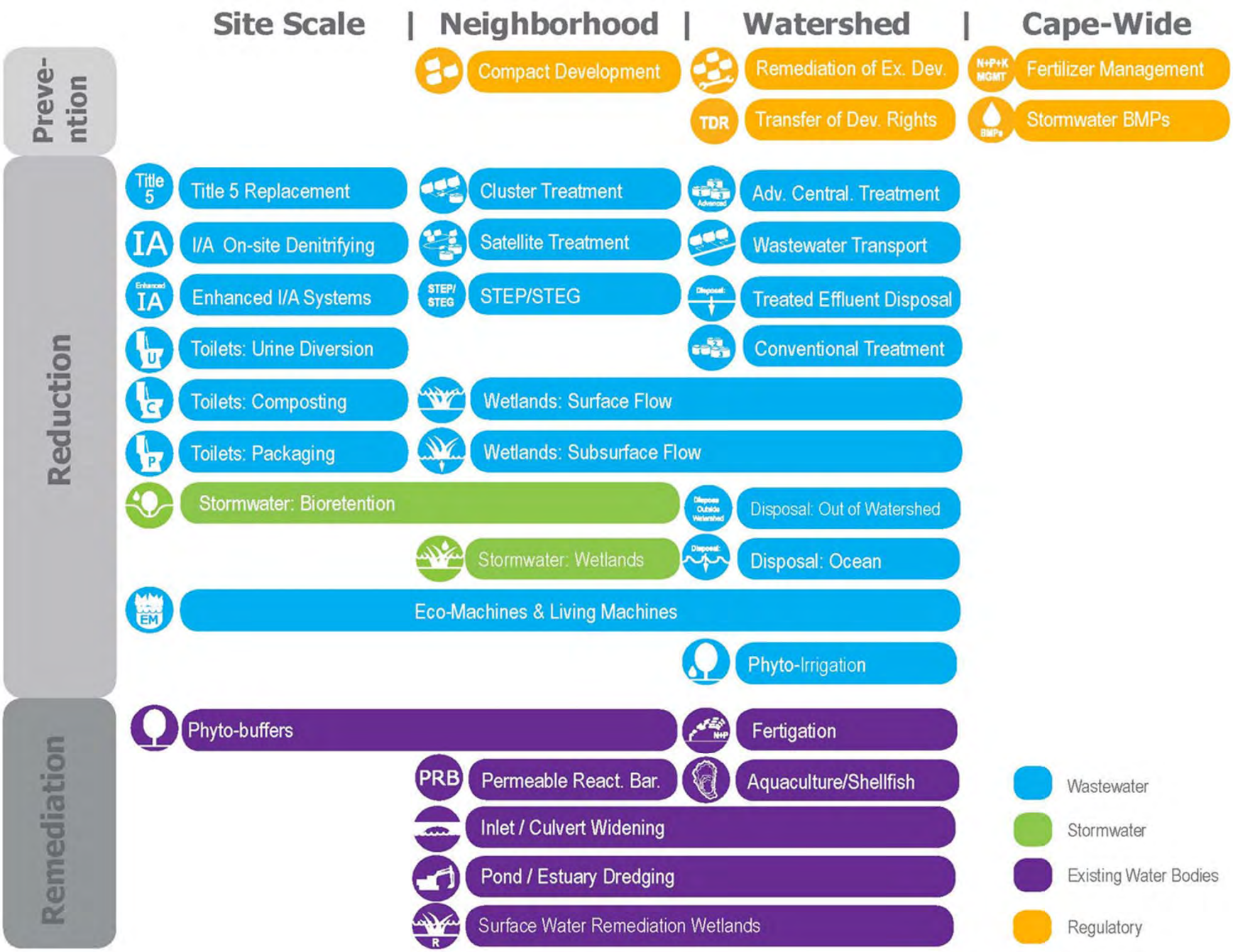
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

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

http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/stage-harbor-group

Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek

Cape Cod 208 Area Water Quality Planning
Stage Harbor Watershed Working Group

Meeting One
September 26, 2013
Chatham Community Center
702 Main Street, Chatham, MA 02633

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:

- The Red River Watershed will be combined with the Herring River Working Group, for which the second meeting will be held on:
  Monday, October 21, 2013
  8:30 am-12:30 pm
  Harwich Community Center
- The other Stage Harbor Watersheds will join the Pleasant Bay Working Group for their second meeting, which will be held on:
  Thursday, October 24, 2013
  8:30 am-12:30 pm
  Orleans Town Hall
- The Stage Harbor Working Group will reconvene separately for a third working group meeting on:
  Tuesday, December 3, 2013
  8:30 am-12:30 pm
  Chatham Community Center

- 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 21 or 24 meeting. (Technology fact sheets will be distributed in early October)
- Cape Cod Commission
  - Secure a data layer for Chatham wetlands.
  - Speak with Mark Robinson to try to secure a Cape-wide layer for OpenSpaces.
  - Add Chatham's additional stormwater attenuation improvements data
  - Change the Cranberry Lane Channel off of Bucks Creek from "Proposed Infrastructure" to "Existing Infrastructure" as it has been completed.
  - Update the areas in Chatham that are actually in Phase 2 of Chatham's CWMP.
  - Confirm sewer and water costs.
  - 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 Stage Harbor Watershed Working Group. Appendix A contains a list of the group members who were in attendance. All meeting documents and presentations for the Stage Harbor Watershed Working Group will be located here:

http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/stage-harbor

Ms. Stacie Smith, Facilitator from the Consensus Building Institute (CBI), reviewed the agenda and described CBI's role and the member selection process.[1] Ms. Smith noted that the much of the Stage Harbor Watershed area is covered by the Chatham Comprehensive Wastewater Management Plan (CWMP), other than the Red River watershed, which includes Harwich.

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.

In their introductory comments, members of the watershed group made the following comments:

- I have some concerns about the Comprehensive Wastewater Management Plan (CWMP) already being underway. Chatham has been in discussions with Harwich to collaborate on shared watersheds; however, the Red River area does not and is not expected to have an MEP.
- All of the Comprehensive Wastewater Management Plan (CWMP) efforts in Harwich have focused on embayments that have already been identified as endangered. It is critical to understand that none of the areas that Harwich has been looking at are included in the Stage Harbor Watershed Group.

REVIEW OF GOALS AND PROCESS

Ms. Patty Daley, Deputy Director of 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 federal and state 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.

[1] 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.

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.

Ms. Daley, who serves as Area Manager for the Lower and Upper Cape in the Section 208 Update Process, will attend the stakeholder workshops and help prepare materials for subsequent workshops to ensure members have the materials necessary for the planned discussions. In early 2014, she will work with the Cape Cod Commission staff to draft a comprehensive Cape-wide plan that combines the specific recommendations from the Stage Harbor Watershed Working Group with the recommendations of the other 11 watershed working groups on the Cape.[2]

Ms. Daley 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. Public meetings were also held in August to present information on affordability and financing options for meeting water quality goals. Since few people attended the August meetings, the Cape Cod Commission will present this information to interested groups upon request.[3] 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.

Ms. Daley 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.”

[2] The area manager information was not explained in the meeting but is added here for general understanding.
[3] Contact Erin Perry (eperry@capecodcommission.org) if you would like to schedule an Affordability and Financing presentation.

LOCAL PROGRESS TO DATE

On two separate chronologies, Ms. Daley highlighted past actions that had been taken, including actions proposed but not approved, in Chatham and in Harwich to protect and improve water quality in the watersheds of the Stage Harbor Working Group.[4] 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. Member shared the following comments:

- The chronologies are oriented towards nitrogen and the map shows Red River as not needing remediation. Harwich has not looked at the watershed in the Stage Harbor watershed region, save for the Great Sand Lake area which has problems with phosphorous and has septic problems. In addition, the Massachusetts Estuaries Project studies do not cover Nantucket Sound.
- Chatham has spent a fair amount of time examining the phosphorous issue and is targeting two ponds that have excess phosphorus. A recent EPA webinar reflected the shift to address nitrogen and phosphorous together. Even saltwater environments have issues due to phosphorous and nitrogen is an issue in freshwater environments too. The interaction between nitrogen and phosphorous is more critical than either substance alone.
- Of all of the watersheds presented here, the Chatham watersheds are being addressed via proposed sewer system expansions set forth in the Chatham CWMP. The Red River is not included in the Harwich CWMP.
- Most fertilizers used on the Cape have eliminated phosphorous because Cape soils have plenty of phosphorous. We have been pushing to include phosphorous in the regulations governing fertilizers and the state is considering only allowing the inclusion of phosphorous if the soil shows a deficit of phosphorous. Another caution is that many organic fertilizers are loaded with phosphorous.
- Chatham started a real estate transfer regulation that resulted in many septic systems being upgraded over the years when real estate changed hands. As a result, Chatham is ahead of the game when it comes to on-site septic system upgrades.

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 Stage Harbor Watershed Working Group. Working group members and members of the public are encouraged to view the layers on the Cape Cod Commission website.[5] 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.

GIS Data Layers

[4] Detailed chronologies are available in the Stage Harbor 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.

[5] Data used for modeling and analysis will be available through the link on page 1 of this summary.

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. This also includes managed greens of golf courses.

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. Land use Vision Map data delineates economic centers; industrial and service trade areas, village boundaries, resource protection areas, other designations, and undesignated lands. Neither Chatham nor Harwich have developed Land use Vision Maps.

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 sewering costs).

Stage Harbor 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.*

- The description on the GIS slide could note that the cranberry bogs shown are active, since there are also several cranberry bogs in this area that are inactive.
- Is anyone delineating wetlands and adding or subtracting the size of the wetlands while evaluating wetlands on a project basis? *We are not sure as to whether anyone is conducting this type of tracking and analysis. The Cape Cod Commission's data is from MassDEP/MassGIS. Generally, the wetland data layers are not accurate in terms of on-the-ground delineations. The Commission also has fly-over data that tend to be more accurate than the MassGIS data layers. For big picture analysis, the MassGIS data is probably okay to use, but when drilling down to the neighborhood level, it may be more useful to use Chatham fly-over data. The Commission will secure a data layer for Chatham wetlands.*
- Much of the Open Space in Chatham appears to be missing. For example, Chatham Conservation Foundation lands do not seem to be shown. What is shown on this map looks like only 50% of the reality. *The purpose of this data layer is to understand what areas are protected in perpetuity, what areas might be held by a trust, etc. The Commission could speak with Mark Robinson to try to secure a Cape-wide layer for Open Spaces.*
- How is the Commission defining growth? Is it only new construction or does it include rebuilding existing structures? Chatham is already mostly at buildout capacity and new houses are not being built. Instead, people are redeveloping existing homes. There was lots of surprise in Chatham when the buildout model for the CWMP was performed, as most of the growth consisted of building more on current lots. *Full buildout in the regional scenario assumes that all parcels would be developed to maximum capacity.*
- In Harwich, residential growth is easy to understand, but nonresidential growth is hard to predict .
- The regional buildout model is based on maximum allowable development under current zoning. How could the CWMP buildout models be higher than the regional model? *The regional buildout model is based on using a consistent land use code across the entire region. In contrast, the town buildout models are usually more detailed. The Commission will definitely examine local buildout models in addition to the regional models.*

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:

- Is seasonal population represented in the data? *The Commission is still trying to secure data to reflect seasonal populations.*
- The data presented for annual sewer bills does not accord with our experience in Chatham. Our sewer bills are generally around $400. *The Commission will look into this.*

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 Update. In many

areas of the Cape, the Massachusetts Estuary Project (MEP) provides nutrient loading data and hydrodynamic information to link water quality data to nitrogen loads, and relies on three years of locally collected water quality monitoring data.

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 Stage Harbor, Sulfur Springs/Bucks Creek, Taylors Pond/Mill Creek and Red River. 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 Stage Harbor, Sulfur Springs/Bucks Creek, Taylors Pond/Mill Creek and Red River 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 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:

- *The Cape Cod Commission will review the information on Stage Harbor controllable nitrogen loads to reflect 2007 data.*
- Where did the Commission get its data about public water supply well points? It appears that there are several public water supply wells and ecological indicators that are missing. *These data on public supply wells come from MA DEP.*
- Note that the MEP numbers on the map are aggregates across the sub-watersheds.
- The color gradations on the maps illustrating nitrogen concentrations are hard to see.

- Barnstable County extension has a lot of information about the extent of eelgrass.
- Most of the data about eelgrass will be site-specific. Charlie Costello, at the state level, has been mapping eelgrass for years. The 1951 data has very limited value. Some areas that had not been mapped previously started being mapped in the mid-1990's. We try to standardize on Costello's recent work because it is more uniform.
- There are several ponds that have been studied by the Chatham and by PALS that do not appear to have been analyzed here. We should have enough data to analyze all ponds in this area. *Only ponds with "report conclusions" were included in the data layer, which may account for the absence of some ponds.*
- How do you apply the criteria identifying potential Title 5 compliance issues? Any one of the conditions identified (size of lot, depth to groundwater, large water quantity use, built on clay soils) could be addressed through a variance. There are a lot of Title 5 compliance issues that are addressed through variances at the town level. I would use local regulations instead of Title 5 to get a sense of priority areas where Title 5 issues might happen.
- Chatham started a real estate transfer regulation that resulted in many septic systems being upgraded over the years when real estate changed hands. The broad-brush review presented here may not be taking into consideration how Title 5 issues have been previously addressed over the years. Title 5 is still an issue in Chatham, just not as significant of an issue.

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. This watershed group includes a wastewater treatment facility as well as sewered parcels. The proposed infrastructure layer illustrates the locations of natural attenuation sites and CWMP sewershed phasing, if applicable. They requested group members provide additional information on planned stormwater upgrades to existing infrastructure. Group members made the following comments:

- In terms of inlet widening, is the Commission looking for information only about projects involving physical widening or also projects, such as dredging, that would help to maintain flow levels? *Projects that help to maintain flow, such as dredging, would be included.*
- There are a number of stormwater attenuation improvements in Chatham such as rain gardens in the municipal parking lot.
- The Cranberry Lane Channel off of Bucks Creek should be changed from "Proposed Infrastructure" to "Existing Infrastructure" as it has been completed.
- There are areas in Chatham represented in white that are actually in Phase 2 of Chatham's CWMP. This should be updated.

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:

- Red River needs to be addressed. It has not been studied yet. Specifically, the ponds in the northern extent of the watershed, and development south of Route 28 should be addressed.
- Direct discharge in Nantucket sound will eventually need to be addressed. The Atlantic Ocean side probably does not need more work.

- Chatham's plan is to sewer the entire community. Once that is done, all the ponds and waters will have been addressed. The Chatham plans should address all areas of concern unless something else pops up.
- In Chatham, during the next few years we are focusing on the Oyster Pond area of Stage Harbor. This is consistent with a recommendation in the Chatham CWMP DRI approval. Chatham is already in discussions with Harwich and with communities on the Pleasant Bay side also. The only other thing may be to reevaluate some of the outliers like sewering Morris Island. Chatham has proposed sewering for that area, but if everything else goes according to plan, then crossing the distance of the dike may not be cost effective (nor prudent given potential climate changes) to complete. Maybe technology will improve and Chatham can implement that in the future.

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 sewering 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 (i.e. fertilizer regulation, stormwater infrastructure).
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 sewering or other grey infrastructure management options

Group members made the following comments:

- Category 4, "Watershed/Embayment Options" should be framed as "is it cheaper than wastewater infrastructure systems?" not just "is it cheaper than sewering?" This is a broader issue in which dredging and shell aquaculture could offset wastewater needs. *Agreed, and there may in fact be a mixture of technologies implemented, as opposed to just one.*

Working Group members, Commission representatives, and Ms. Smith, the facilitator, discussed the future structure of the Stage Harbor Working Group. Ms. Smith noted that, given the small size of the Working Group, members could decide how they would like to structure their participation in the Section 208 planning process going forward. Participants discussed holding a webinar on Red River for the second meeting, Stage Harbor Working Group members attending meetings if different working groups for the second meeting and then reconvening for a Round 3 meeting, and combining the Stage Harbor Working Group with the Herring River Working Group. Participants discussed a number of considerations to deal with the Red River area:

- From an environmental point of view, Red River is not a significant issue because it is wetlands. Upon further examination, it will probably fall into a category that could assimilate more nitrogen.
- Undersized culverts were replaced at the mouth of Red River.
- Ponds could be the main focus of attention in the Red River area.
- The large marsh system is not a priority area for either Chatham or Harwich compared to other open water body areas.
- Chatham's most significant concern would be that the public supply water wells extend into the Red River area.

The Working Group decided to move Red River to the Herring River Working Group, have other members attend the Pleasant Bay meeting for meeting 2, and to reconvene in as a Stage Harbor group for meeting 3 on December 3 to discuss scenario runs.

OPERATING PROTOCOLS

Operating protocols were not reviewed due to changes in the Working Group structure.

PUBLIC COMMENTS

No public comments were made.

Appendix A
Attendance

NAME	AFFILIATION
Kristen Anders	Chatham Conservation Agent
Paul Chamberlain	Chatham Conservation Commission
John Crea	EINCOM
Robert Duncanson	Chatham Director of Health and Environment
Dan Milz	
Fran Meaney	Chatham Concerned Taxpayers
Ed Nash	Golf Supt. Association
David Spitz	Town planner - Harwich

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

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

Meeting Agenda

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

Three Bays & Centerville River Group

Baseline Conditions & Needs Assessment

What is the 208 Plan?

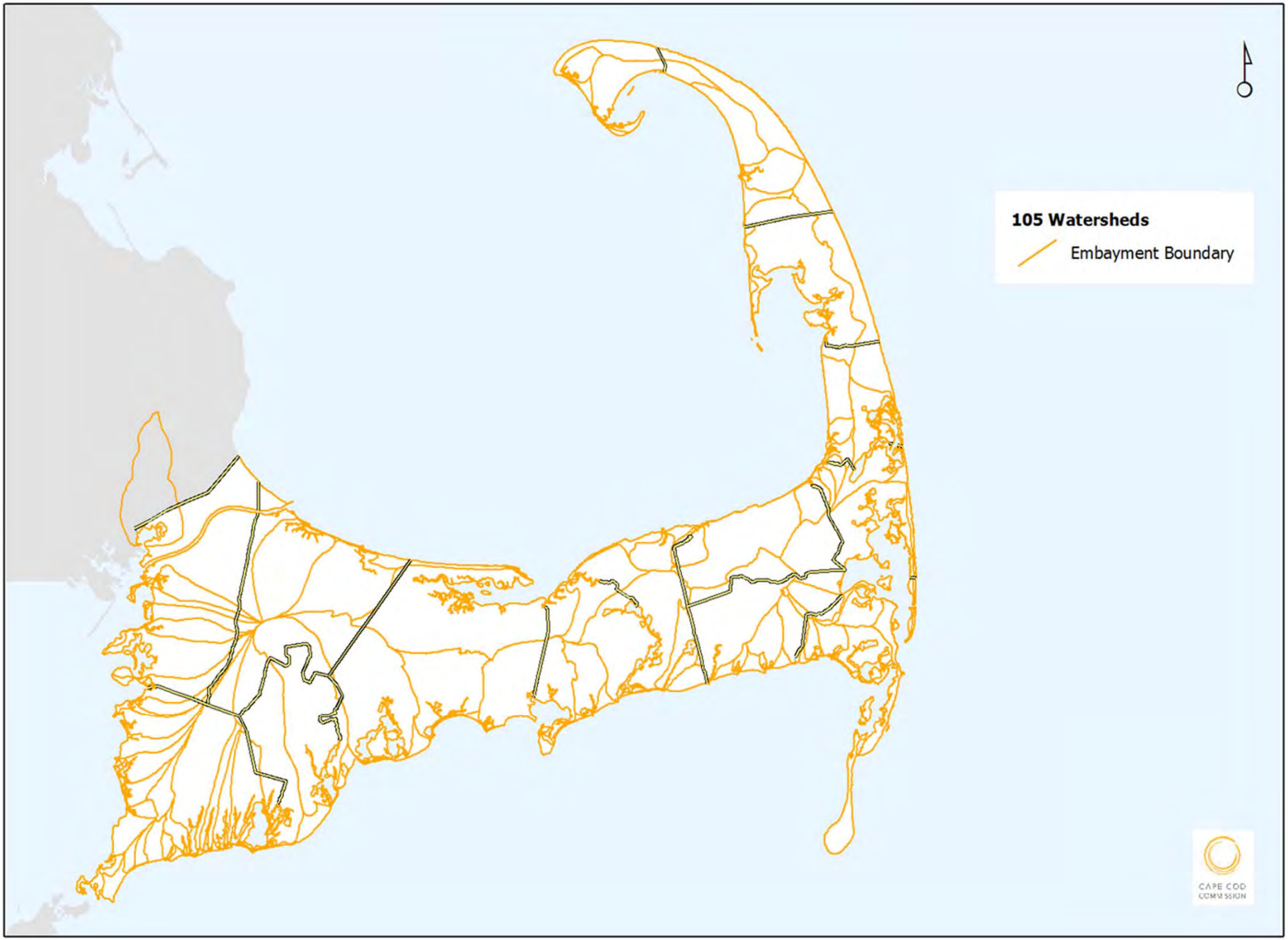
Clean Water Act Section 208

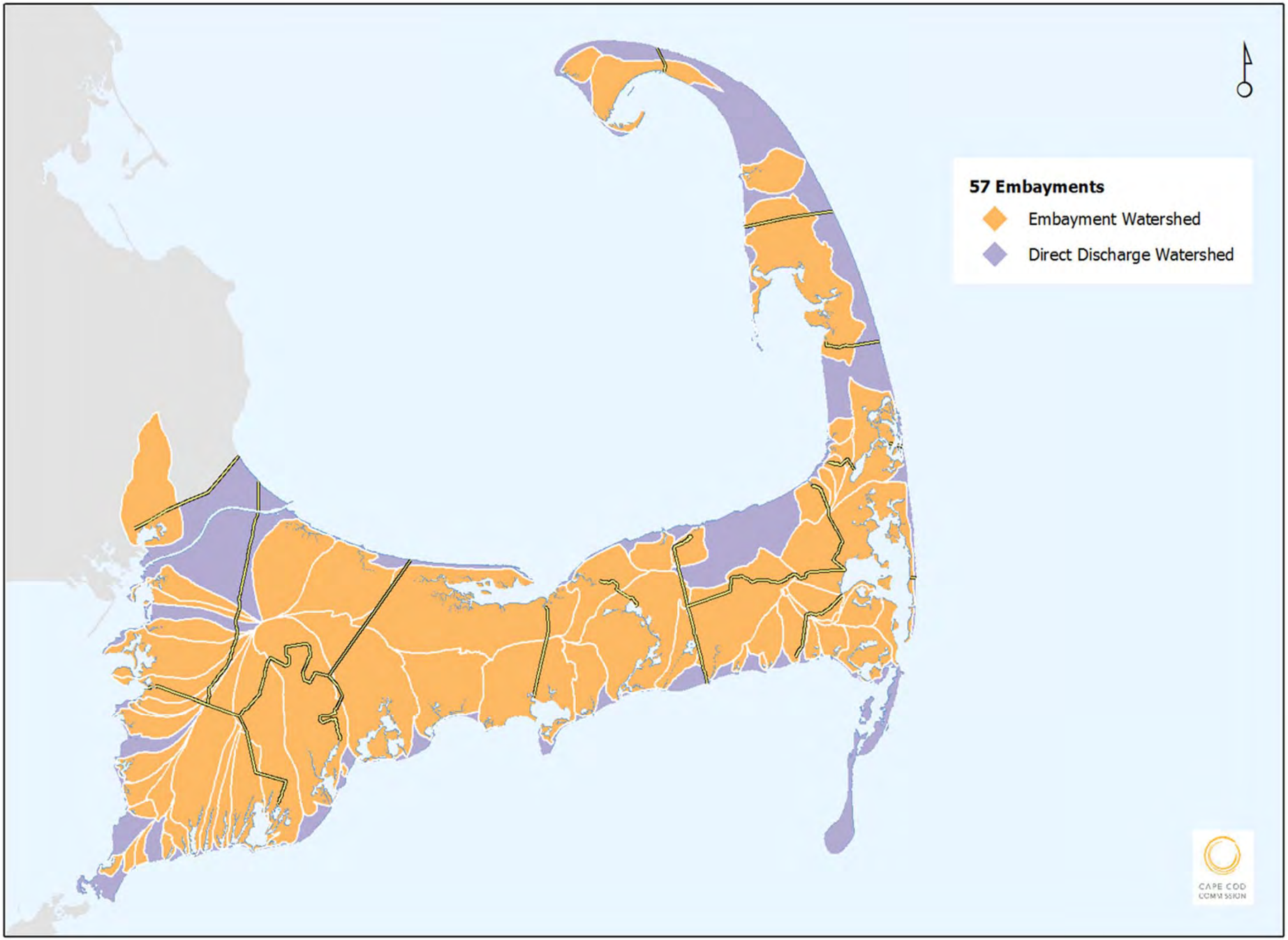
The Commission was directed to update the 1978 Plan

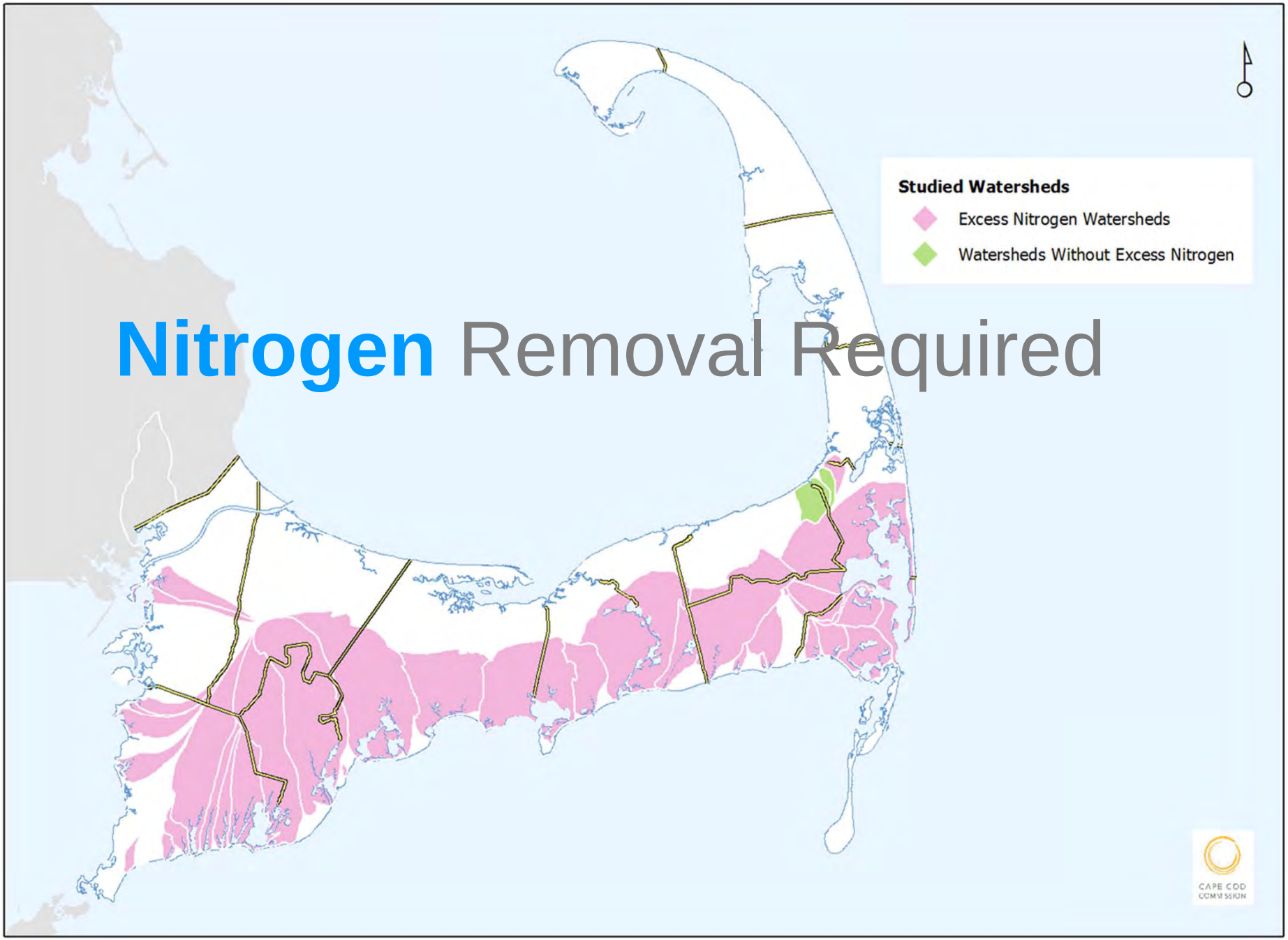
The Commonwealth provided $3 million to fund the project

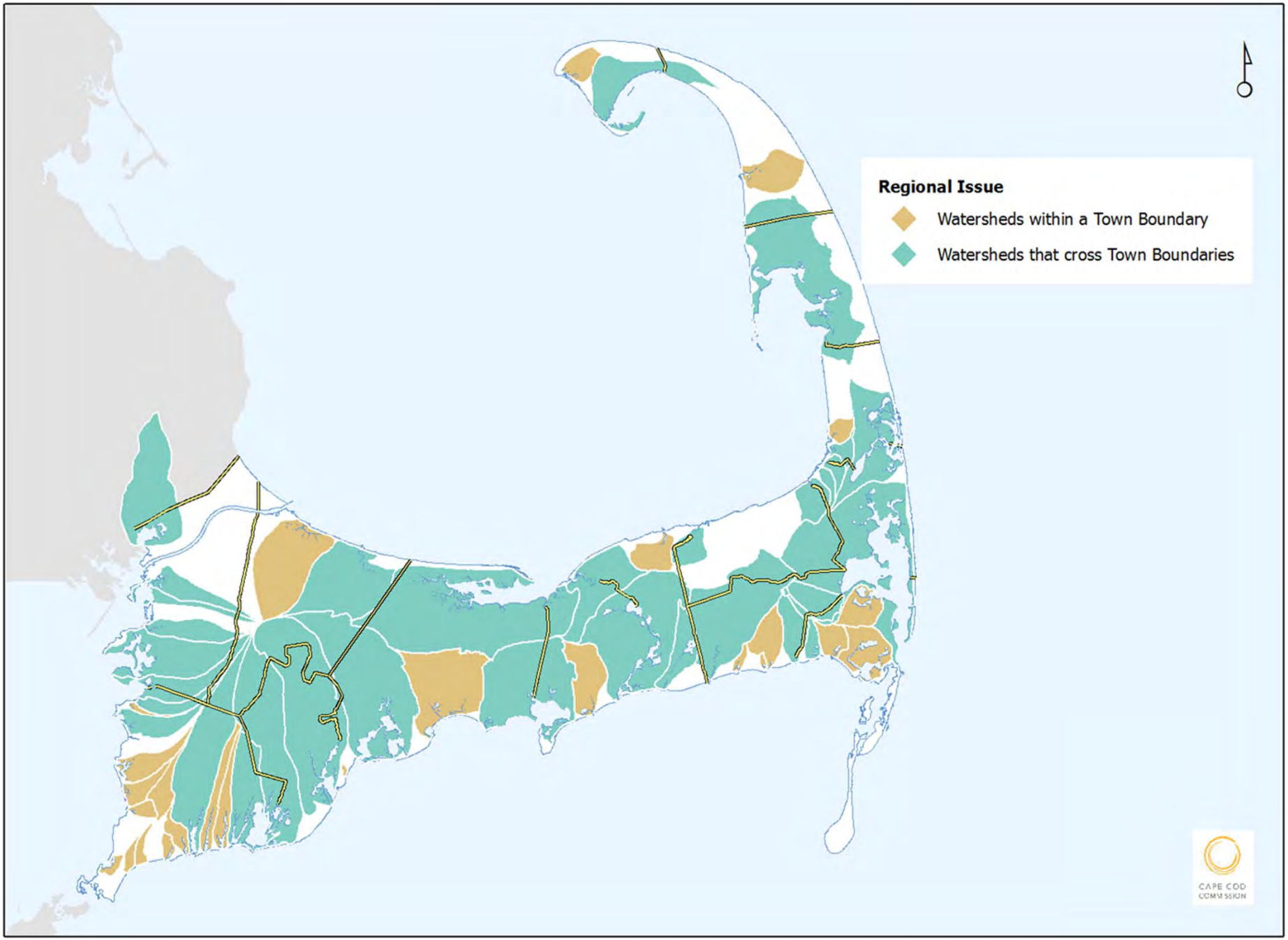
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

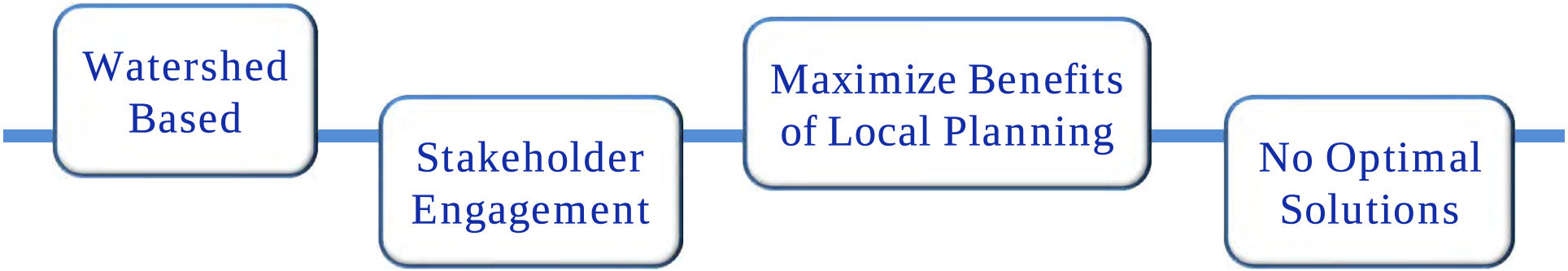

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

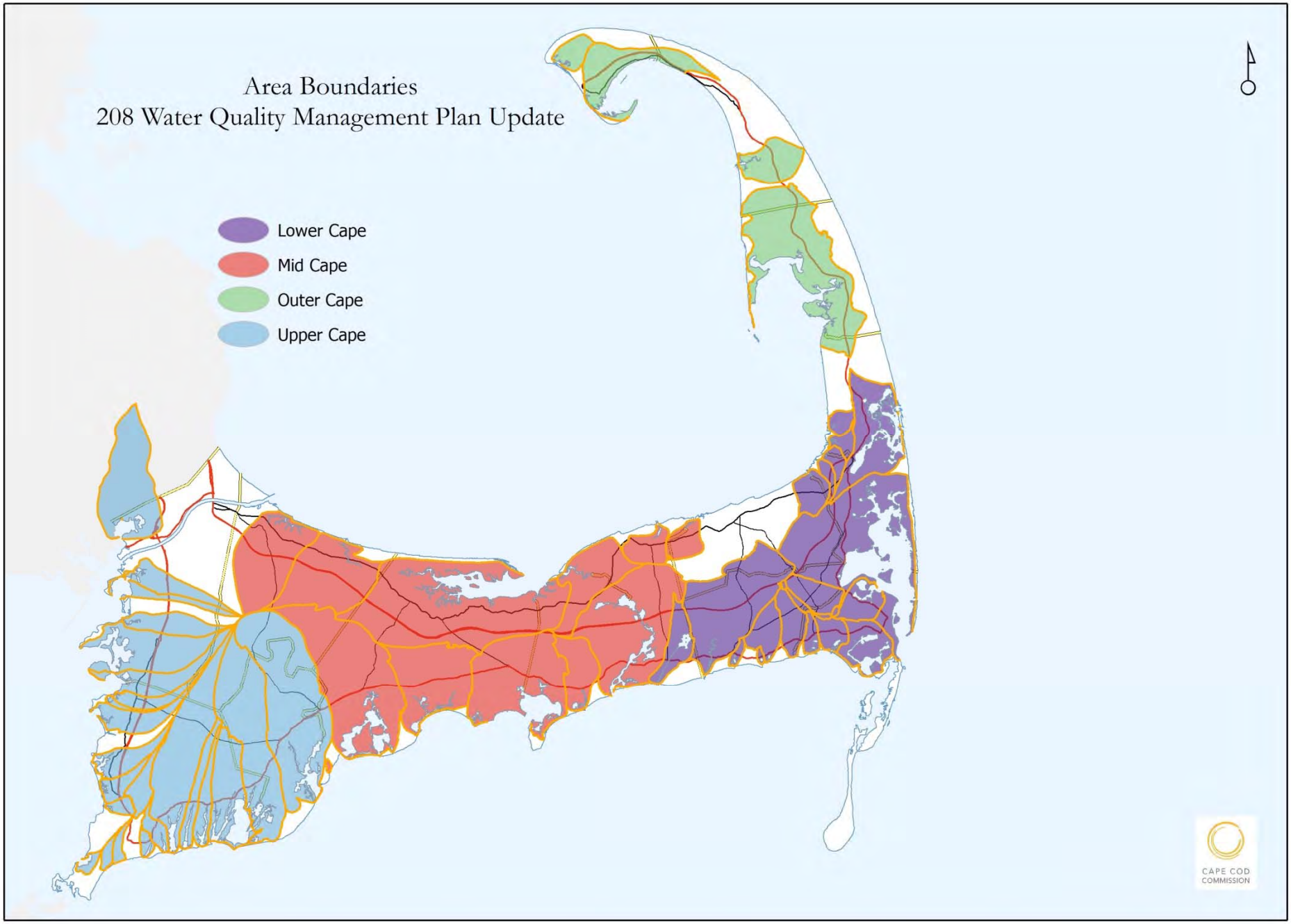

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

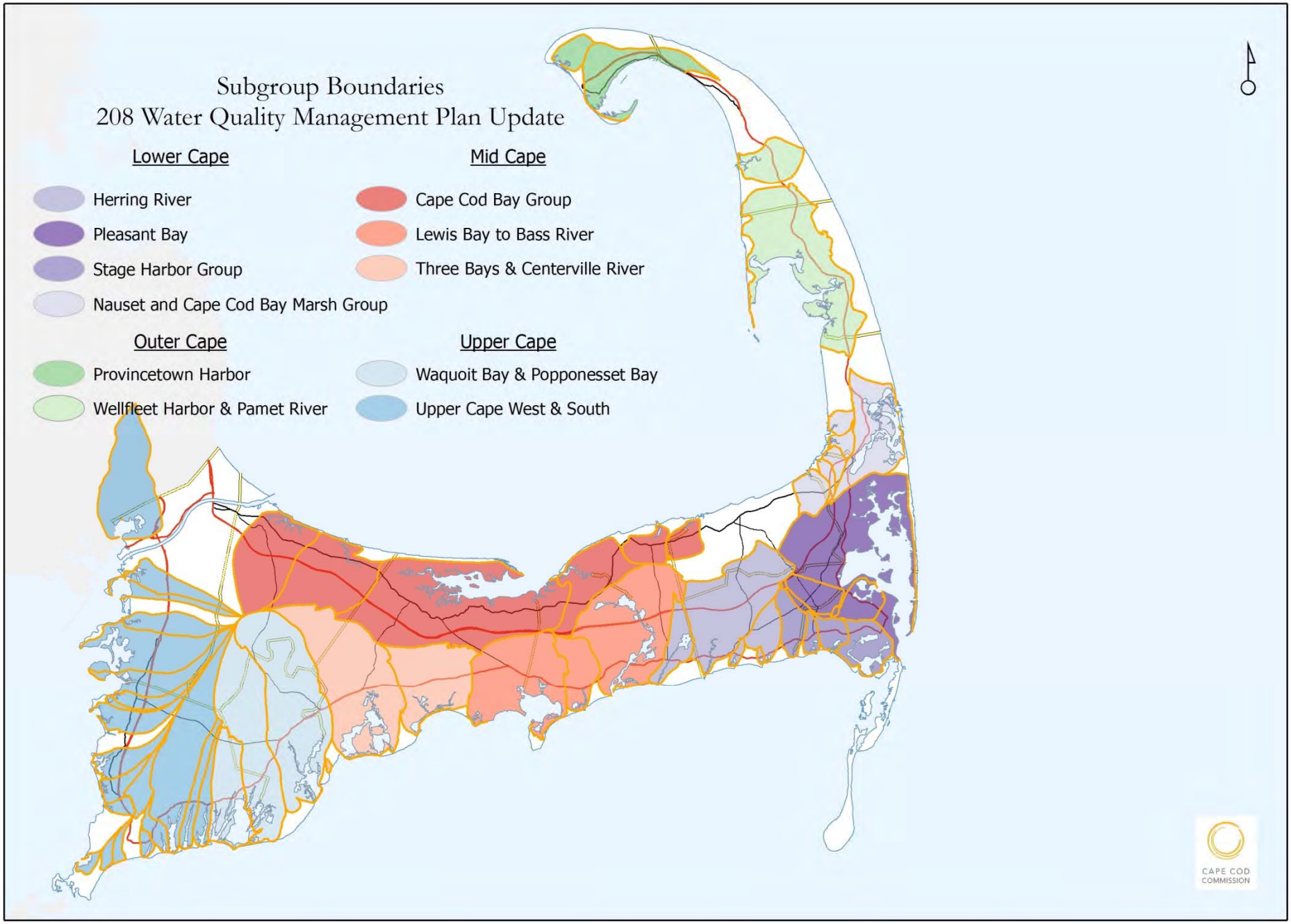

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

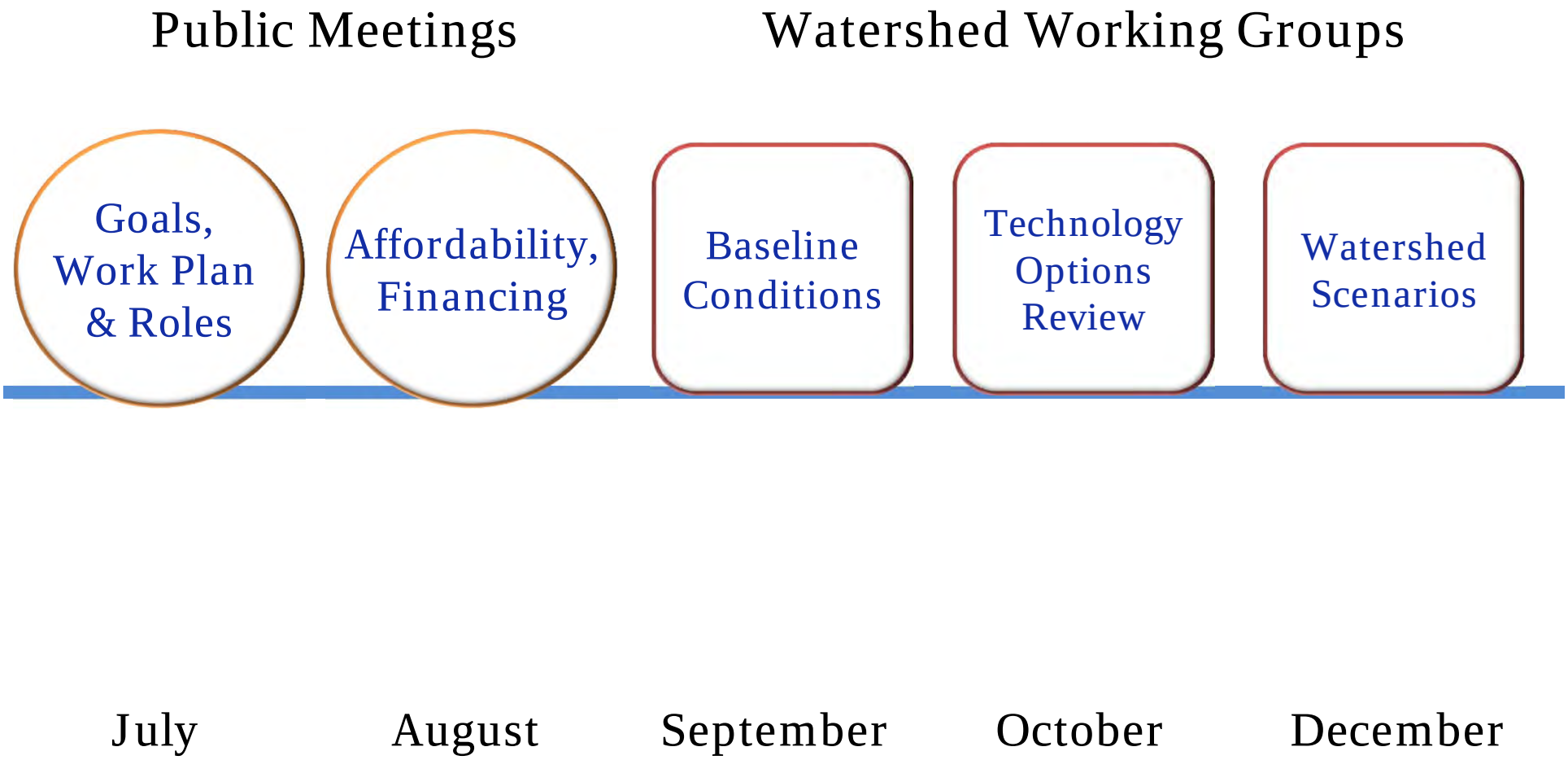


Goal:
To generate a series of approaches in each watershed that will meet water quality standards

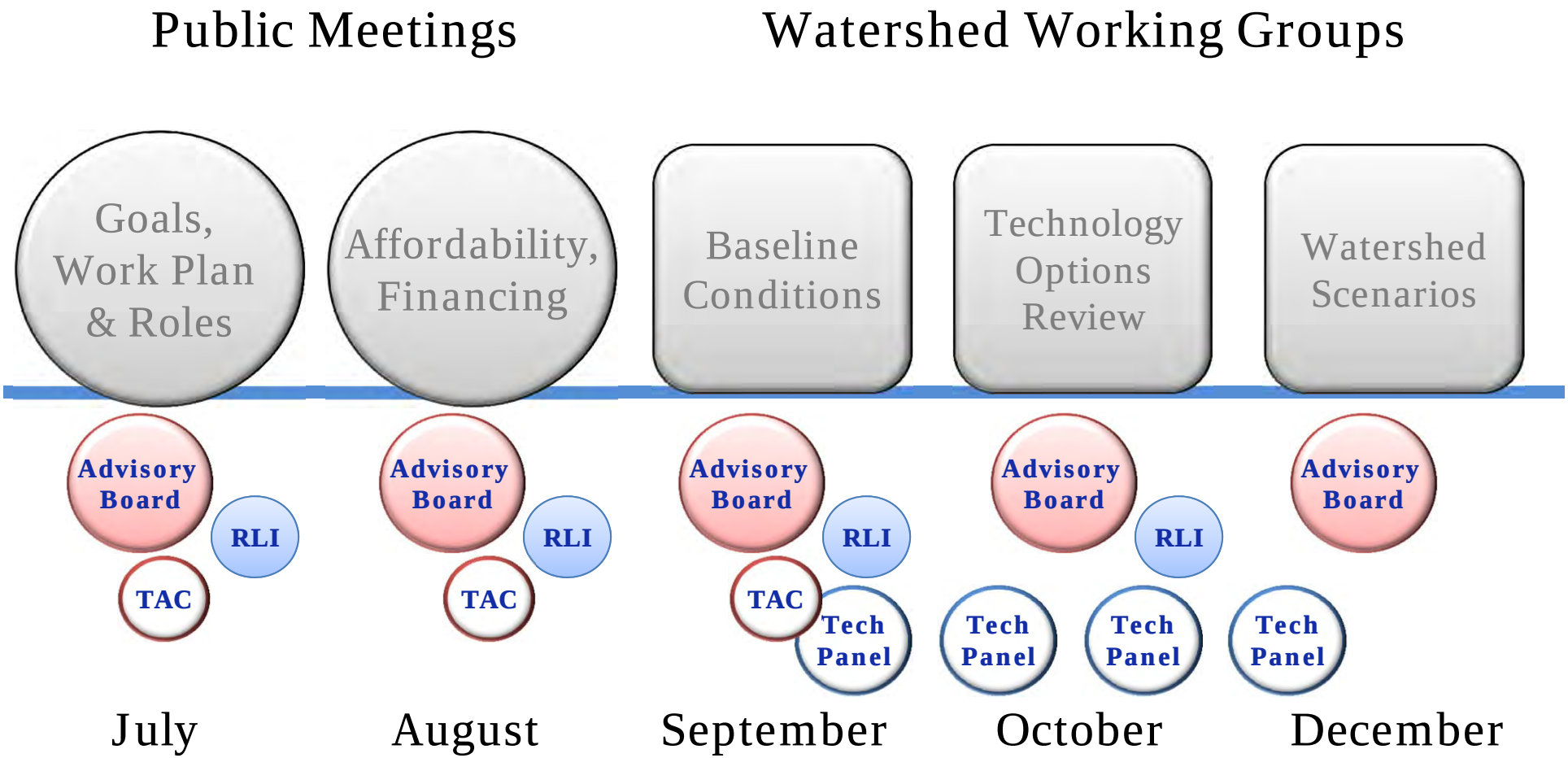

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

What is the stakeholder process?



208 Planning Process



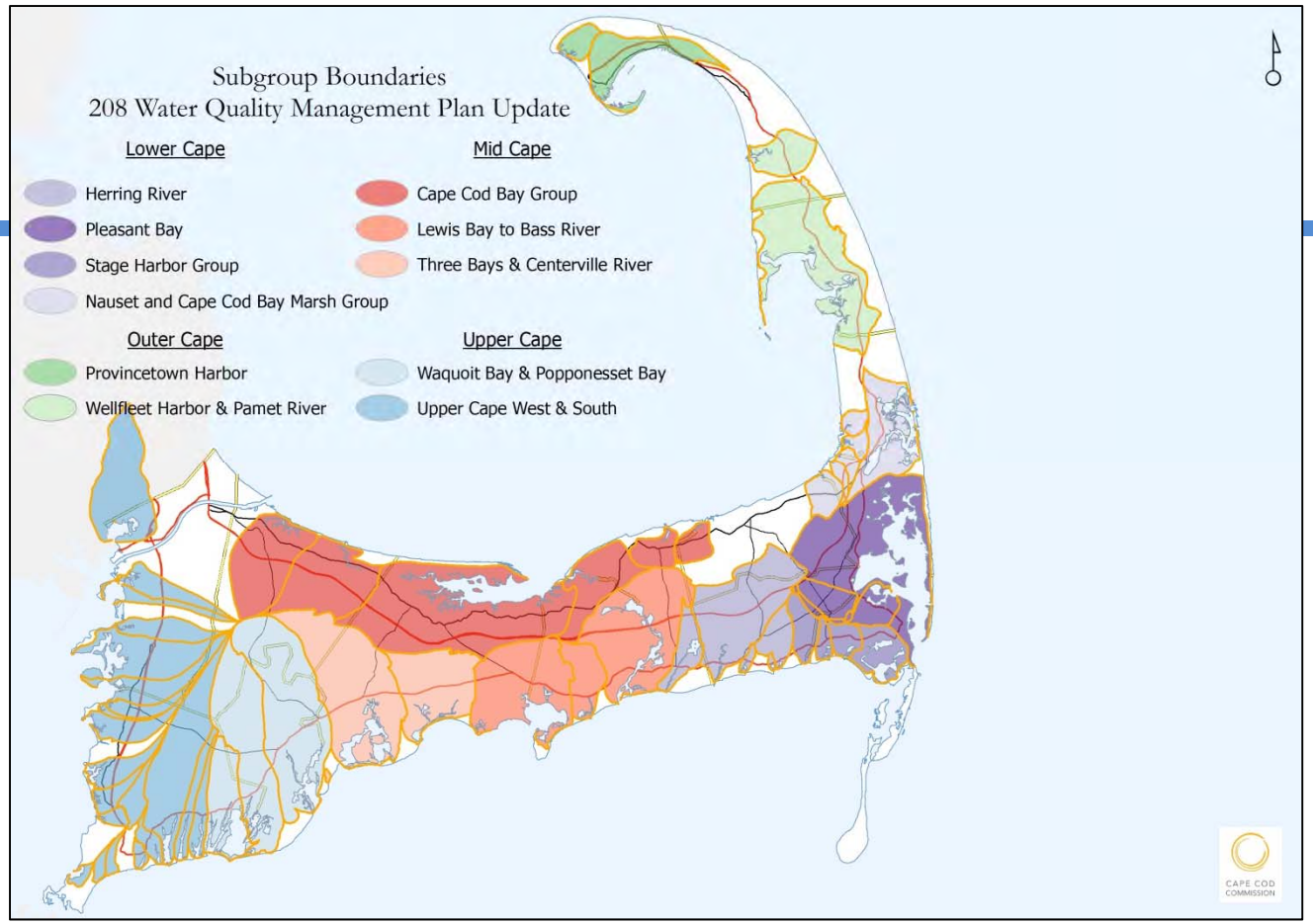
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



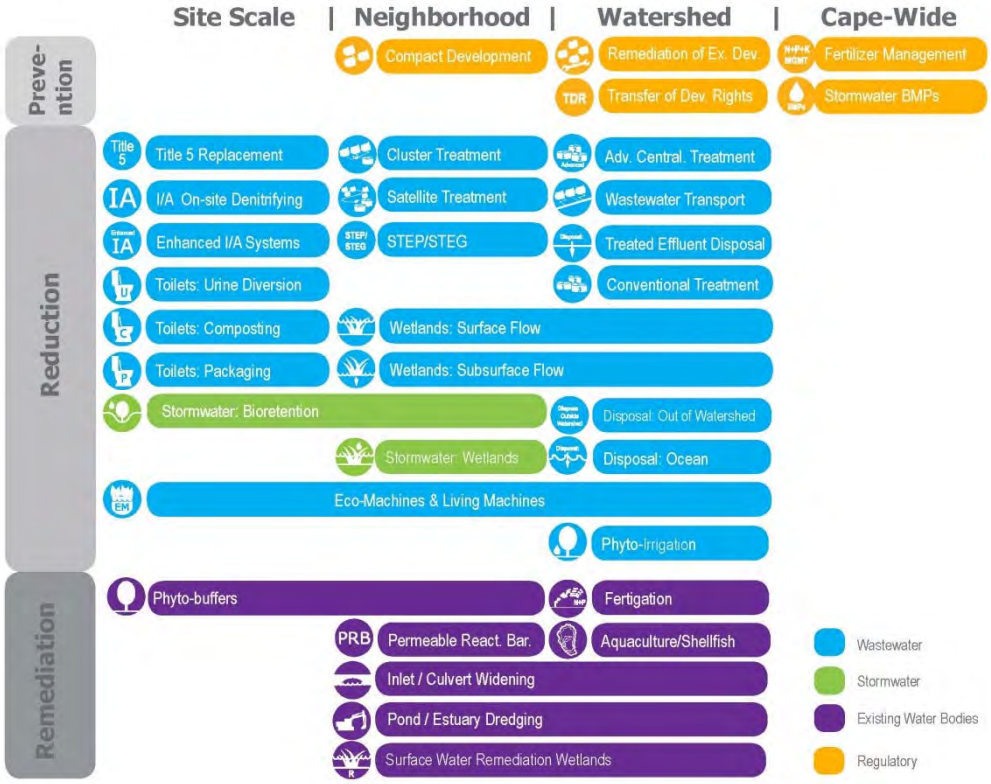
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

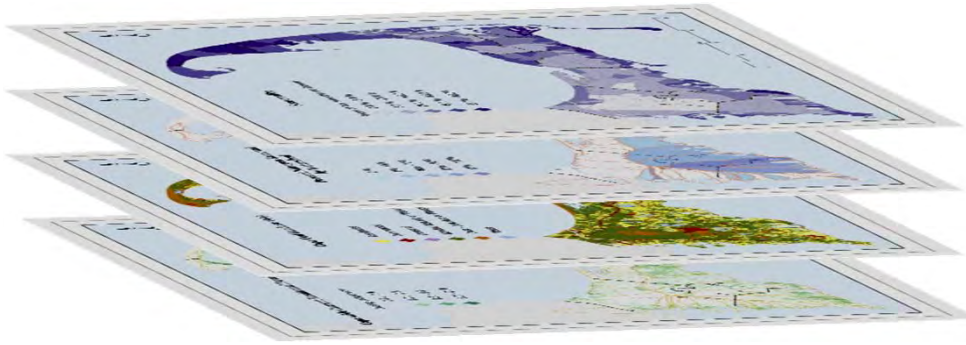


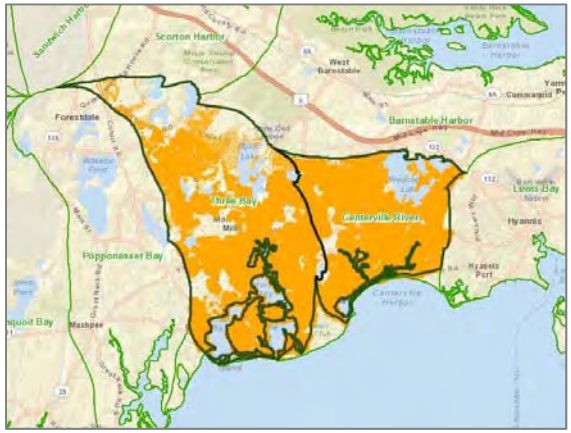
208 Planning Process

Baseline Conditions
11 Working Group Meetings: Sept 18-27

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

Watershed Scenarios
11 Working Group Meetings: Dec 2-11





208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Goal of Today's Meeting:

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

208 Planning Process

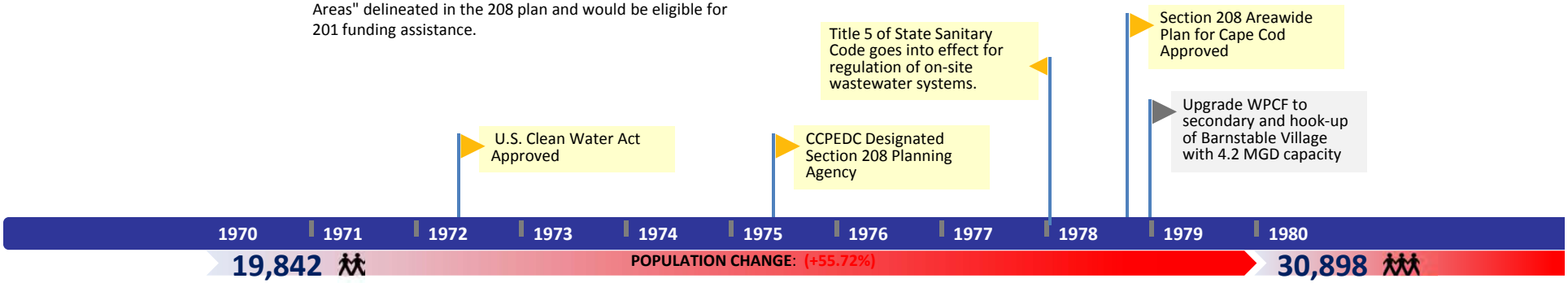
Local Progress to Date

Centerville River
Rushy Marsh
Three Bays

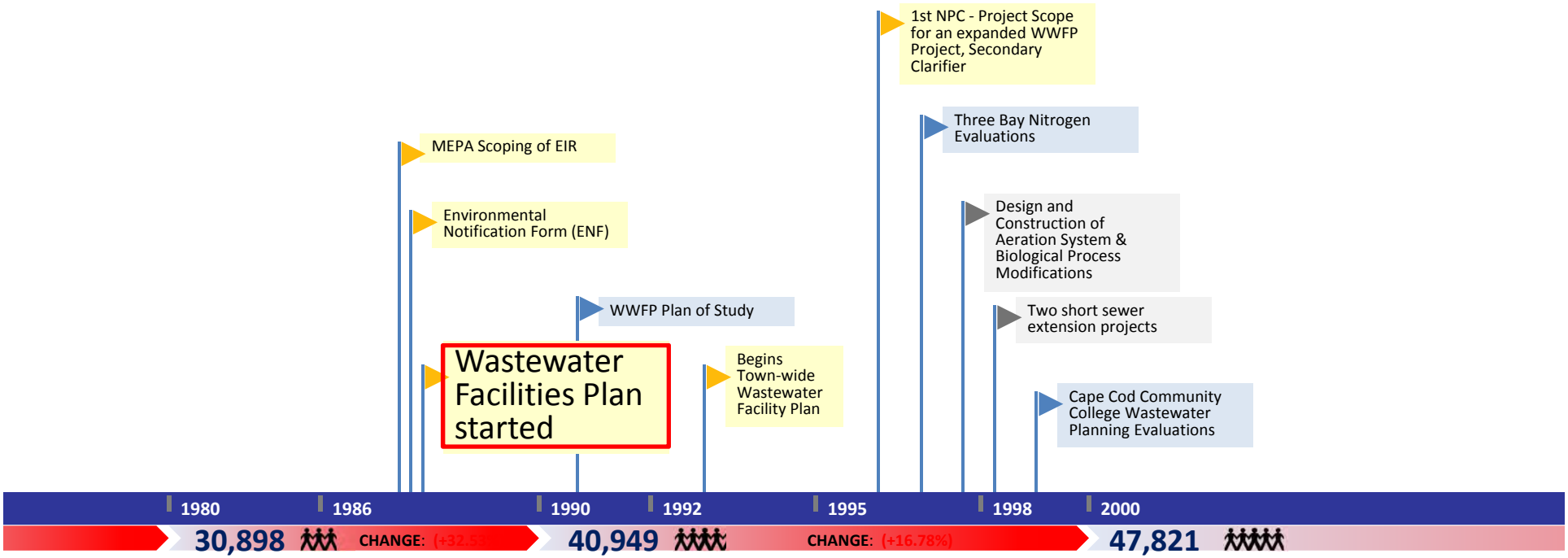
Barnstable: 1970-2013

From 1978 Section 208 Plan

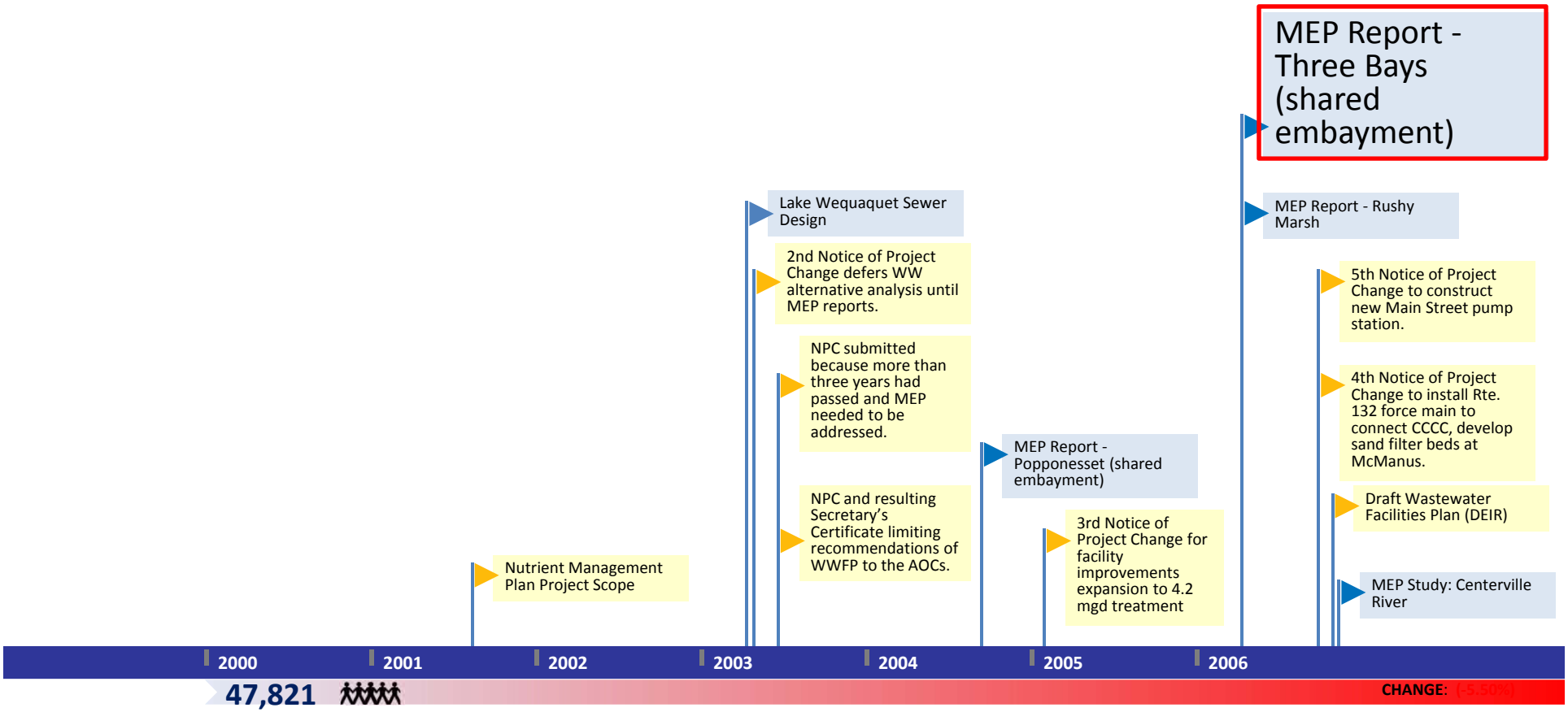
- The major 208 concern for Barnstable is the protection of its public water supply wells.
- **The Planning Board appears to be interested in water supply protection as indicated by its recent zoning proposals. The coordination of town boards and the water utilities is essential to the success of this effort in Barnstable.**
- Possible consolidation of the water utilities or some formal coordinative mechanism should be seriously considered to insure efficient and effective protection of the town's water resources.
- While the town is presently constructing an expansion of the sewage treatment plant and collection system with EPA 201 funds, it has not addressed all of the wastewater management problem areas in the town. Additional 201 facilities planning must be carried out to demonstrate a sewer need exists under present EPA criteria.
- Certain problem areas are included as future phases of the sewer collection system expansion in the "Sewer Service Areas" delineated in the 208 plan and would be eligible for 201 funding assistance.
- The present Hyannis treatment plant has the necessary capacity to handle all sewer service area needs in Hyannis. Should the town want to expand the collection system beyond these sewer service areas, 201 funds will not be available for these expansions or for an additional treatment plant.
- The need for collection system expansion in the Hyannis area should be carefully considered in assessing the plant's ability to accept wastewater from Yarmouth since the Hyannis treatment plant cannot be expanded beyond its present capacity.
- The town should consider, in the near future, entering into a 201 facilities plan to resolve the present Category 2 problem areas possibly through decentralized solutions.
- The 201 study and efforts of town board should address the coastal water quality problems of the town, particularly Lewis Bay.



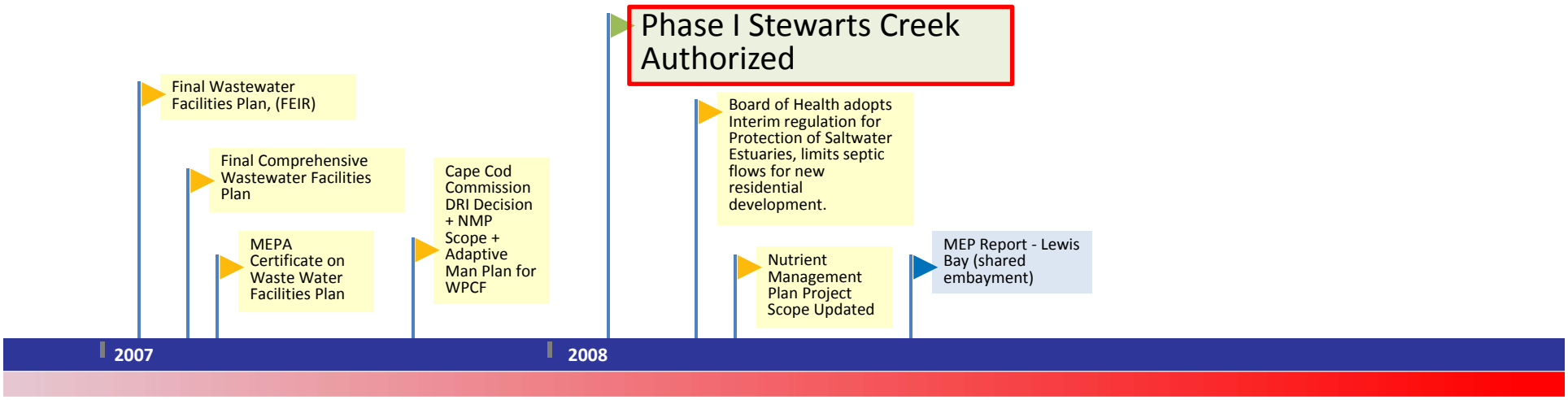
Barnstable: 1970-2013



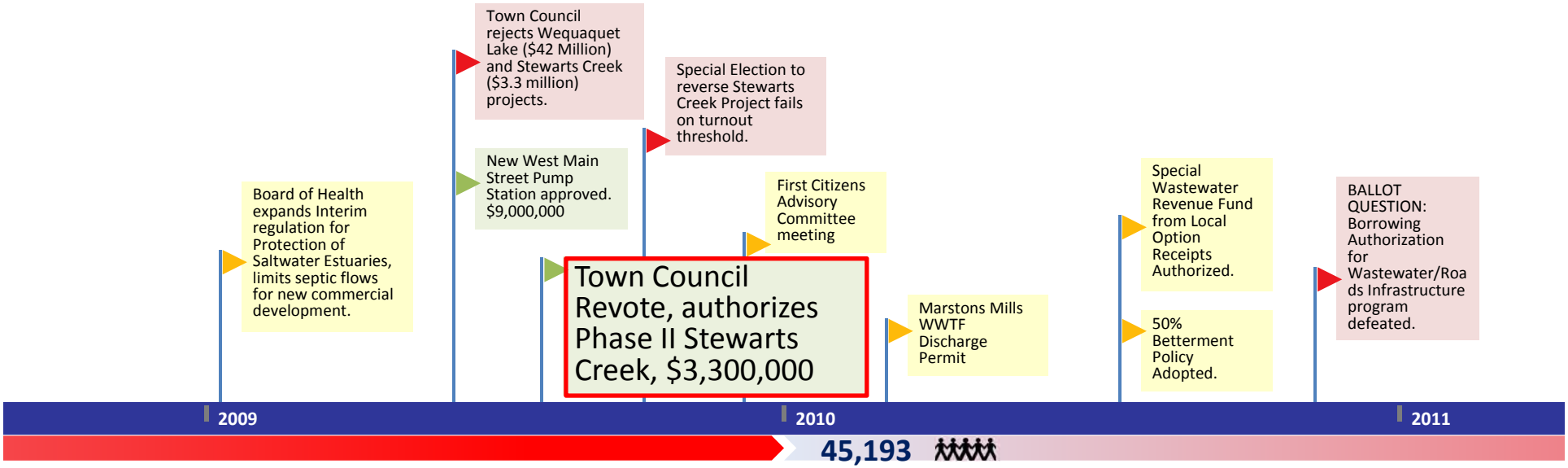
Barnstable: 1970-2013



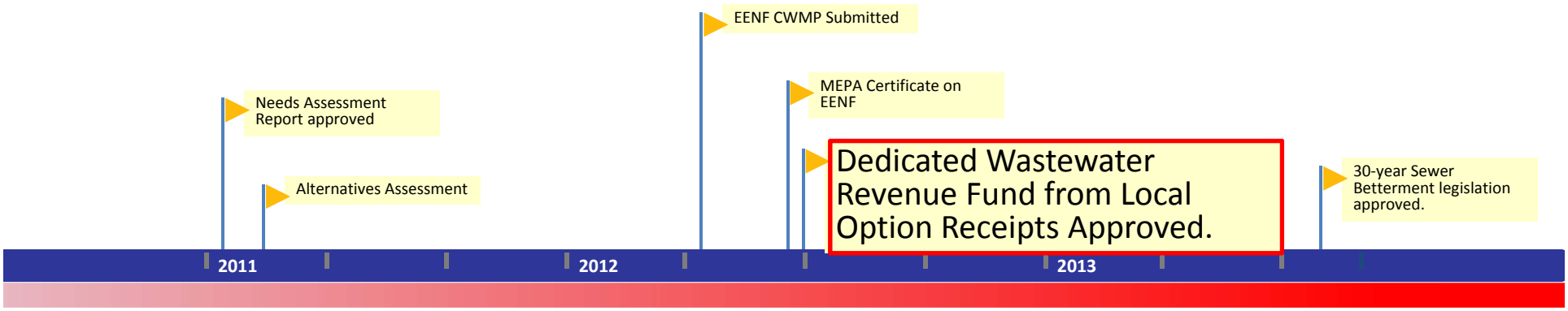
Barnstable: 1970-2013



Barnstable: 1970-2013



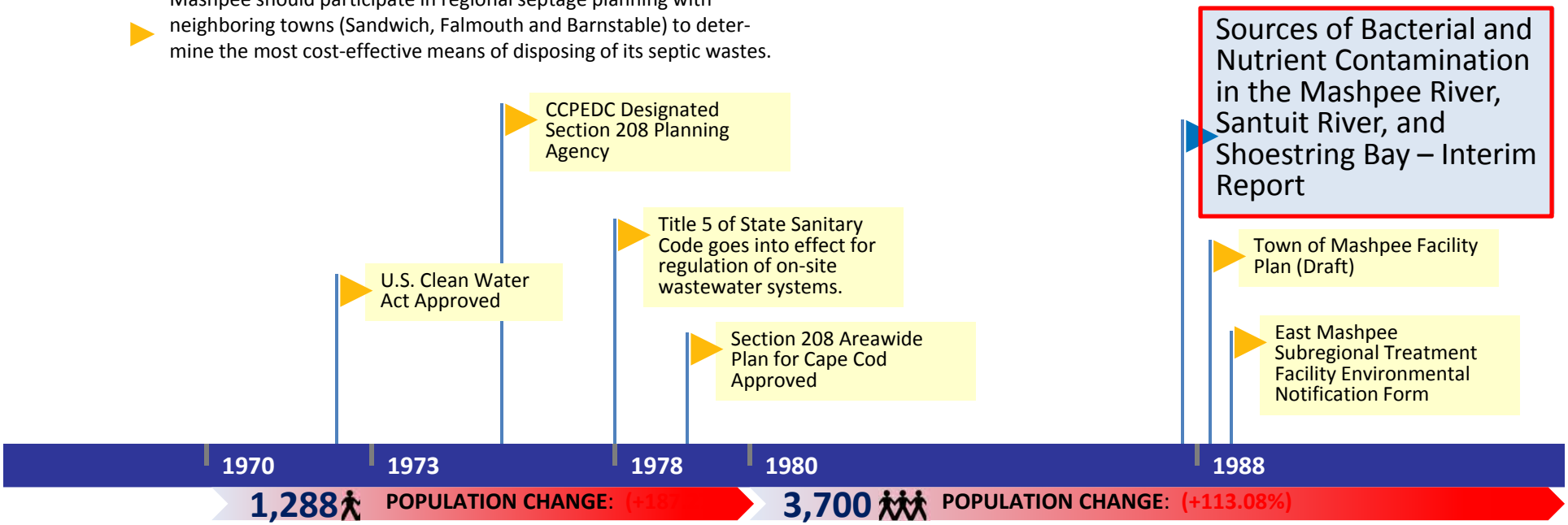
Barnstable: 1970-2013



Mashpee

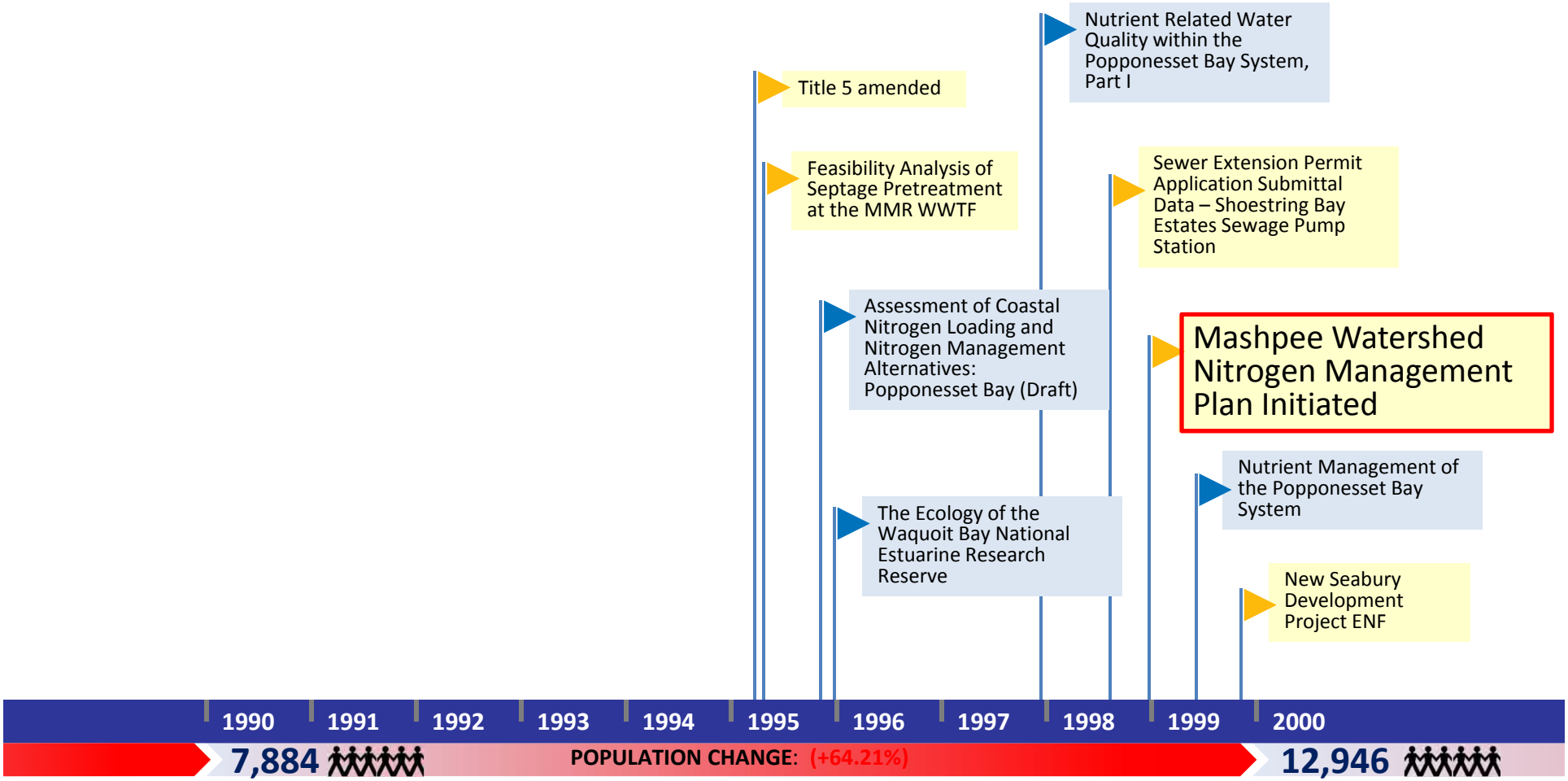
From 1978 Section 208 Plan

- While there does not appear to be any major wastewater management problem areas, pond water quality has been a problem of concern to the town for a number of years.
- The town should protect the future water supply development area, once defined, with a Watershed Protection District.
- Non-structural solutions, including careful management of on - site systems, water conservation and innovative options should be adequate to avoid creation of future sewer needs.
- Mashpee is not highly developed and is in an excellent position to plan development and manage subsurface disposal to avoid future problems.
- Mashpee should participate in regional septage planning with neighboring towns (Sandwich, Falmouth and Barnstable) to determine the most cost-effective means of disposing of its septic wastes.
- The town has been concerned about the condition of recreational ponds that have significant development around them, particularly Johns and Ashumet Ponds.
- Extensive water quality testing has been conducted on Johns Pond, and the town is interested in implementing a Pond Management program.
- It is further suggested that the town adopt a "Great Pond Protection District" as part of its zoning by-laws to begin such a management program.
- The landfill plume may be flowing towards the Mashpee River. If private wells are found to be down gradient there may be a need for town water service to the area.

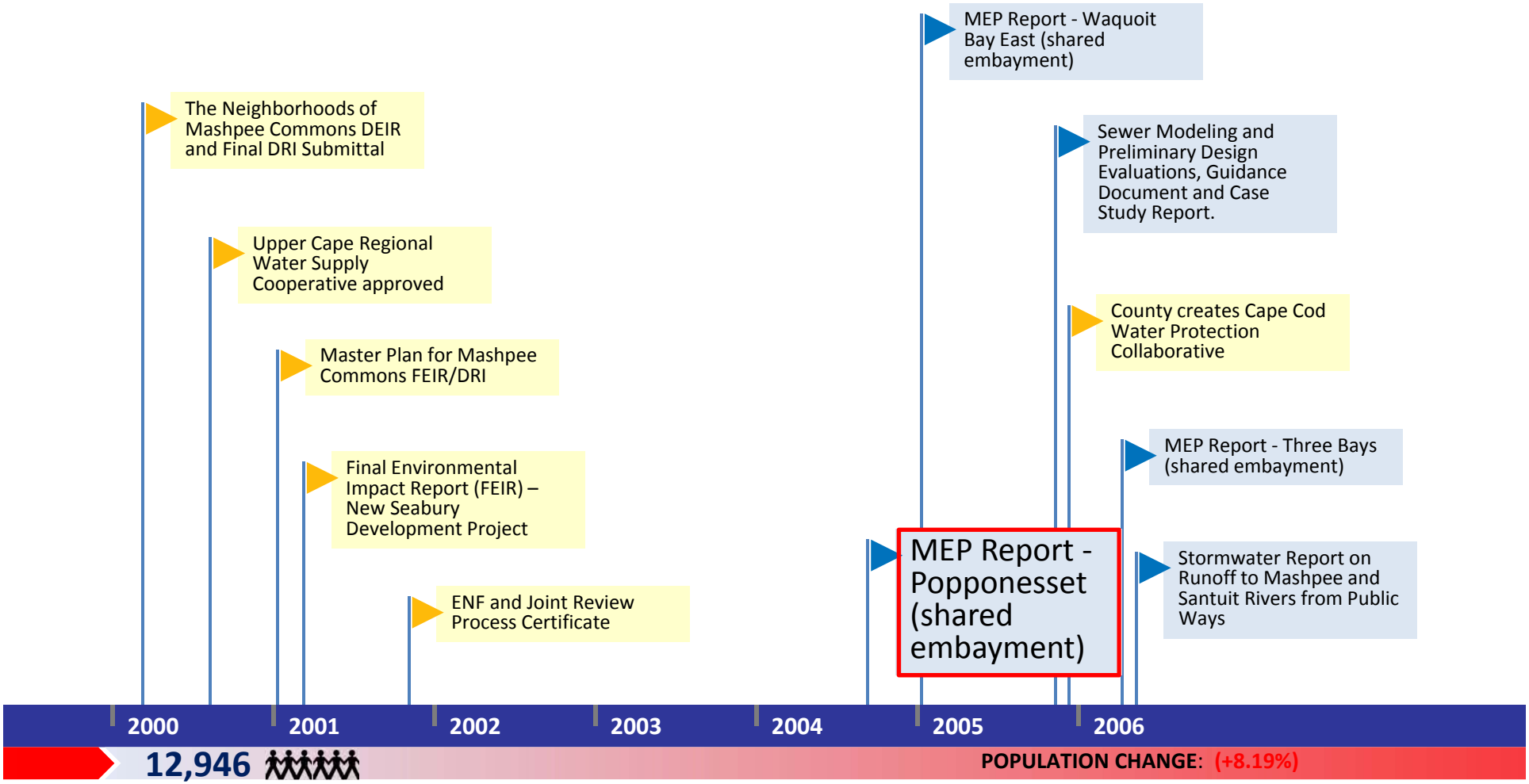


POPULATION: 7,884
(+113.08%)

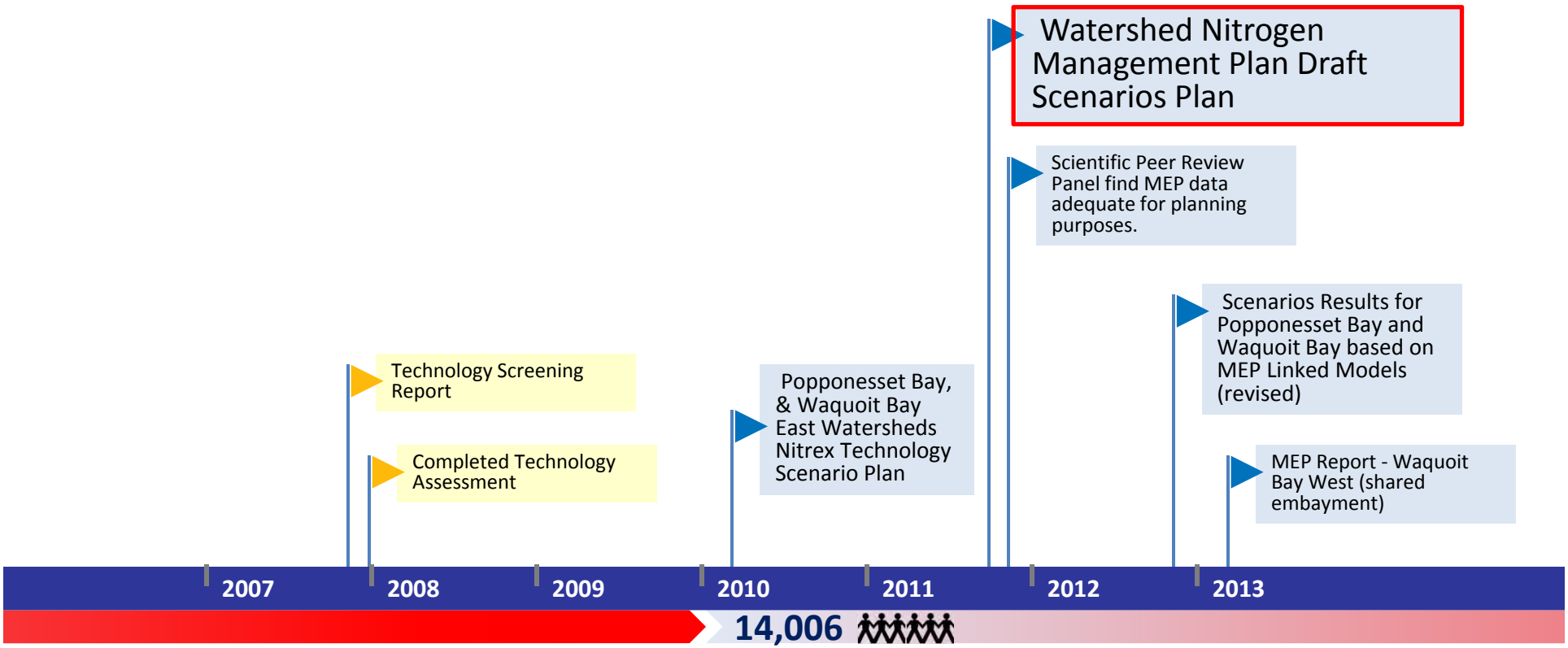
Mashpee: 1970-2013



Mashpee: 1970-2013



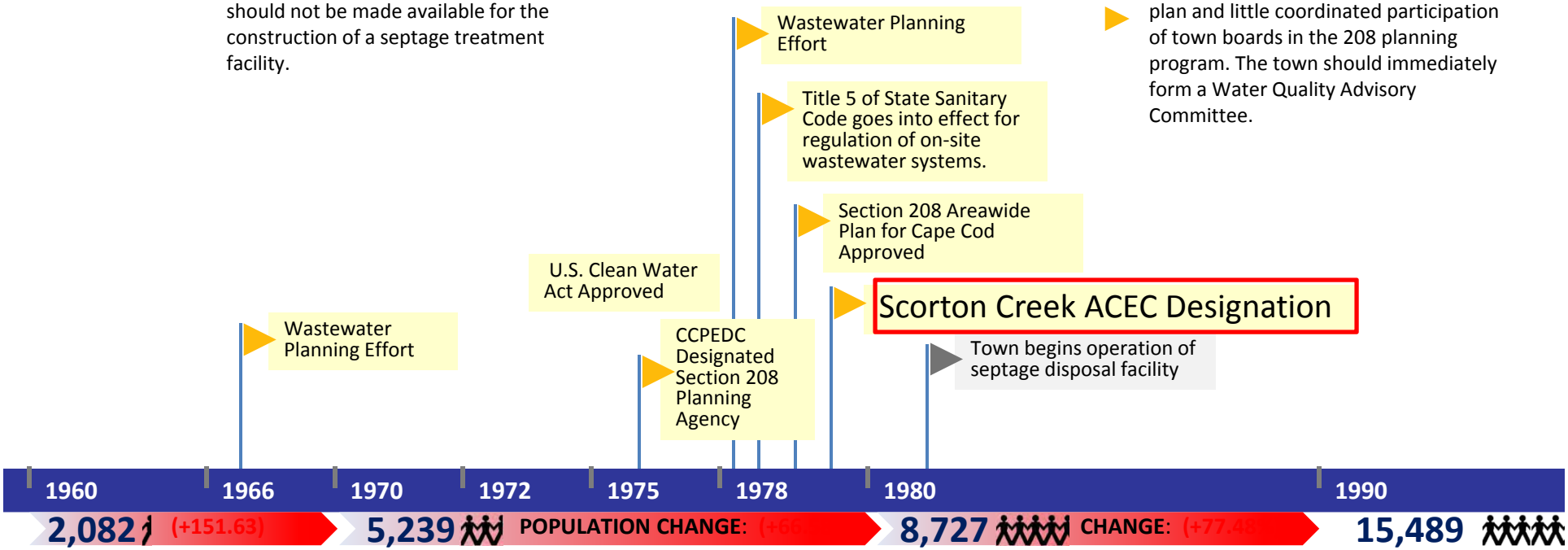
Mashpee: 1970-2013



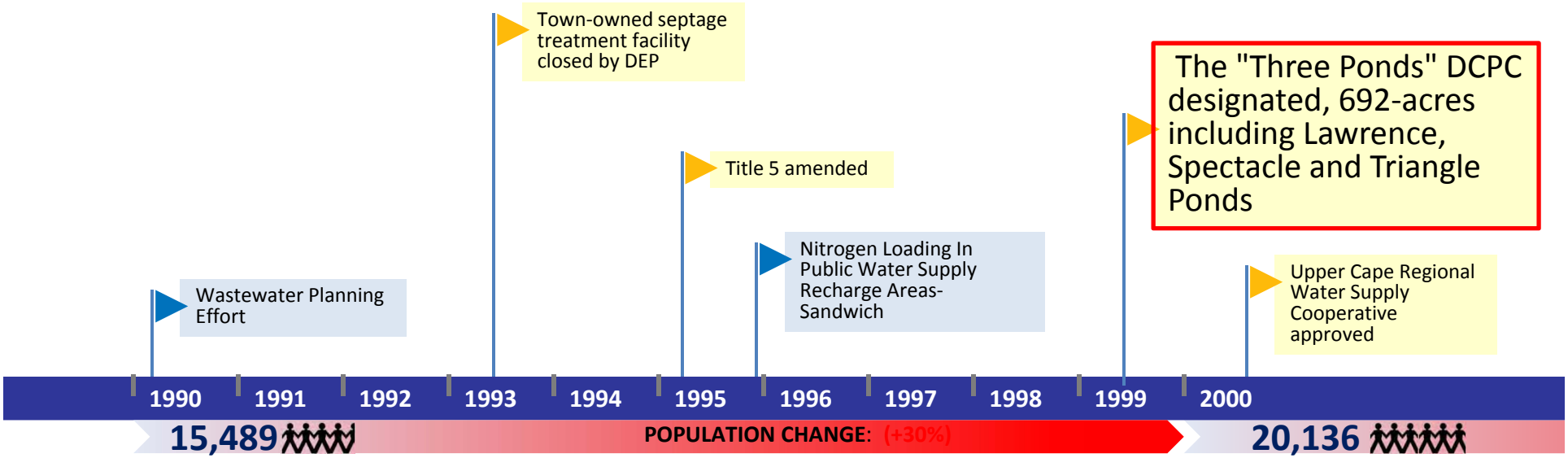
Sandwich

From 1978 Section 208 Plan

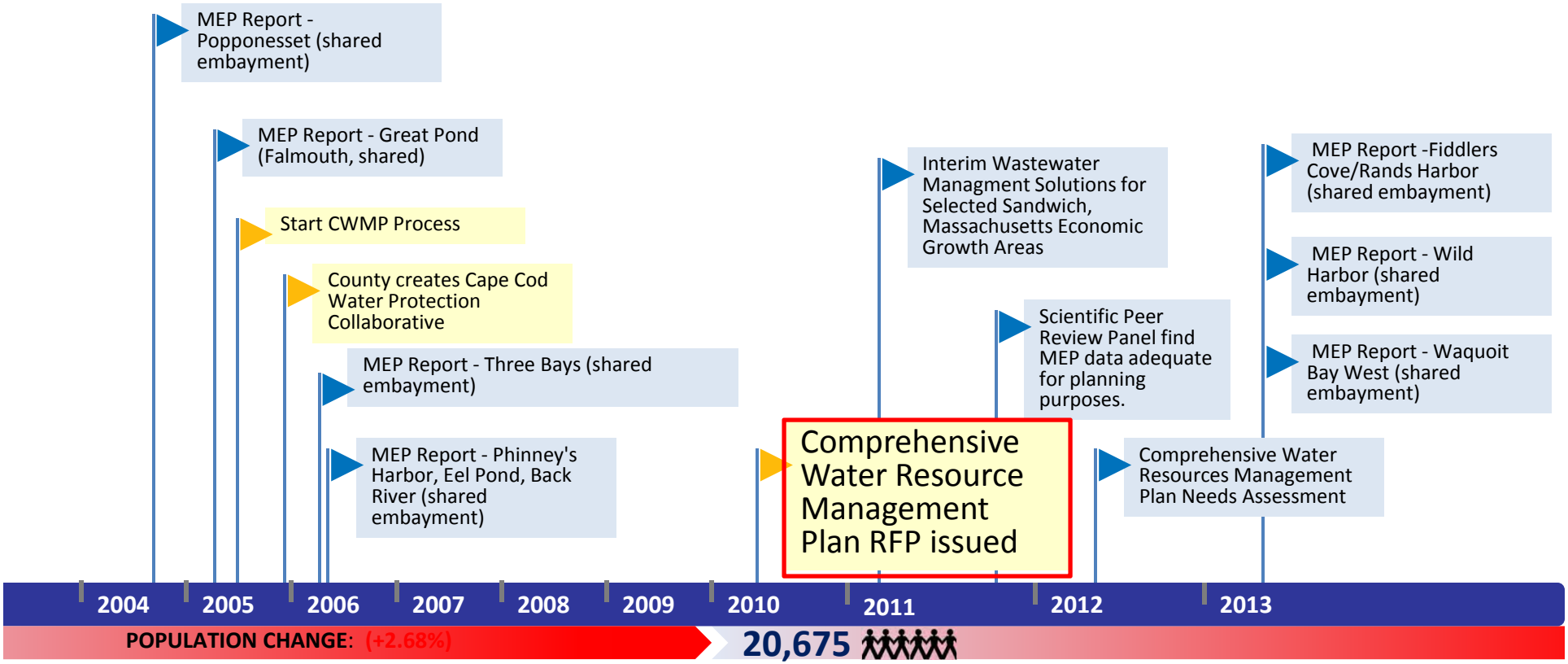
- A sewer facilities plan was completed for Sandwich in 1978. The plan calls for a small outfall into the Cape Cod Canal, which now could only be allowed through a special act of the legislature.
- Should the town fail to act by 1980, a DEQE investigation of Title 5 violations should be initiated.
- A septage treatment facility would not provide a comprehensive solution and could not be considered to be consistent with the 208 plan. Funds should not be made available for the construction of a septage treatment facility.
- The town health agent should strictly enforce Title 5 and should seek additional qualified personnel to implement the 208 recommended on-site systems management program.
- The town has taken progressive steps to increase lot sizes to at least one acre in most areas of town. The town has indicated willingness to cooperate with the 208 staff in delineating watershed areas and in adopting Watershed Protection Districts.
- The problem of the State Fish Hatchery discharging over half a million gallons of fresh water must be addressed by the Department of Fisheries and Wildlife as recommended in the "Water Conservation" section of the final plan.
- The town should actively participate in regional solid waste planning to develop a long-range solution to its solid waste management problems.
- There has been a serious delay in action on the town's proposed sewer facility plan and little coordinated participation of town boards in the 208 planning program. The town should immediately form a Water Quality Advisory Committee.



Sandwich: 1960-2013



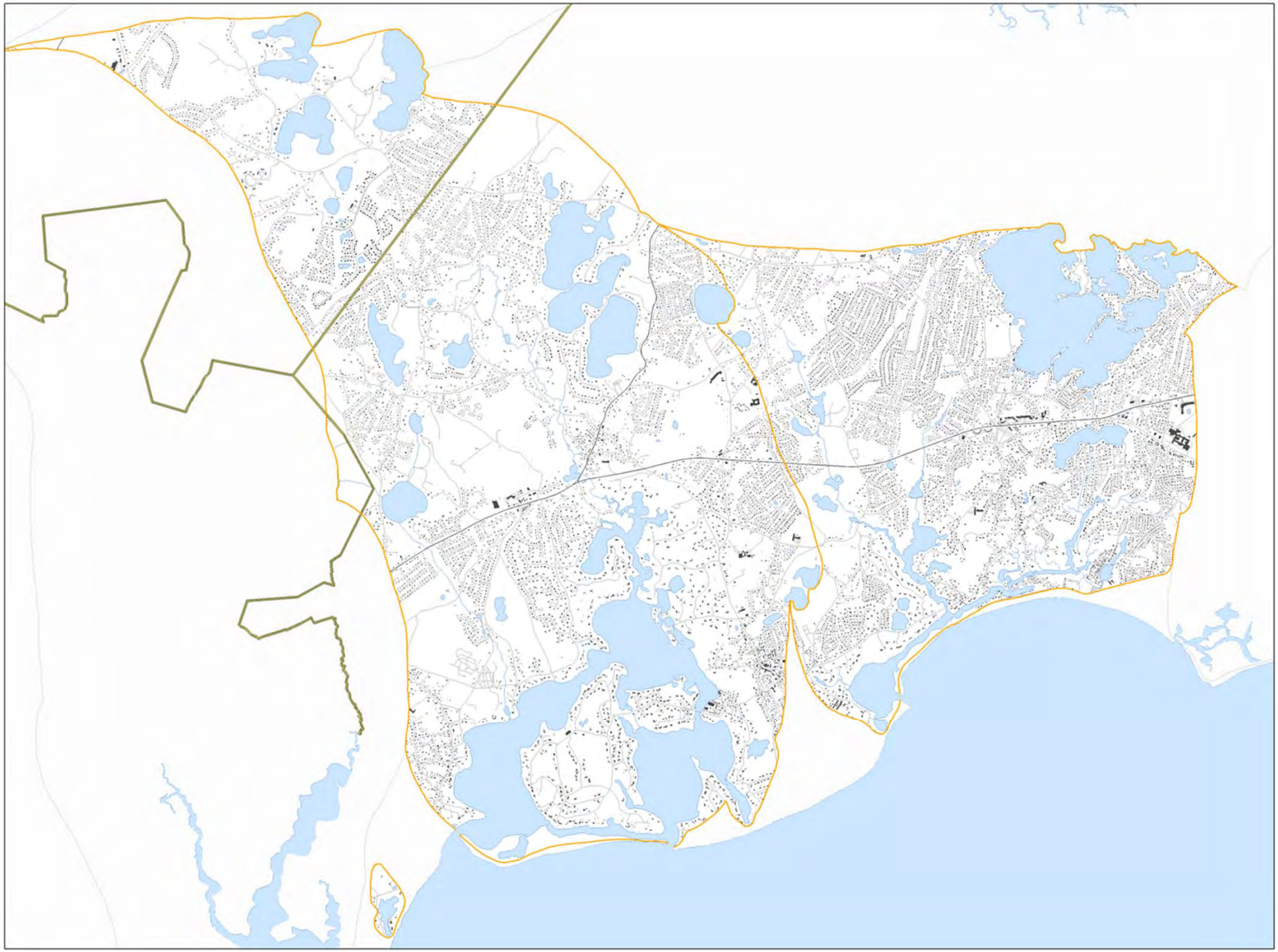
Sandwich: 1960-2013

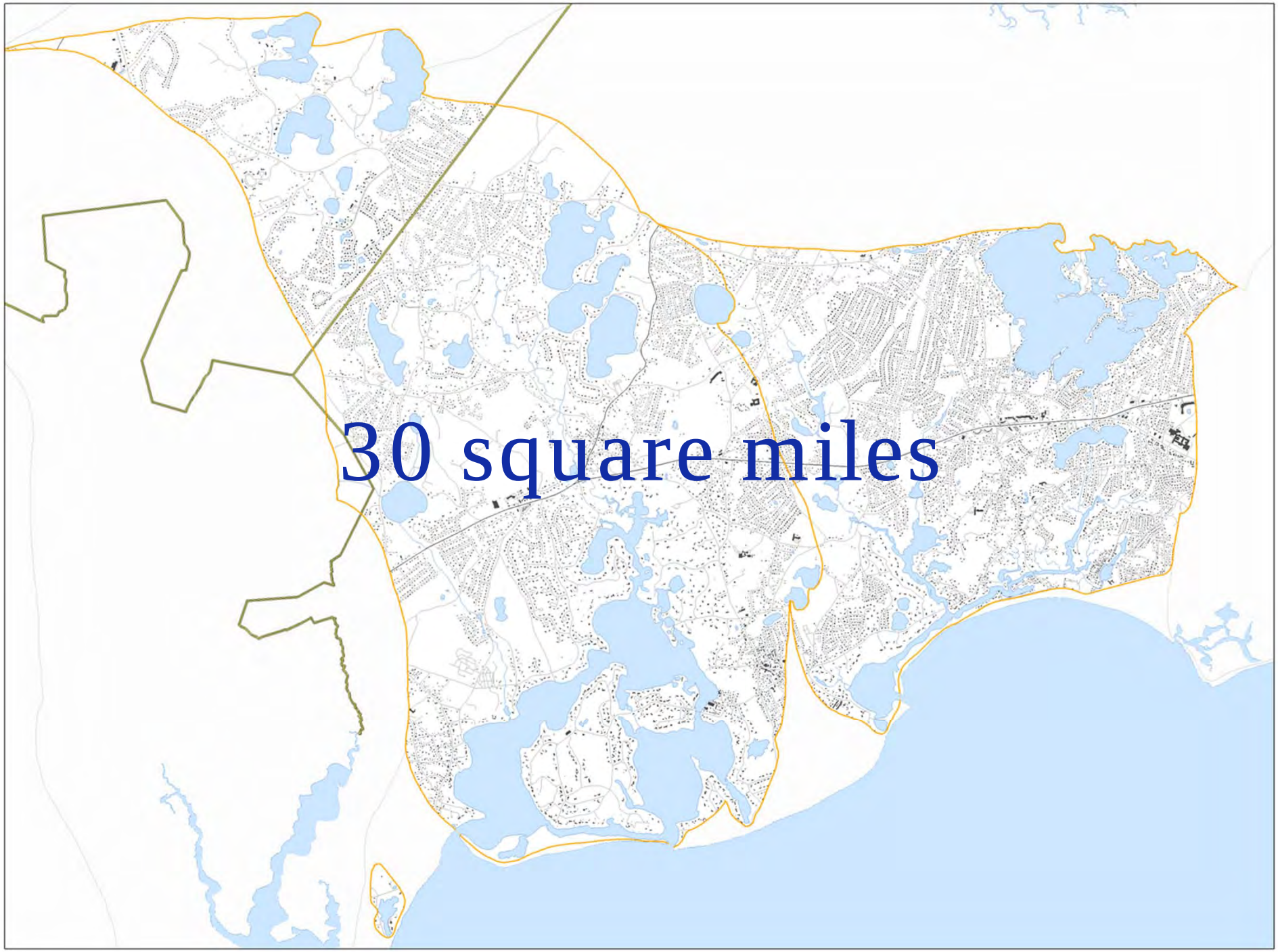


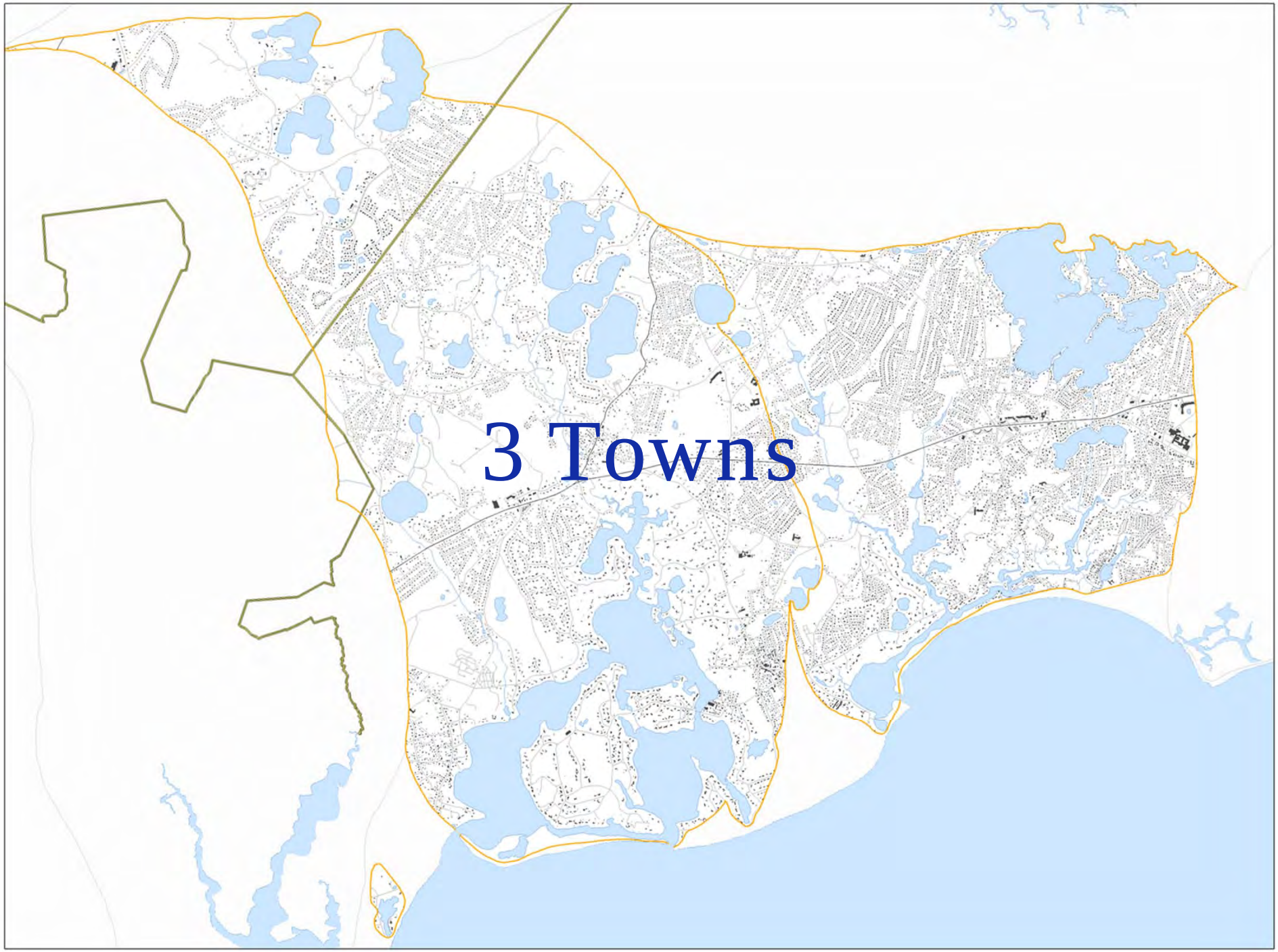
Did we miss anything?

Your Watersheds

Centerville River
Rushy Marsh
Three Bays




30 square miles


3 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 Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

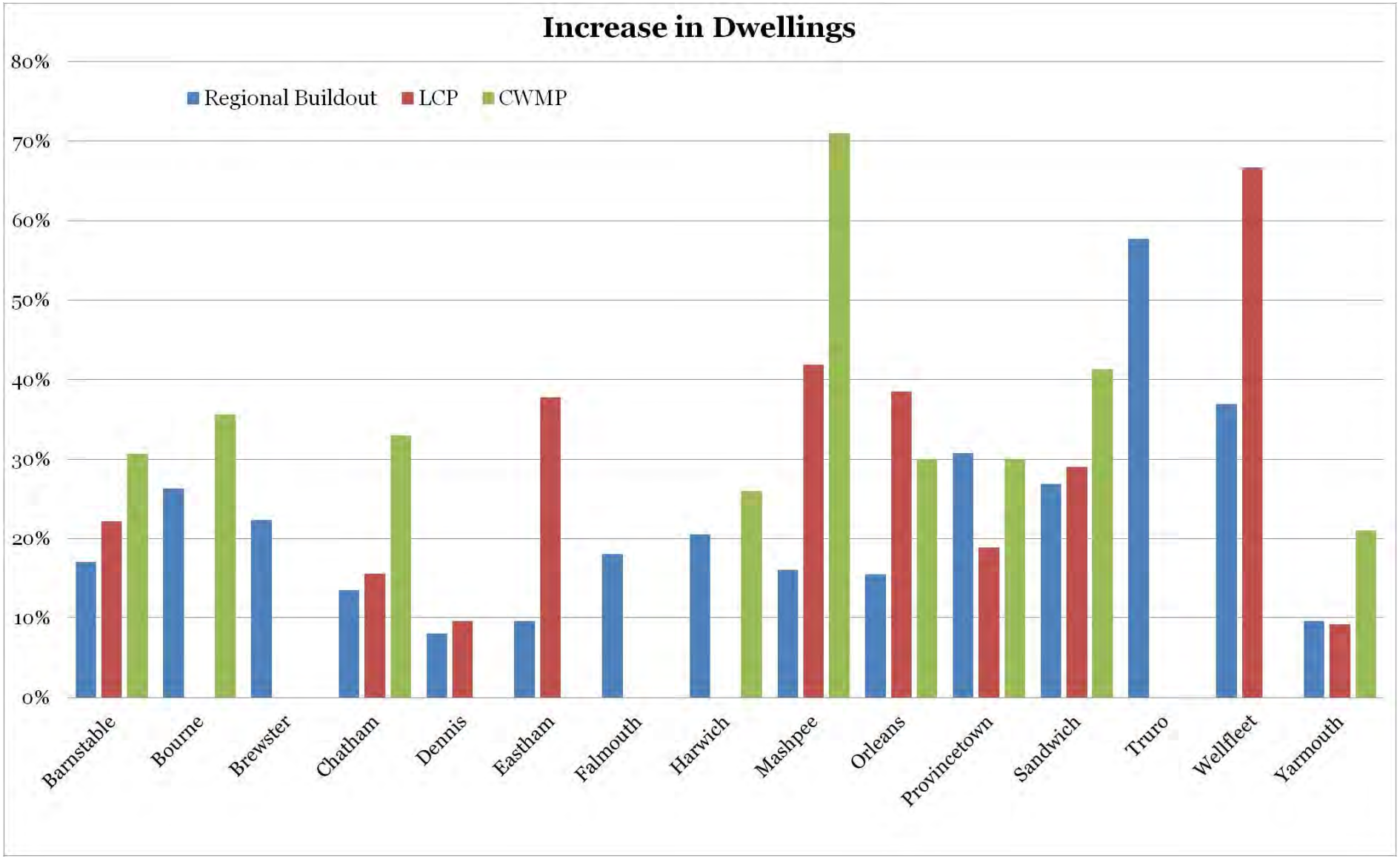
Sources: MassGIS, MassDOT

Density

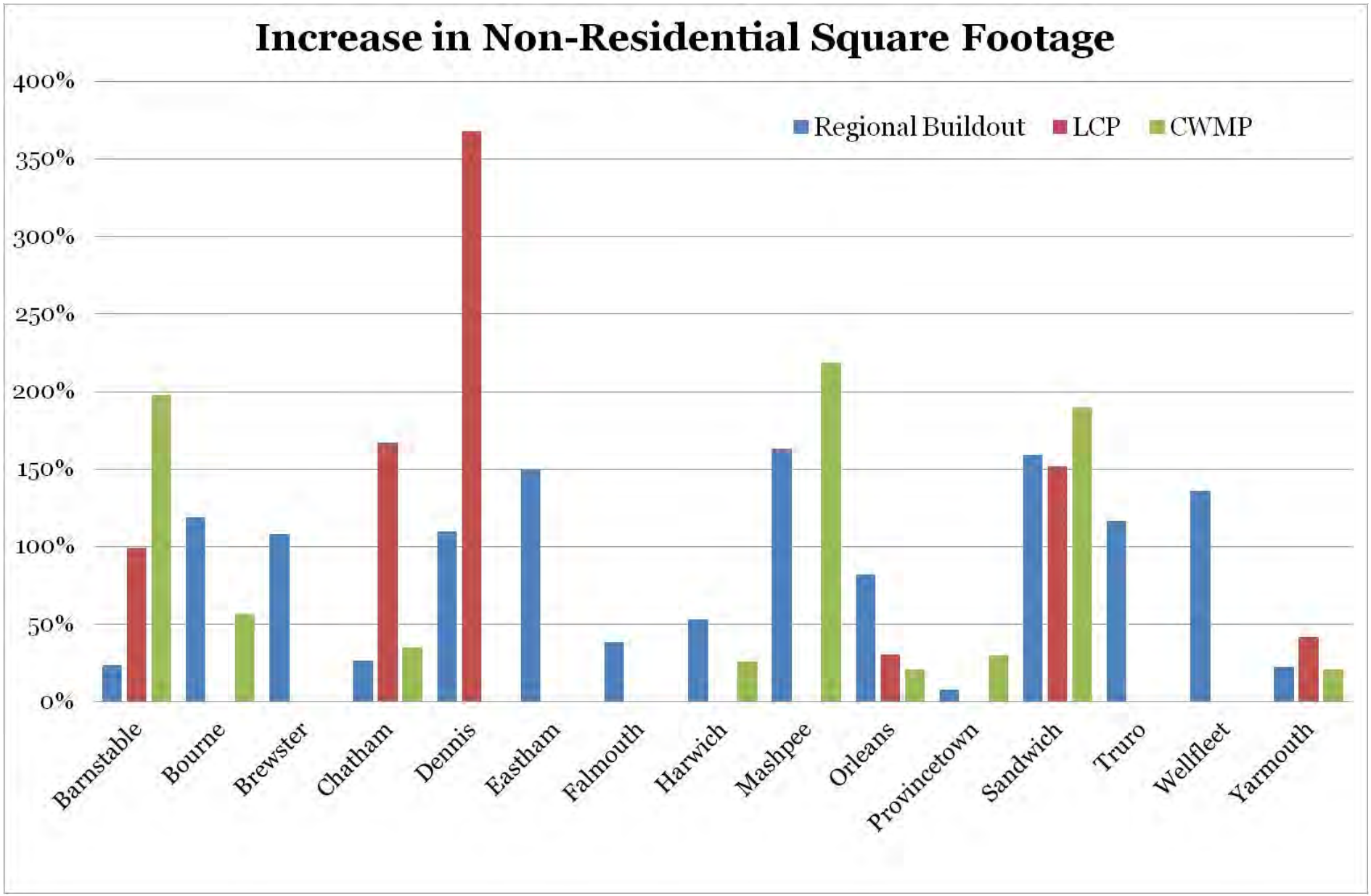
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

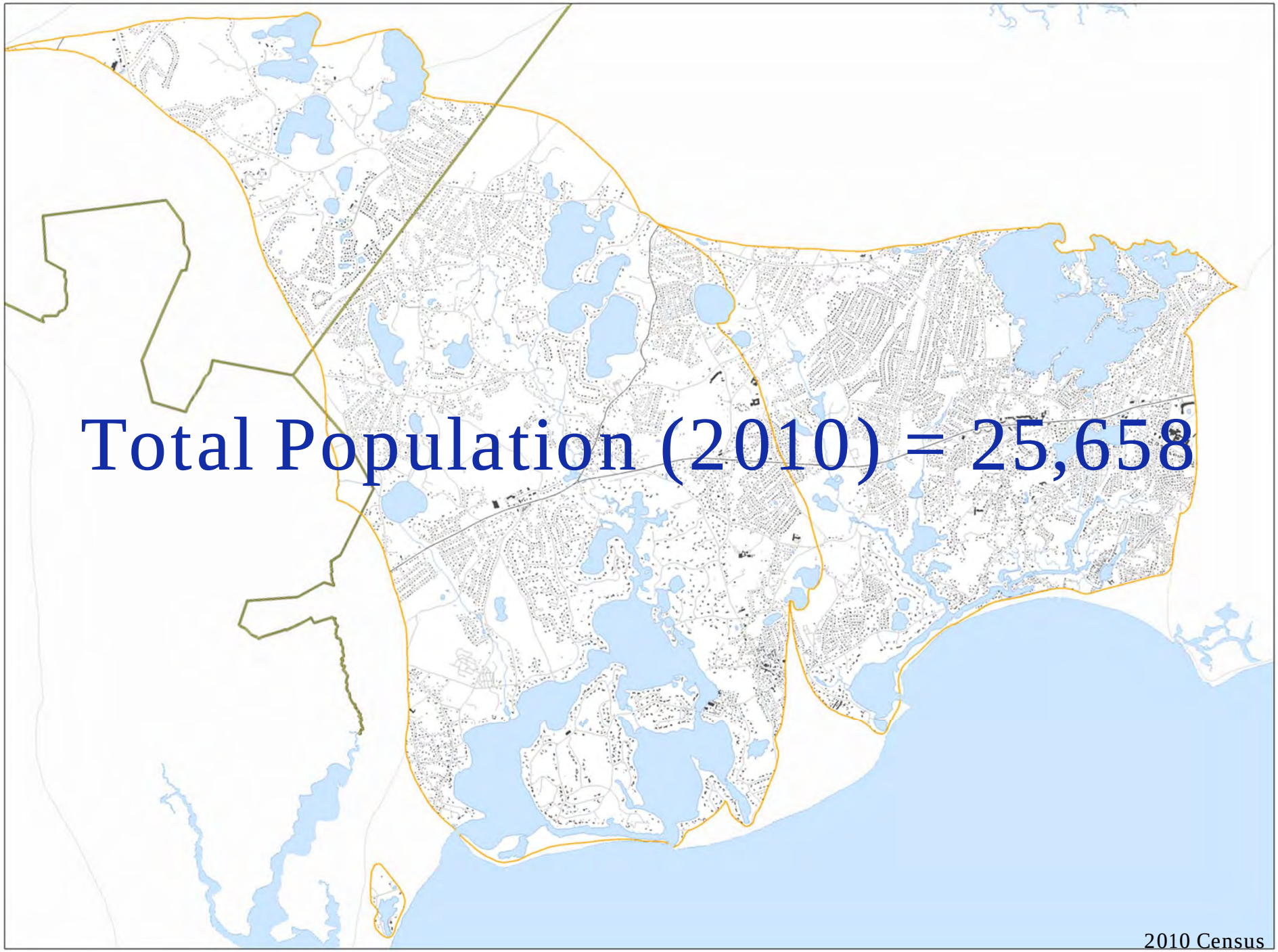

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

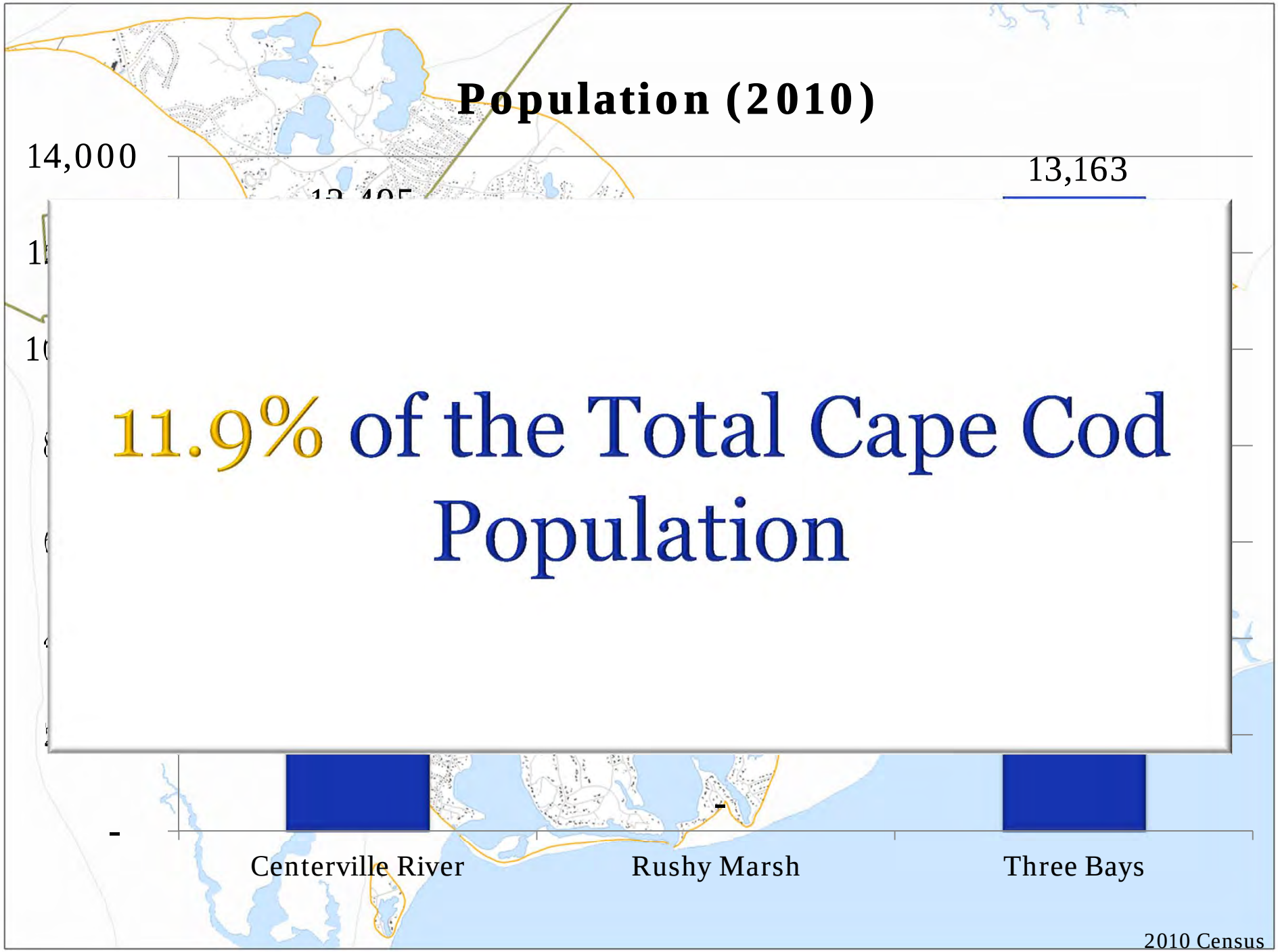
Buildout

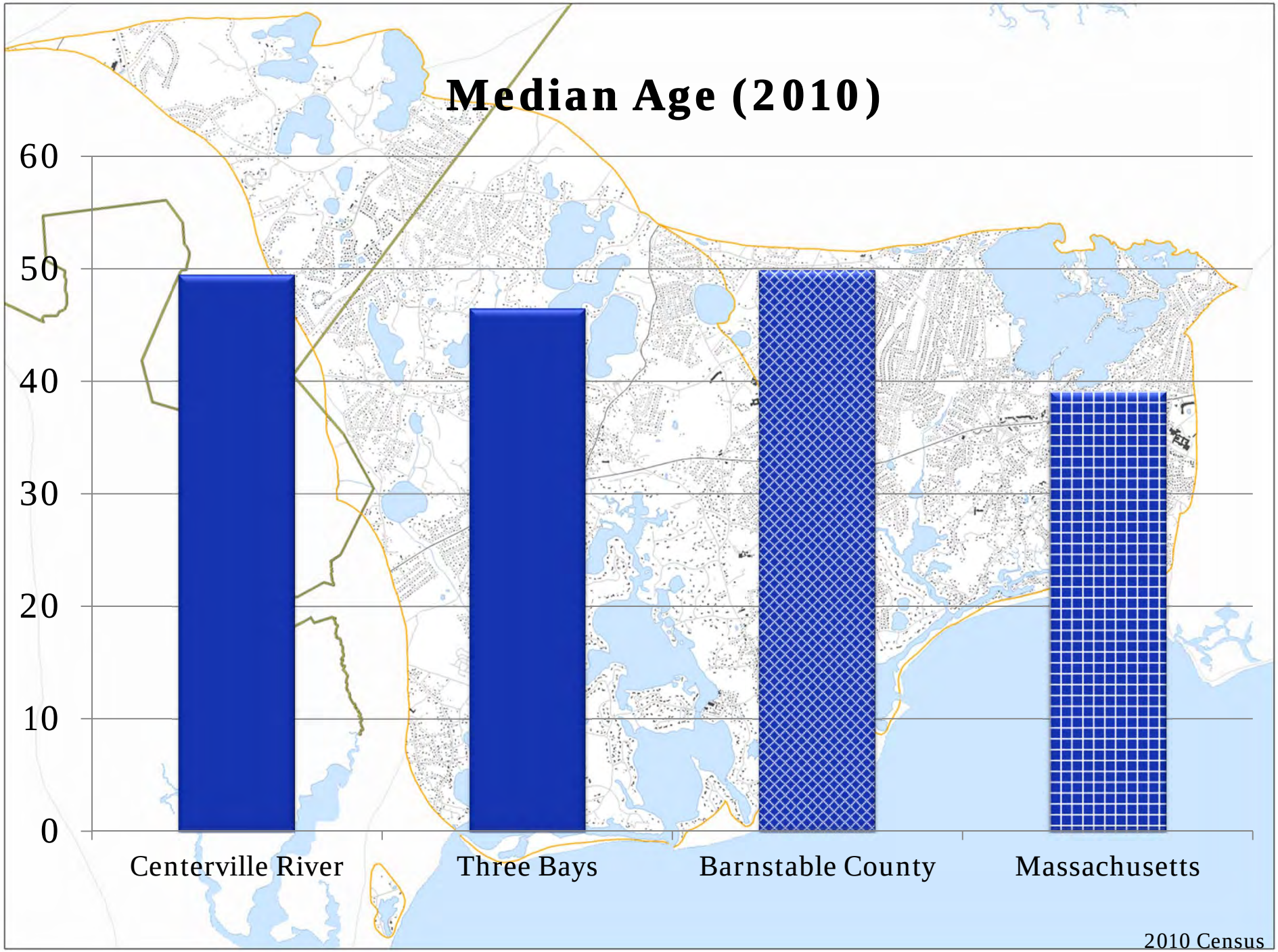

Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

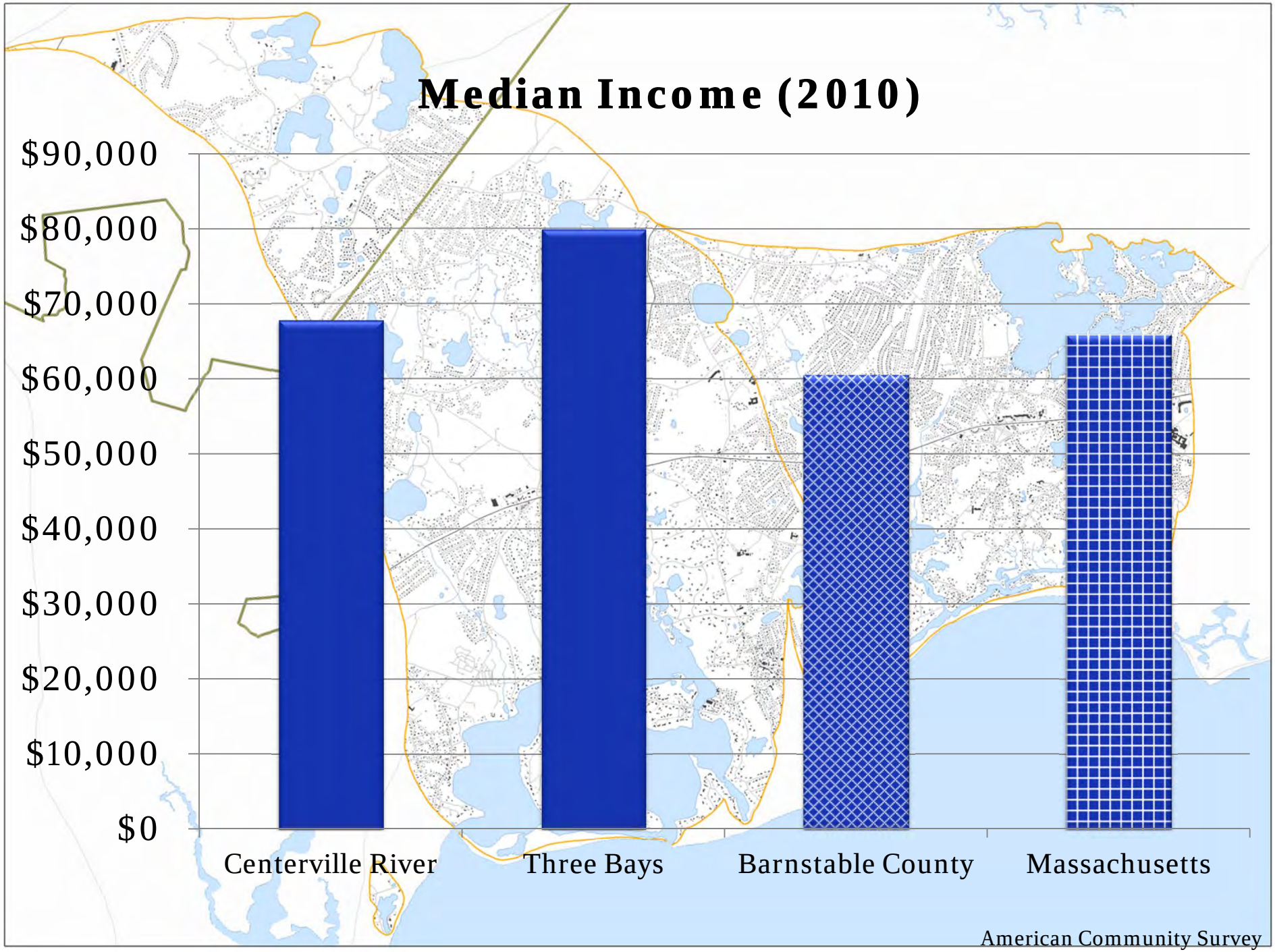
The People

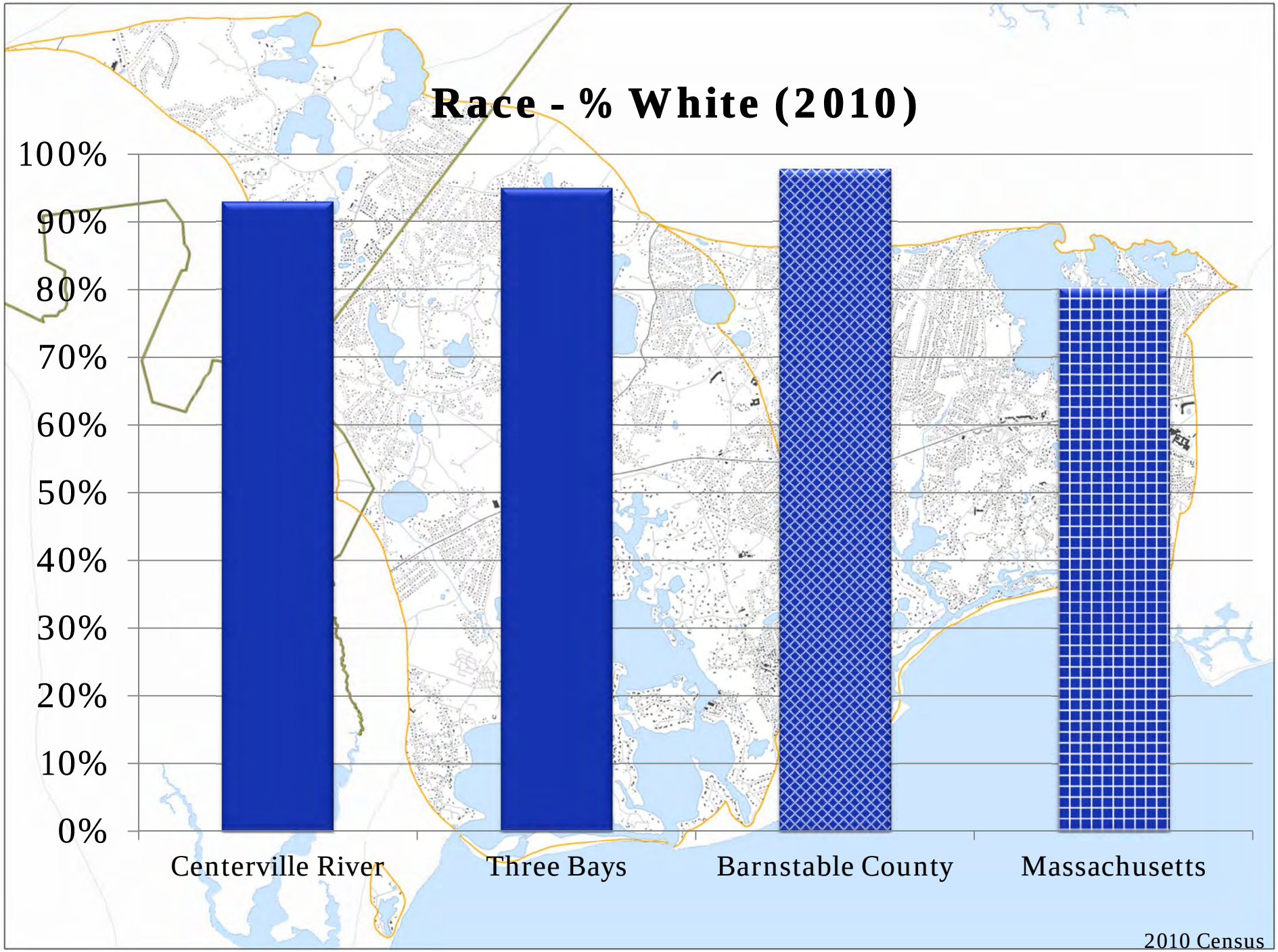
Centerville River
Rushy Marsh
Three Bays

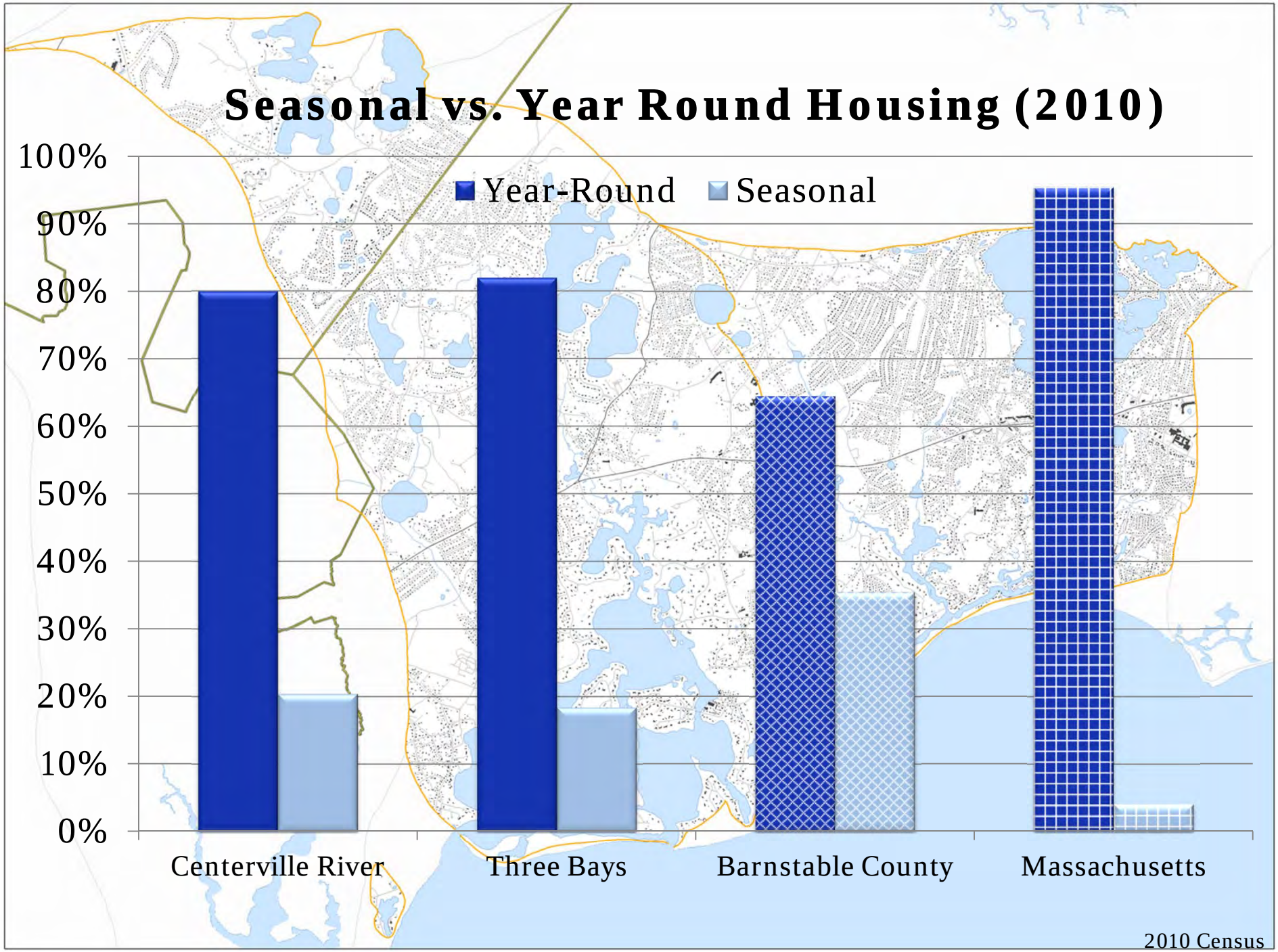

Total Population (2010) = 25,658
2010 Census

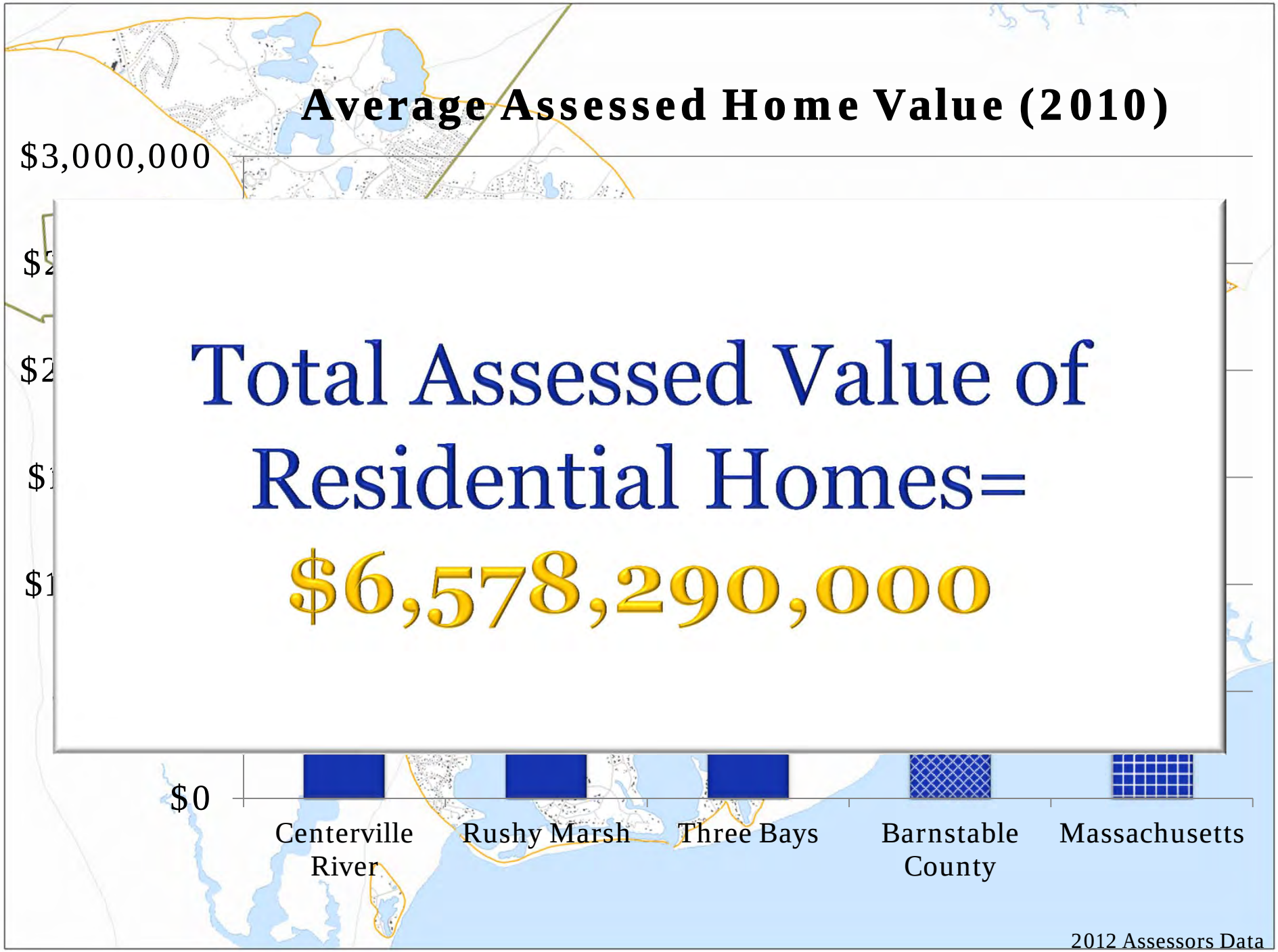

Population (2010)
14,000
13,163
11.9% of the Total Cape Cod Population
-
-
Centerville River
Rushy Marsh
Three Bays
2010 Census


Median Age (2010)
60
50
40
30
20
10
0
Centerville River
Three Bays
Barnstable County
Massachusetts
2010 Census


Median Income (2010)
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Centerville River
Three Bays
Barnstable County
Massachusetts
American Community Survey

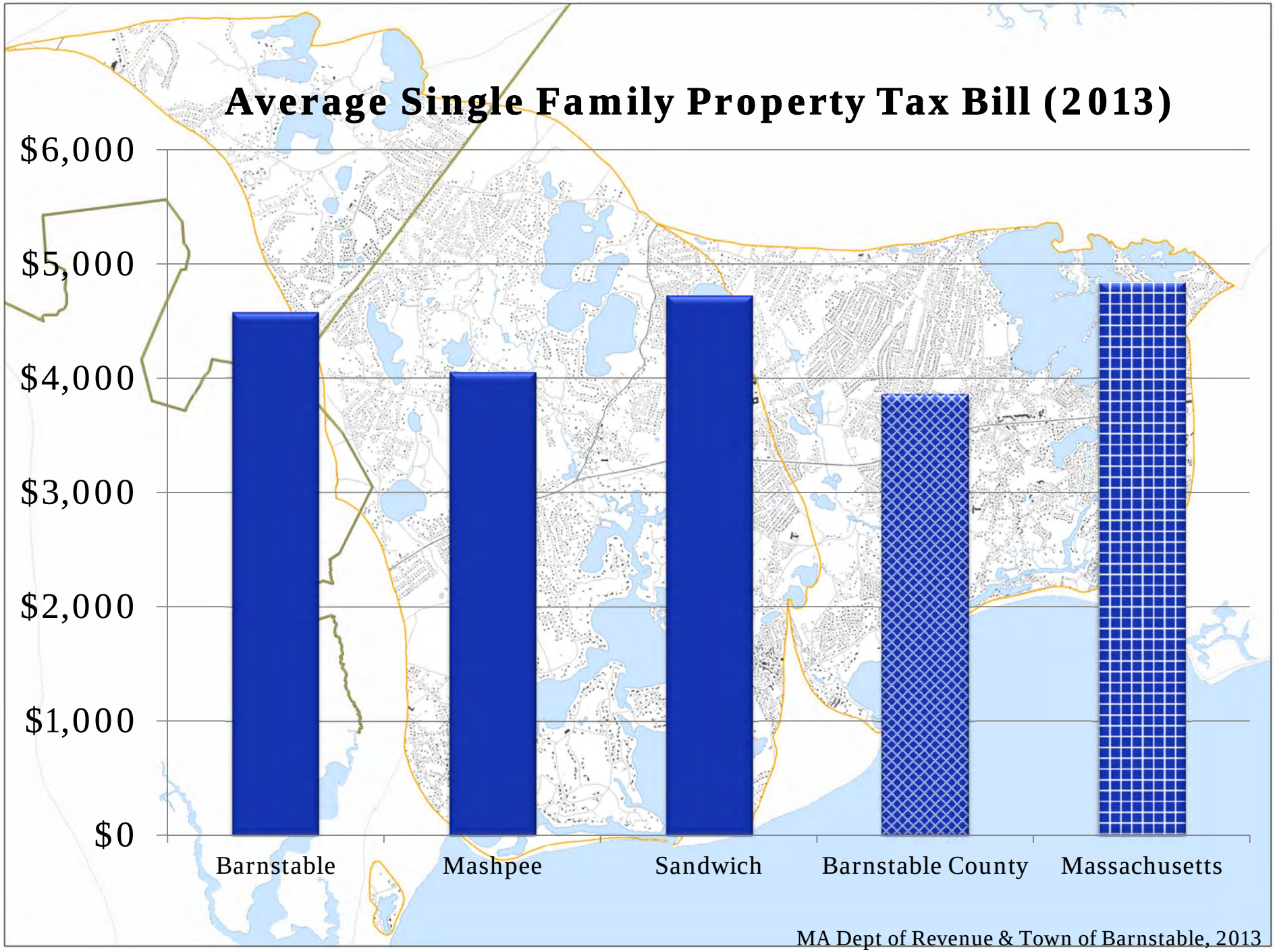

Race - % White (2010)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Centerville River
Three Bays
Barnstable County
Massachusetts
2010 Census

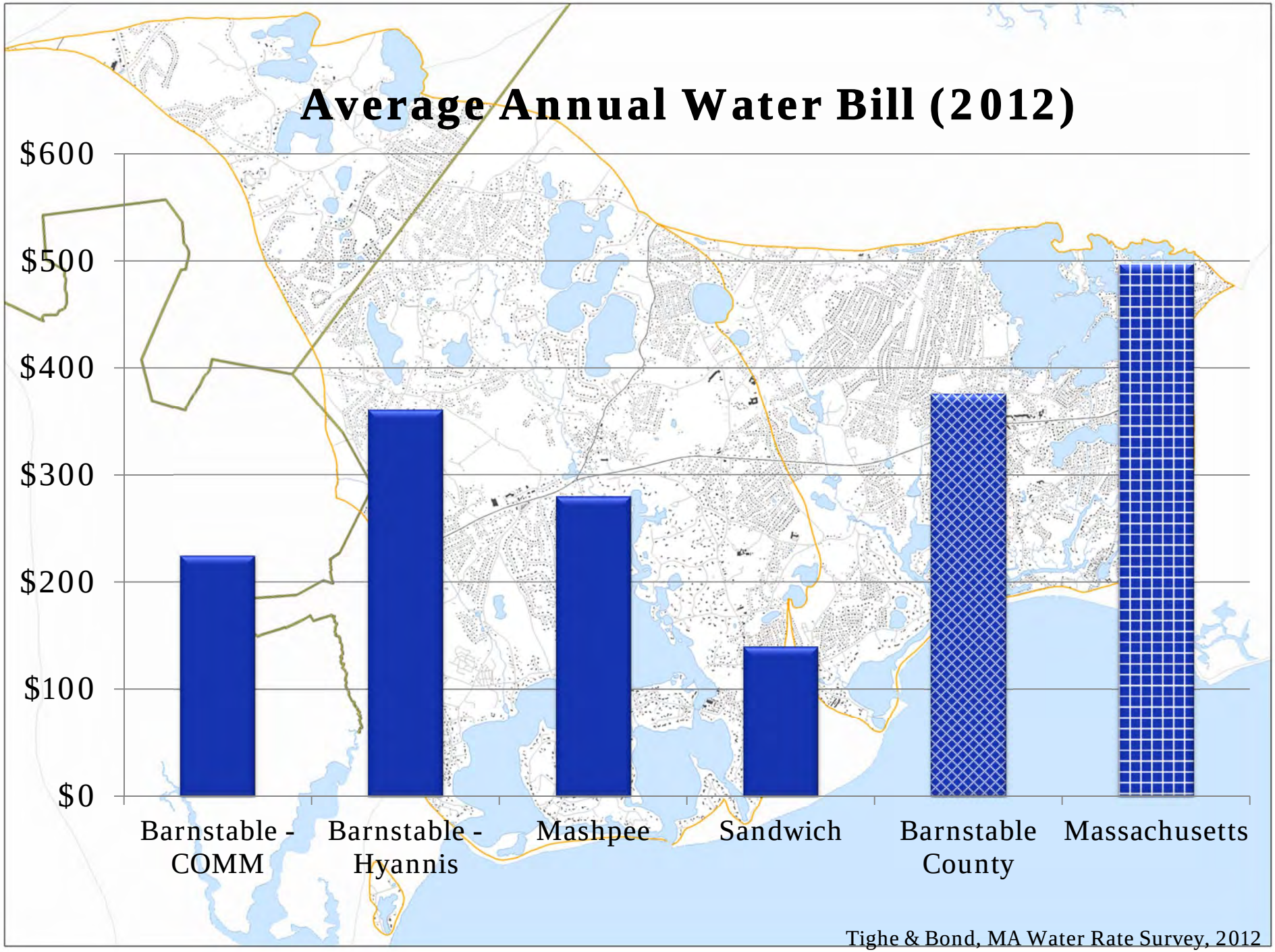

Seasonal vs. Year Round Housing (2010)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Year-Round
Seasonal
Centerville River
Three Bays
Barnstable County
Massachusetts
2010 Census

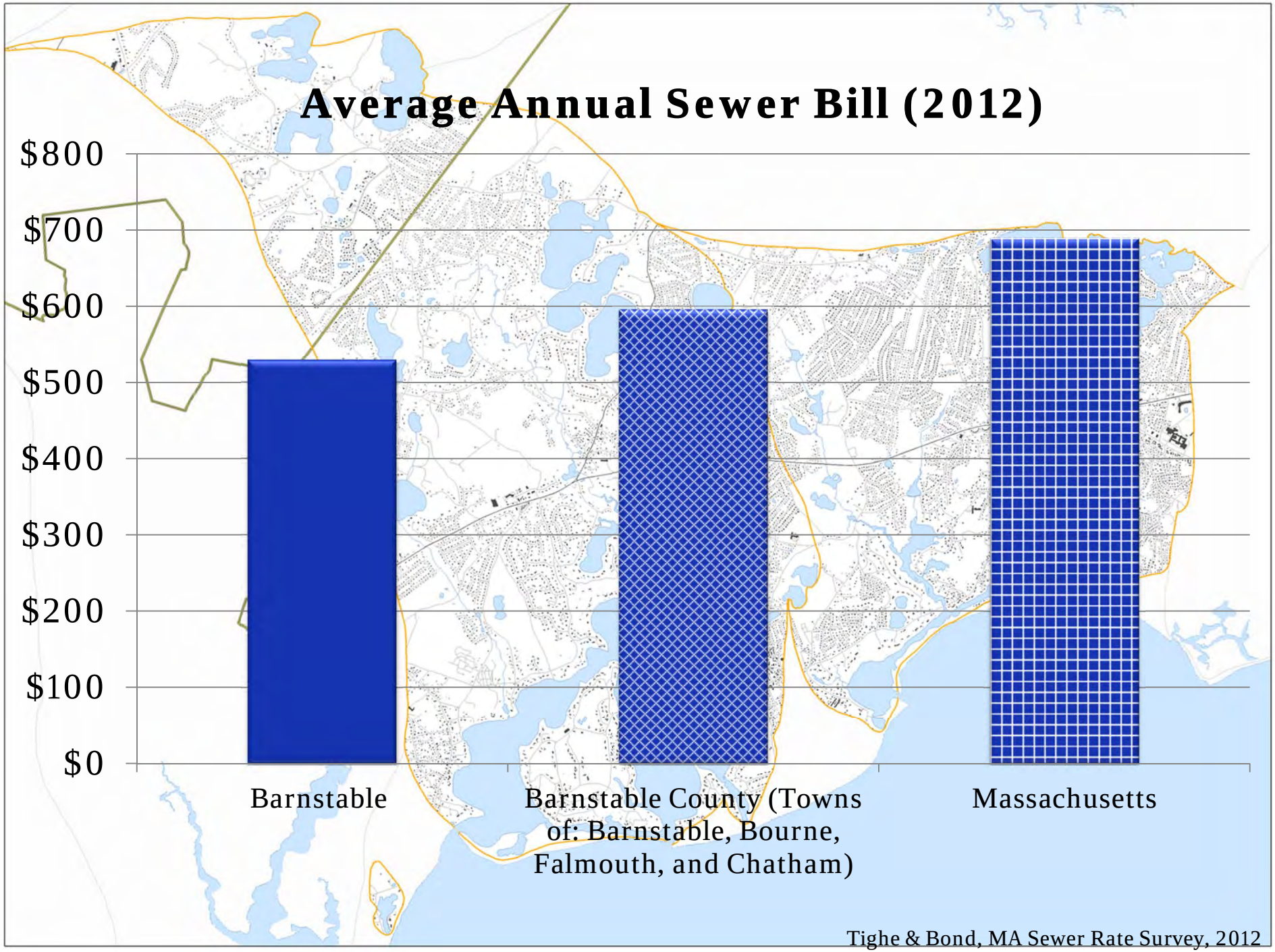

Average Assessed Home Value (2010)
$3,000,000
$0
Total Assessed Value of Residential Homes=
$6,578,290,000
Centerville River
Rushy Marsh
Three Bays
Barnstable County
Massachusetts
2012 Assessors Data

Your Government & Taxes

Centerville River
Rushy Marsh
Three Bays

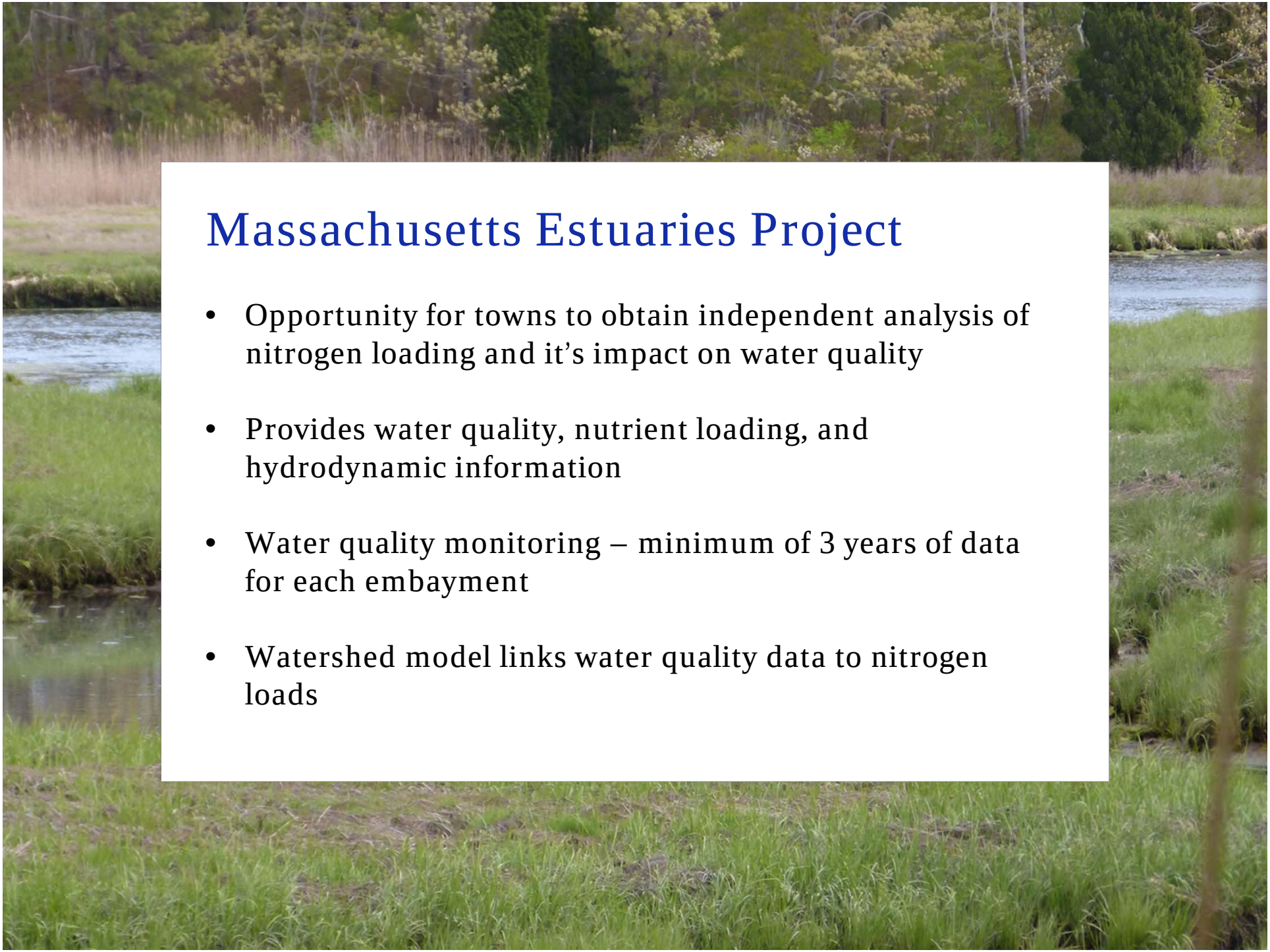

Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Barnstable
Mashpee
Sandwich
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013


Average Annual Water Bill (2012)
$600
$500
$400
$300
$200
$100
$0
Barnstable - COMM
Barnstable - Hyannis
Mashpee
Sandwich
Barnstable County
Massachusetts
Tighe & Bond, MA Water Rate Survey, 2012


Average Annual Sewer Bill (2012)
$800
$700
$600
$500
$400
$300
$200
$100
$0
Barnstable
Barnstable County (Towns of: Barnstable, Bourne, Falmouth, and Chatham)
Massachusetts
Tighe & Bond, MA Sewer Rate Survey, 2012

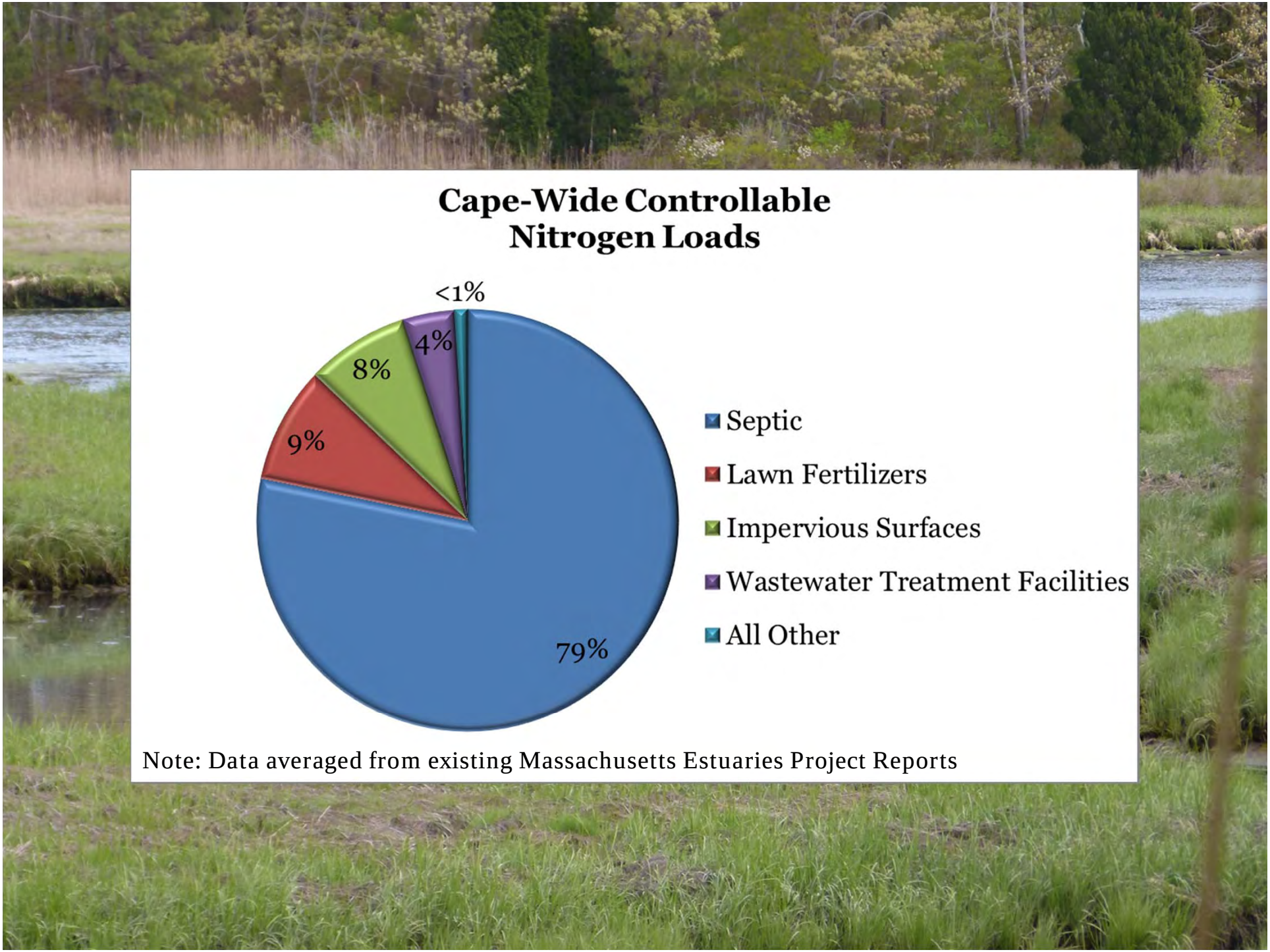
The Problem

Centerville River
Rushy Marsh
Three Bays

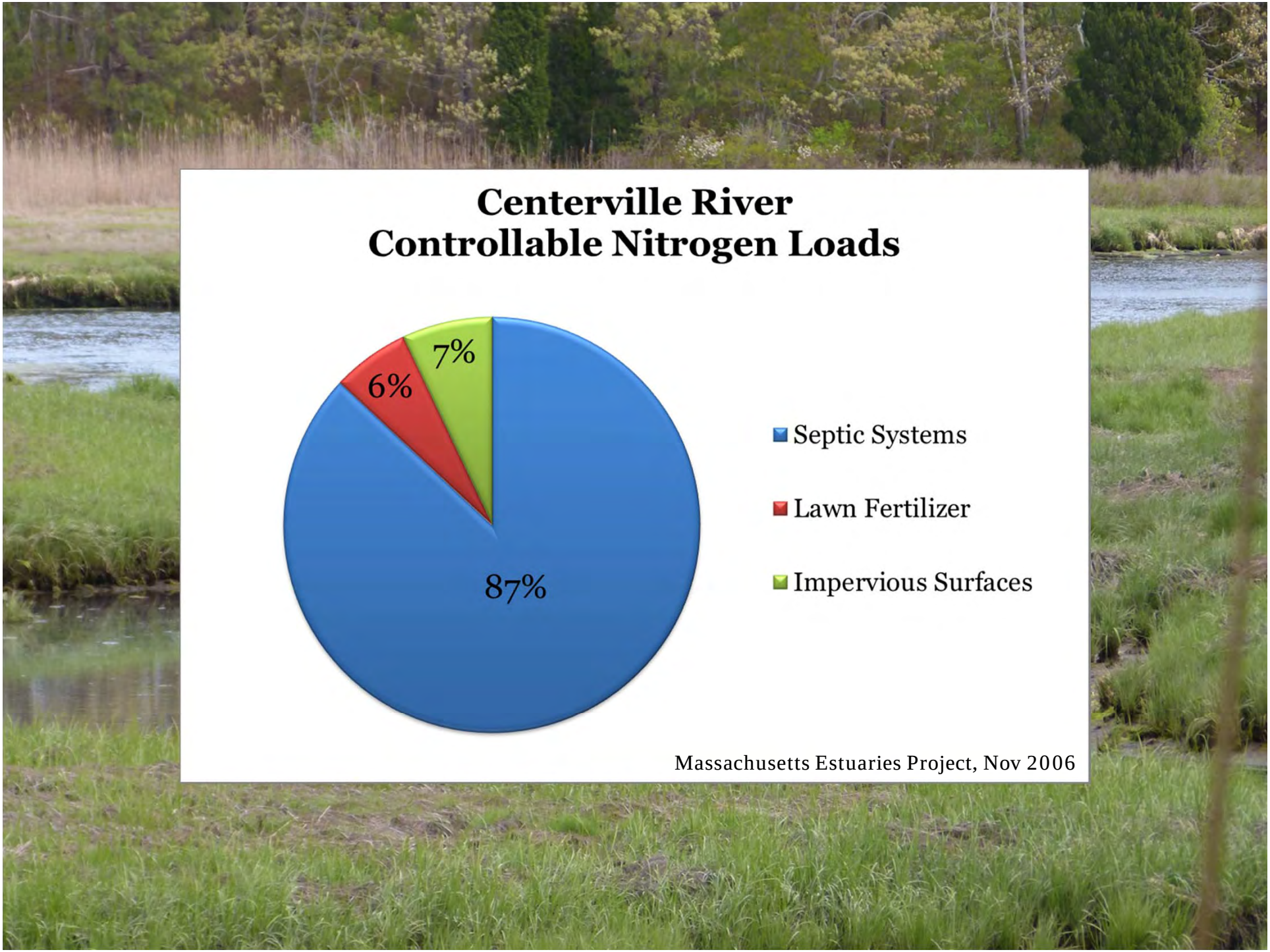


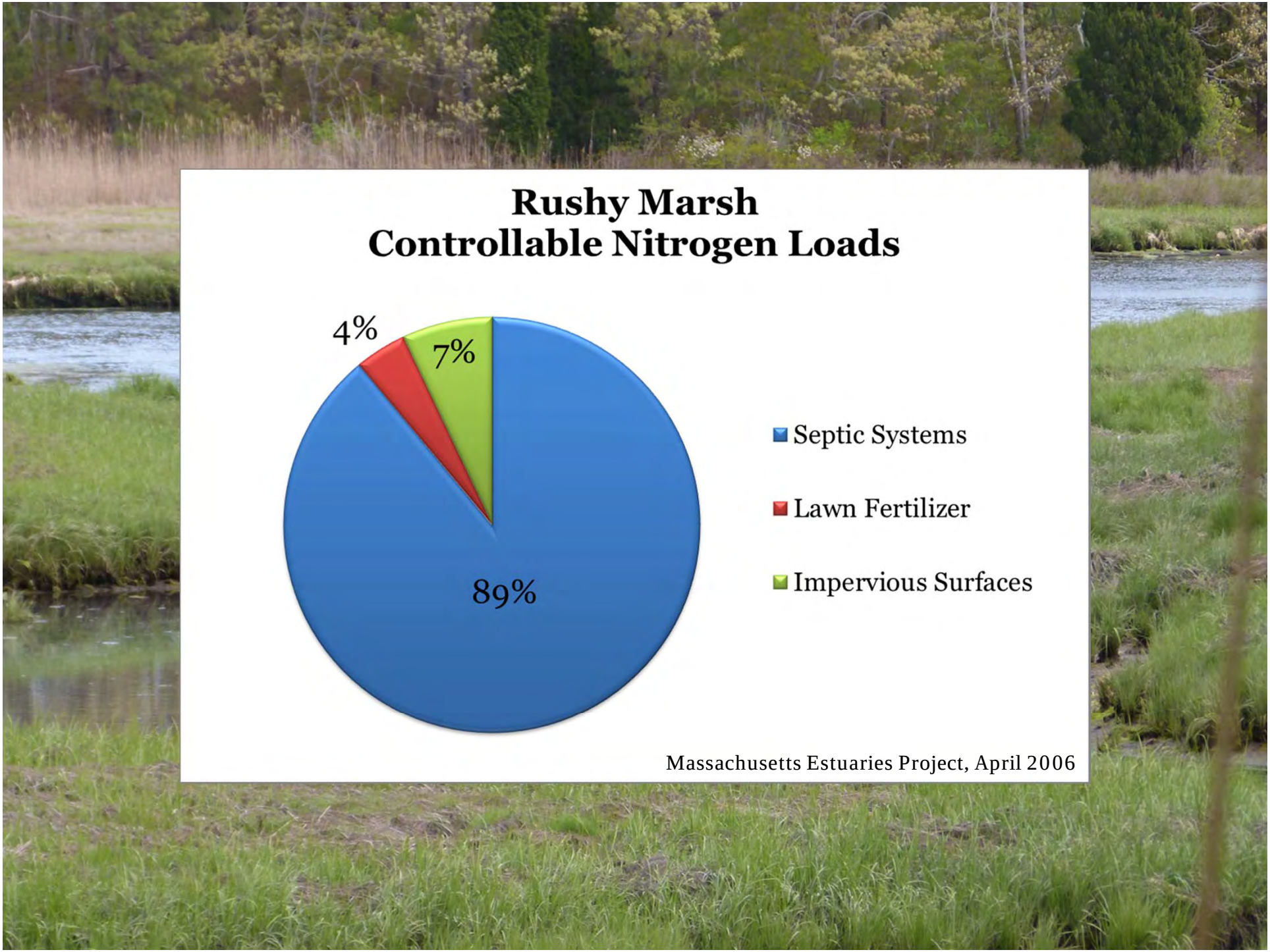
Massachusetts Estuaries Project

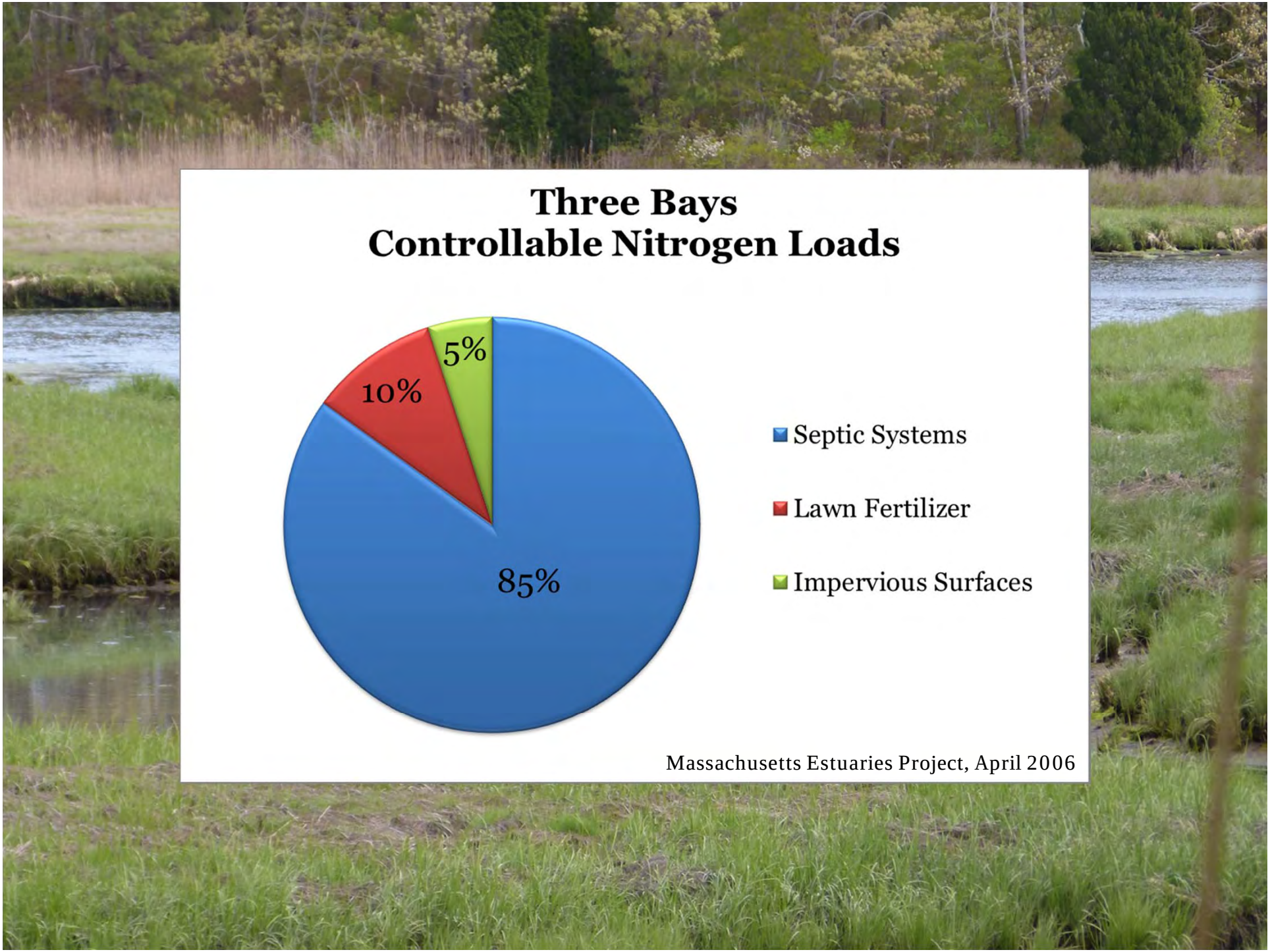
- Opportunity for towns to obtain independent analysis of nitrogen loading and it's impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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



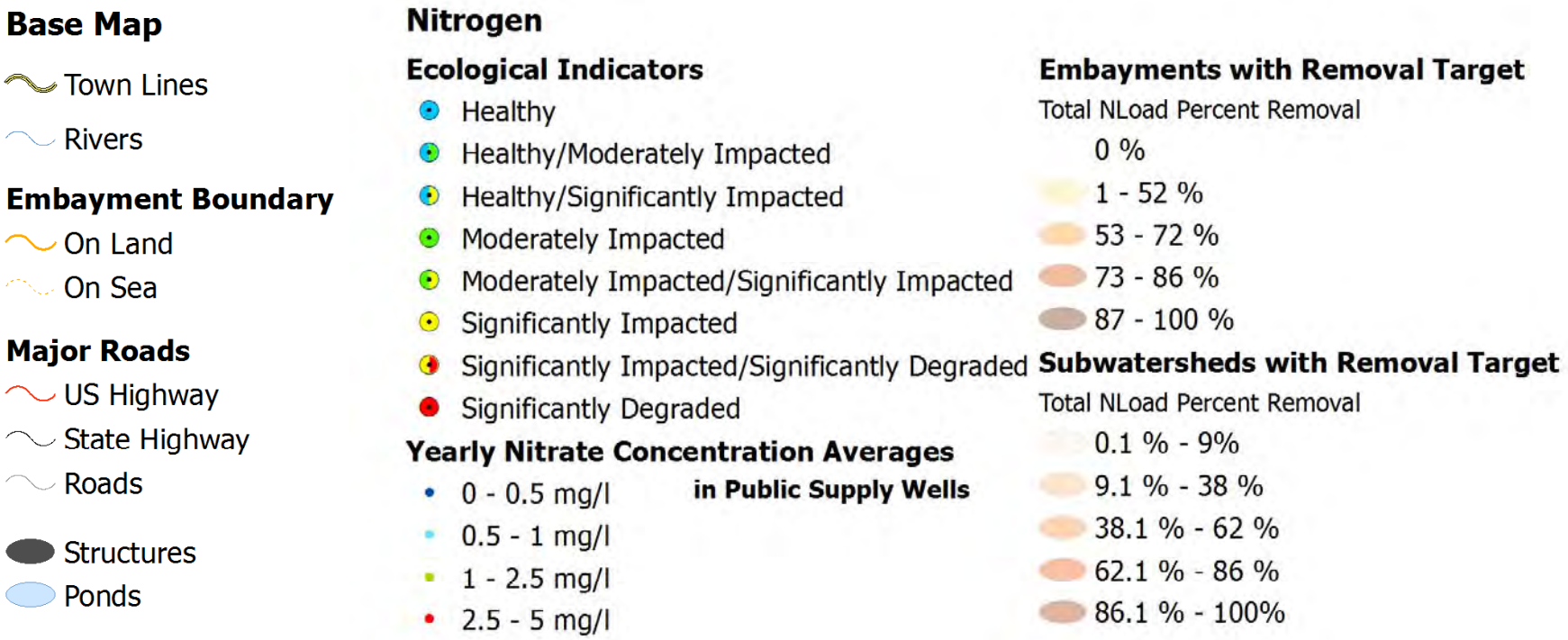
Note: Data averaged from existing Massachusetts Estuaries Project Reports


Centerville River
Controllable Nitrogen Loads
7%
6%
87%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, Nov 2006

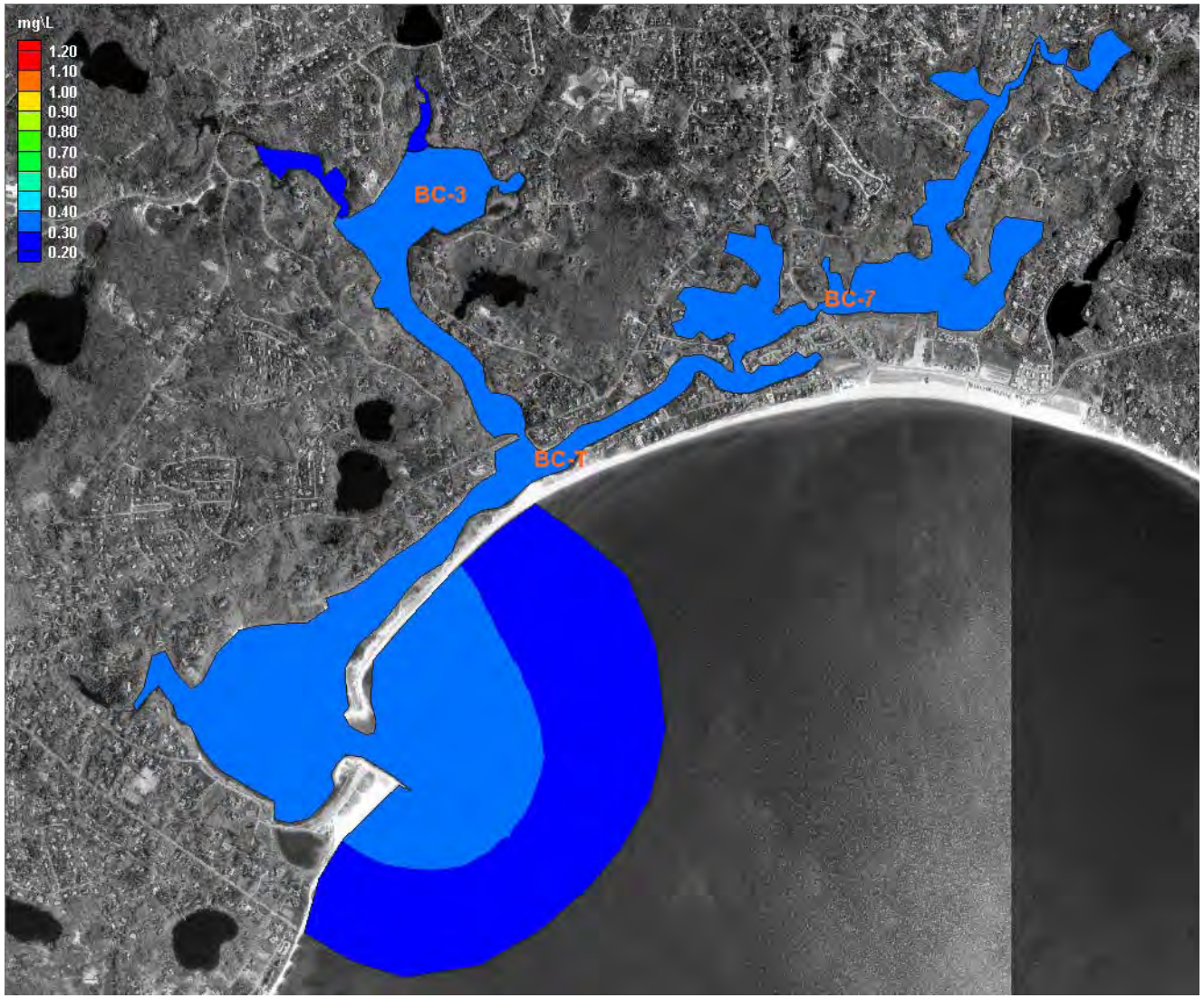

Rushy Marsh
Controllable Nitrogen Loads
4%
7%
89%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, April 2006


Three Bays
Controllable Nitrogen Loads
5%
10%
85%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, April 2006

Nitrogen Problem



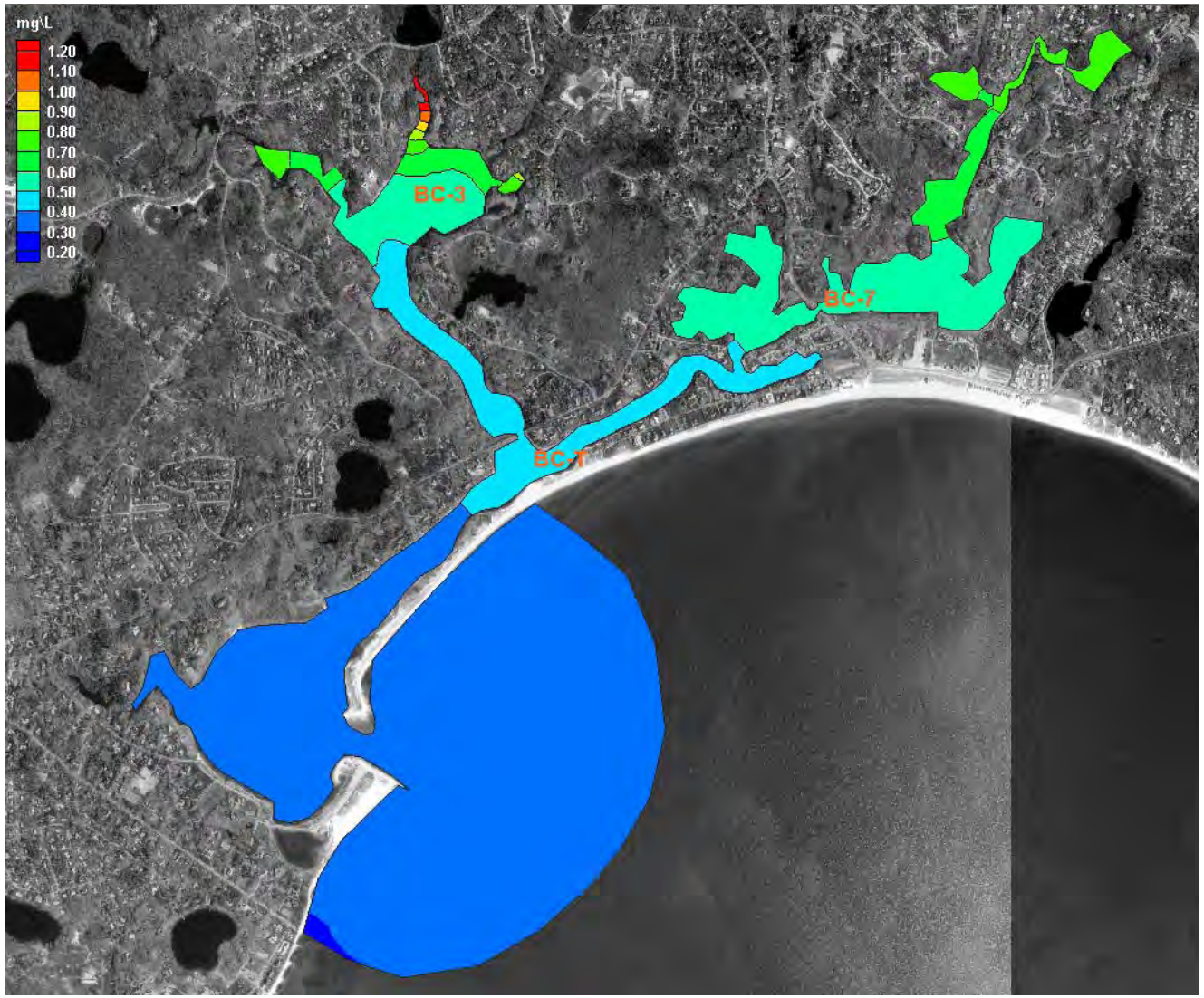
Sources: MassGIS, MEP, CCC



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

(Source: MEP 2006)

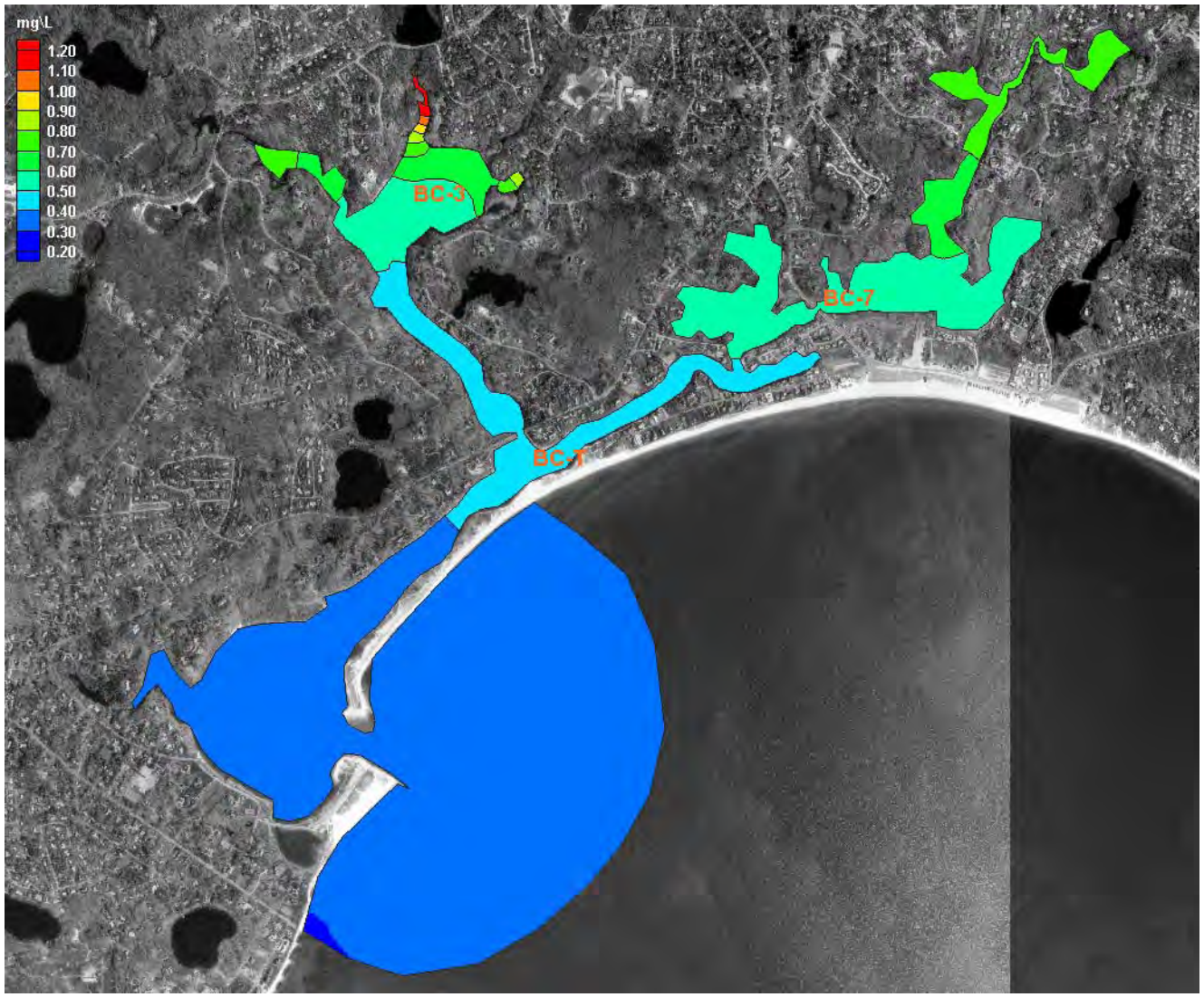
Pre-Colonial Conditions: Centerville River



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

(Source: MEP 2006)

Present Conditions: Centerville River



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

(Source: MEP 2006)

Build-out Conditions: Centerville River

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

(Source: MEP 2006)

Pre-Colonial Conditions: Rushy Marsh

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

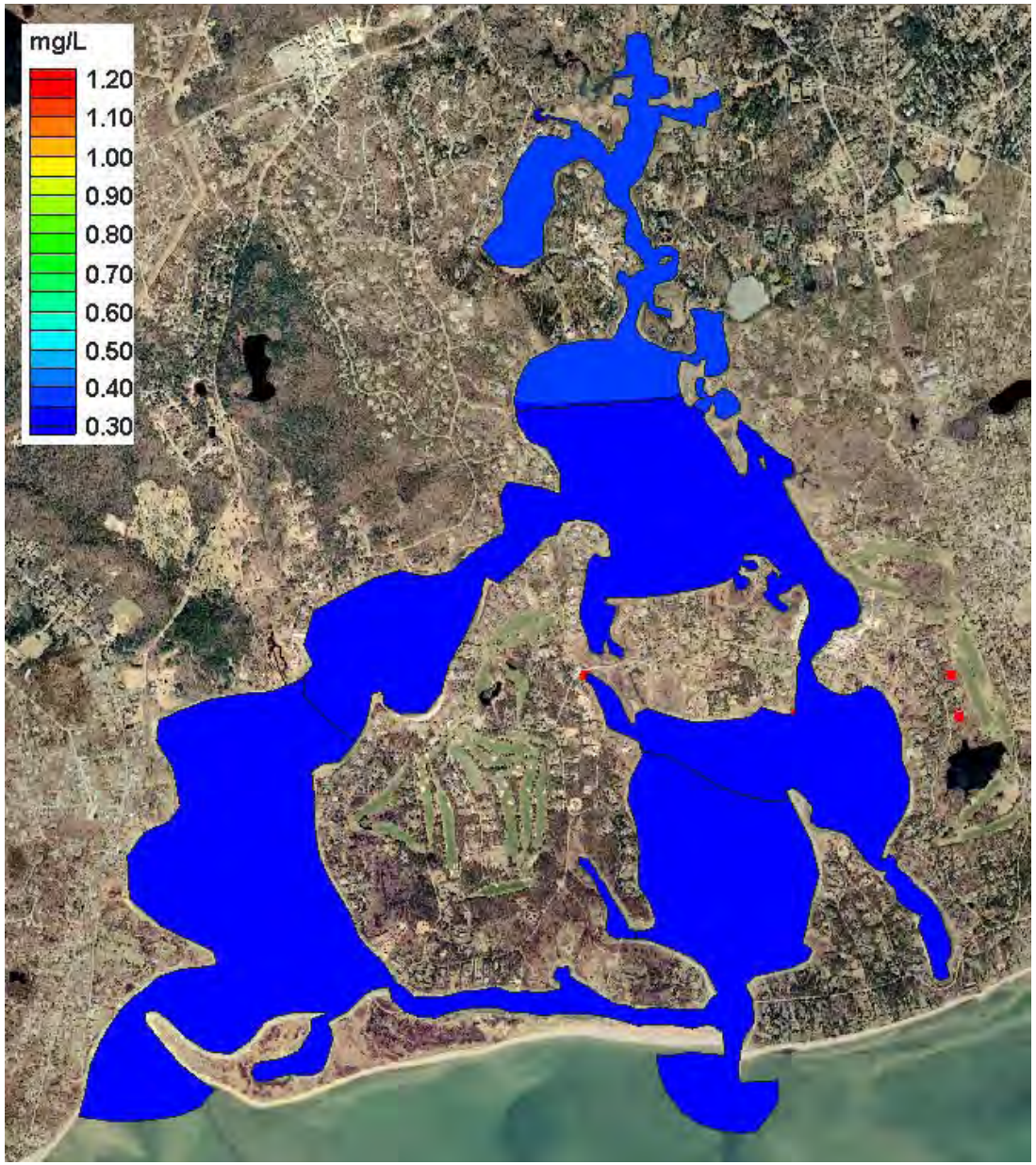
(Source: MEP 2006)

Present Conditions: Rushy Marsh

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

(Source: MEP 2006)

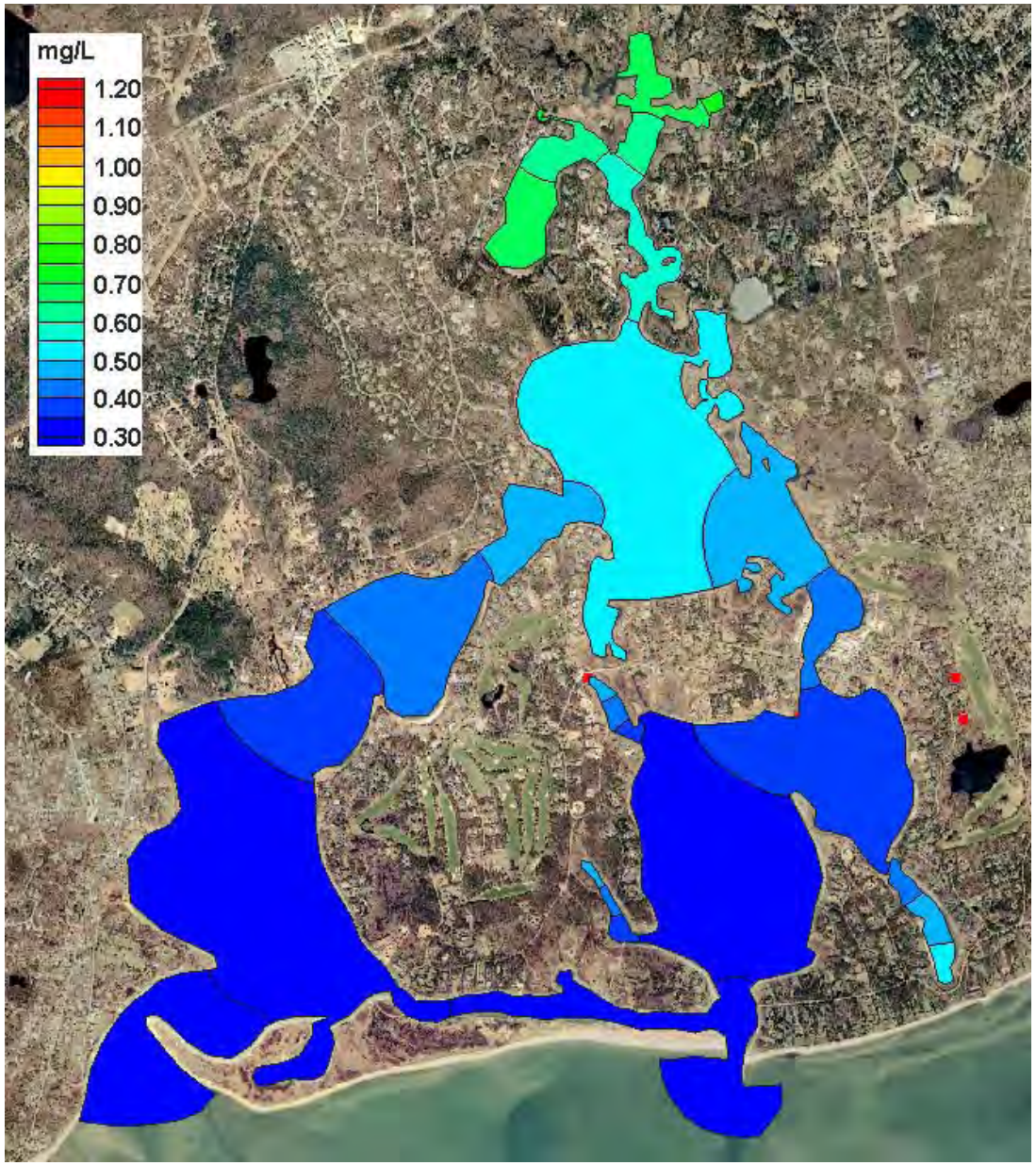
Build-out Conditions: Rushy Marsh



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

(Source: MEP 2006)

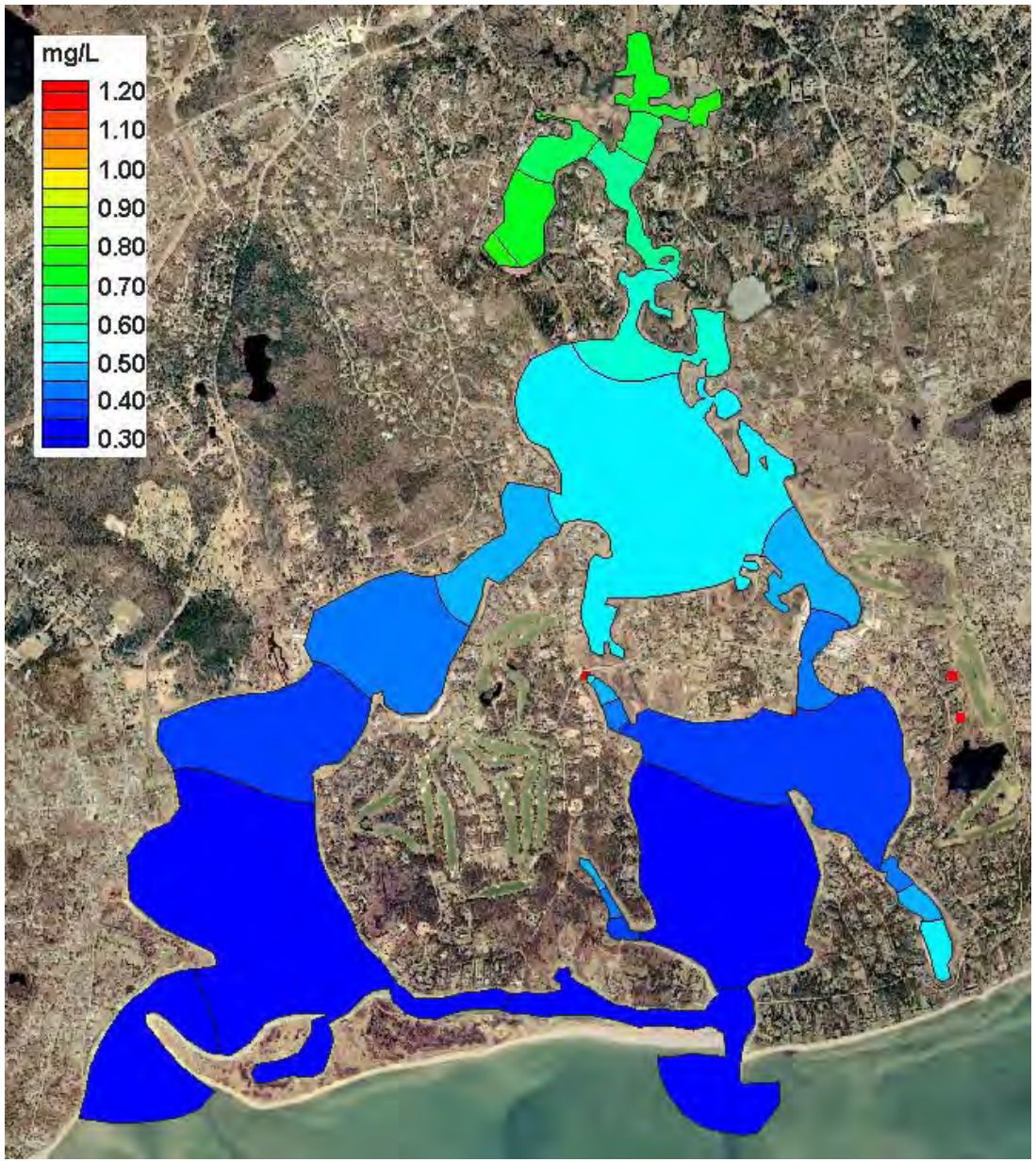
Pre-Colonial Conditions: Three Bays



Present Conditions: Three Bays

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

(Source: MEP 2006)

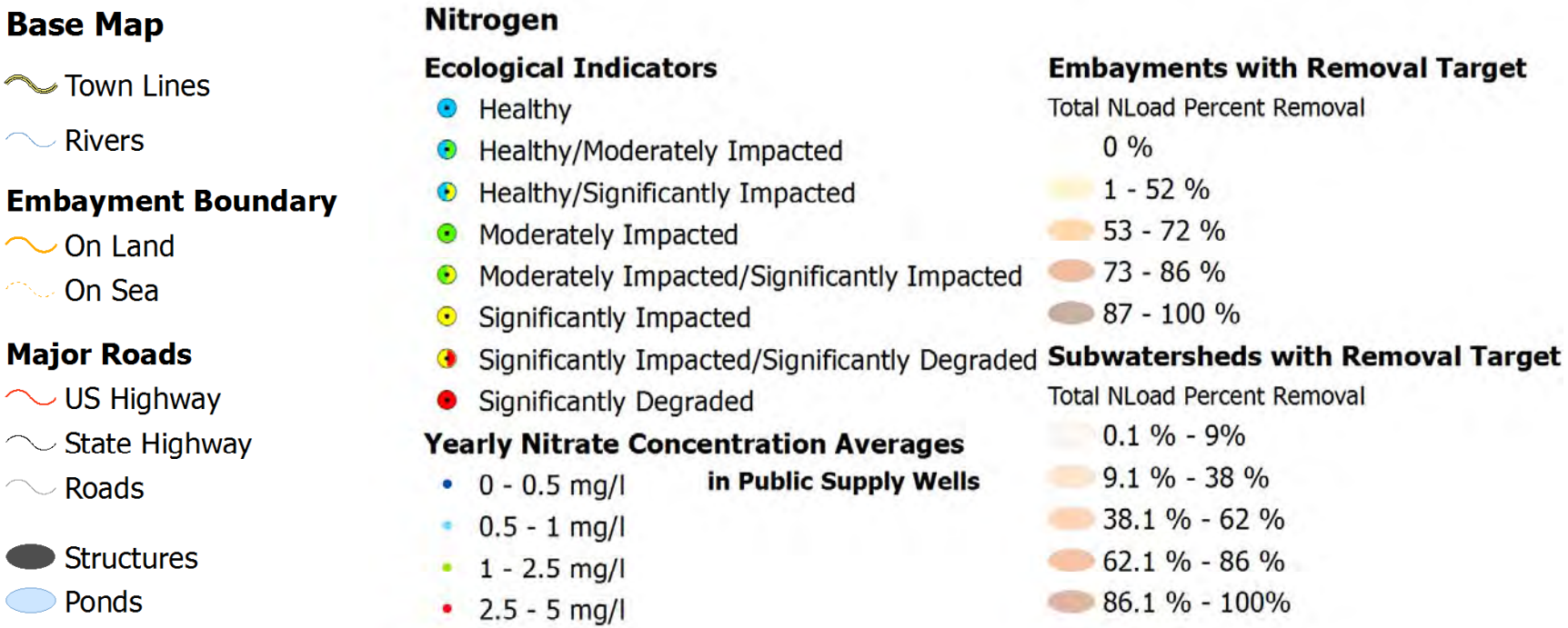


Contour plot of modeled **total nitrogen concentrations (mg/L)** in the Three Bays system, for projected build-out loading conditions.

(Source: MEP 2006)

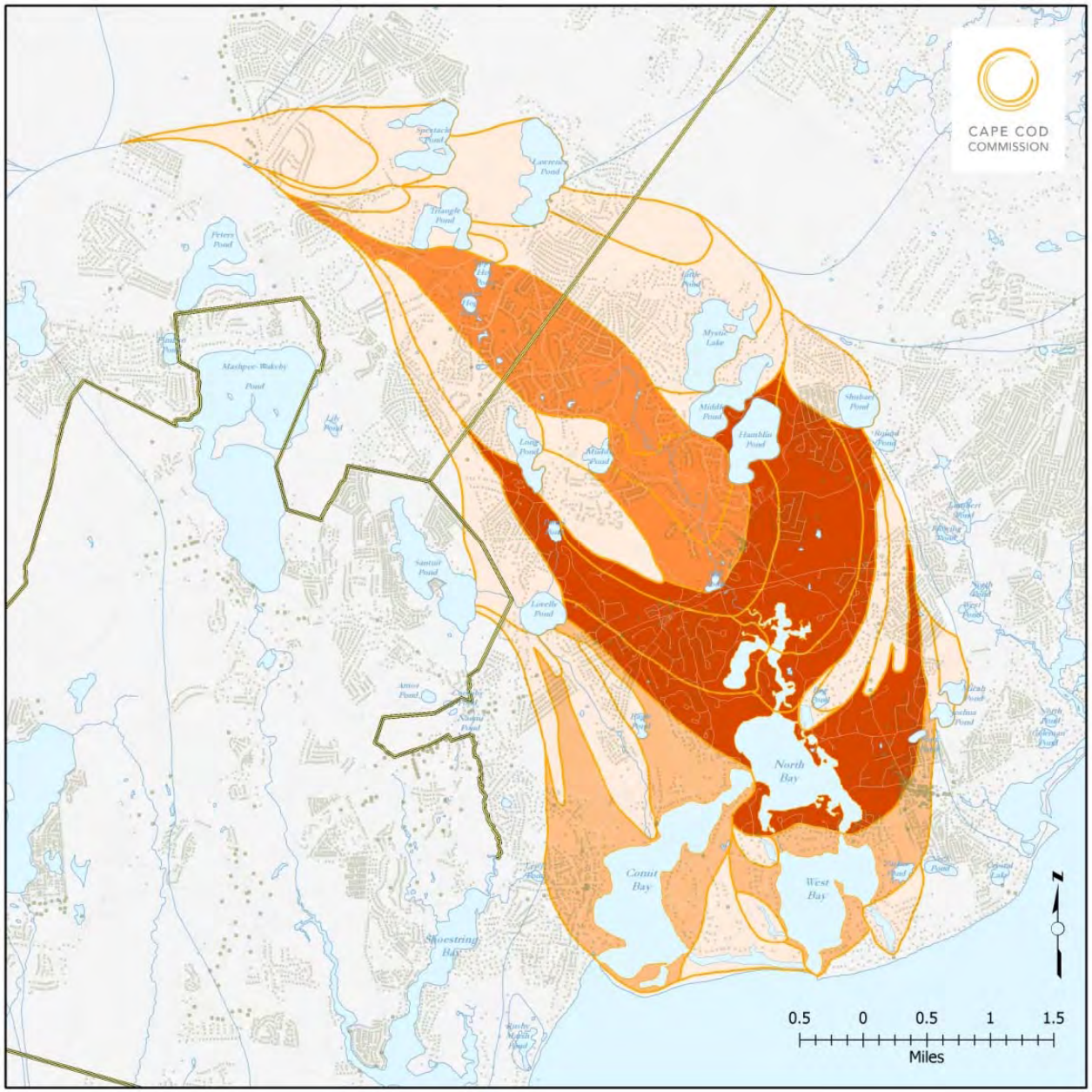
Build-out Conditions: Three Bays

Nitrogen Problem



Sources: MassGIS, MEP, CCC

Nitrogen Problem



100% Removal

25% Removal

20% Removal

Sources: MEP

Eelgrass Extent

Base Map

Town Lines

Rivers

Embayment Boundary

On Land

On Sea

Major Roads

US Highway

State Highway

Roads

Structures

Ponds

Eelgrass

Eelgrass Extent

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Centerville River
Rushy Marsh
Three Bays

Existing Infrastructure

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

- Structures
- Ponds

Existing Conditions

- Approx. Locations of Loans Issued for Title 5 Repair
- Potential Title 5 Compliance Issues
- Wastewater Treatment Facility
- Groundwater Discharge Points
- Sewered Parcels

Enhanced Attenuation Sites

- Pipe
- Stormwater

Public Supply Wells

- Public Water Supply Well
- Small Volume Wells, Non-Transient
- Proposed Public Water Supply Well
- Surface Water Supply
- Small Volume Wells, Transient

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

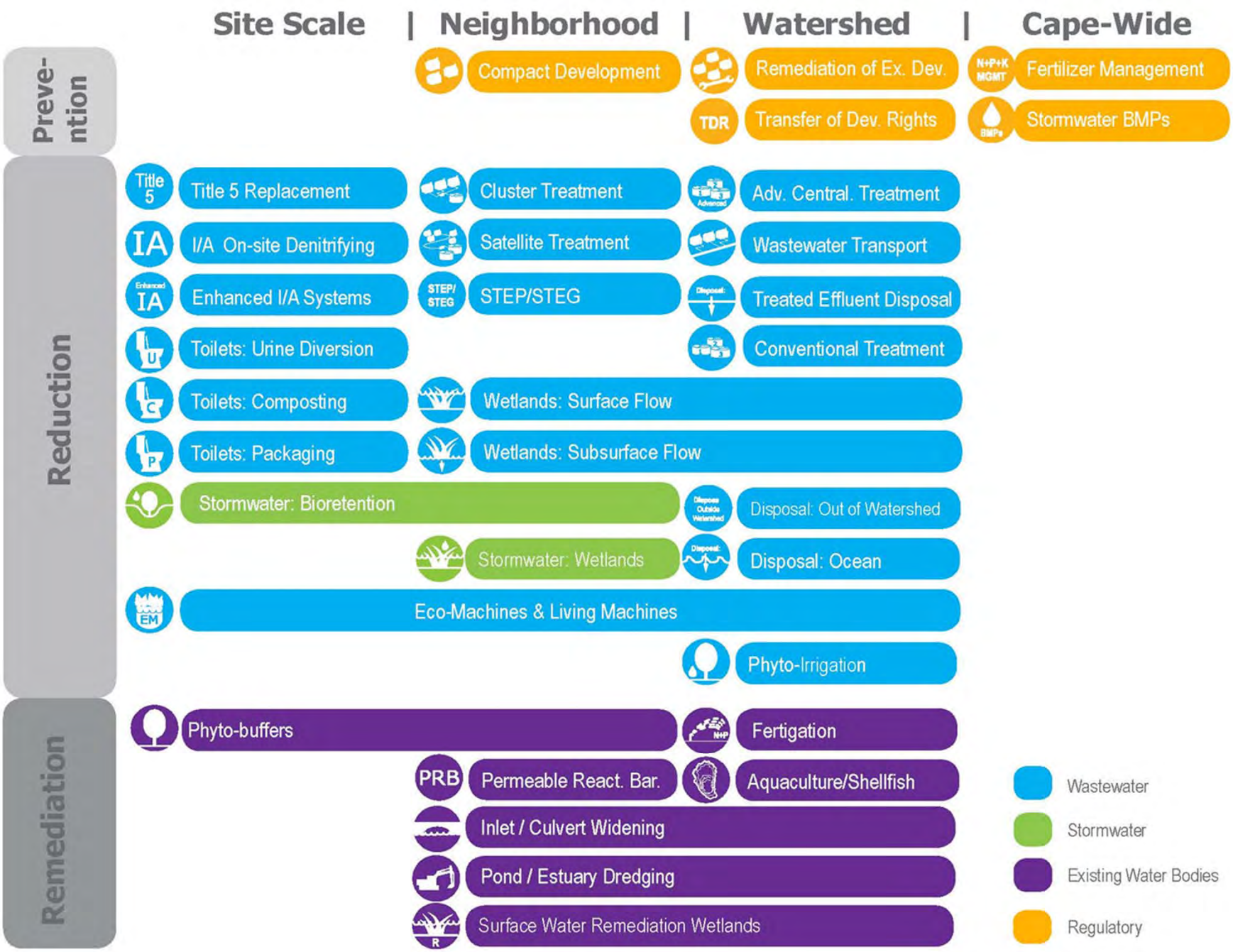
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Centerville River
Rushy Marsh
Three Bays


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

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

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

Centerville River
Rushy Marsh
Three Bays

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

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

DRAFT SUMMARY NOTES

ACTION ITEMS

Cape Cod Commission

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

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

For Working Group Members

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

WELCOME AND INTRODUCTIONS

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

REVIEW OF GOALS AND PROCESS

The stated goal of the meeting was: "To review and develop shared understanding of the characteristics of these watersheds, the work done to date, existing data and information available, and how to apply all of this to planning for water quality improvements for these watersheds moving forward." Ms. Hulet explained that by the end of the meeting, she and the Commission hoped that all participants had contributed any additional questions or concerns they had.

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

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

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

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

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

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

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

LOCAL PROGRESS TO DATE

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

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

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

Discussion about the Sandwich Chronology

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

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

Discussion about the Mashpee Chronology

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

Discussion about the Barnstable Chronology

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

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

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

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

BASELINE CONDITIONS

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

Land Features Data:

The Cape Cod Commission presented the following GIS data layers:

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

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

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

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

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

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

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

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

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

Demographic Data

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

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

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

The Problem

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

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

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

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

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

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

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

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

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

Existing and Proposed Solutions

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

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

Mr. Horsley closed the Baseline Conditions review by saying the Working Group will have some homework in between meetings. One thing the Commission would like Working Group members to do is to further review and check this data, which will be available online[2]. He said the goal isn't to be perfect but to make sure that they don't miss something really important.

NEXT STEPS

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

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

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

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

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

1) Establish targets and articulate project goals.
2) Identify priority geographic areas
3) Determine which management activities should definitely be implemented. These might be the easiest and least costly management activities that should be undertaken regardless of other management actions.
4) Assess alternative options to implement at the watershed or embayment scale
5) Assess options to implement at the site-level
6) Examine priority collection/high density areas
7) Consider traditional sewering or other grey infrastructure management options

- One participant commented that there are other reasons that towns may want to consider wastewater management in addition to Title 5 and environmental issues: he thinks it might be important for their economic development.
    - Mr. Horsley replied that this brings up the role that private development may play in the wastewater management puzzle.
    - Participants suggested that the Commission add "economic development" to the screening process, perhaps under project goals or target areas.
- Another participant said that when the group gets to alternative on-site options, it would be wise to look at public spaces where it is relatively easy to implement these processes and have a larger effect, for example in schools.
- One participant reiterated that the group needs to be mindful of managing growth throughout this process
- A participant suggested adding buildout load to the "Establish targets and articulate goals" section of the screening process.

OPERATING PROTOCOLS

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

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

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

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

Appendix A
Attendance

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

Cape Cod 208 Area Water Quality Planning
Waquoit Bay and Popponesset Bay Working Group

Meeting One
Wednesday, September 25, 2013
Mashpee Town Hall, 16 Great Neck Rd North, Mashpee, MA 02649

Meeting Agenda

1:00 pm Welcome – *Cape Cod Commission*

1:05 Introductions, confirm working group membership and participation – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*

1:30 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

1:45 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Patty Daley (Area Manager, Cape Cod Commission)*

2:00 Review and add to chronology of work to date – *Working Group*

2:15 Discussion: drawing on past work to move forward – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*

2:30 Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Patty Daley (Area Manager, Cape Cod Commission)*

3:15 Break

3:30 Discussion of Baseline Conditions – *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*

4:00 Framework for Moving Forward: Preview Meetings 2 and 3 – *Patty Daley (Area Manager, Cape Cod Commission)*

4:20 Review/Discuss Process Protocols - *Doug Thompson (Facilitator, Consensus Building Institute) and Working Group*

4:40 pm Public Comments

5:00 Adjourn

Popponesset Bay & Waquoit Bay Group

Baseline Conditions & Needs Assessment

What is the 208 Plan?

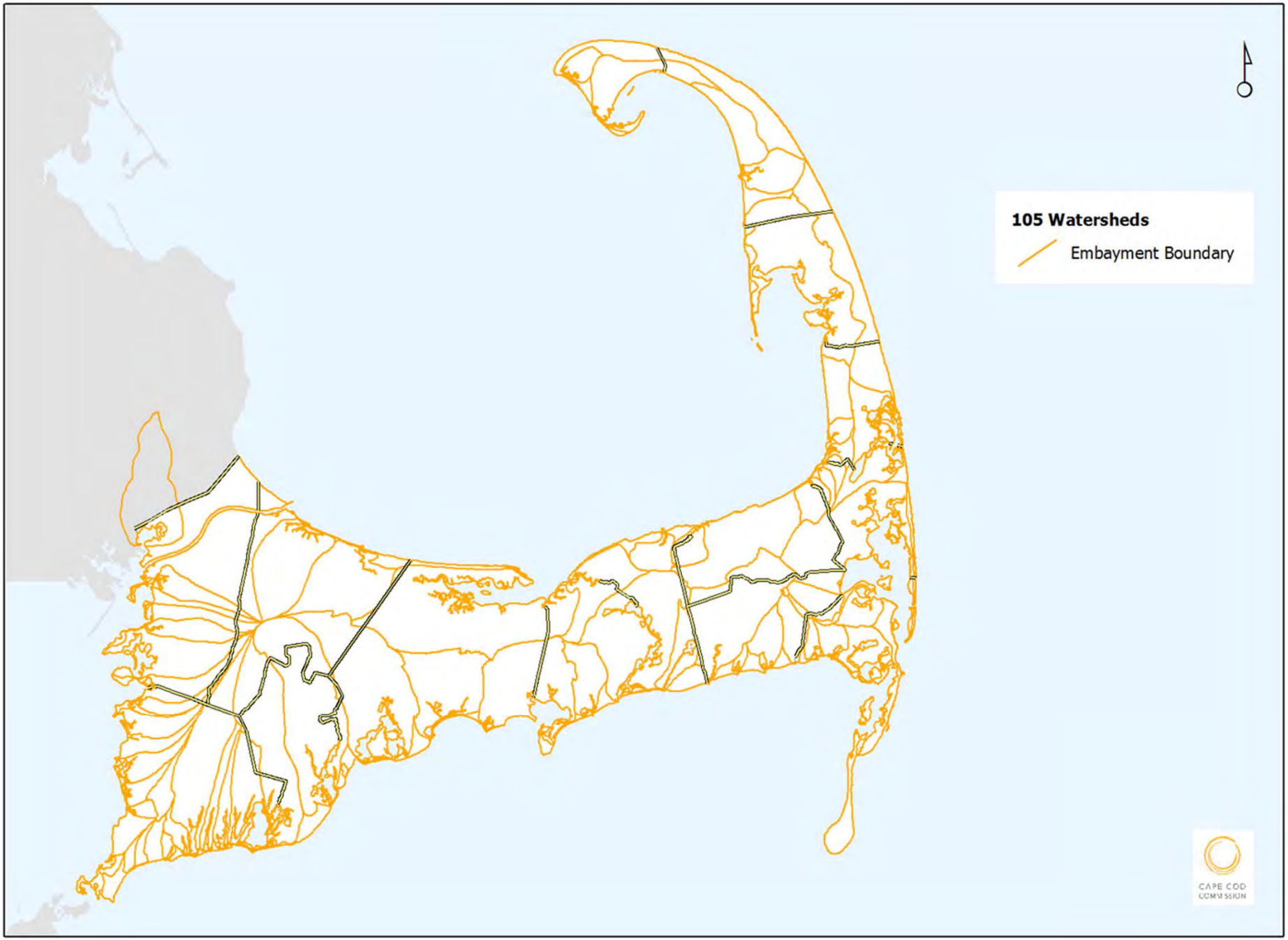
Clean Water Act Section 208

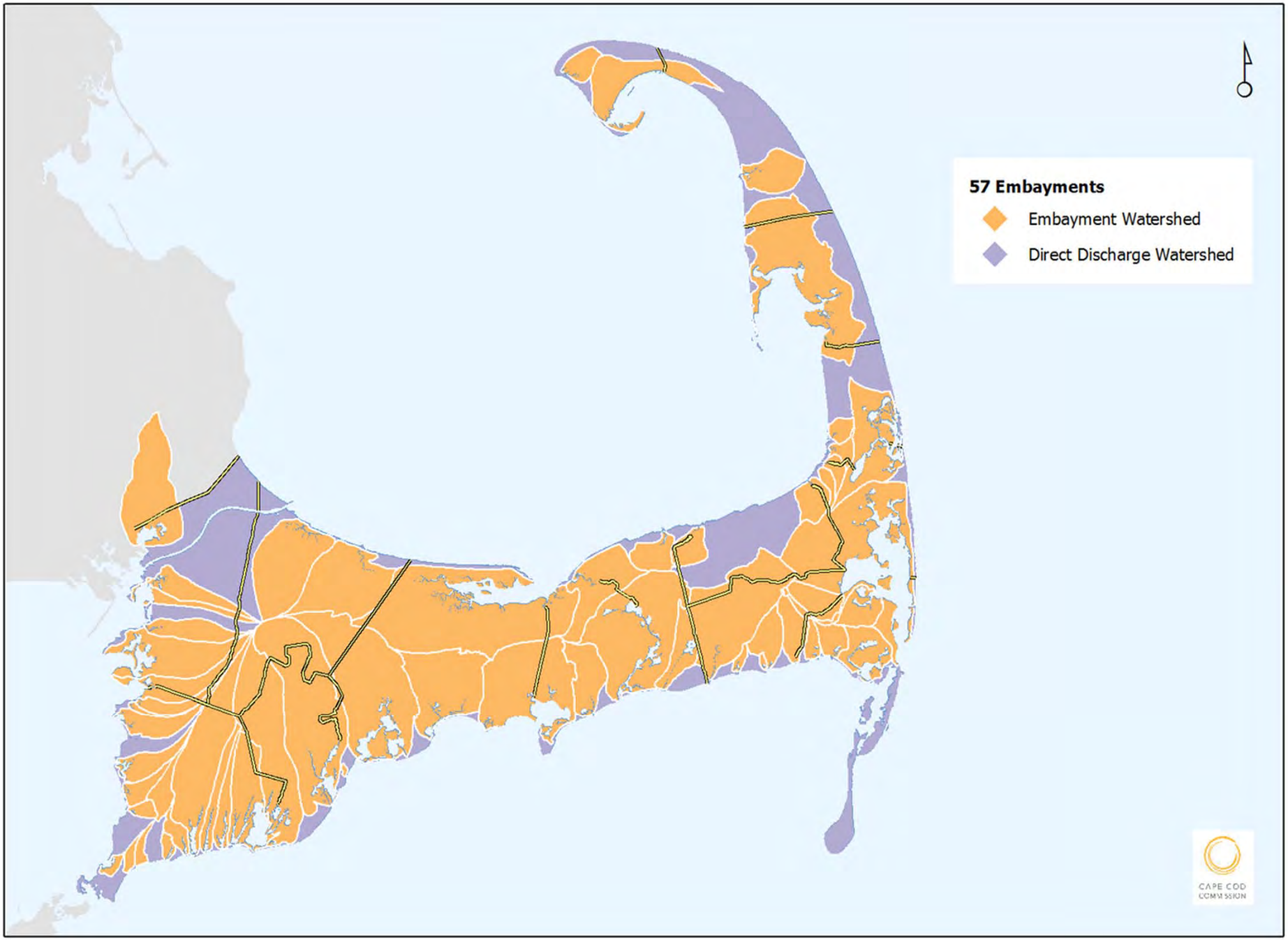
The Commission was directed to update the 1978 Plan

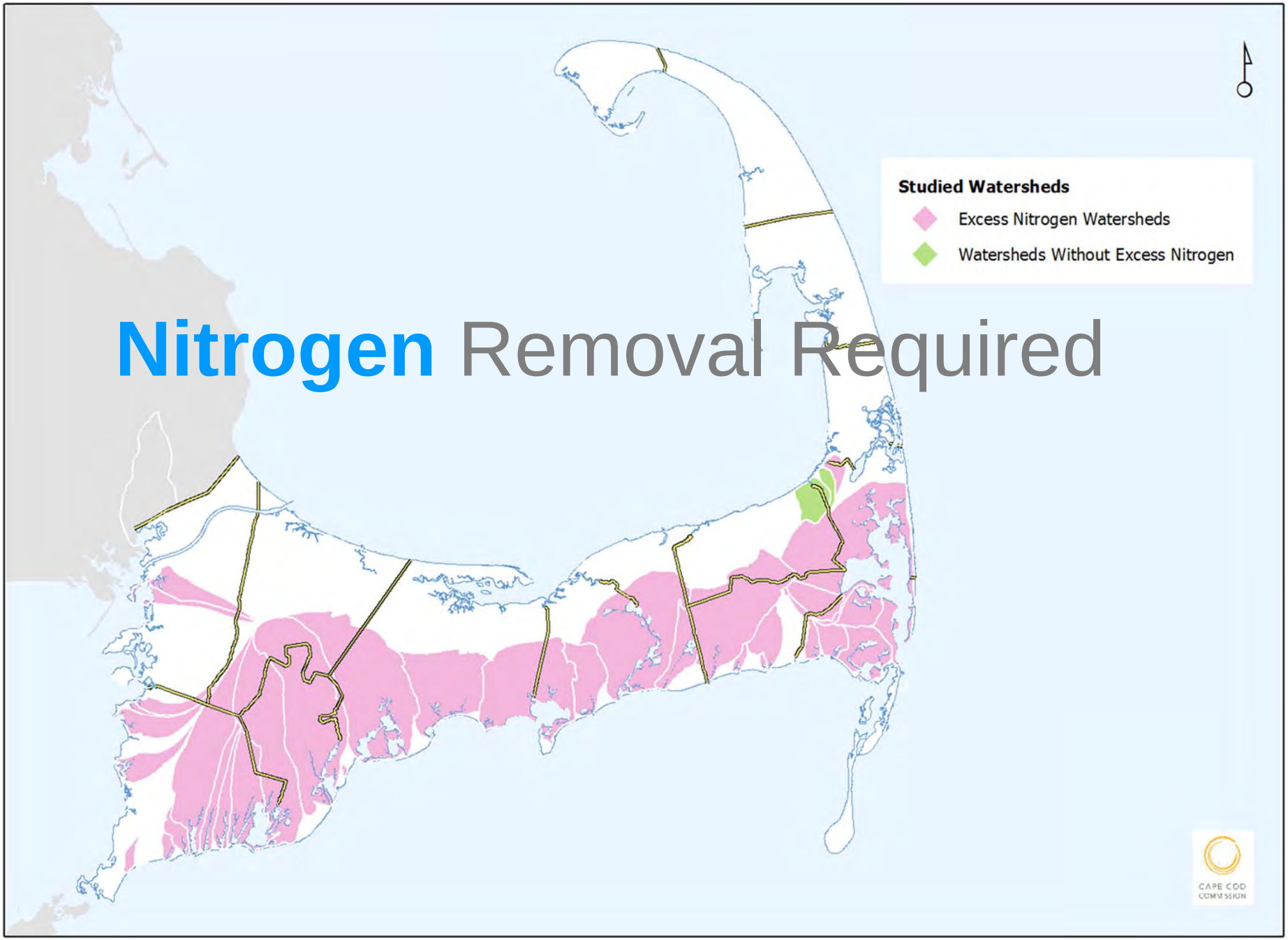
The Commonwealth provided $3 million to fund the project

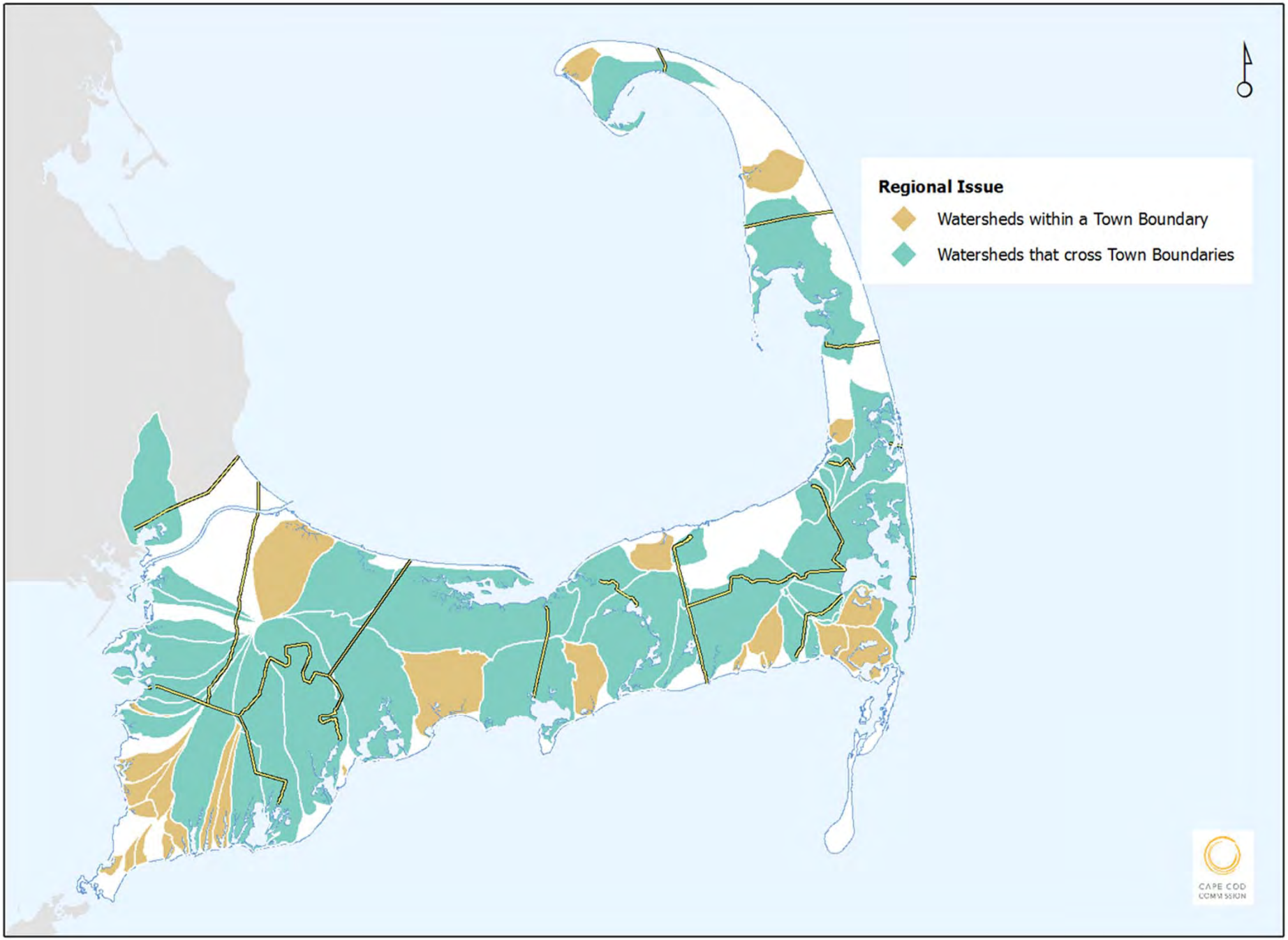
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

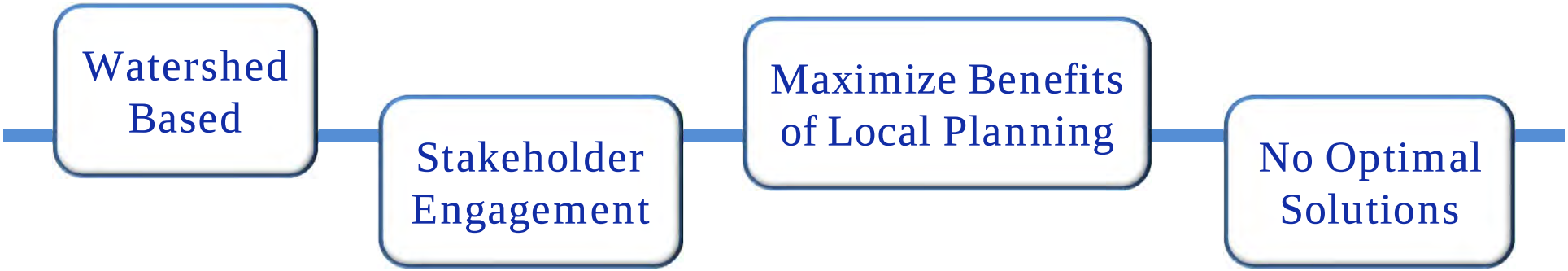

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

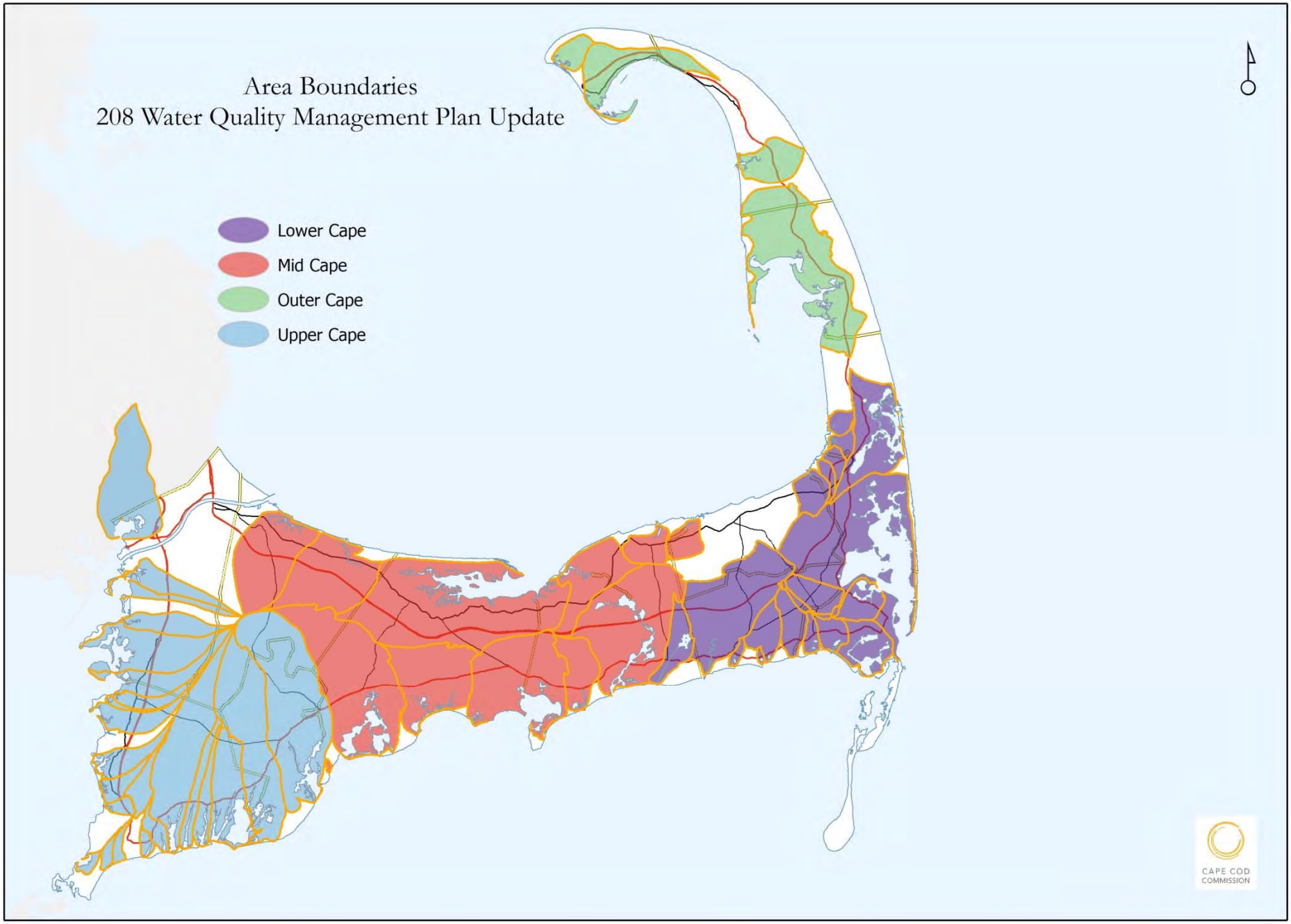

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

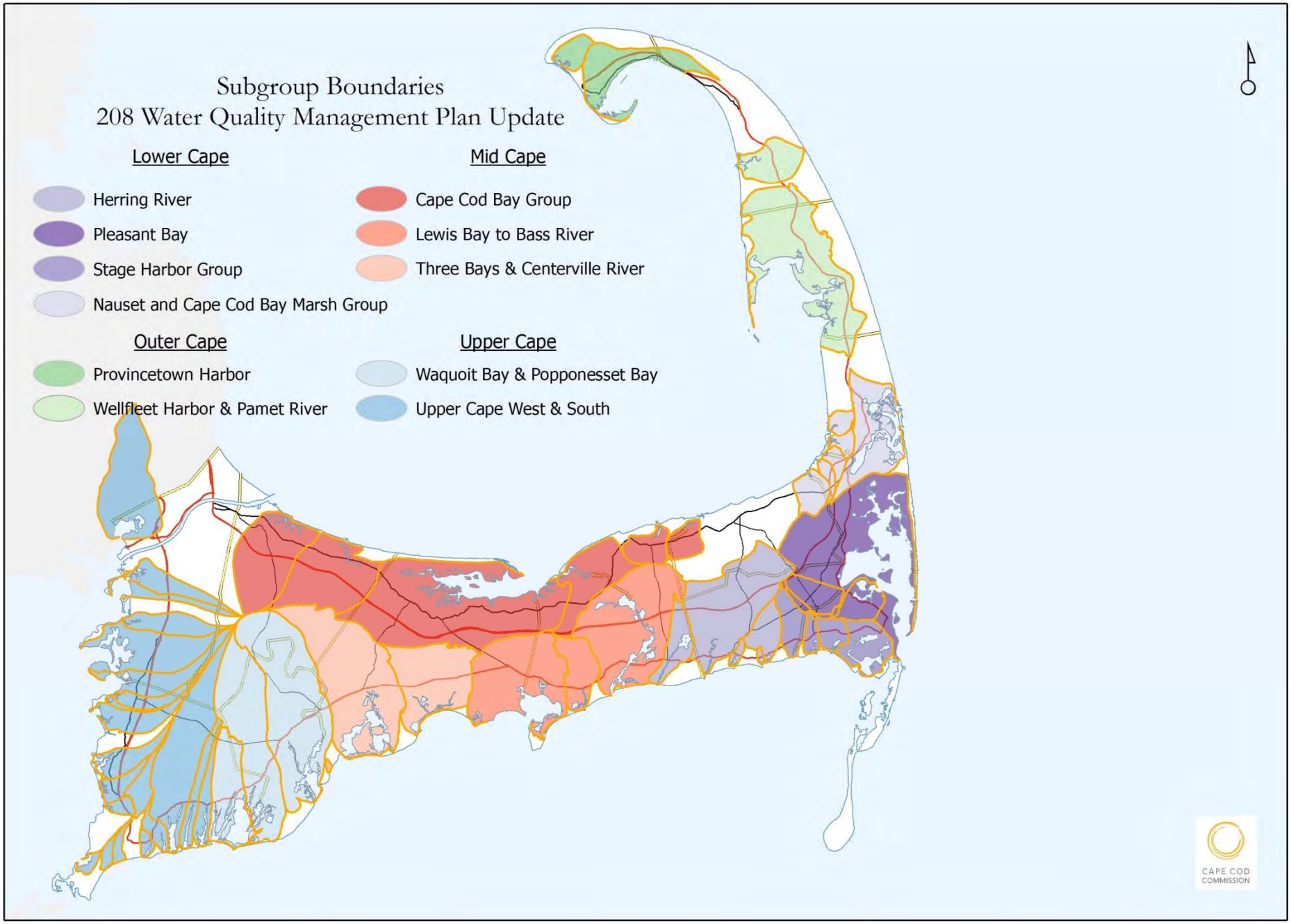

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

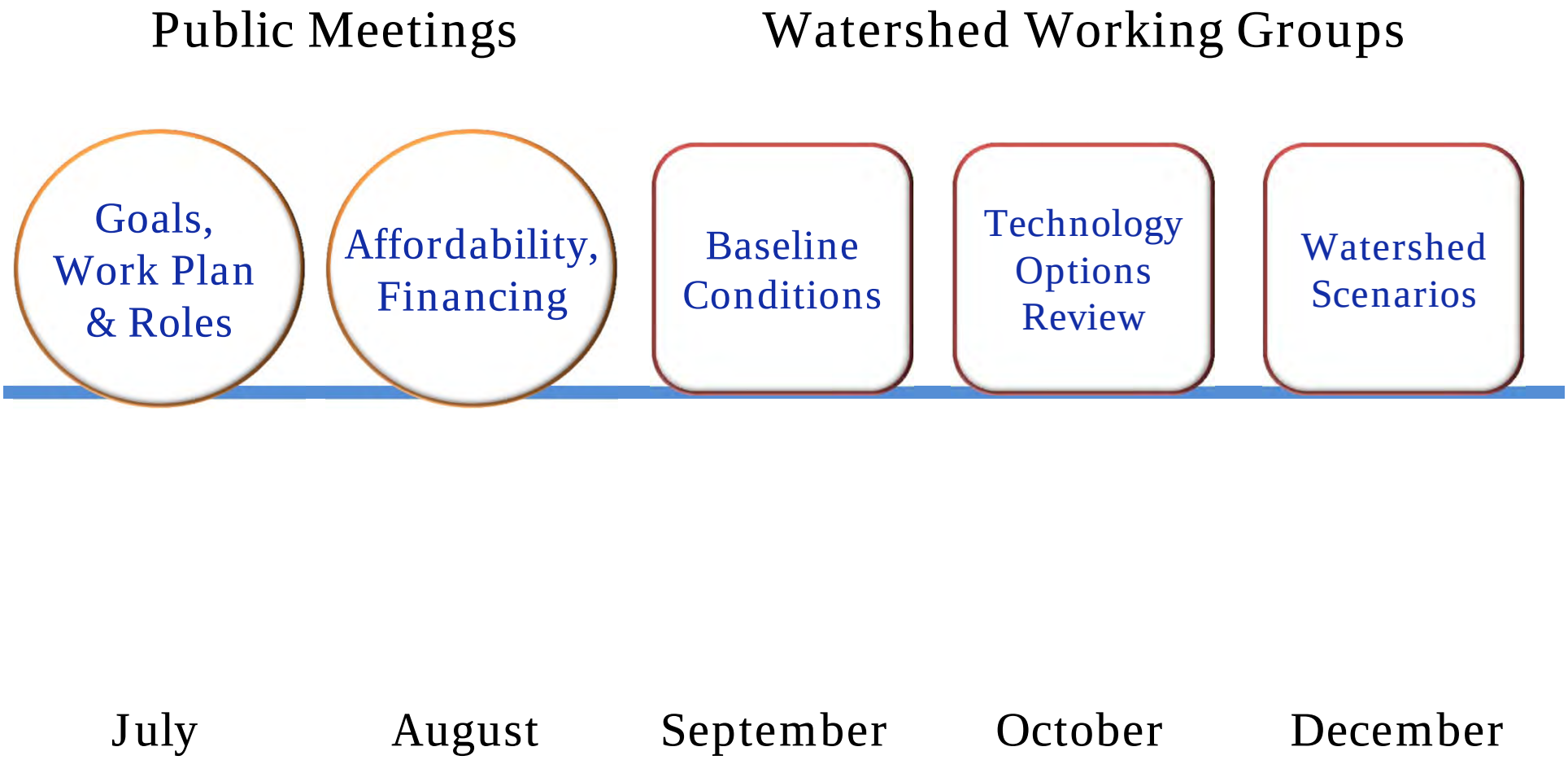


Goal:
To generate a series of approaches in each watershed that will meet water quality standards

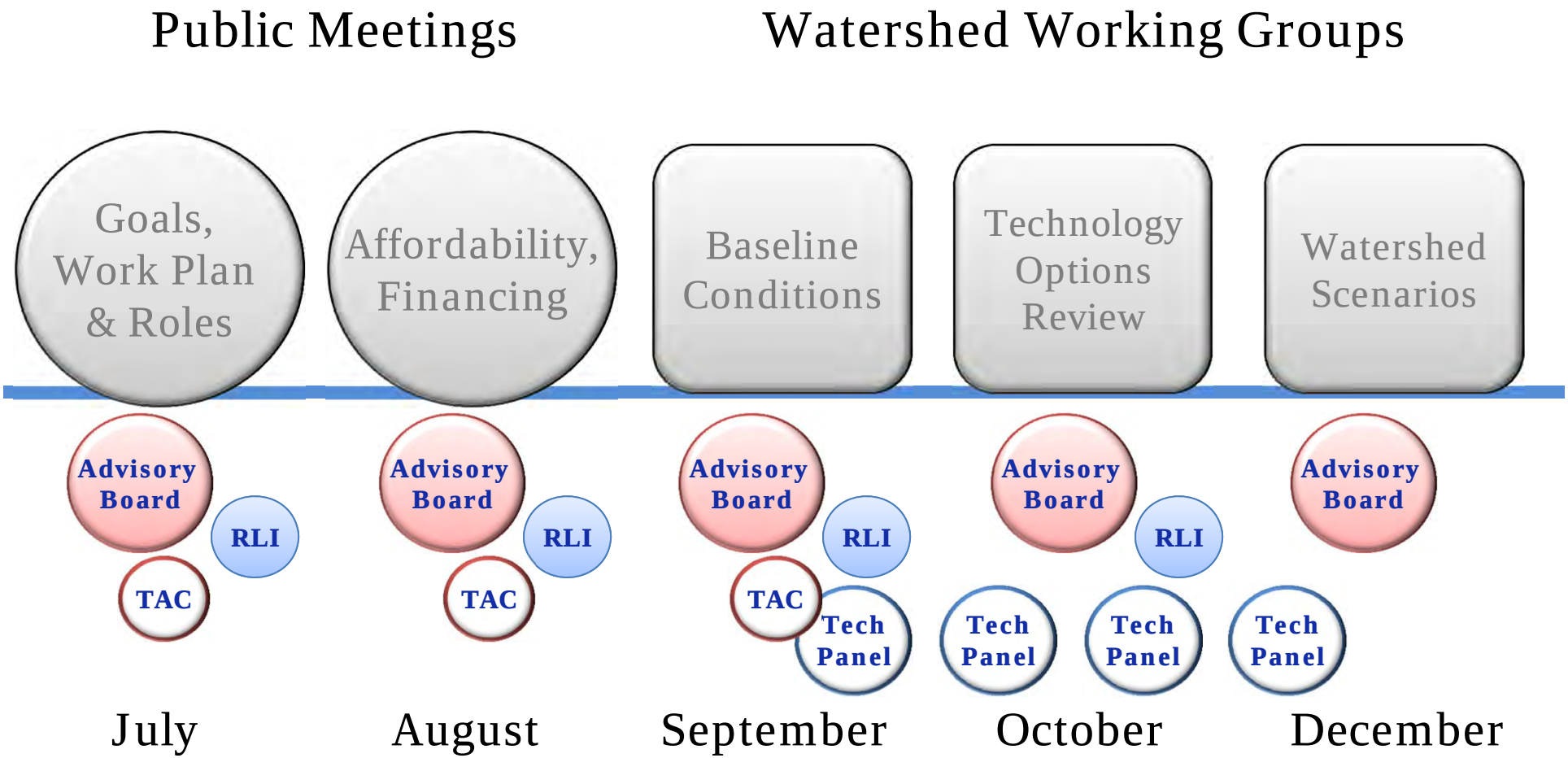

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

What is the stakeholder process?



208 Planning Process



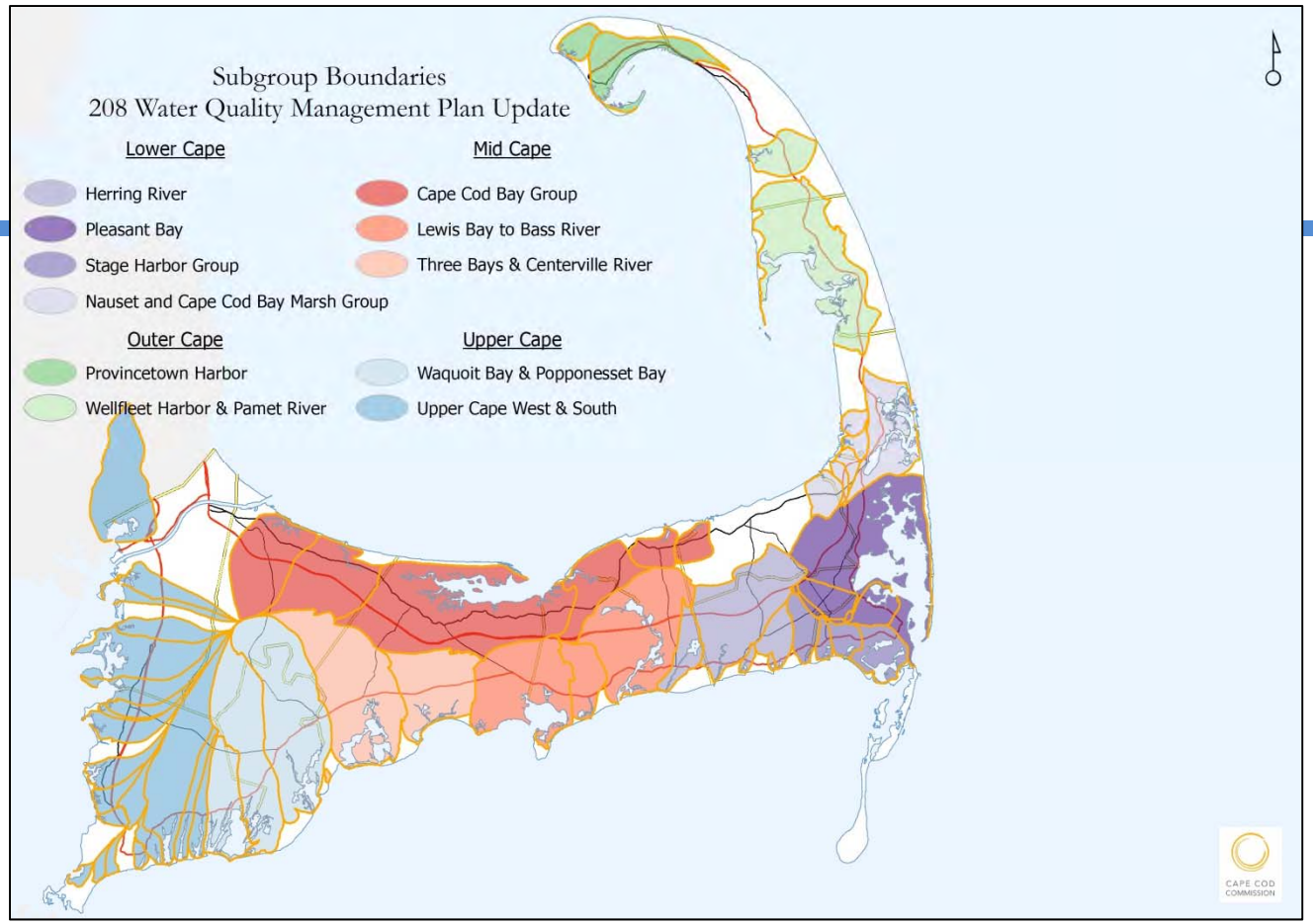
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



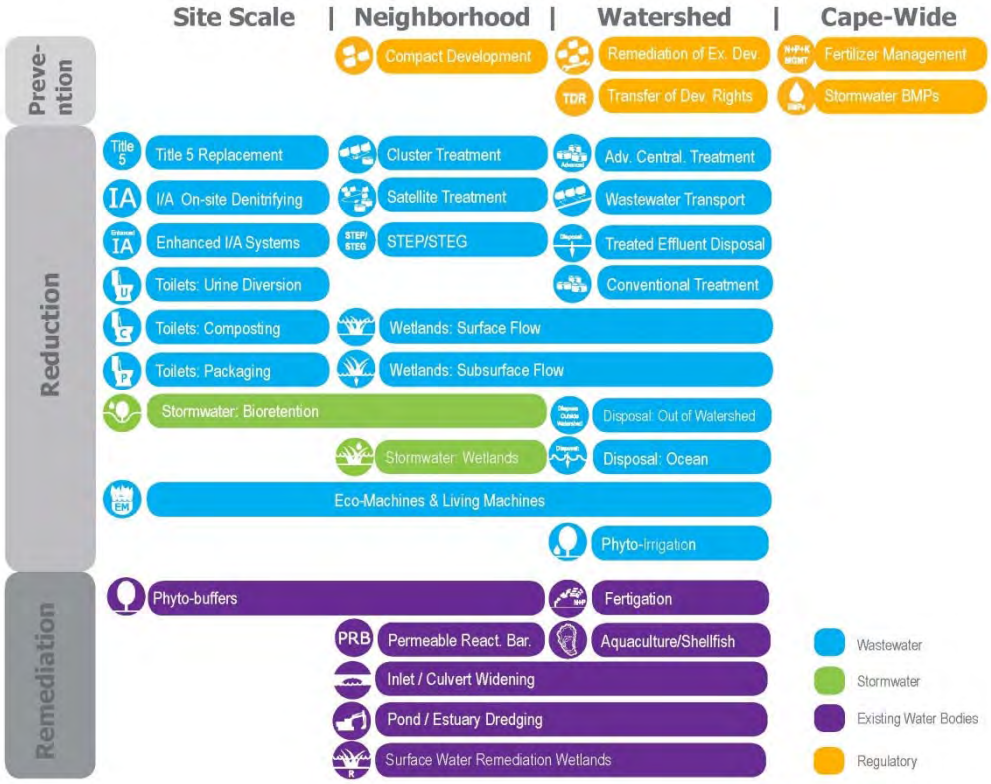
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5



208 Planning Process

Baseline Conditions

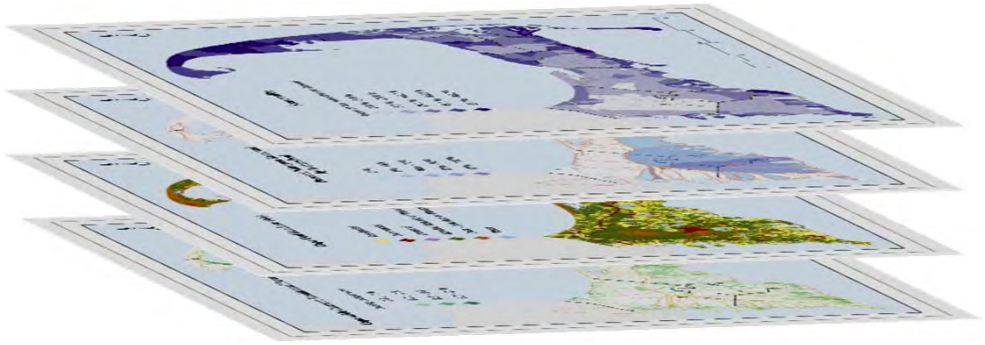
11 Working Group Meetings: Sept 18-27

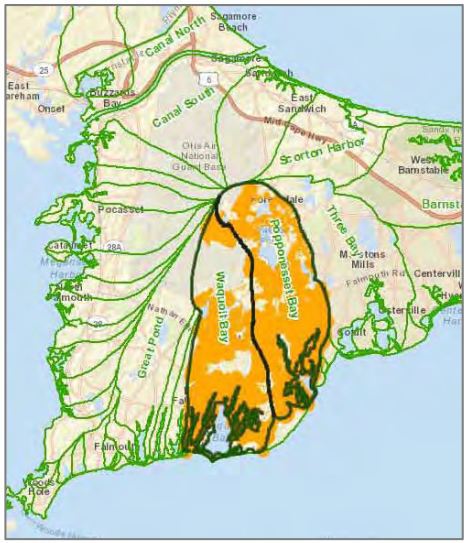
Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11





208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Goal of Today's Meeting:

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

208 Planning Process

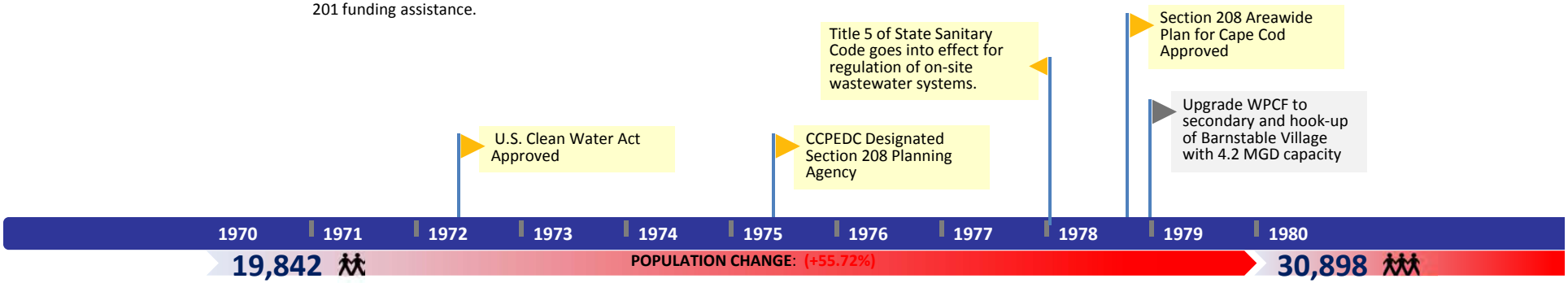
Local Progress to Date

Popponesset Bay
Waquoit Bay

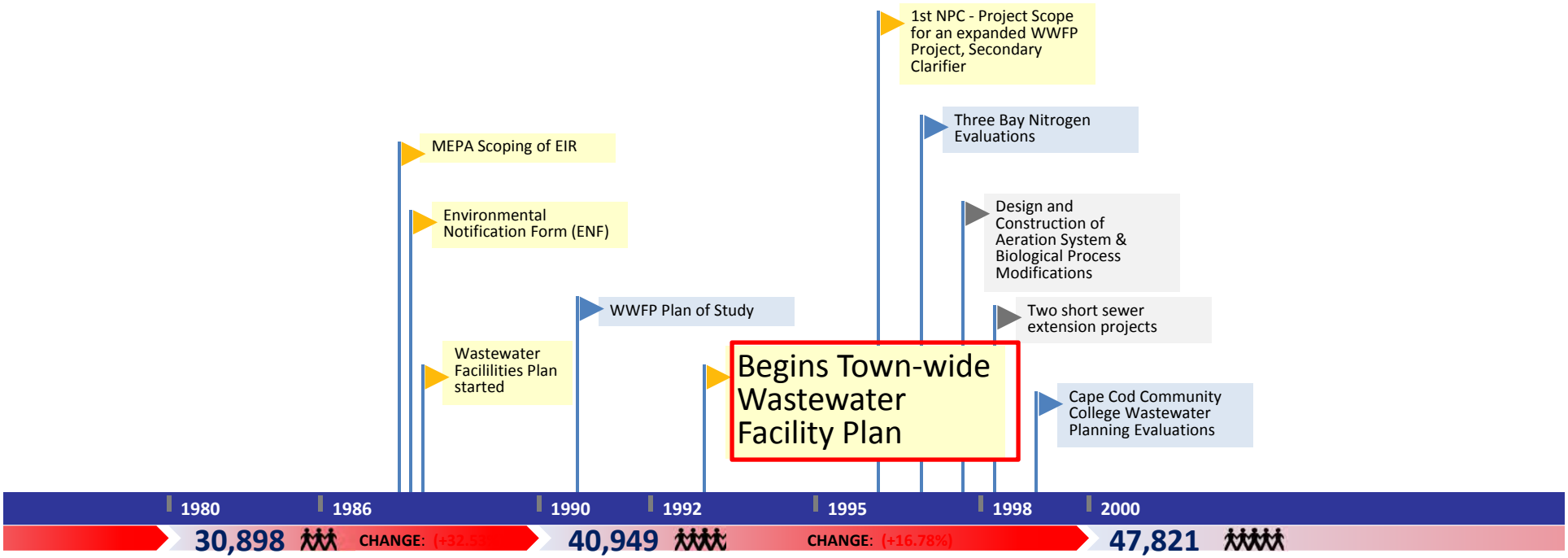
Barnstable: 1970-2013

From 1978 Section 208 Plan

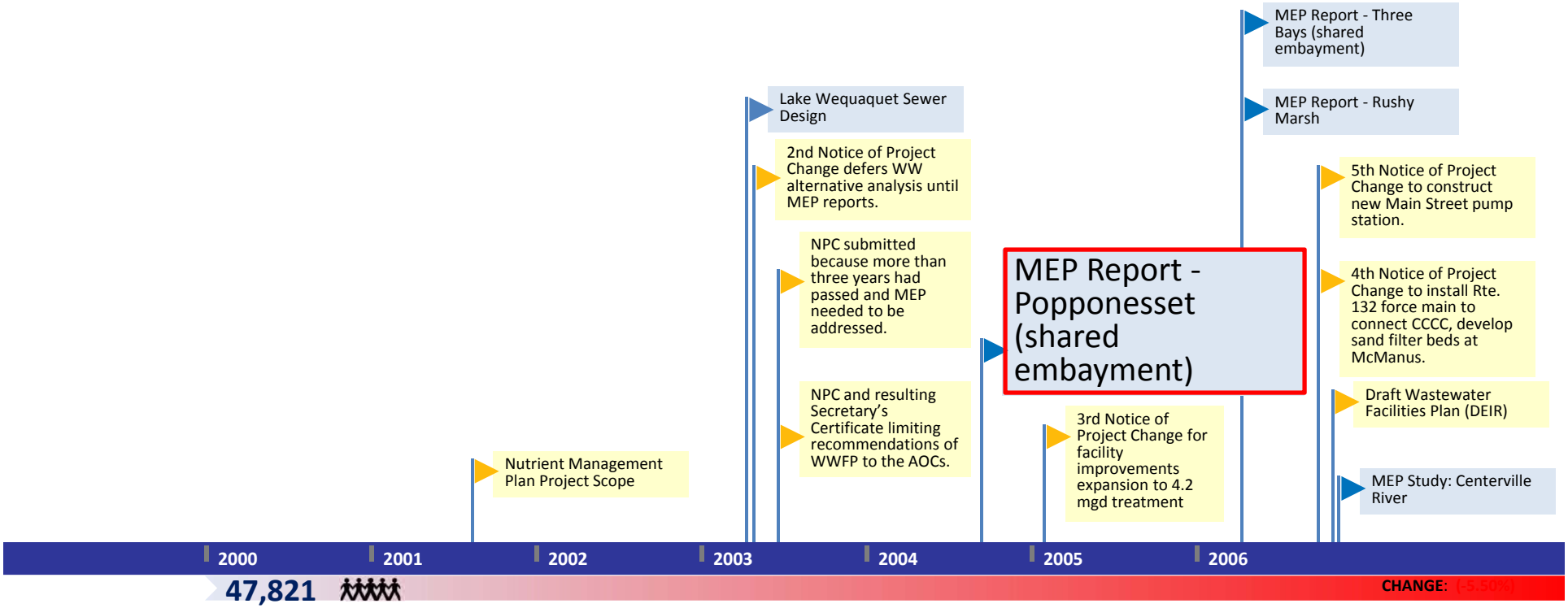
- The major 208 concern for Barnstable is the protection of its public water supply wells.
- The Planning Board appears to be interested in water supply protection as indicated by its recent zoning proposals. The coordination of town boards and the water utilities is essential to the success of this effort in Barnstable.
- Possible consolidation of the water utilities or some formal coordinative mechanism should be seriously considered to insure efficient and effective protection of the town's water resources.
- While the town is presently constructing an expansion of the sewage treatment plant and collection system with EPA 201 funds, it has not addressed all of the wastewater management problem areas in the town. Additional 201 facilities planning must be carried out to demonstrate a sewer need exists under present EPA criteria.
- Certain problem areas are included as future phases of the sewer collection system expansion in the "Sewer Service Areas" delineated in the 208 plan and would be eligible for 201 funding assistance.
- The present Hyannis treatment plant has the necessary capacity to handle all sewer service area needs in Hyannis. Should the town want to expand the collection system beyond these sewer service areas, 201 funds will not be available for these expansions or for an additional treatment plant.
- The need for collection system expansion in the Hyannis area should be carefully considered in assessing the plant's ability to accept wastewater from Yarmouth since the Hyannis treatment plant cannot be expanded beyond its present capacity.
- The town should consider, in the near future, entering into a 201 facilities plan to resolve the present Category 2 problem areas possibly through decentralized solutions.
- The 201 study and efforts of town board should address the coastal water quality problems of the town, particularly Lewis Bay.



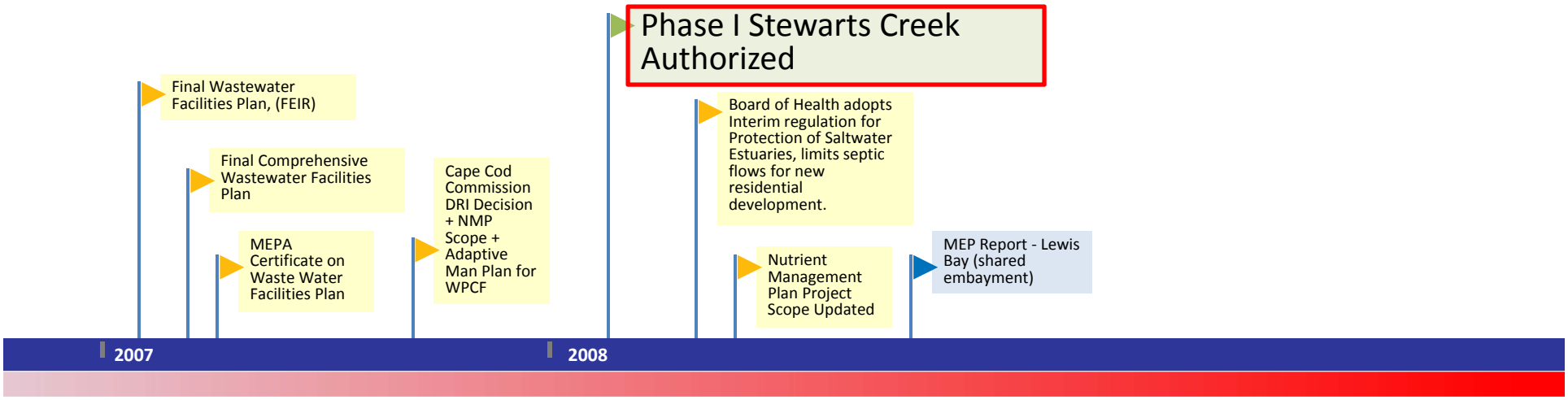
Barnstable: 1970-2013



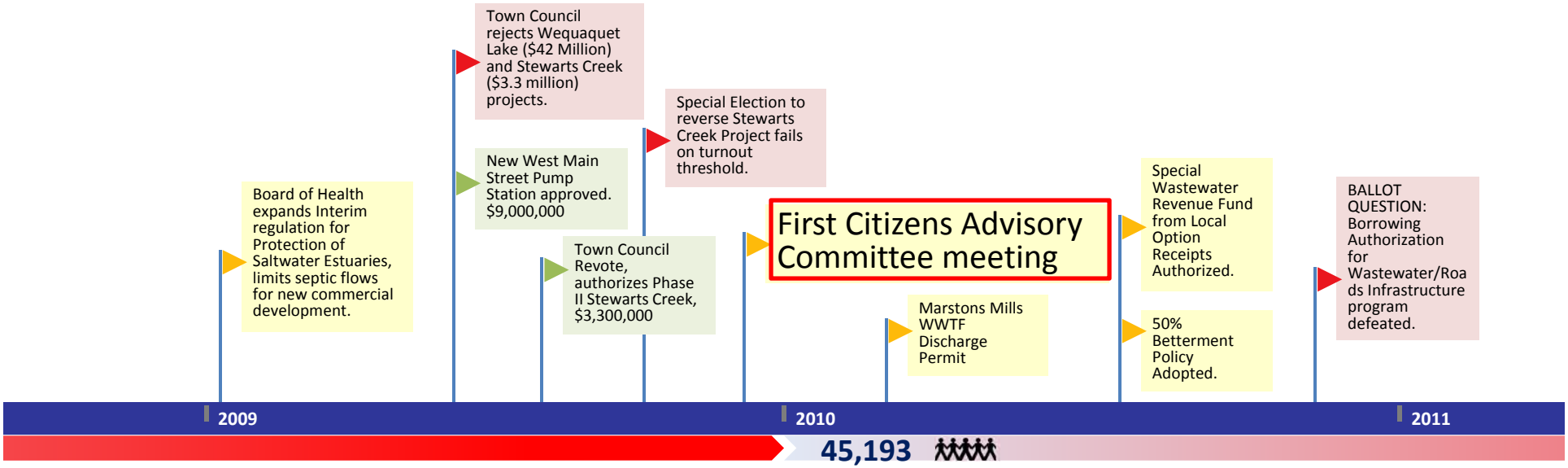
Barnstable: 1970-2013



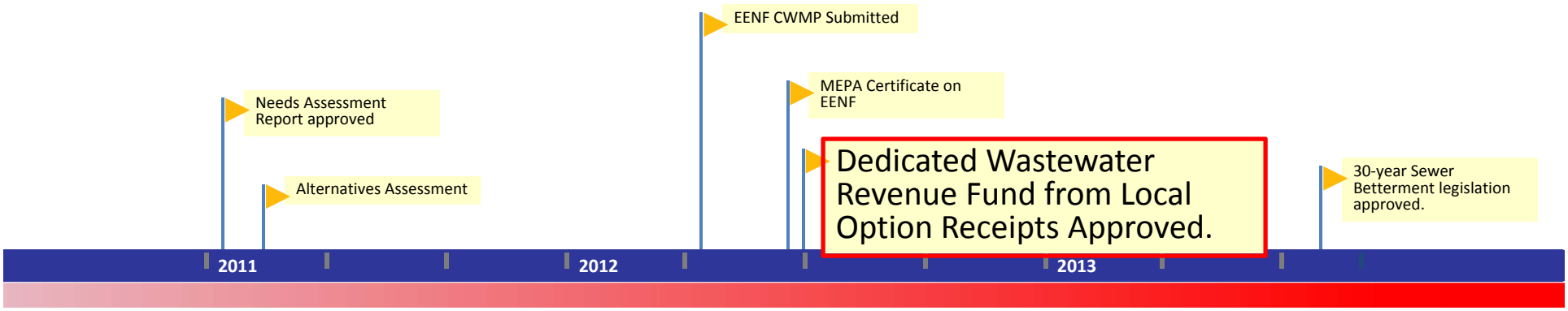
Barnstable: 1970-2013



Barnstable: 1970-2013



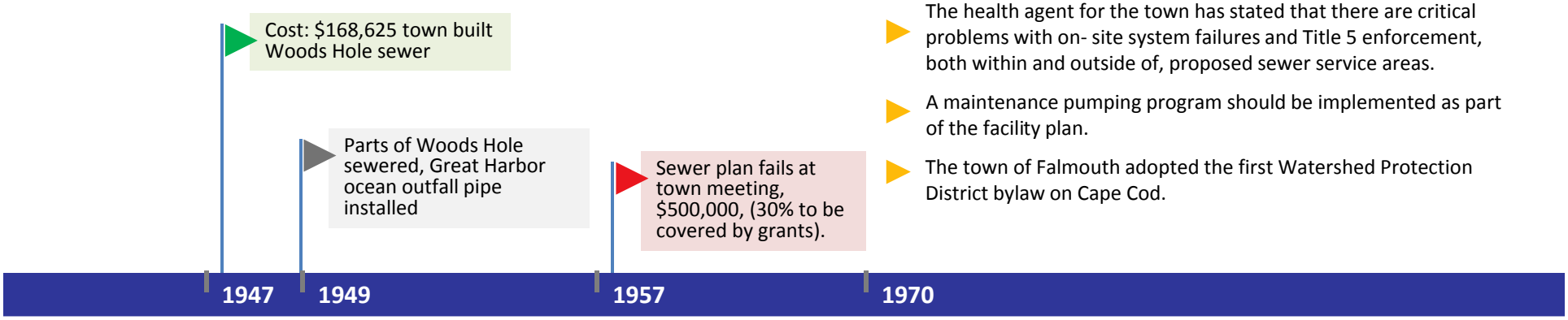
Barnstable: 1970-2013



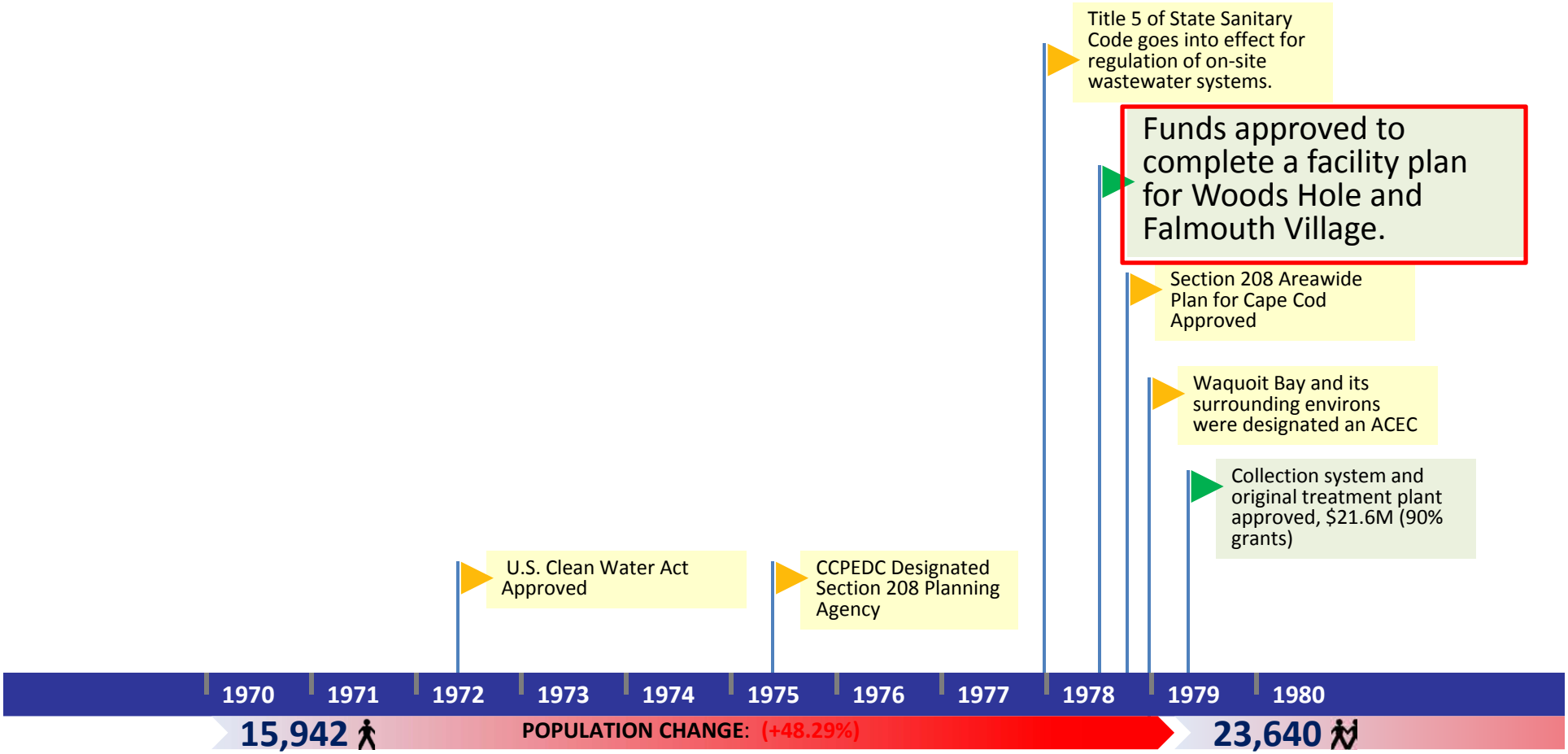
Falmouth

From 1978 Section 208 Plan

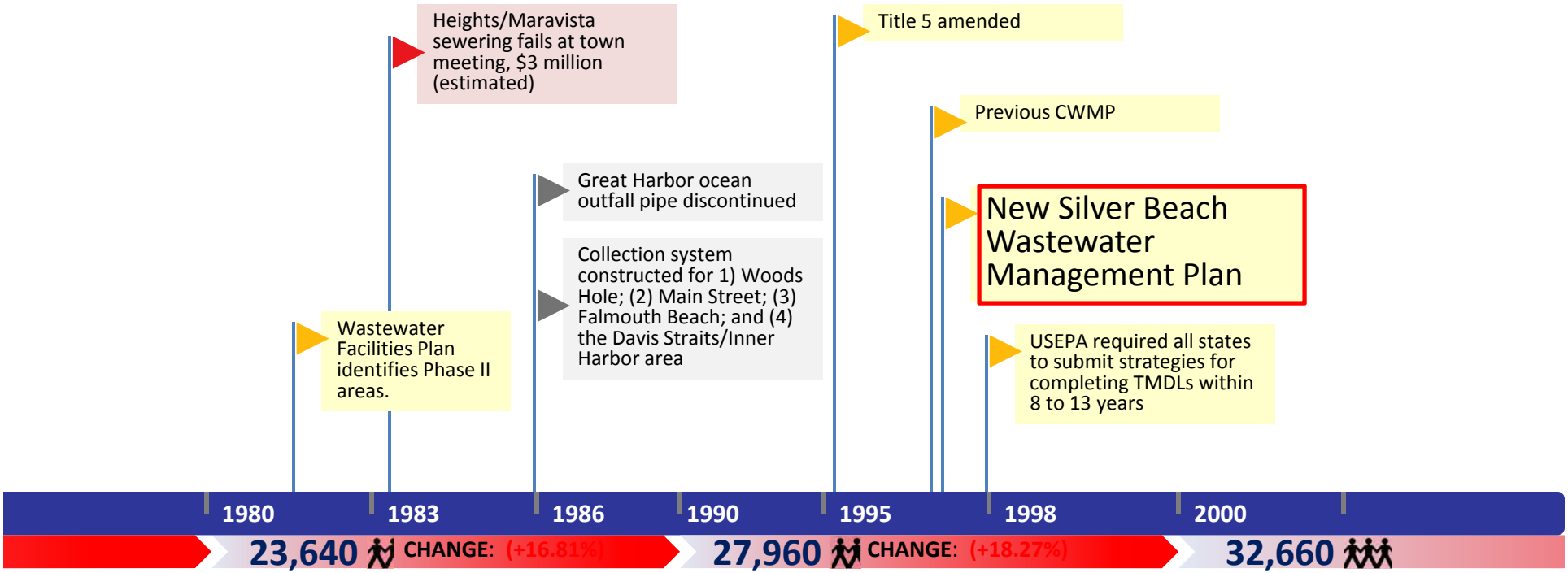
- Falmouth's difficulties with sewer system planning and construction have a 30 year history. It is strongly recommended that the town appoint a water quality advisory committee.
- A survey of residents and potential sewer users was conducted in the summer of 1978 to determine whether they would be willing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



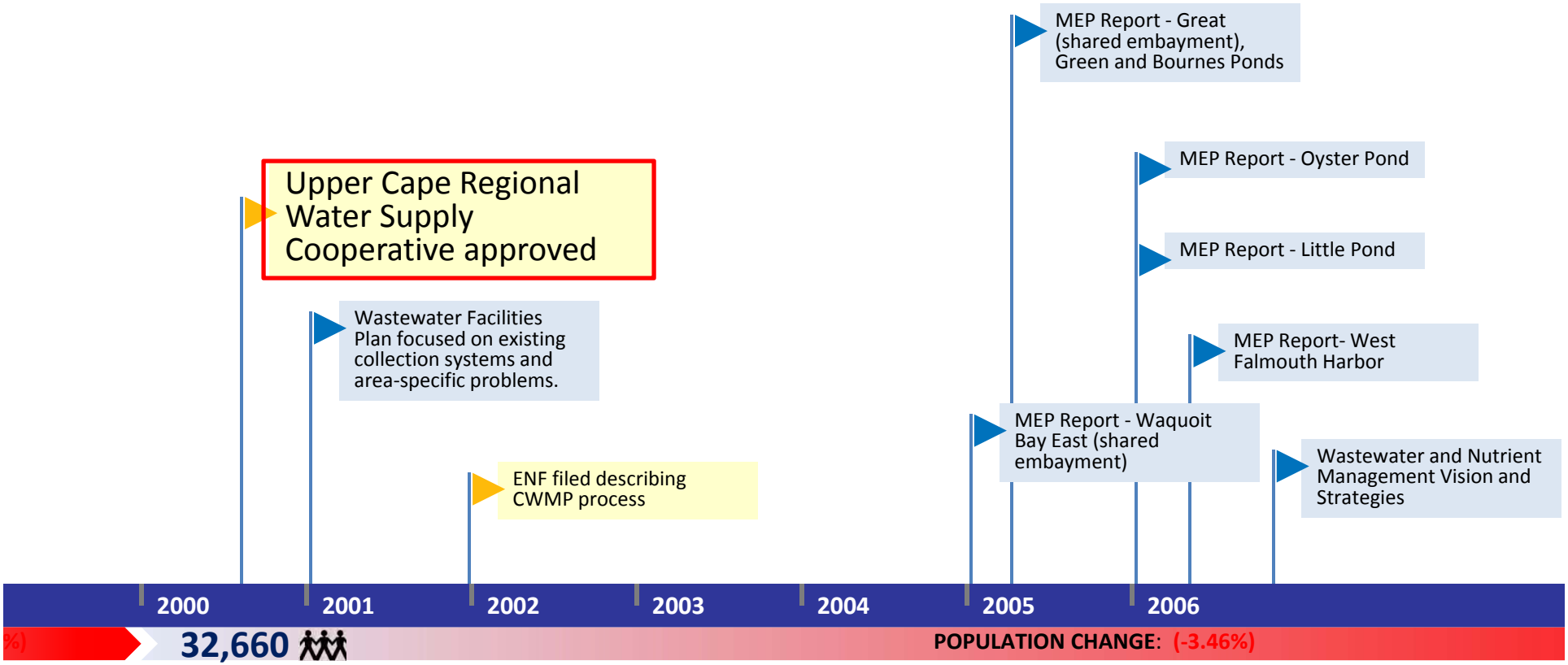
Falmouth: 1947-2013



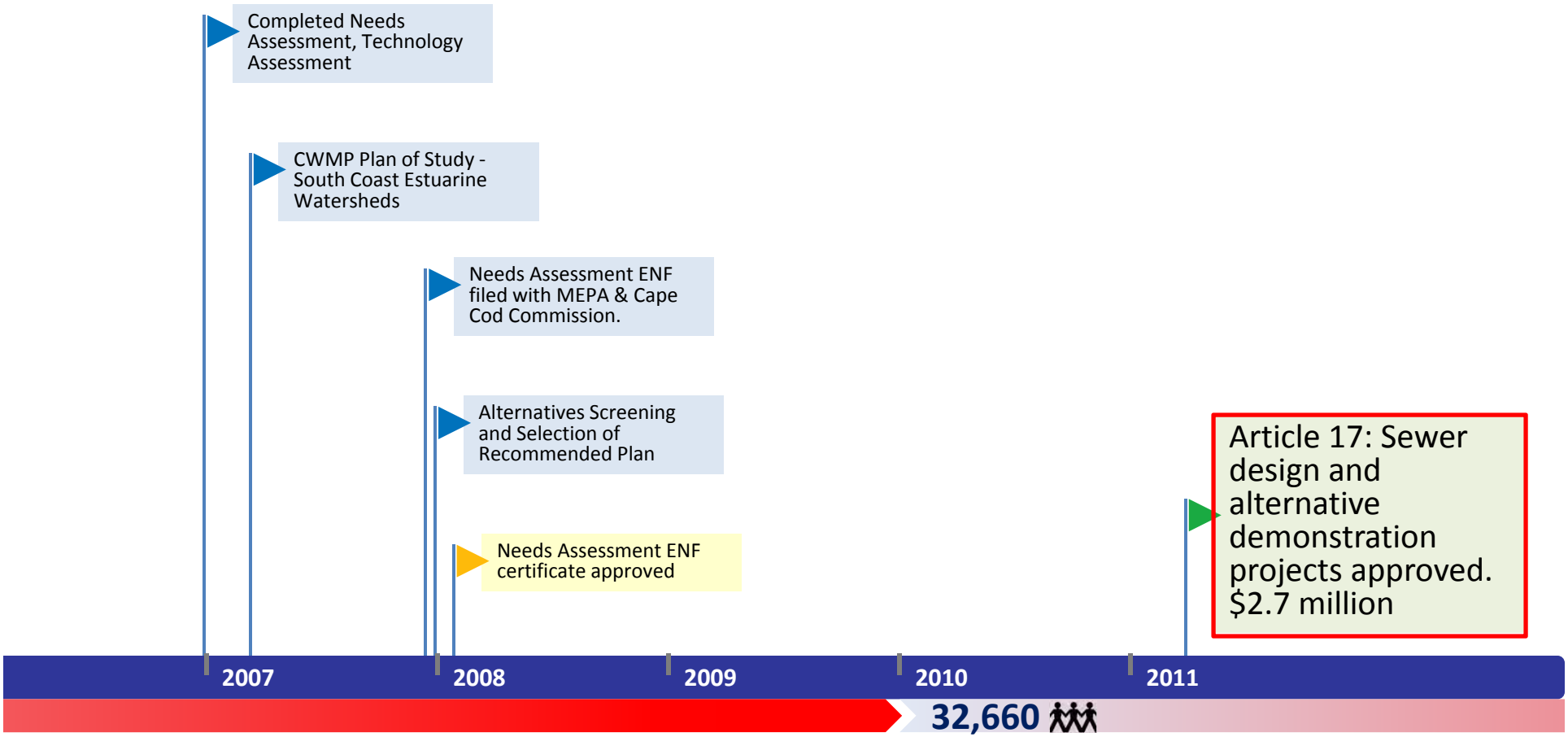
Falmouth: 1947-2013



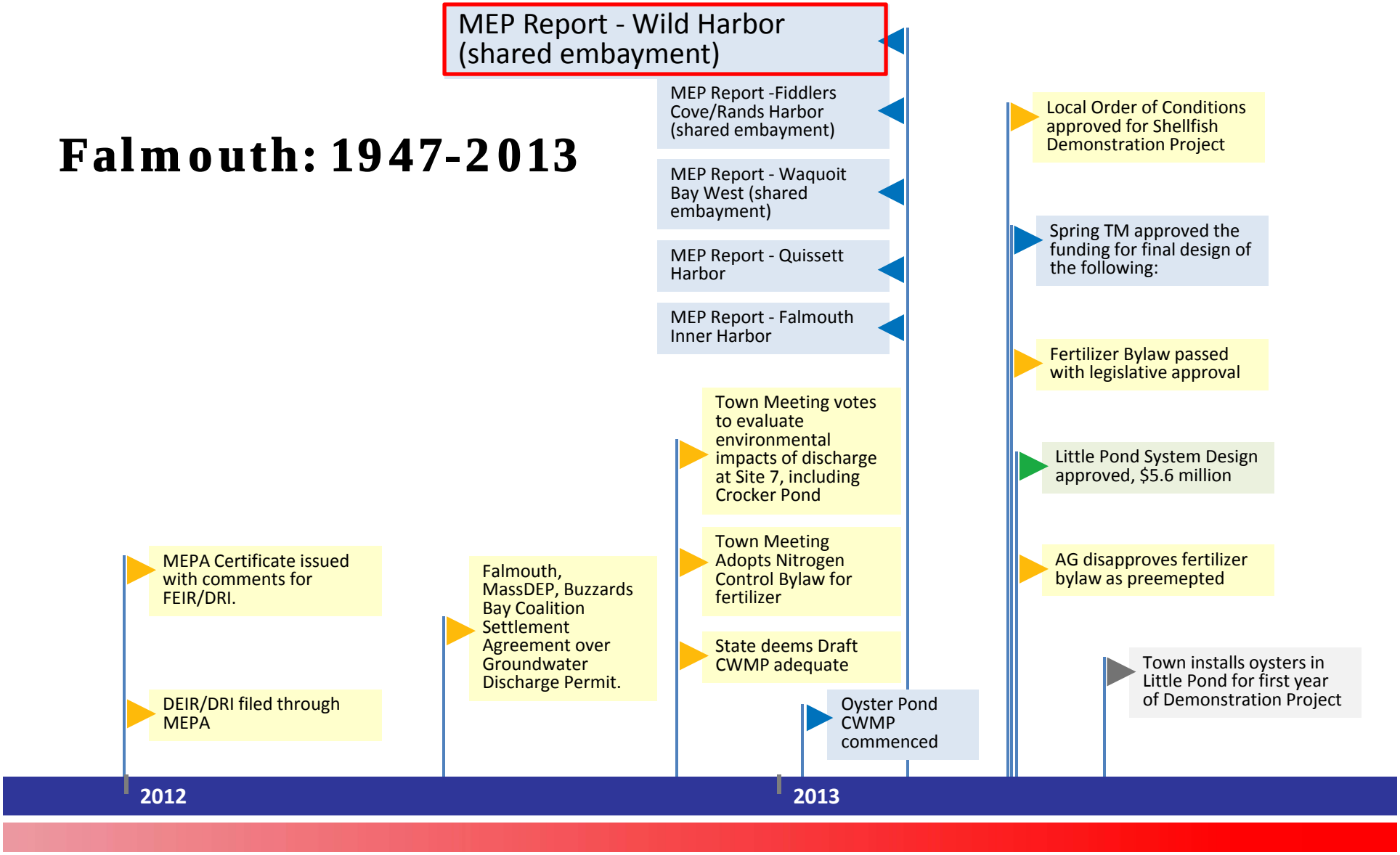
Falmouth: 1947-2013



Falmouth: 1947-2013



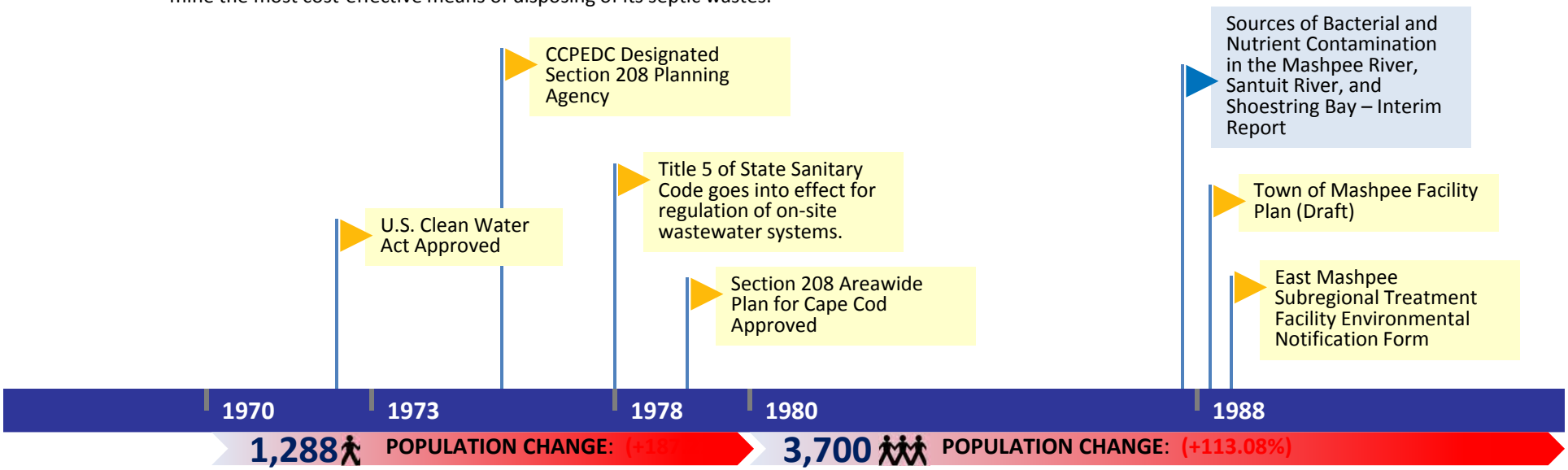
Falmouth: 1947-2013



Mashpee

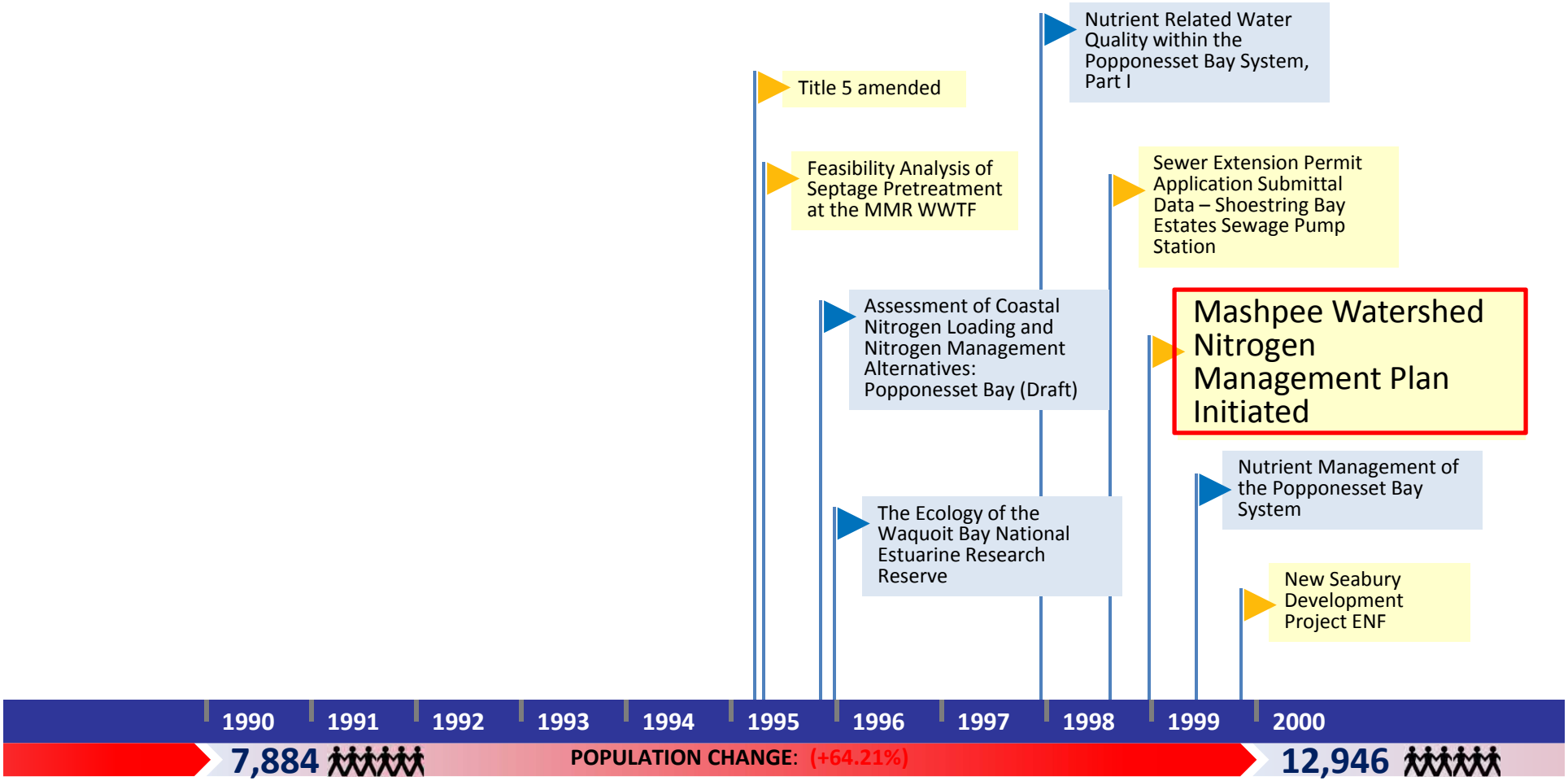
From 1978 Section 208 Plan

- While there does not appear to be any major wastewater management problem areas, pond water quality has been a problem of concern to the town for a number of years.
- The town should protect the future water supply development area, once defined, with a Watershed Protection District.
- Non-structural solutions, including careful management of on - site systems, water conservation and innovative options should be adequate to avoid creation of future sewer needs.
- Mashpee is not highly developed and is in an excellent position to plan development and manage subsurface disposal to avoid future problems.
- Mashpee should participate in regional septage planning with neighboring towns (Sandwich, Falmouth and Barnstable) to determine the most cost-effective means of disposing of its septic wastes.
- The town has been concerned about the condition of recreational ponds that have significant development around them, particularly Johns and Ashumet Ponds.
- Extensive water quality testing has been conducted on Johns Pond, and the town is interested in implementing a Pond Management program.
- It is further suggested that the town adopt a "Great Pond Protection District" as part of its zoning by-laws to begin such a management program.
- The landfill plume may be flowing towards the Mashpee River. If private wells are found to be down gradient there may be a need for town water service to the area.

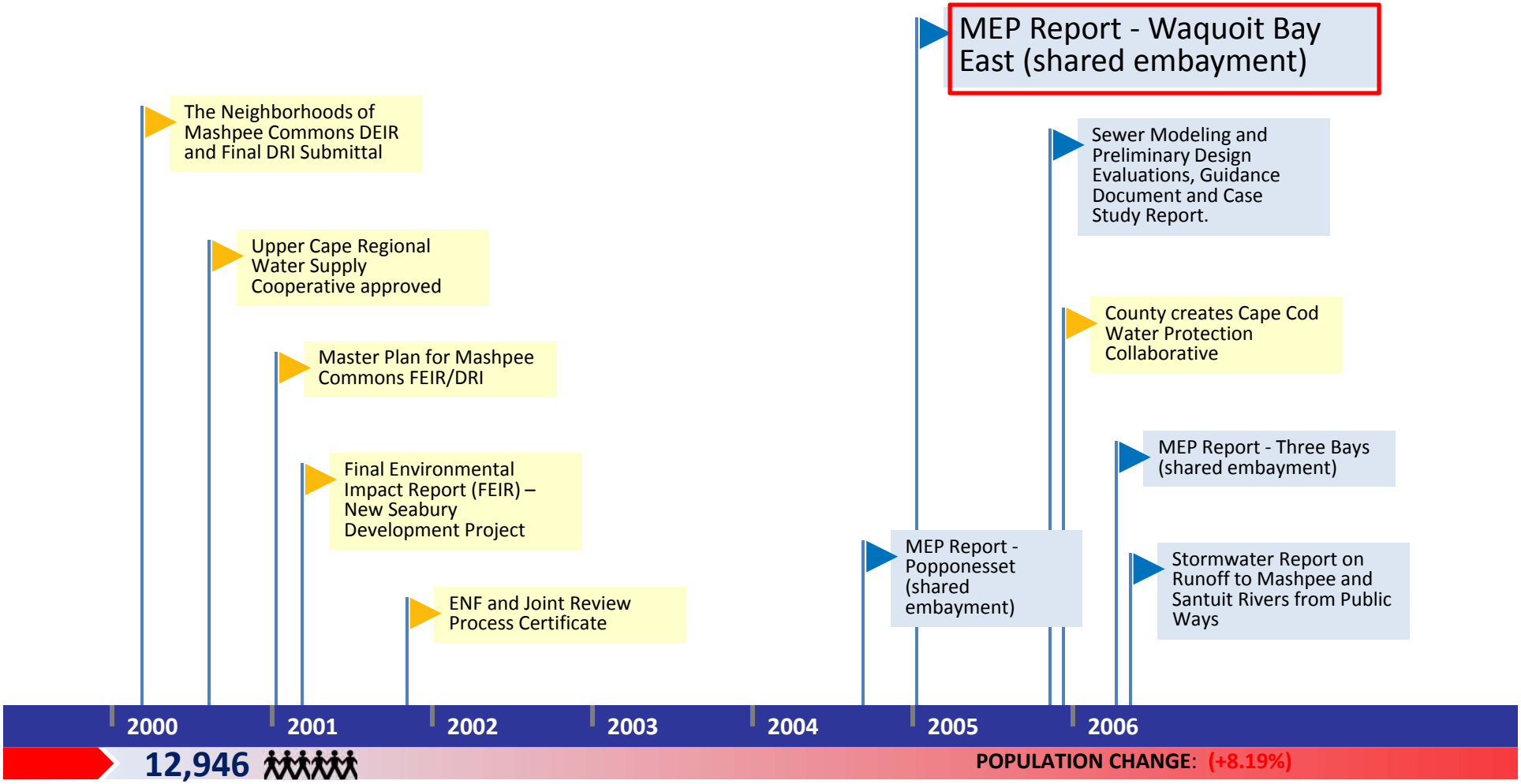


POPULATION: 7,884
(+113.08%)

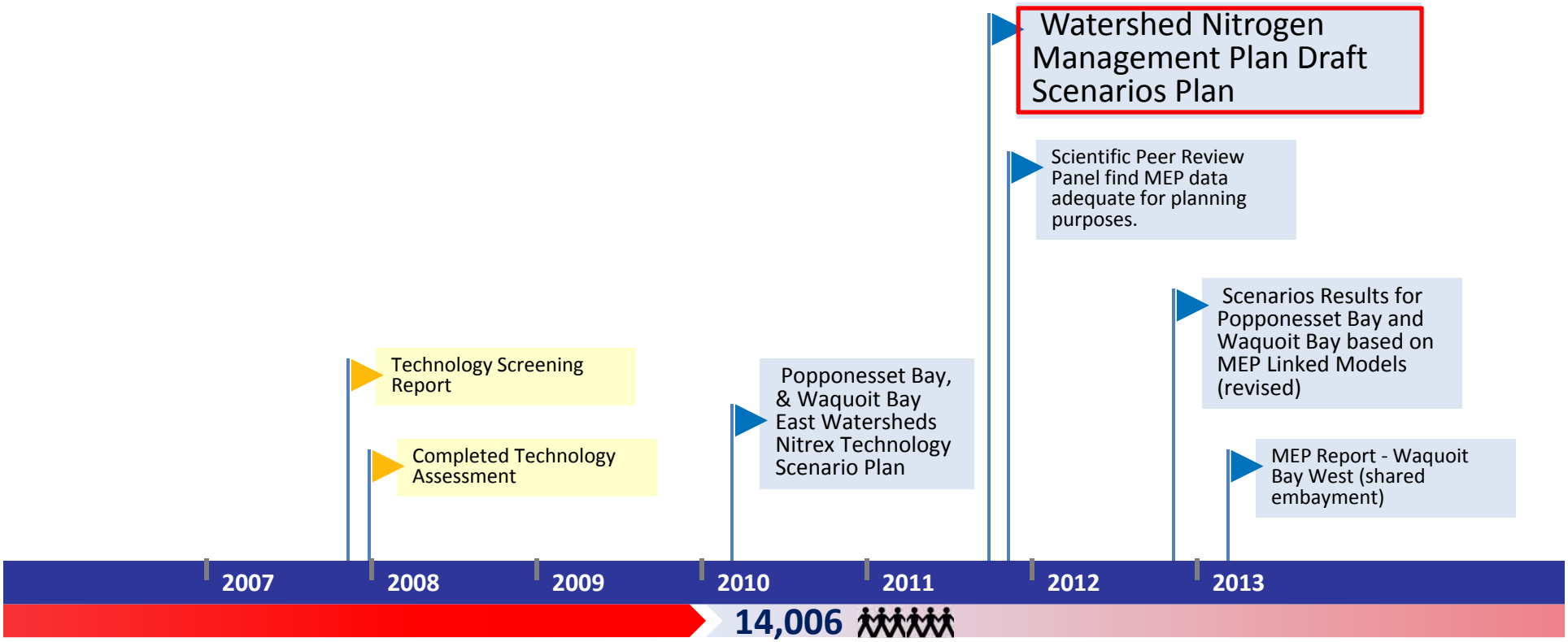
Mashpee: 1970-2013



Mashpee: 1970-2013



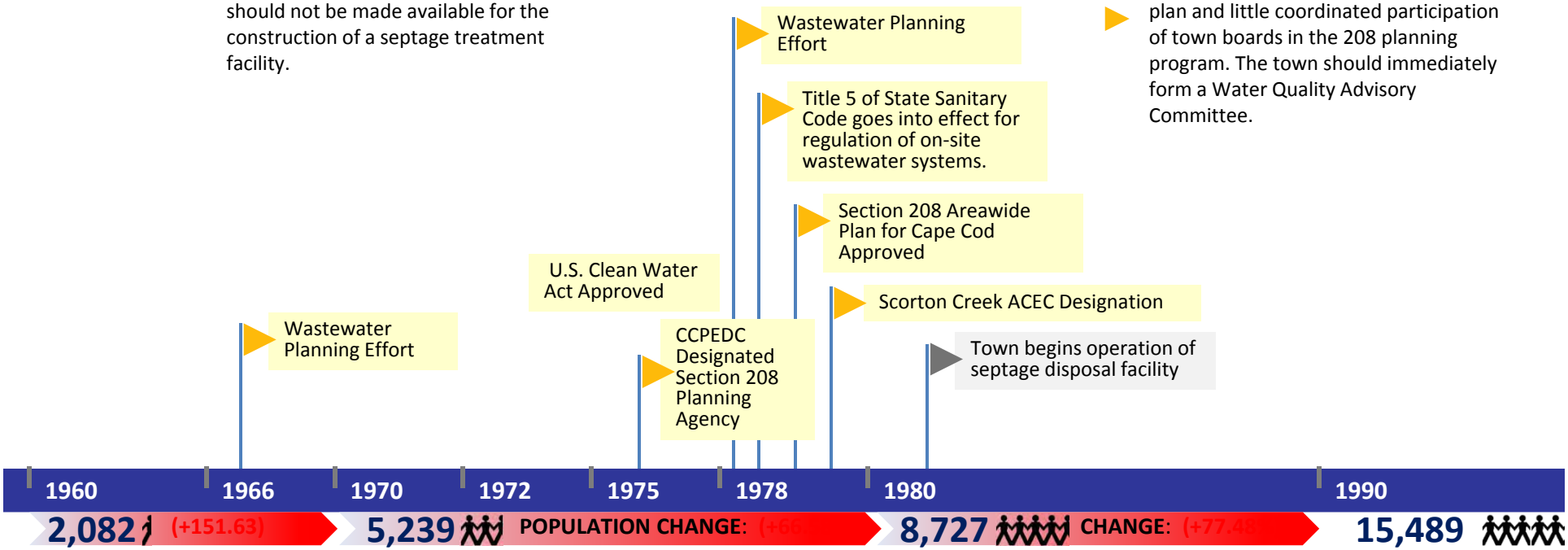
Mashpee: 1970-2013



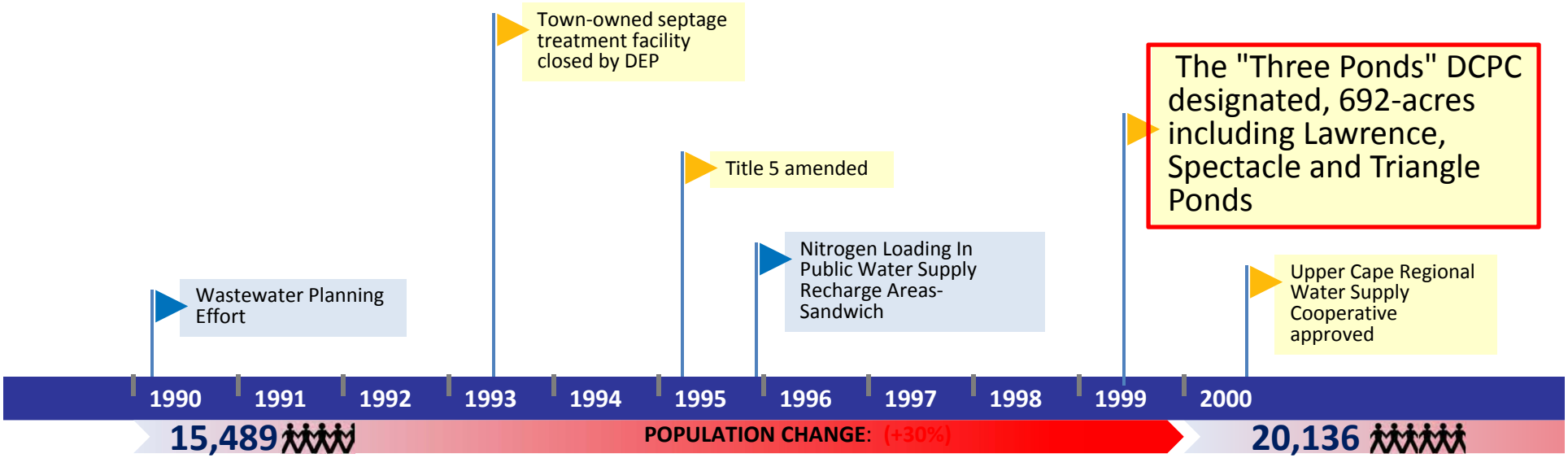
Sandwich

From 1978 Section 208 Plan

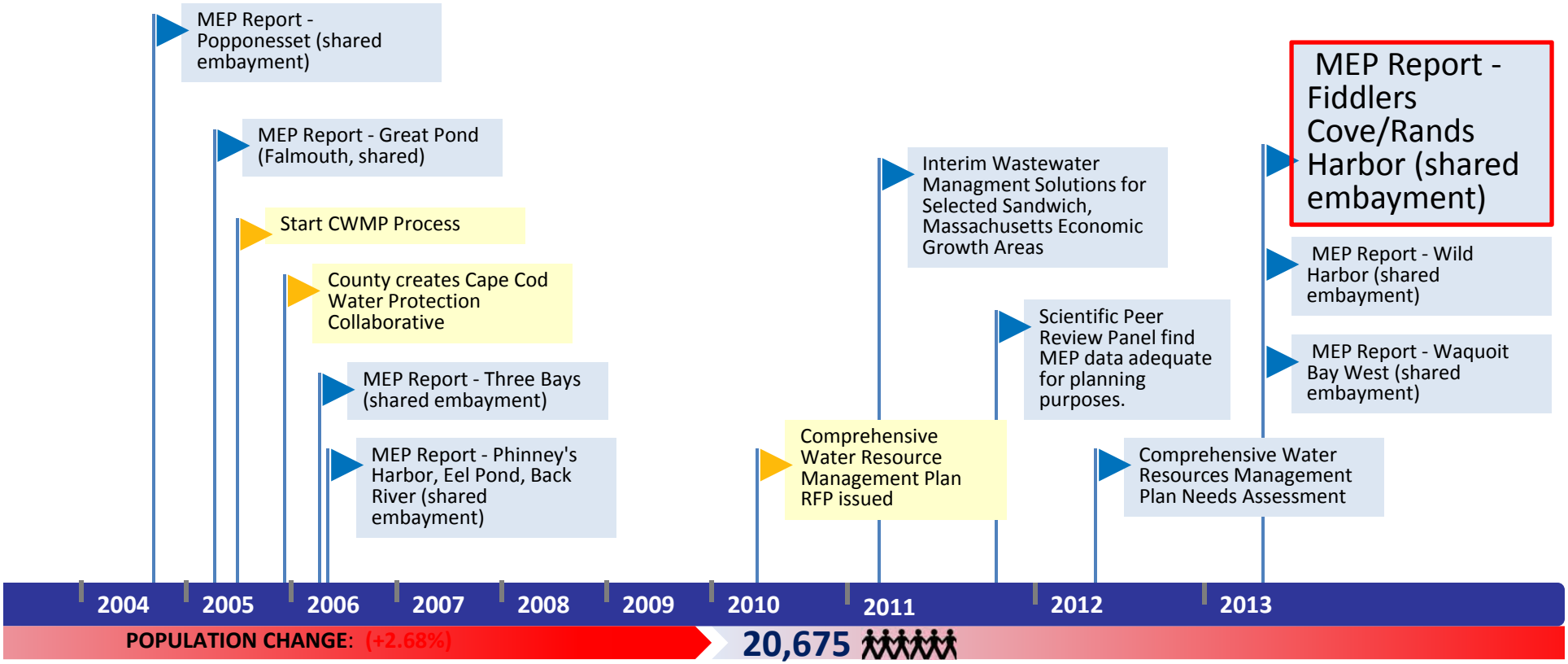
- A sewer facilities plan was completed for Sandwich in 1978. The plan calls for a small outfall into the Cape Cod Canal, which now could only be allowed through a special act of the legislature.
- Should the town fail to act by 1980, a DEQE investigation of Title 5 violations should be initiated.
- A septage treatment facility would not provide a comprehensive solution and could not be considered to be consistent with the 208 plan. Funds should not be made available for the construction of a septage treatment facility.
- The town health agent should strictly enforce Title 5 and should seek additional qualified personnel to implement the 208 recommended on-site systems management program.
- The town has taken progressive steps to increase lot sizes to at least one acre in most areas of town. The town has indicated willingness to cooperate with the 208 staff in delineating watershed areas and in adopting Watershed Protection Districts.
- The problem of the State Fish Hatchery discharging over half a million gallons of fresh water must be addressed by the Department of Fisheries and Wildlife as recommended in the "Water Conservation" section of the final plan.
- The town should actively participate in regional solid waste planning to develop a long-range solution to its solid waste management problems.
- There has been a serious delay in action on the town's proposed sewer facility plan and little coordinated participation of town boards in the 208 planning program. The town should immediately form a Water Quality Advisory Committee.



Sandwich: 1960-2013



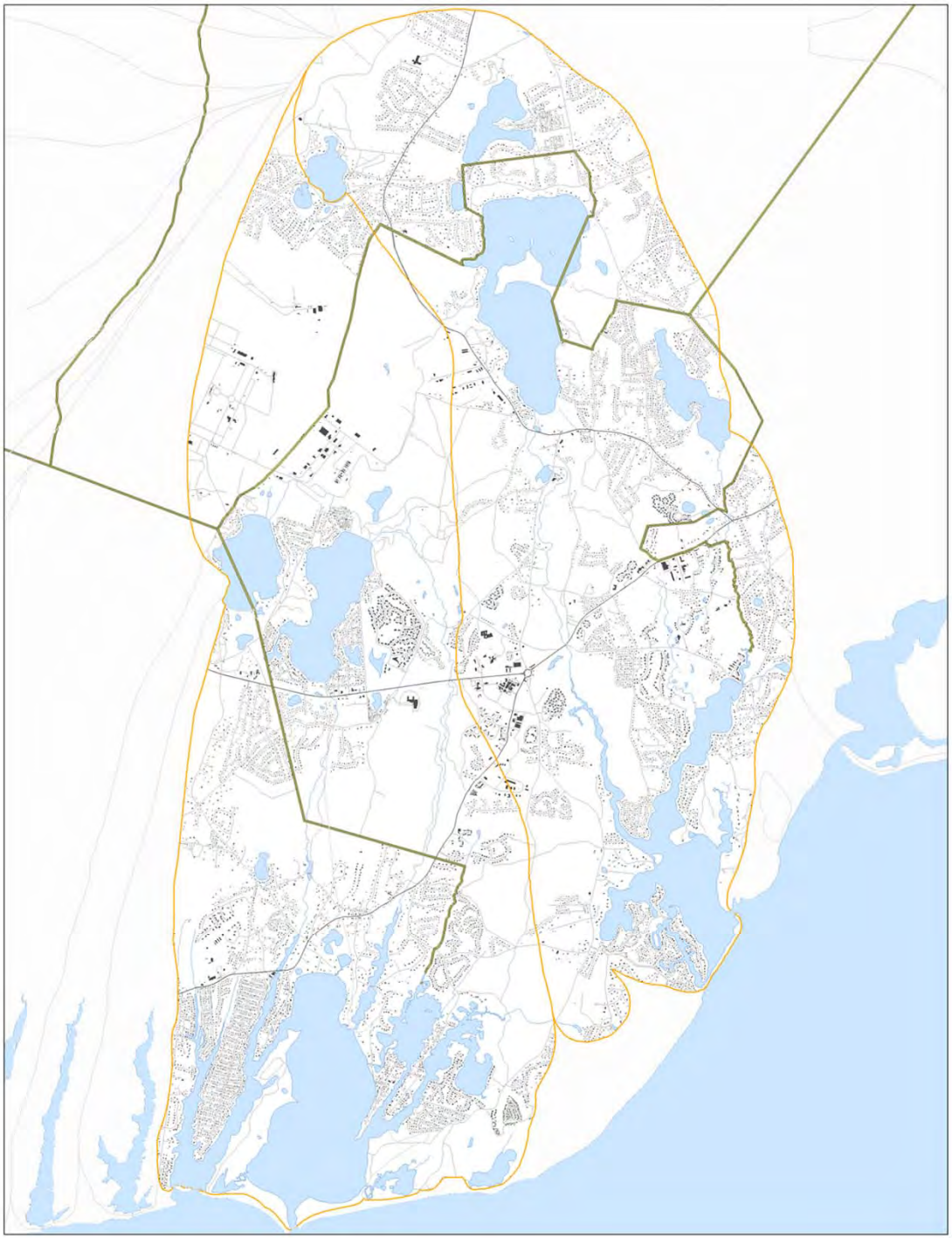
Sandwich: 1960-2013

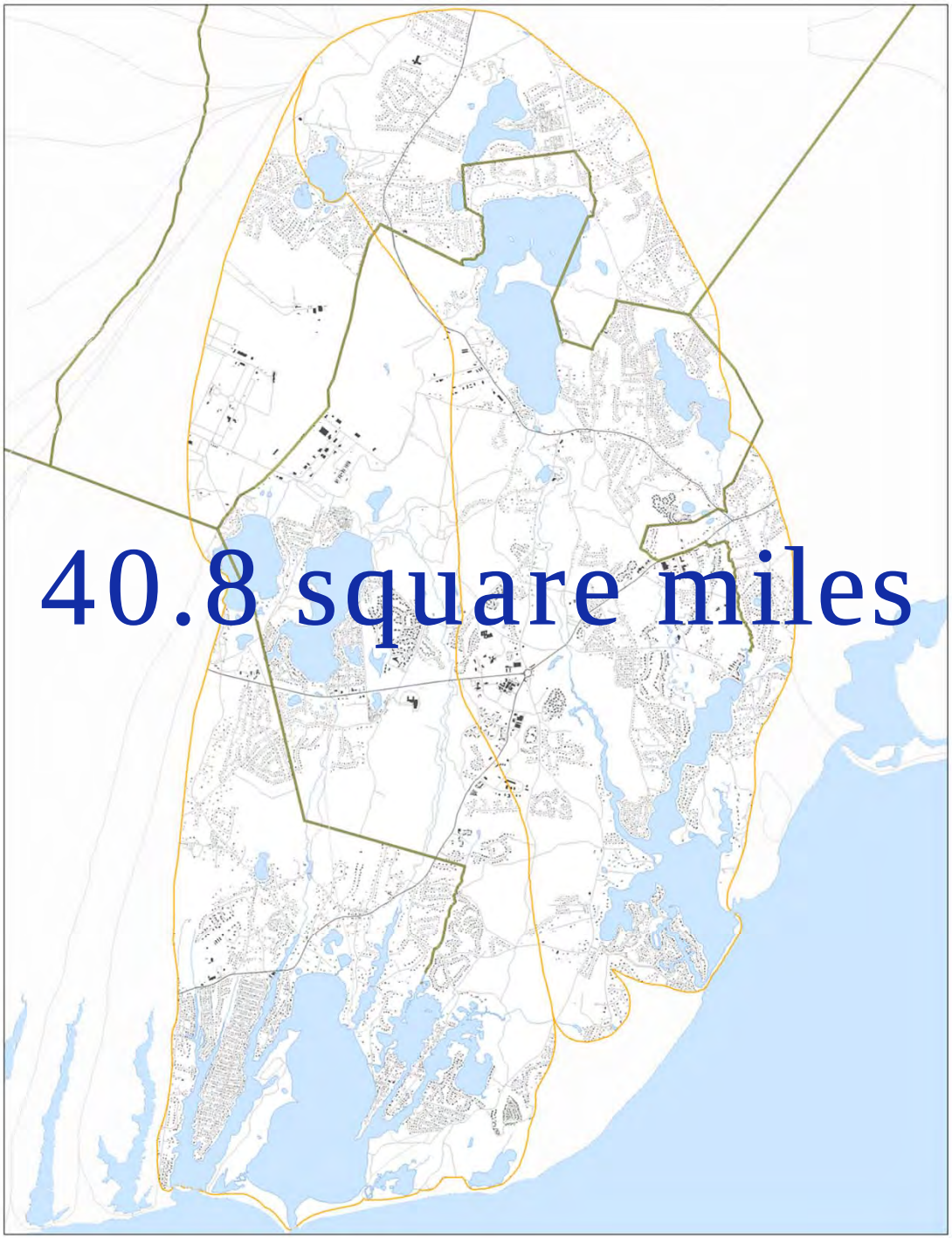


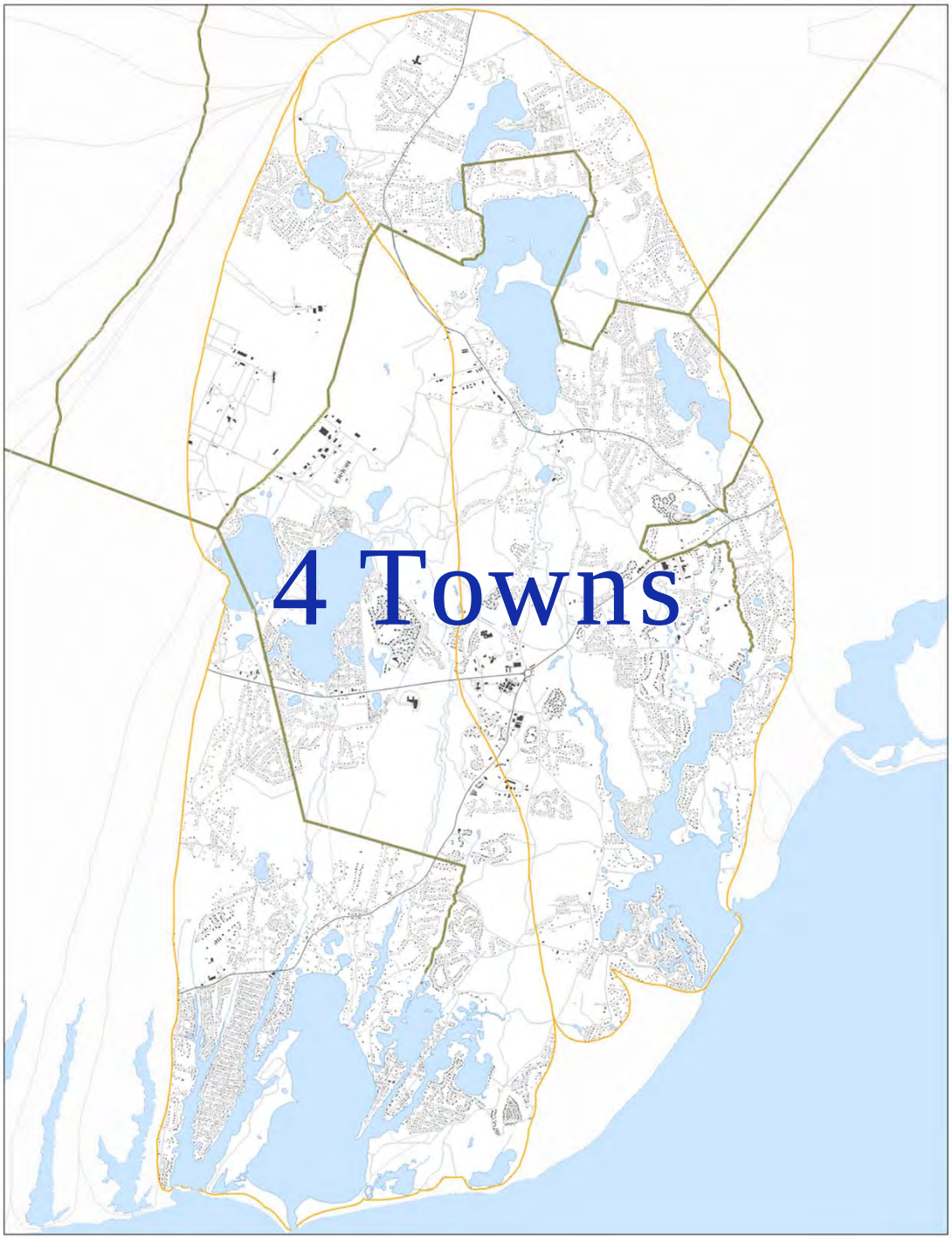
Did we miss anything?

Your Watersheds

Popponesset Bay
Waquoit Bay




40.8 square miles


4 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 Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

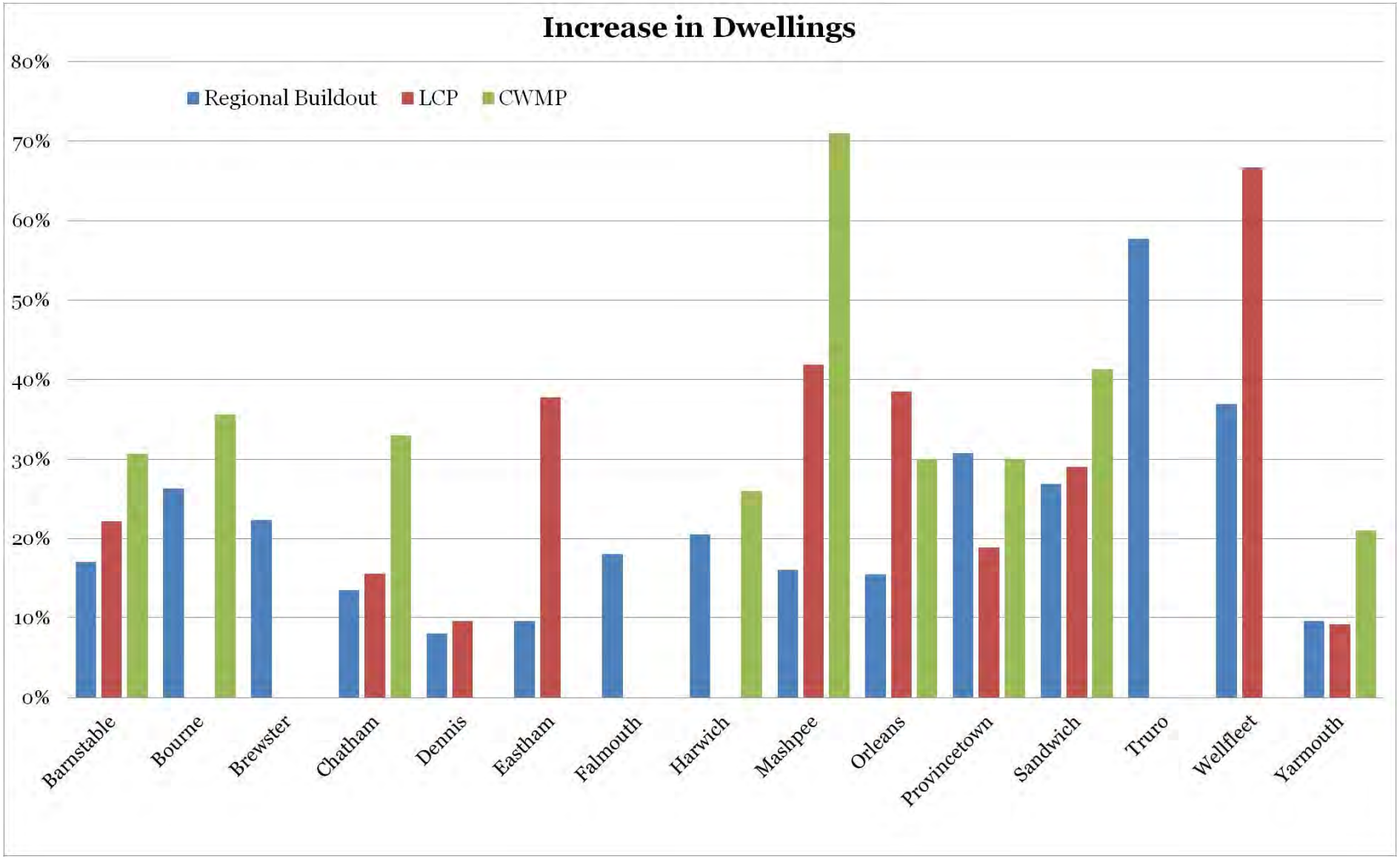
Sources: MassGIS, MassDOT

Density

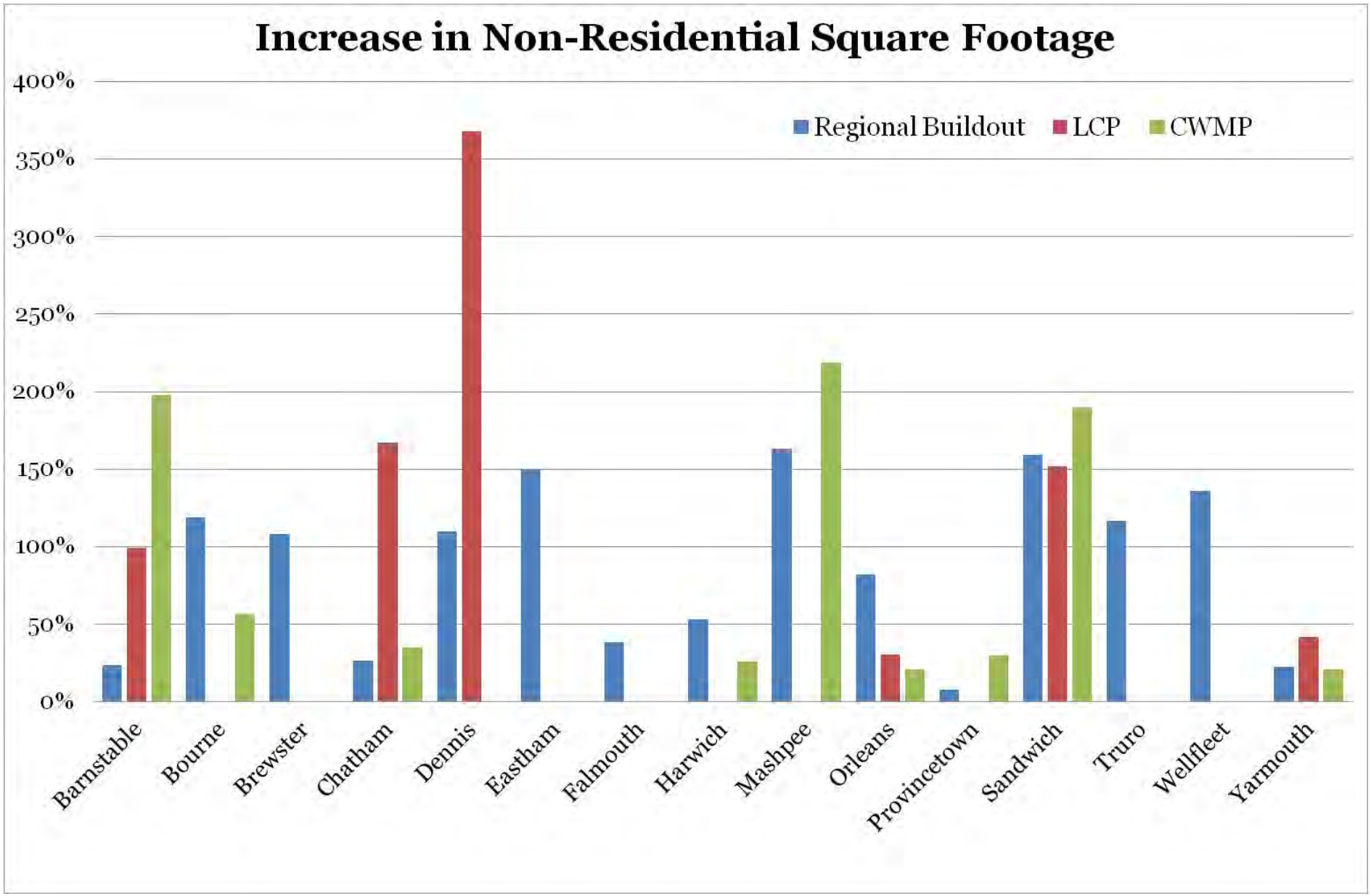
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

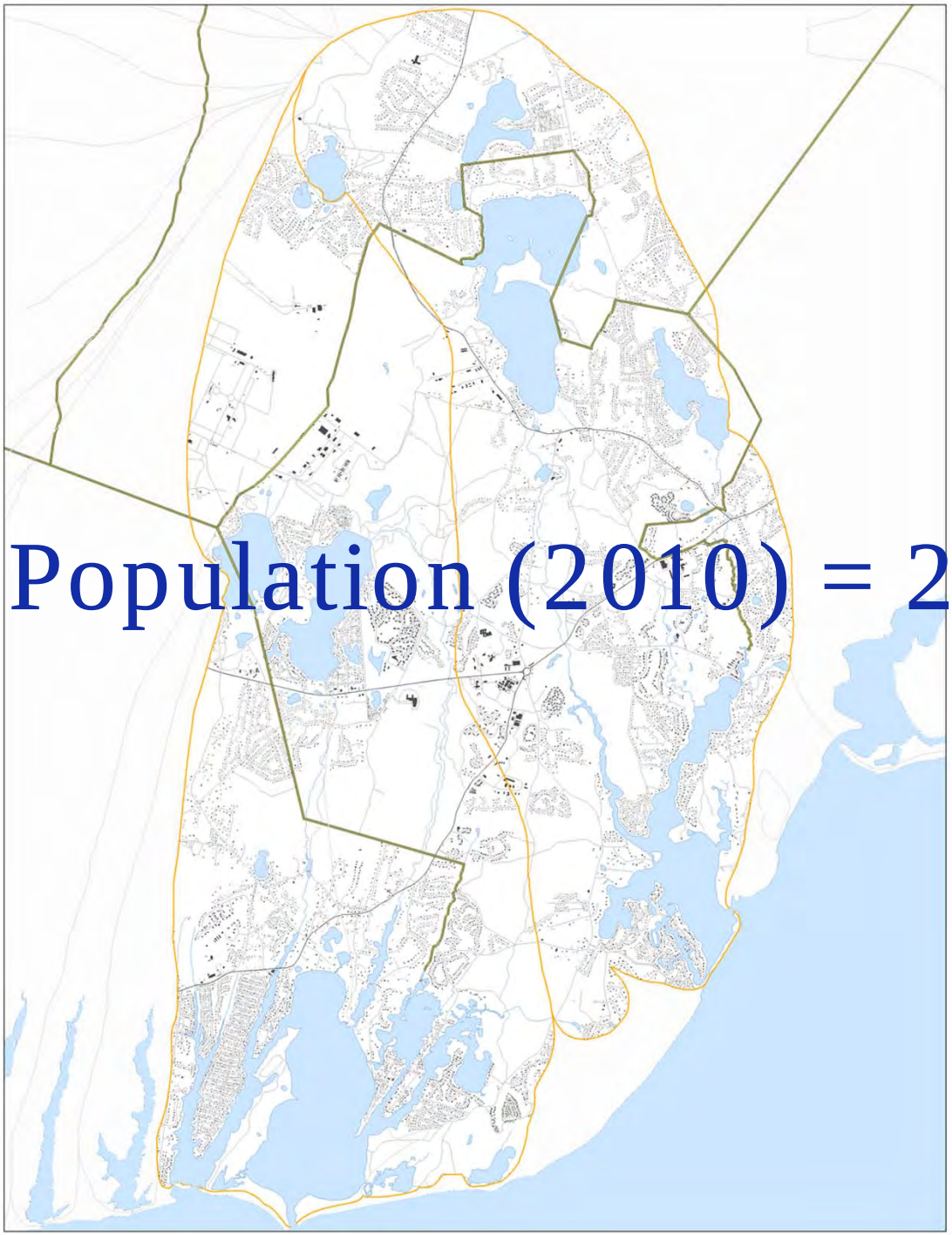

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout


Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

The People

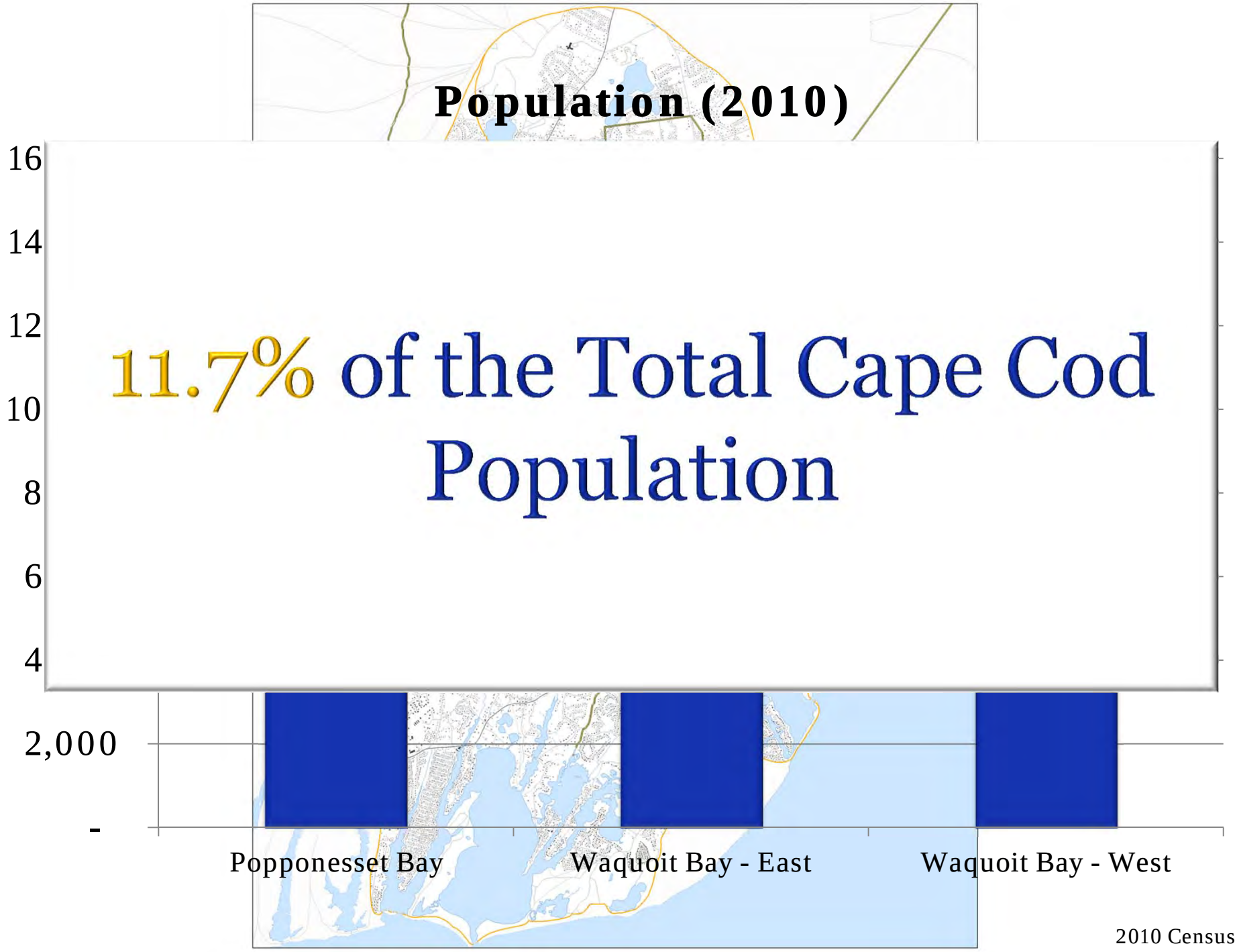
Popponesset Bay
Waquoit Bay



Total Population (2010) = 25,273

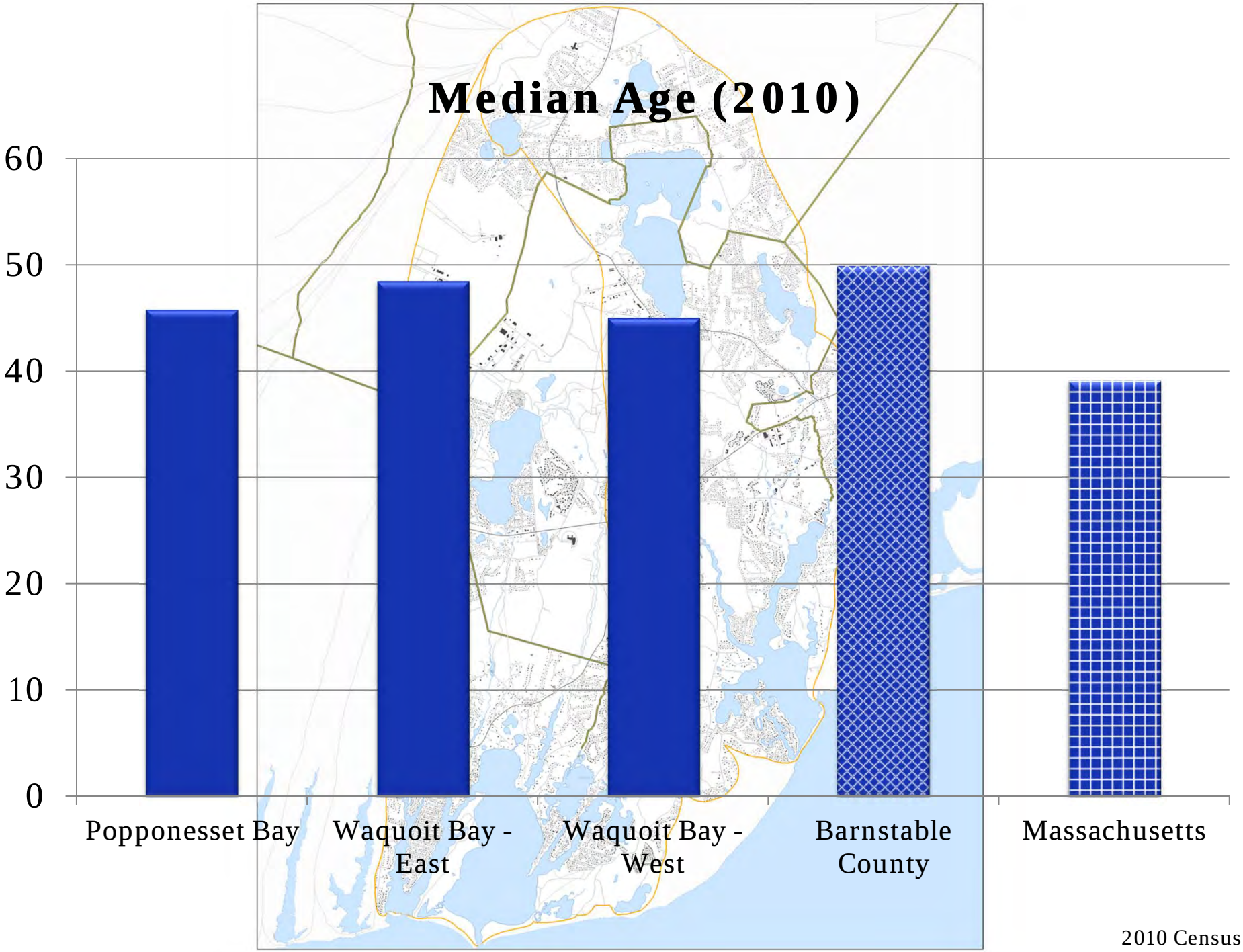
2010 Census

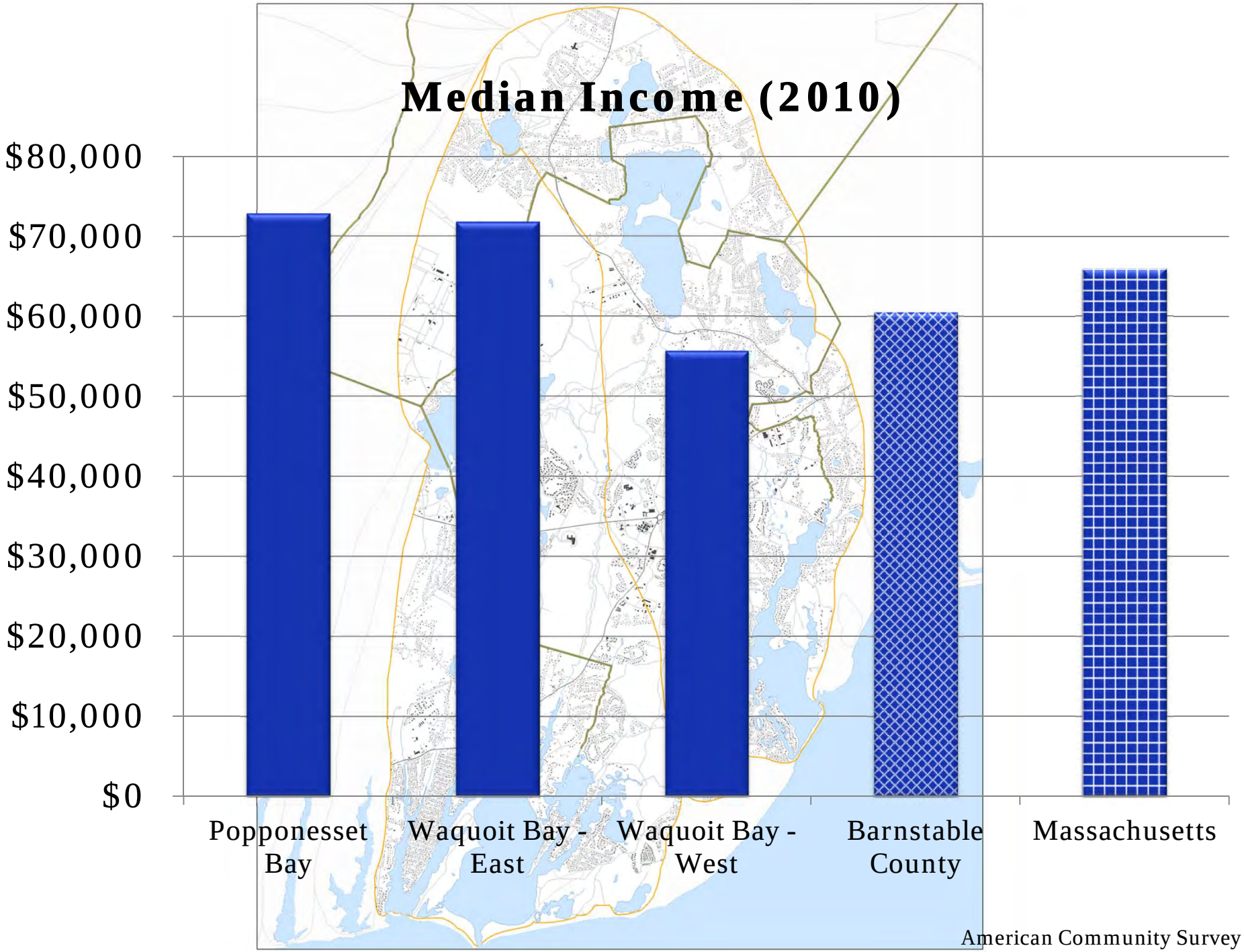
Population (2010)

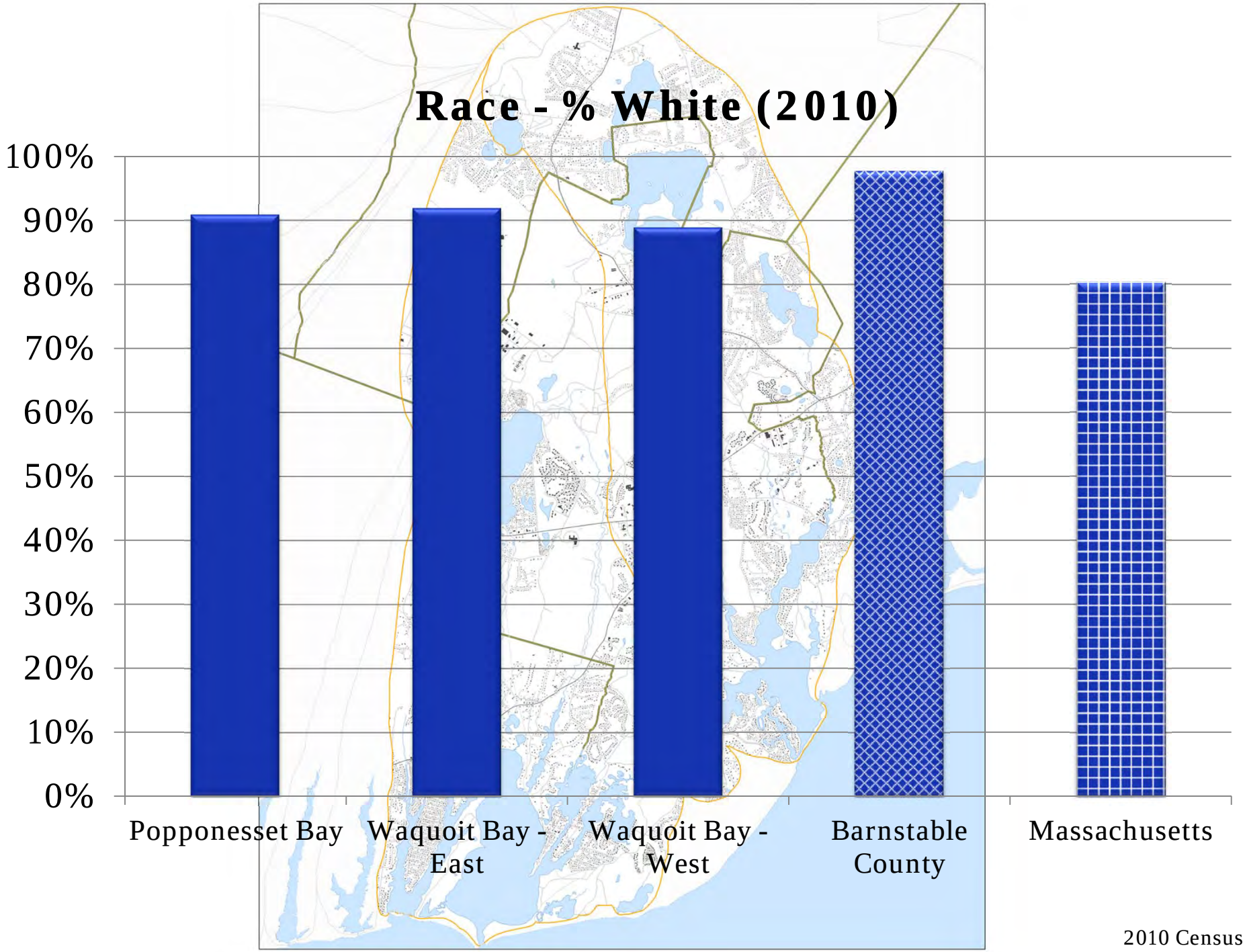


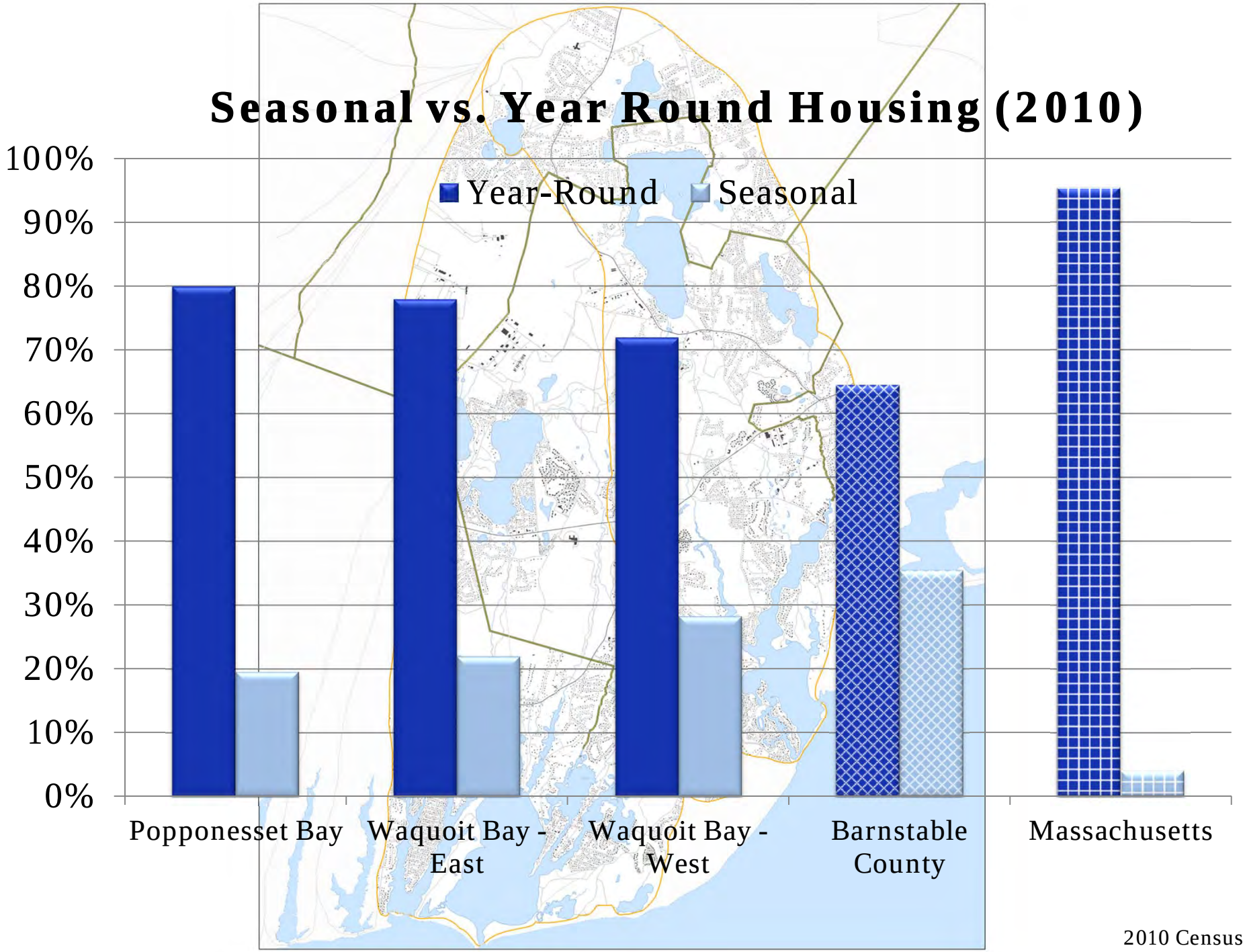
11.7% of the Total Cape Cod Population

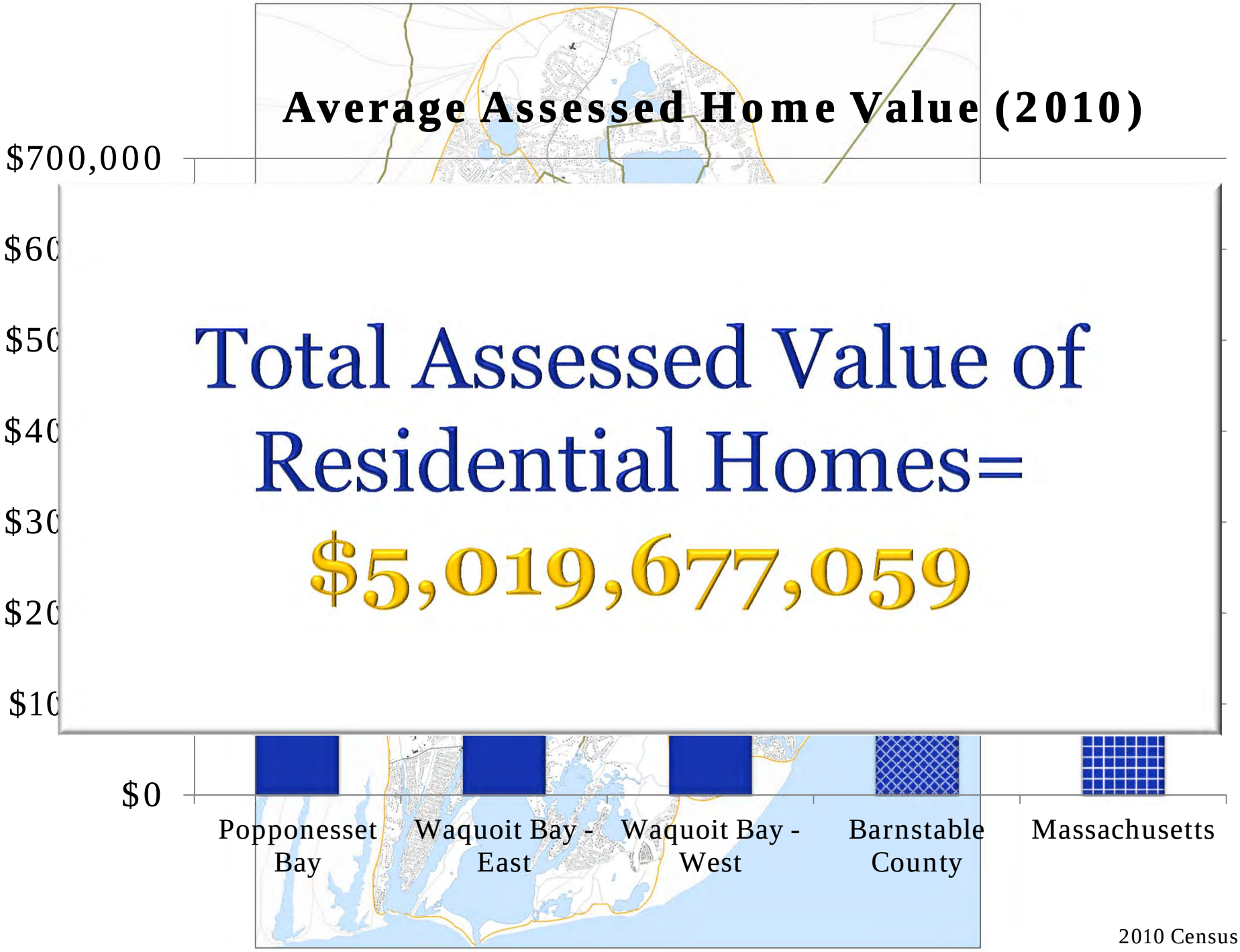
2010 Census


Median Age (2010)
60
50
40
30
20
10
0
Popponesset Bay
Waquoit Bay - East
Waquoit Bay - West
Barnstable County
Massachusetts
2010 Census


Median Income (2010)
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Popponesset Bay
Waquoit Bay - East
Waquoit Bay - West
Barnstable County
Massachusetts
American Community Survey

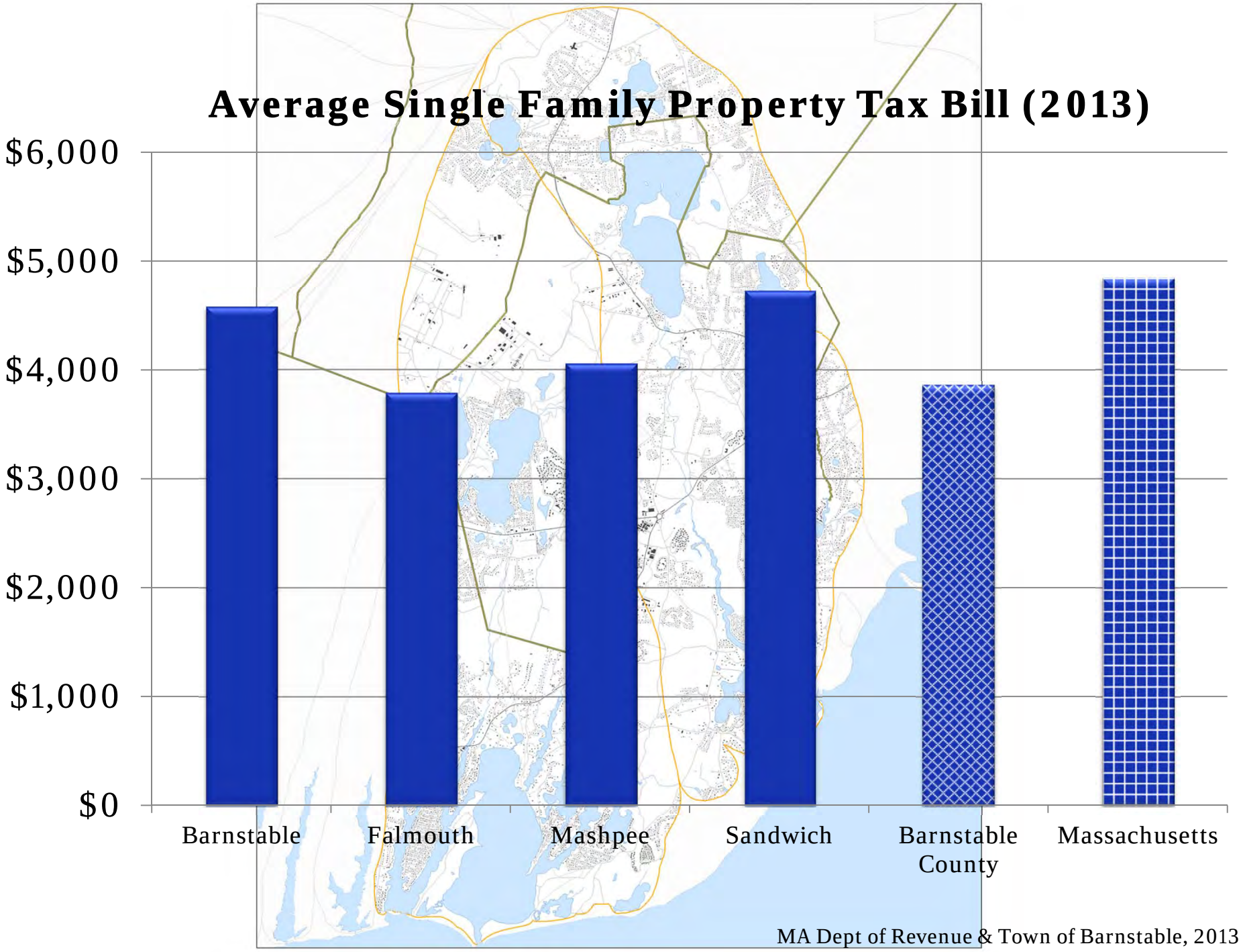

Race - % White (2010)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Popponesset Bay
Waquoit Bay - East
Waquoit Bay - West
Barnstable County
Massachusetts
2010 Census

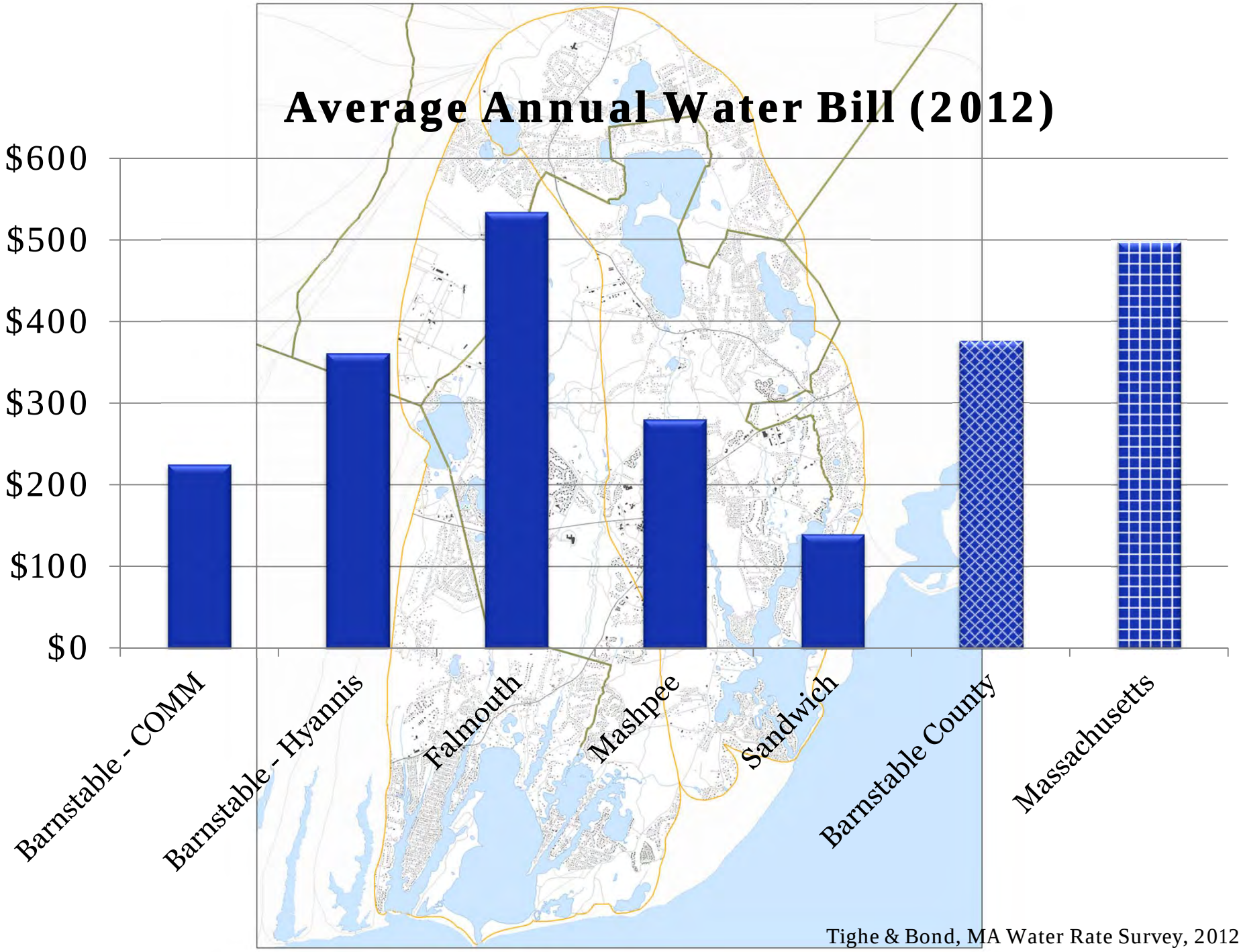

Seasonal vs. Year Round Housing (2010)
Year-Round
Seasonal
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Popponesset Bay
Waquoit Bay - East
Waquoit Bay - West
Barnstable County
Massachusetts
2010 Census


Average Assessed Home Value (2010)
$700,000
$60
$50
$40
$30
$20
$10
$0
Total Assessed Value of Residential Homes=
$5,019,677,059
Popponesset Bay
Waquoit Bay - East
Waquoit Bay - West
Barnstable County
Massachusetts
2010 Census

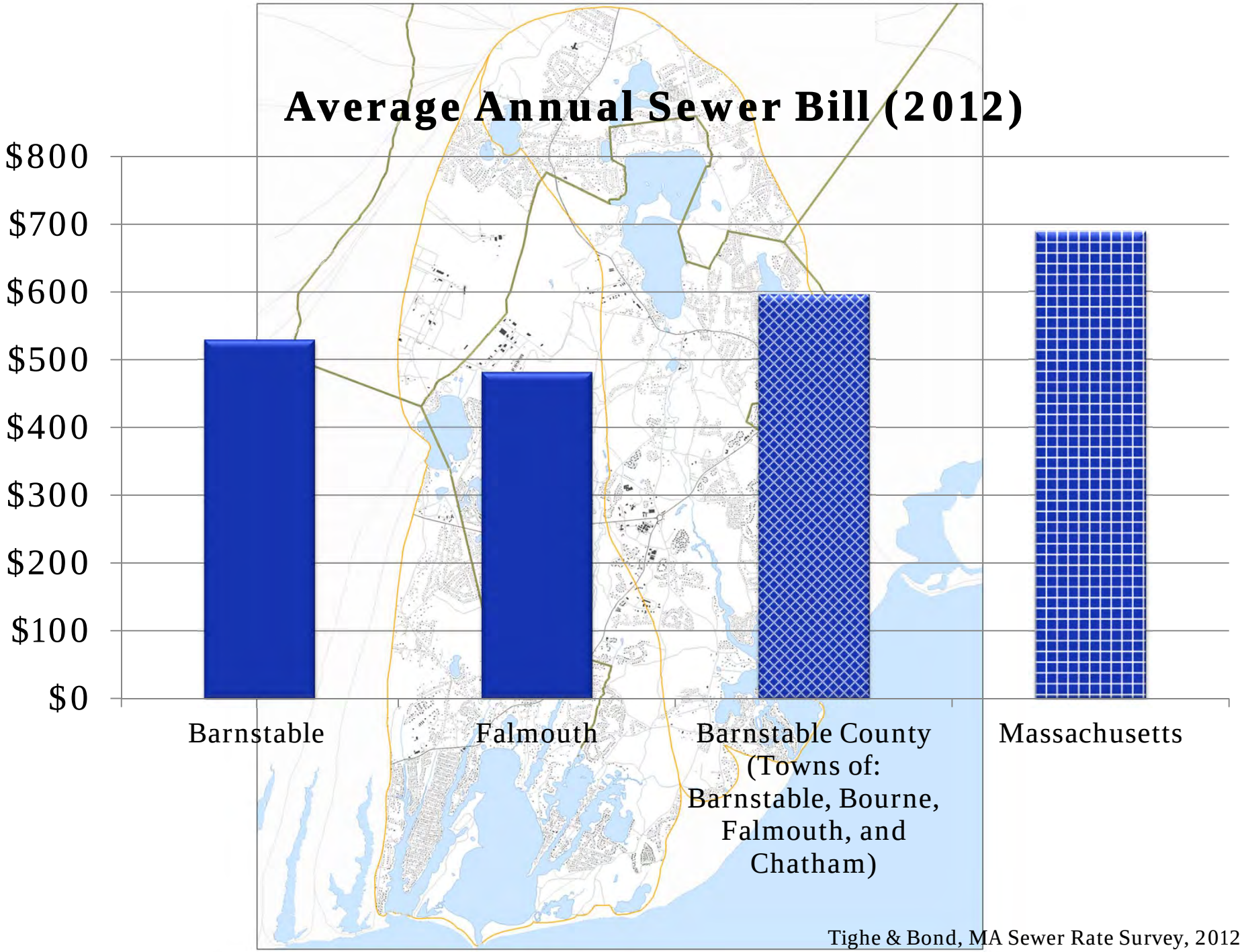
Your Government & Taxes

Popponesset Bay
Waquoit Bay


Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Barnstable
Falmouth
Mashpee
Sandwich
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013



Tighe & Bond, MA Water Rate Survey, 2012

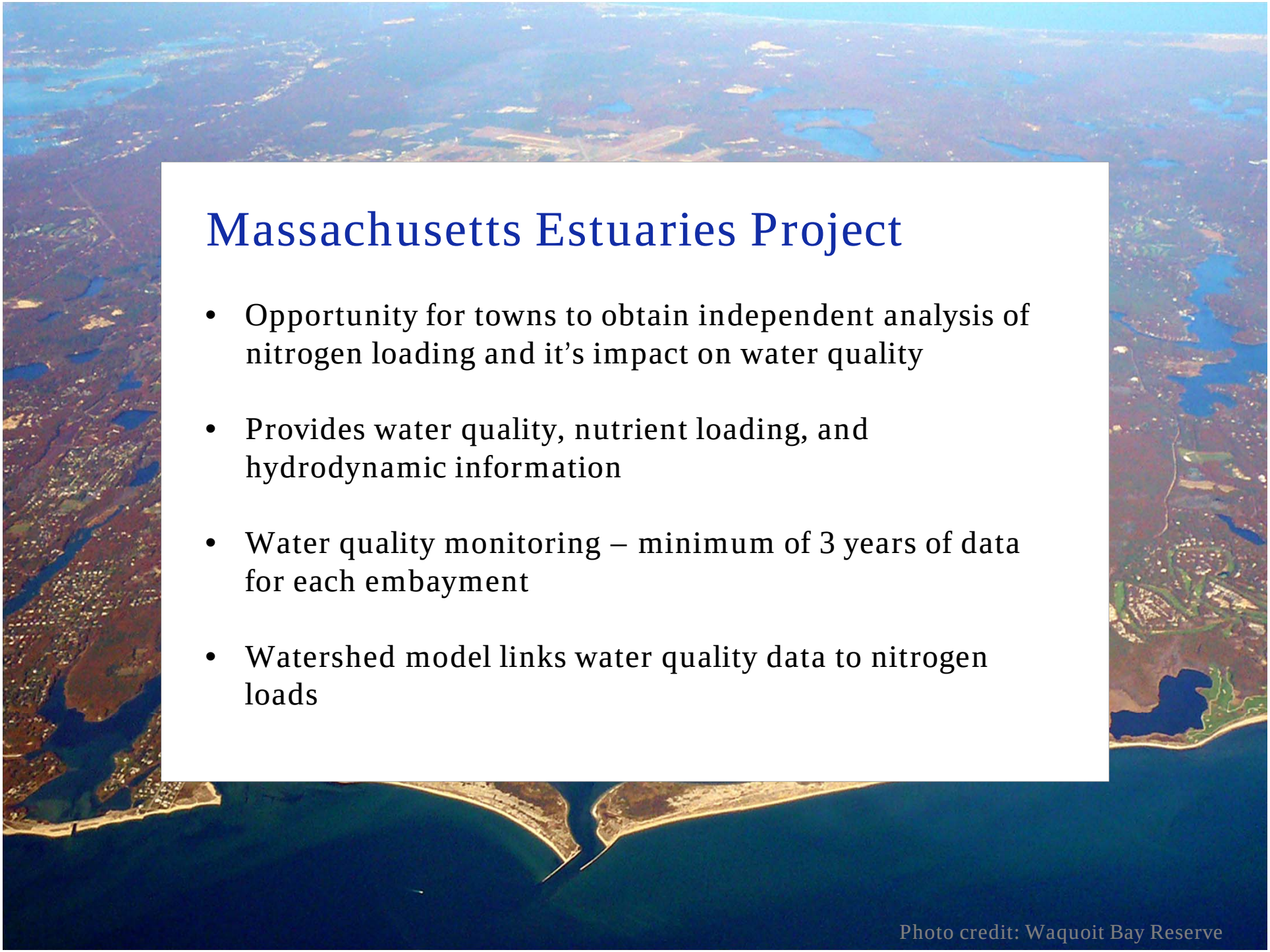


Tighe & Bond, MA Sewer Rate Survey, 2012

The Problem

Popponesset Bay
Waquoit Bay

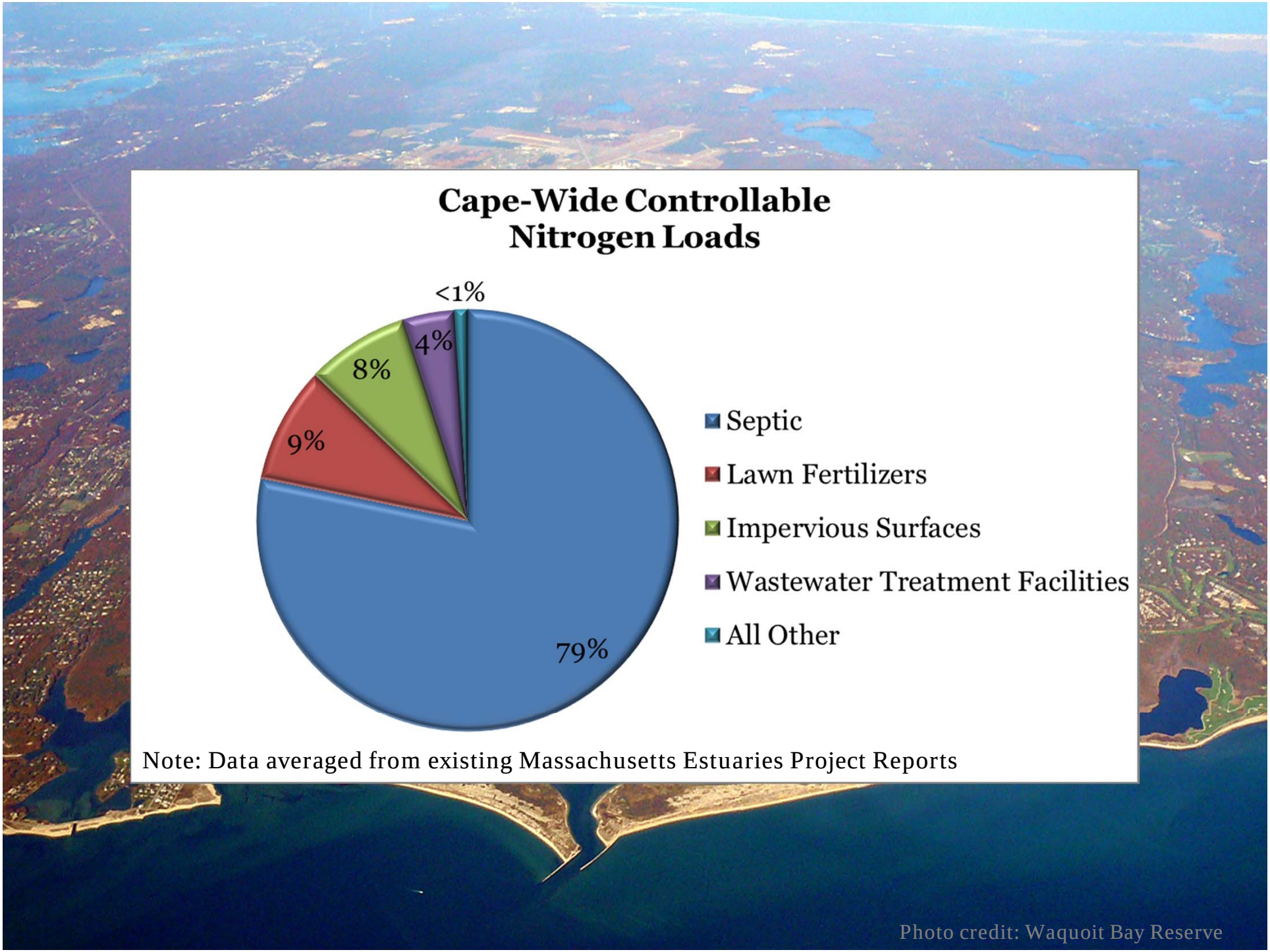

Photo credit: Waquoit Bay Reserve



Massachusetts Estuaries Project

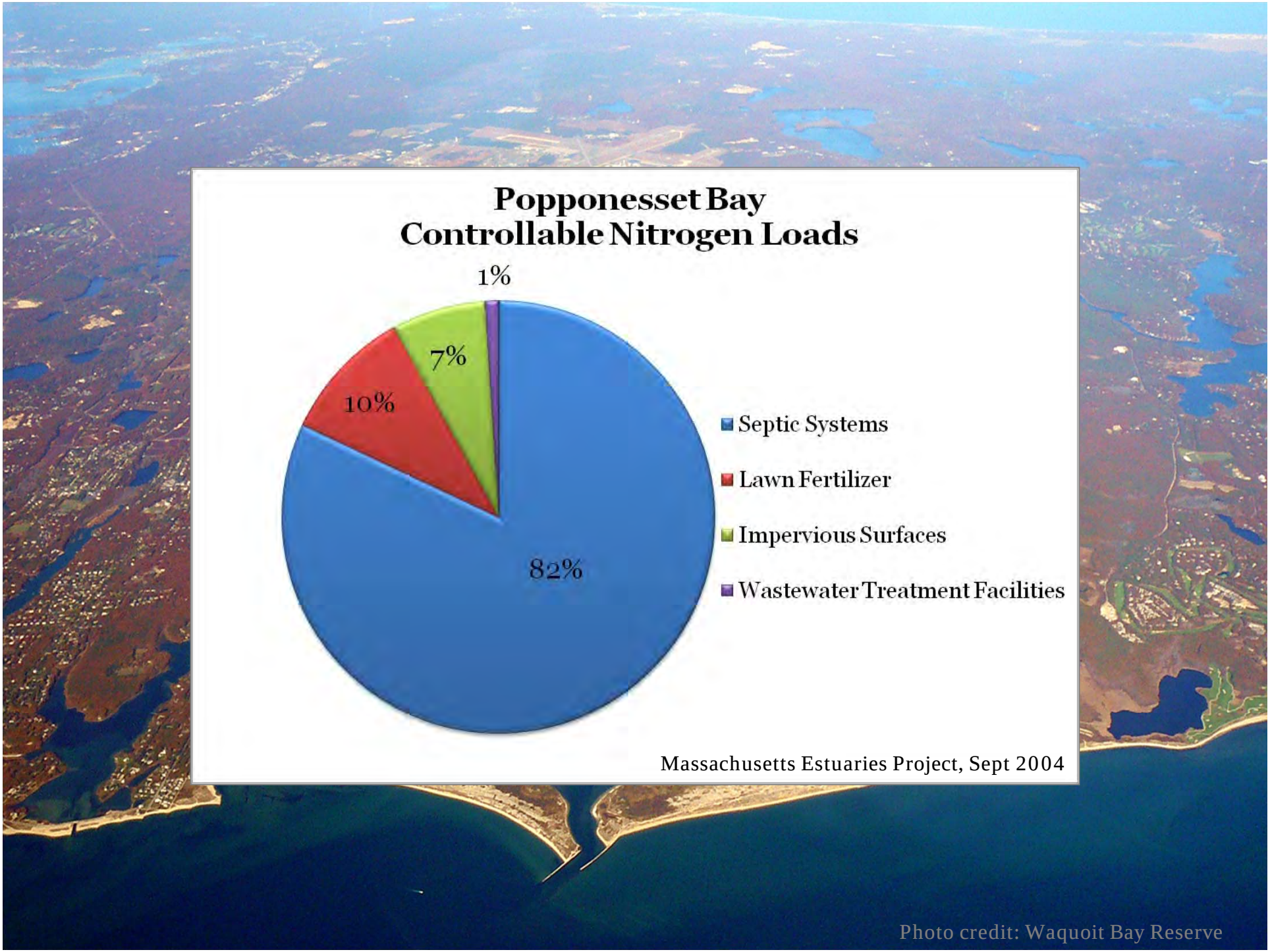
- Opportunity for towns to obtain independent analysis of nitrogen loading and it's impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

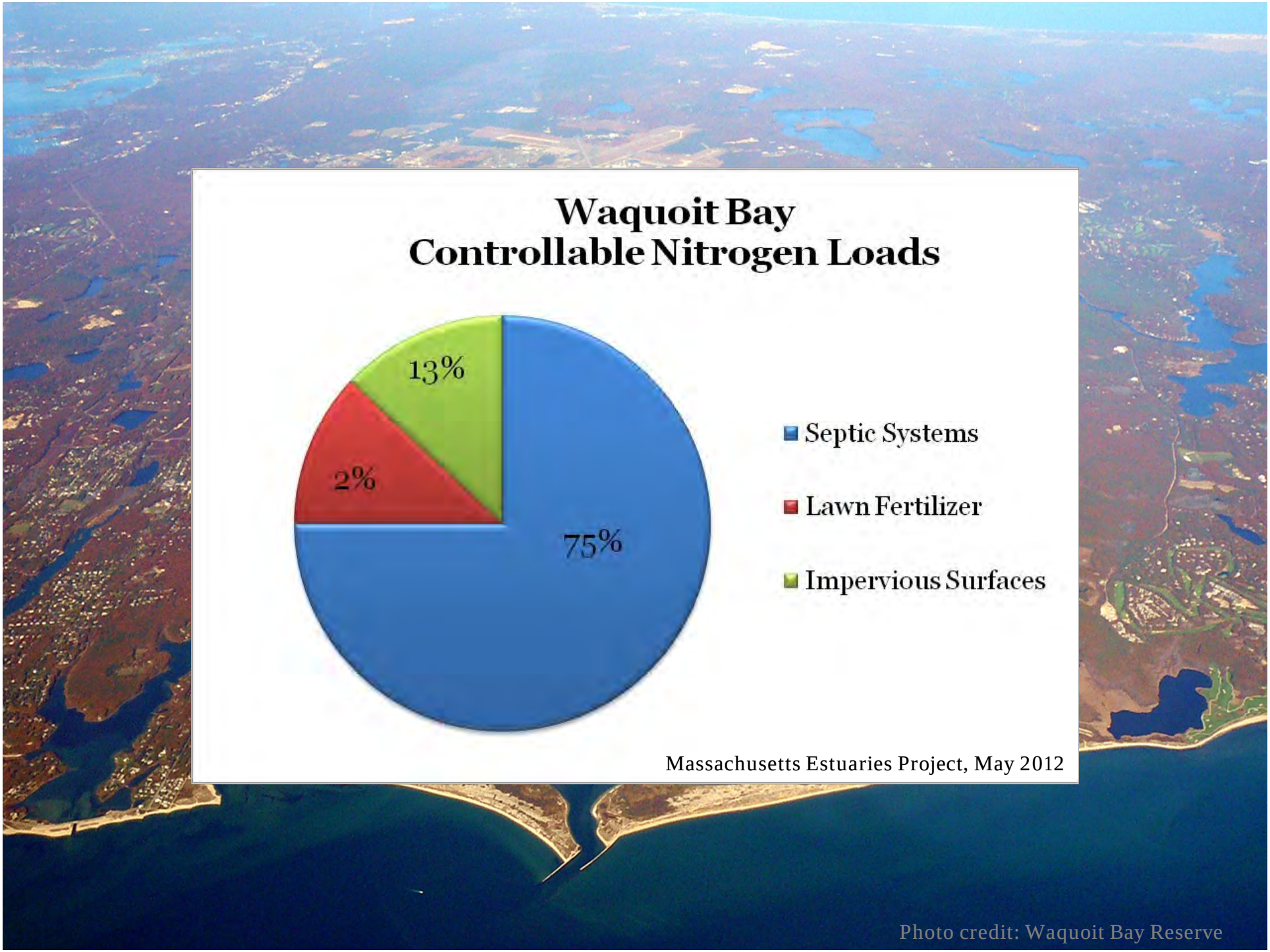
Photo credit: Waquoit Bay Reserve



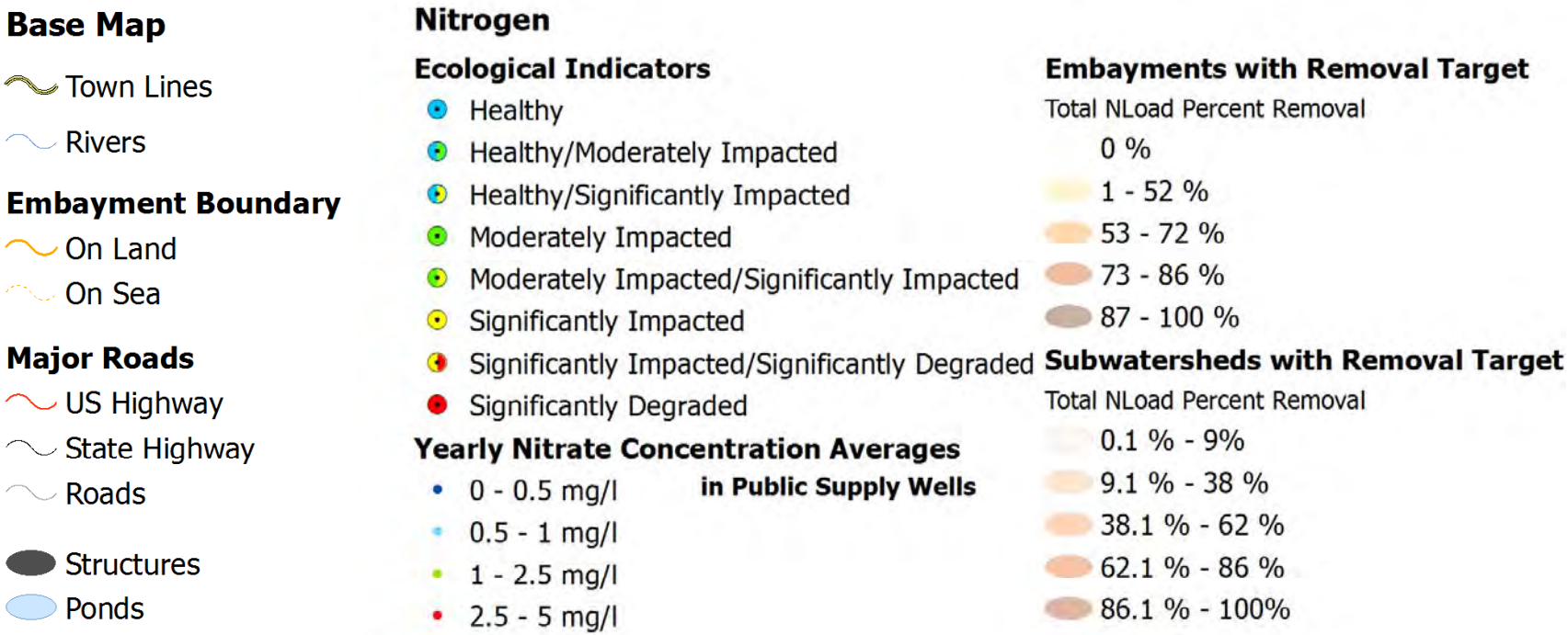
Note: Data averaged from existing Massachusetts Estuaries Project Reports

Photo credit: Waquoit Bay Reserve

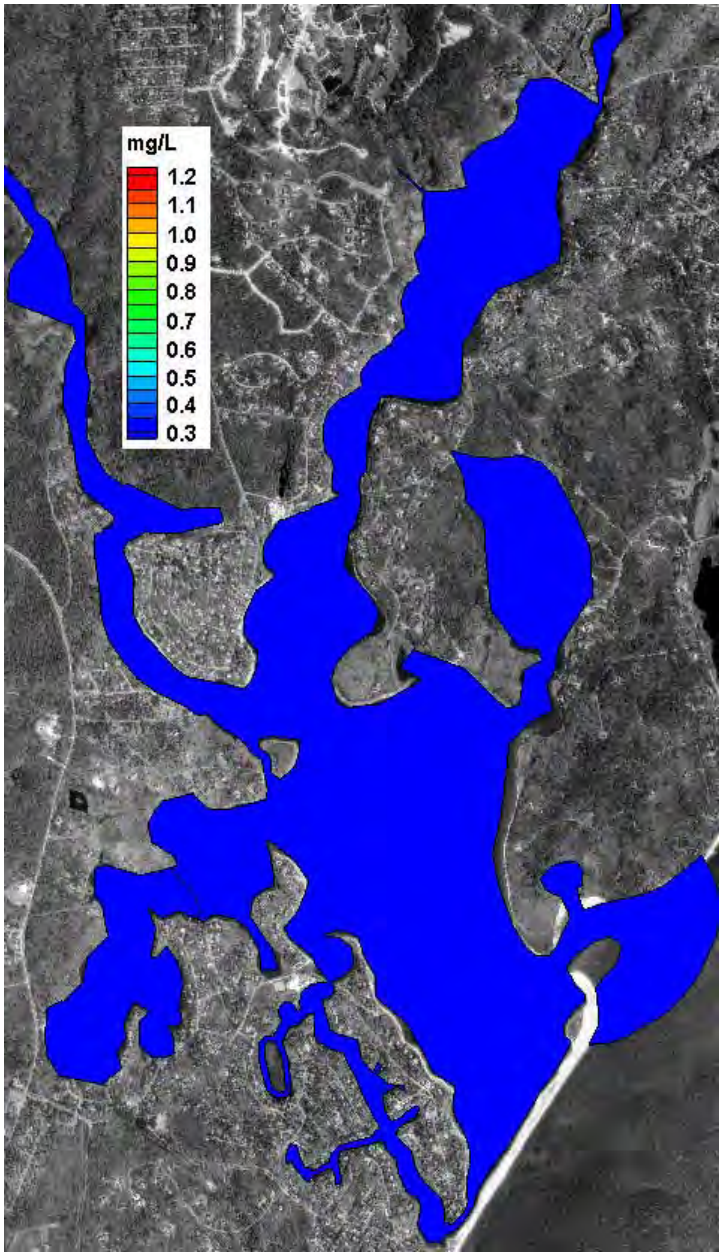

Popponesset Bay
Controllable Nitrogen Loads
1%
7%
10%
82%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Wastewater Treatment Facilities
Massachusetts Estuaries Project, Sept 2004
Photo credit: Waquoit Bay Reserve


Waquoit Bay
Controllable Nitrogen Loads
13%
2%
75%
Septic Systems
Lawn Fertilizer
Impervious Surfaces
Massachusetts Estuaries Project, May 2012
Photo credit: Waquoit Bay Reserve

Nitrogen Problem



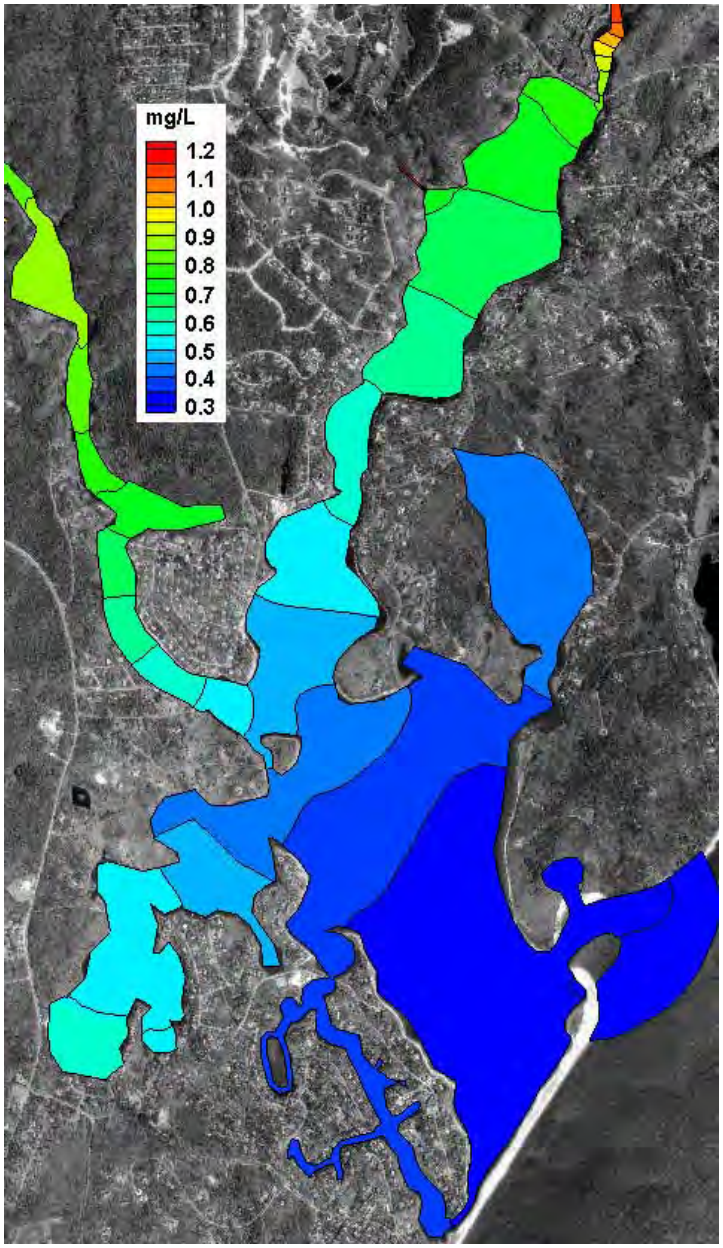
Sources: MassGIS, MEP, CCC



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

(Source: MEP 2004)

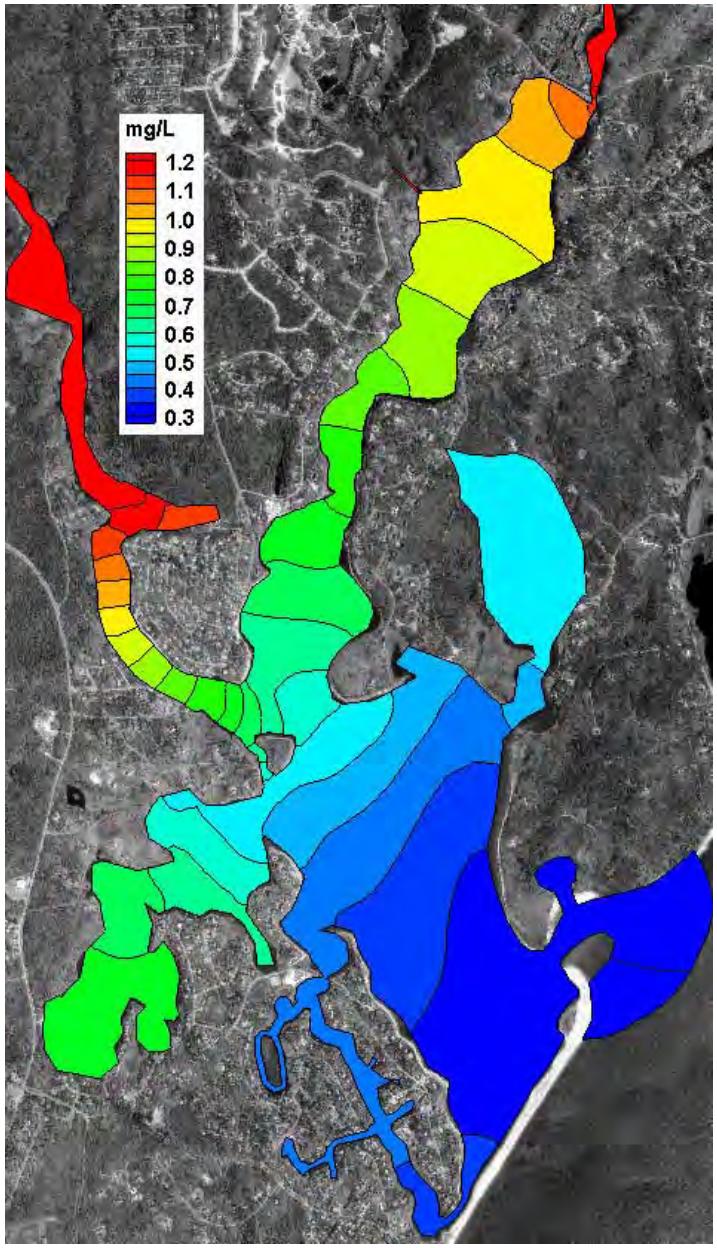
Pre-Colonial Conditions: Popponesset Bay



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

(Source: MEP 2004)

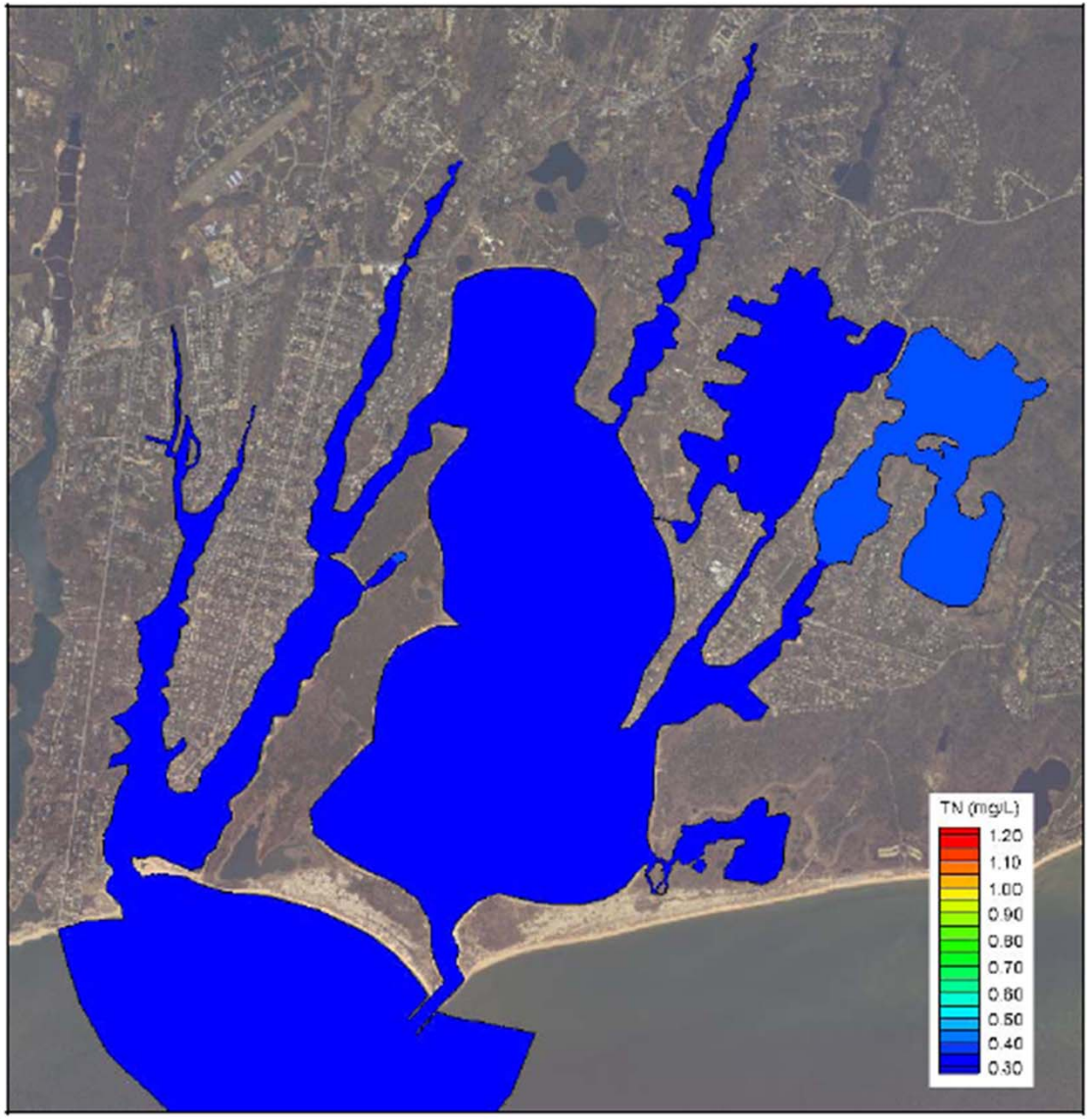
Present Conditions: Popponesset Bay



Contour Plot of **modeled total nitrogen concentrations (mg/L)** in Popponesset Bay, for projected build out loading conditions.

(Source: MEP 2004)

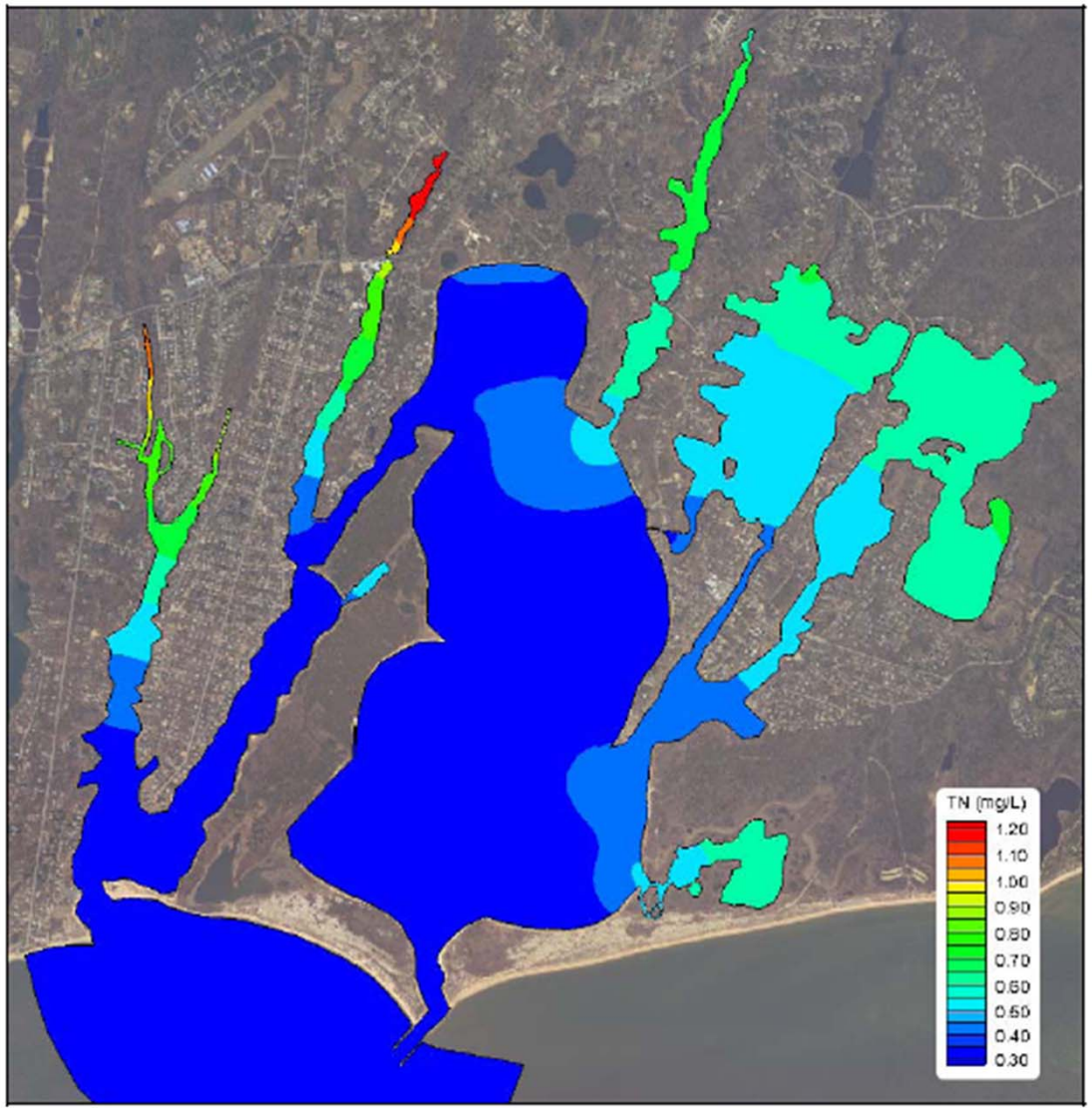
Buildout Conditions: Popponesset Bay



Contour plots of **modeled total nitrogen concentrations (mg/L)** in Waquoit Bay system, for no anthropogenic loading conditions, and bathymetry.

(Source: MEP 2012)

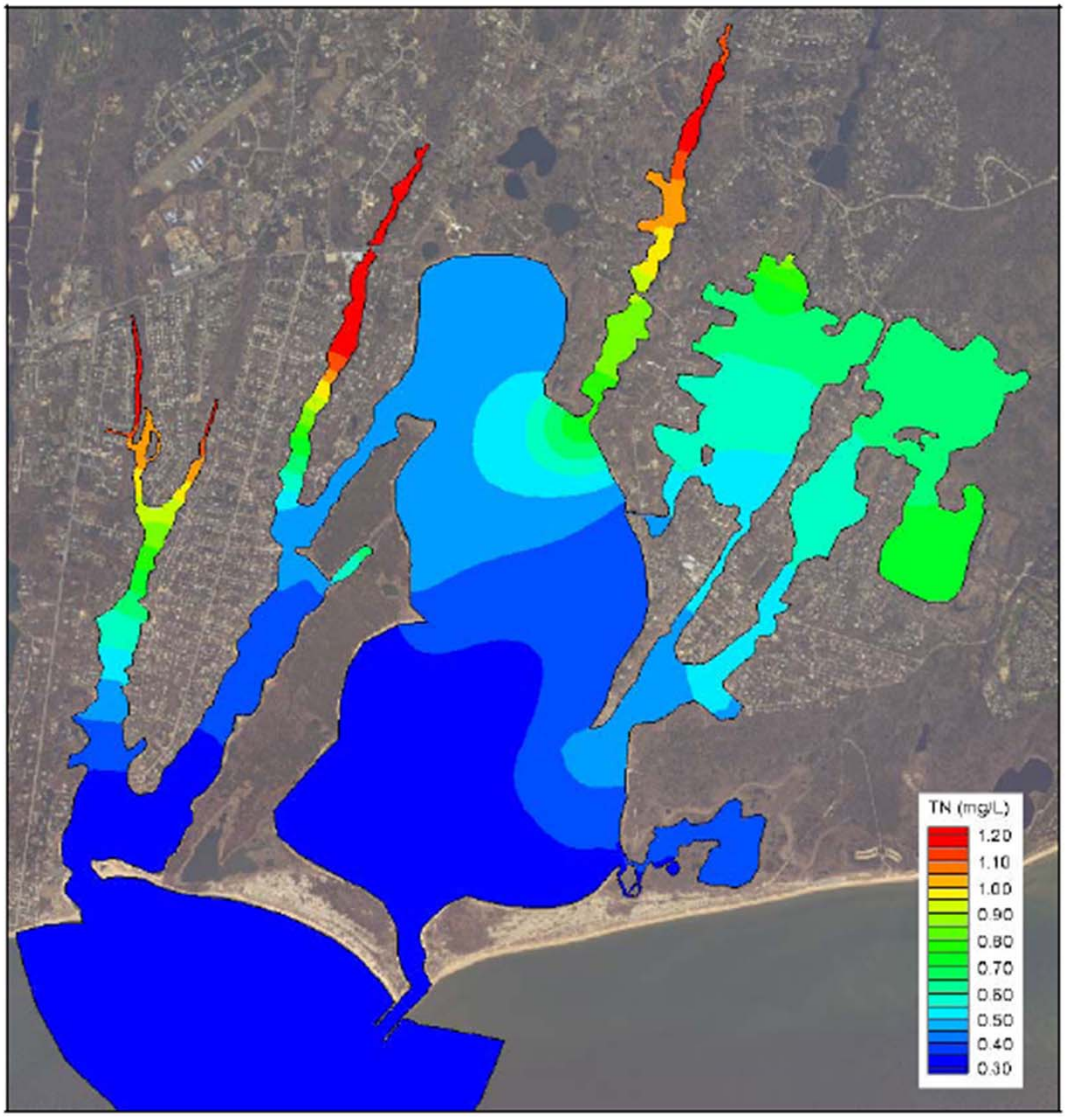
Precolonial Conditions: Waquoit Bay



Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for the Waquoit Bay system.

(Source: MEP 2012)

Present Conditions: Waquoit Bay

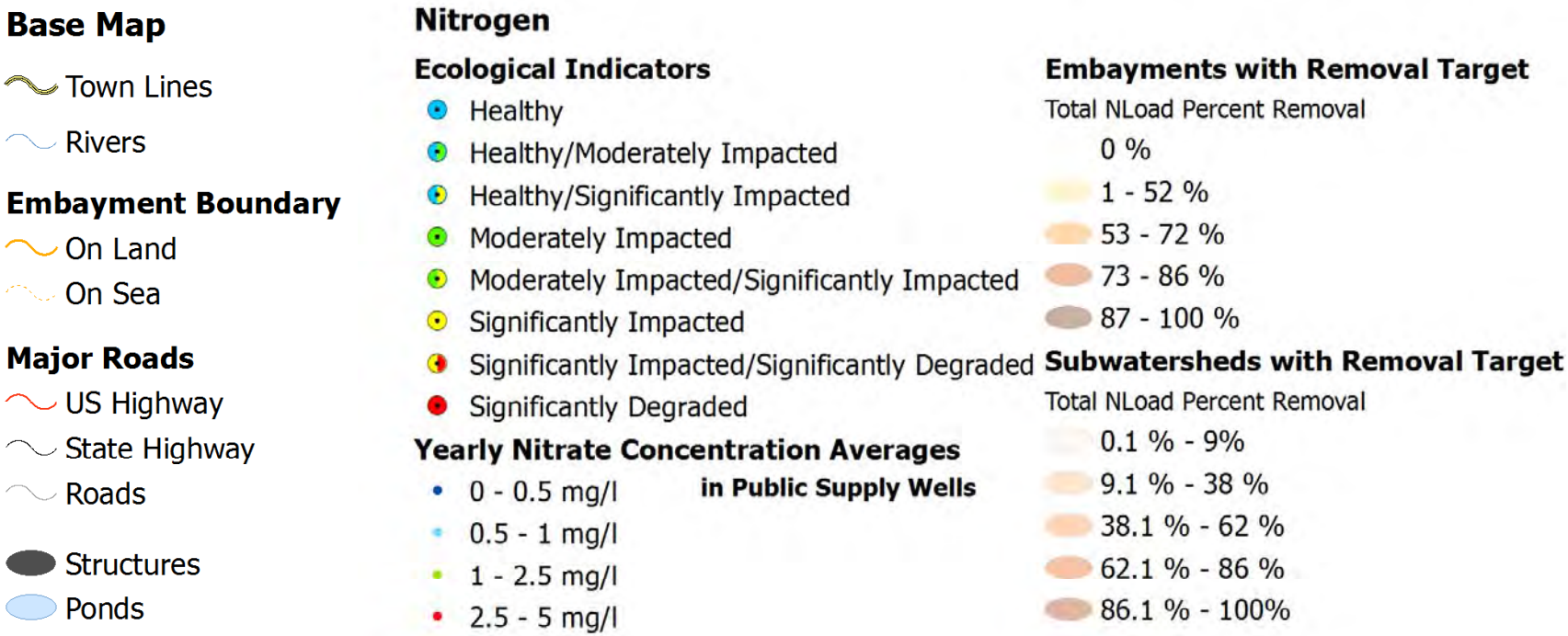


Contour plots of **modeled total nitrogen concentrations (mg/L)** in Waquoit Bay system, for projected build-out loading conditions, and bathymetry.

(Source: MEP 2012)

Buildout Conditions: Waquoit Bay

Nitrogen Problem



Sources: MassGIS, MEP, CCC

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

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Popponesset Bay
Waquoit 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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

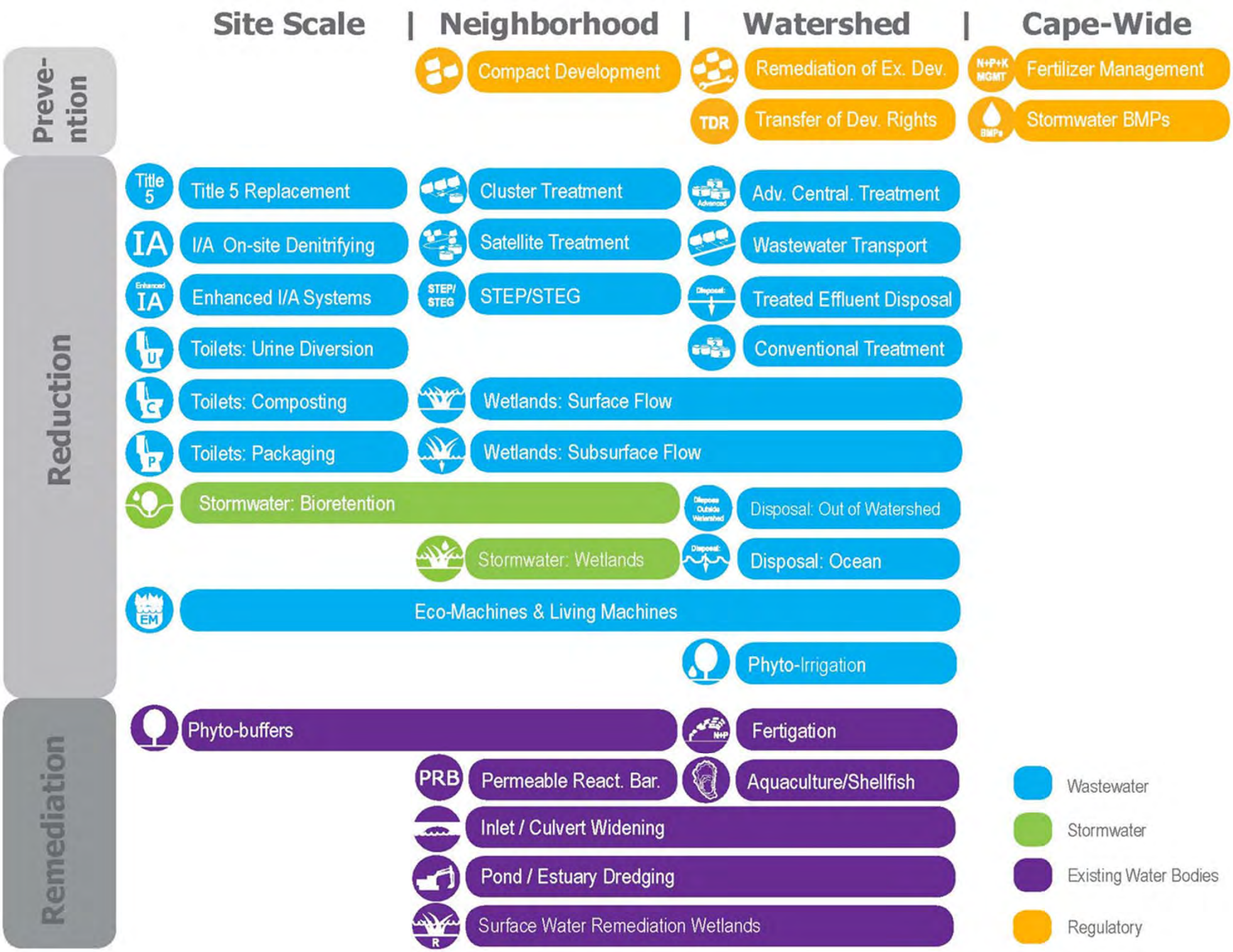
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Popponesset Bay
Waquoit Bay


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

All materials and resources for the Popponesset Bay and Waquoit Bay Group will be available on the Cape Cod Commission website:

http://watersheds.capecodcommission.org/index.php/watersheds/upper-cape/waquoit-popponesset

Popponesset Bay
Waquoit Bay

Cape Cod 208 Area Water Quality Planning
Popponesset Bay and Waquoit Bay Watershed Working Group

Meeting One
Wednesday, September 25, 2013
Mashpee Town Hall, 16 Great Neck Road North, Mashpee, MA

DRAFT SUMMARY NOTES

ACTION ITEMS

Working Group Members

- Working group members should follow up with Ms. Patty Daley or other Cape Cod Commission staff if they have any further additions or comments about the chronologies. Participants expressed particular interest in adding some milestones related to the phosphorus issue.
- The Cape Cod Commission welcomes any data local groups have on phosphorus in local ponds and freshwater bodies. If local groups want to collect data on new ponds, this would be helpful to the Commission and region.
- Working group members can contact Ms. Daley or other Cape Cod Commission staff if they would like to arrange a presentation on affordability and financial matters l for their groups or people in their area.

Cape Cod Commission

- Update chronologies for Barnstable, Falmouth, Mashpee, and Sandwich to reflect suggested changes.
- Make GIS data available as soon as the first round of meetings is completed.
- Make sure that all presentations, diagrams, and information on working groups and advisory committees is available online.
- Check with towns to see what their local build-out projections are, as well as what the related assumptions are, and incorporate these into the CCC's build-out numbers where possible and reasonable.
- Fix the typo on the pie chart of nitrogen sources for Waquoit Bay. One section says 2% but should say 12%.
- Contact the Waquoit Bay Reserve to get eelgrass data from a Reserve survey last summer. One participant also said that Brian Howes has good eelgrass data that can be shared with the CCC.
- Tom Fudala from Mashpee saw a number of potential issues with the Existing Infrastructure GIS data; follow up with him to get more information.
- During the meeting, there was quite a bit of confusion about total maximum daily loads (TMDLs) and reduction targets. The Commission may want to intentionally clarify this for working group members and the general public.
- Move STEP and STEG to the collection part of the technology matrix (from the treatment section). A couple other participants thought there were some similar issues. The CCC may want to run the matrix by participants in advance of the next meeting to collect this additional feedback.

WELCOME AND INTRODUCTIONS

Ms. Patty Daley from the Cape Cod Commission (CCC) opened the meeting with a welcome. The meeting facilitator, Mr. Doug Thompson from the Consensus Building Institute, introduced himself and explained that his goal as the facilitator of the meeting was to make the discussion process easier. All of the representatives around the table and the public attendees introduced themselves and explained their interest in the issue (see Appendix A).

REVIEW OF GOALS AND PROCESS

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

Ms. Daley explained the 208 planning process. The Commission was directed by the state to update the section 208 plan, which has not been updated since it was created in 1978. This update will focus on the "21st century problems," with a focus on nitrogen loads in saline waters, phosphorus loads in fresh waters, and related water quality issues. The Commonwealth has provided $3 million to fund this process, which will involve a 3-year planning effort. The intent is to produce a plan in the first year in order to help secure federal and state funds to support the effort going forward.

Ms. Daley noted that there are 105 watersheds on Cape Cod and 57 embayments. She said that the Massachusetts Estuaries Project (MEP) has found that almost all of the Cape embayments for which it has studies require nitrogen removal. She explained that in light of the fact that these watersheds and embayments cross town lines, this a regional issue. Ms. Daley explained that the goal of the 208 Update Process is to generate a series of approaches in each watershed that will meet water quality standards. The process is watershed-based, includes a focus on both stakeholder engagement and technical work, seeks to maximize the benefits of local planning, and favors allowing local stakeholders to decide which of a range of options to pursue instead of mandating a single "optimal" solution. Ms. Daley noted that the 208 Update Planning Process is occurring simultaneously in 11 subgroups across the Cape, one of which is the Popponesset Bay and Waquoit Bay Watershed Working Group.

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

- An Advisory Board of six people who provide ongoing feedback to the CCC;
- A Regulatory, Legal and Institutional Work Group, which provides legal and regulatory input;
- A Technical Advisory Committee of the Cape Cod Water Protection Collaborative, which will provide input on the potential technologies;

- Technology Panel of experts throughout the country who will be giving high-level review of possible technologies.

Comments and Questions from Attendees

- A member of the public wanted to know who was on these boards and groups. Ms. Daley said these boards, their members, and their function are listed on the CCC website.

LOCAL PROGRESS TO DATE

Ms. Daley provided an overview of efforts made across the Cape, and in the municipalities of Barnstable, Falmouth, Mashpee, and Sandwich to address water pollutants.

The study group members and observers were then encouraged to review printed chronologies of what the towns of Barnstable, Falmouth, Mashpee, and Sandwich have done to protect the watersheds in the area over the last couple decades. CCC staff asked all attendees to make additions or corrections to the chronologies through use of sticky notes. Ms. Daley asked the working group to reflect on what stood out to them as they reviewed the chronology. She also asked the group to identify some "lessons learned" from the past that should be applied going forward. Before the participants began reviewing the chronologies, Ms. Daley asked for comments and questions.

Comments and Questions from Attendees

- One participant asked whether the participatory process would be done in December, or whether there will be more involvement after that.
    - Ms. Daley responded that there will be more involvement and that Working Group members would likely be asked to come back a fourth time to review the plan.
    - She said there will also be a 120-day public comment period on the draft plan.
- A participant asked whether the plan will be regional and specific to the estuaries or whether it would be "one size fits all."
    - Ms. Daley responded that it will probably be tailored to be site specific.
- A participant asked Ms. Daley to discuss the cost and affordability of implementation of the plan.
    - Ms. Daley responded that affordability is uppermost in the CCC's thoughts. As an example of this, she explained that on the technology matrix the CCC has put together (discussed later in the meeting), there is information about where these technologies are appropriate and what the costs are likely to be.
- A participant asked whether the CCC would be willing to present about the planning process and related technologies for other groups. He also asked whether the CCC could tailor the presentation to talk about issues and technologies that are most relevant to each site.
    - Ms. Daley said that the CCC would be more than happy to come out to talk to folks and could probably tailor the material presented to be appropriate for the site.

Attendees were given approximately 15 minutes to review the chronologies and to make suggested changes or additions on sticky notes. Everyone reviewed the printed timelines and posted their suggested changes and additions. There were a number of notes on all but Sandwich timelines; there was no one from Sandwich in attendance.

The group then reconvened and the facilitator, Mr. Thompson, asked for people's comments and thoughts on the chronologies.

Comments and questions from the attendees:

- One participant noted that there was a shift in the Barnstable timeline from a focus on pathogens prior to 1990 to more attention on nitrogen issues after that point. She said that Title 5 has taken care of most of the pathogen issues, and have now shifted into an era of new problems. She noted that we are dealing with different problems than we were in 1978. We didn't even know about the nitrogen problem then.
    - Another participant noted that the first time he became aware of the nitrogen problem was in the 1980s.
- A participant noted that phosphorus is a major problem in freshwater systems and asked whether people should be commenting on this issue as well.
    - Ms. Daley replied yes.
    - People indicated that they may have more to add to the chronologies about the phosphorus issue.
    - Ms. Daley indicated that people can email her directly with their additional comments about and suggested additions to the chronology.
    - One participant noted that the chronologies missed the shellfish overlay district and that the CCC may want to add the land acquisition efforts in that area to the chronologies.
- A participant asked for reasons to believe that the outcome of this process will be different from past attempts to deal with wastewater issues on the Cape.
    - Ms. Daley responded by saying that the process is centered around a lot of stakeholder engagement and public outreach with the intent of engaging people as a whole and getting widespread buy-in. There will also be a heavy focus on affordability and financing, which the CCC thinks will generate widespread interest and support as well.
    - Another participant mentioned that there is another reason to think this process will be more effective than past attempts to address the water quality issue: that fact the water quality issues are affecting economic viability on the Cape. Back in 1978, she said, nitrogen and phosphorus loading wasn't affecting people the way it is now. As a result, people believe the experts more now than they did before.
- One participant said that something people in the region need to think about now is that there will be another 30-40 years of lag time affects as nitrogen moves through the soil and water system. He thinks that things like oysters will be necessary to deal with water quality issues that will occur for the next couple of decades regardless of whether nitrogen and phosphorus inputs are reduced today. He expressed concern about investing all of the region's resources in sewering Mashpee but not addressing effects in the Bay, as there will be ongoing problems due to the nitrogen already in the ecosystem. He thinks that attacking the problem in the Bay and then moving upward would be best.
    - Another participant agreed with this point, but said that Falmouth has a different problem. There are an enormous number of people in the estuary, so Falmouth thought that all they needed to do was to sewer the properties on the estuary. Now they are looking at other options. He said that if they were able to invest $600 million to sewer all of Falmouth, the problem would basically be solved in 10 years.

  - The participant who made the initial comment about the lag time of nitrogen in the ecosystem said he wasn't so sure that sewering Falmouth would address the issue so quickly.
- One participant said that in 1978 the increase in algae due to nitrogen was helping shellfish populations, particularly scallops. Now, there are almost no scallops. They are trying to seed scallops, and he felt that without intervention, there would be no scallops. He thinks there needs to be a balance of science, technology, and nature in dealing with this problem.
- One participant made the comment that he thinks it is important that, before any plan or policy goes to vote, funding for the implementation of the plan or proposal has to be secured. He feels that without this, any effort will not pass the vote and will prove fruitless.
  - In response to this, another participant said that she thinks one of the benefits of this regional approach is the political clout that it could generate. She also said that she has heard stories about disintegrating wastewater infrastructure throughout the U.S. and that there is a huge national problem around wastewater handling. She said she feels this has to be something that the federal government is going to have to throw money at.
    - Ms. Daley replied that most of Massachusetts is on sewer systems, so other places are looking at upgrading. The Cape is looking at putting in something entirely new, which is a different challenge. Additionally, it is a tough political environment for obtaining funding. However, she added, one of the key goals of this planning process is to attract high level financial support.
- In regard to the earlier comment about nitrogen lag time, one participant said his understanding is that there is very little nitrogen more than 10 years away from the Bay.

BASELINE CONDITIONS

Ms. Daley and Shawn Goulet from the Cape Cod Commission presented a number of slides and GIS maps illustrating the water quality challenges the Cape faces as well as some of the data the CCC uses for its modeling and analysis. Working Group members were asked to identify anything they believed was missing from the data, as well as any differences of opinion they had with the CCC's analysis or approach.

Ms. Daley said that the GIS information would be made publically available online as soon as first round of stakeholder meetings is completed.

Natural Features: Ms. Daly explained the GIS data on natural features, including jurisdictional wetlands, vernal pools, two different types of floodplains, and cranberry bogs (many of which were previously wetlands). She stated that one option to consider later is the possible conversion of abandoned bogs to treatment areas.

Managed Surfaces: Ms. Daley explained that managed surfaces layers on the GIS map, which include impervious areas as well as areas that are disturbed and open. Golf course, residential and municipal lawns are also shown to demonstrate managed turf areas that may be appropriate for fertilizer management.

Regulatory Surfaces: Ms. Daley then explained the regulatory surfaces GIS layers. She commented that this region has one of the most impressive open space coverage in the watershed. She also said that the CCC looks at local land use vision maps when making decisions about Development of Regional Impact mitigation requirements and other such policies; Sandwich and Barnstable have land use vision maps, Mashpee and Falmouth do not.

Land Use Change: Ms. Daley discussed the land use change GIS layers. She said that development and growth are the main reasons for the Cape's water quality issues.

- One participant commented that the base was categorized as "commercial" when in reality the area is mostly forest. She asked how this works.
    - Mr. Shawn Goulet clarified that the data is not accurate to the parcel level.
    - Another participant added that this information in not granular enough for developing Comprehensive Wastewater Management Plans (CWMPs)

Density: Ms. Daley explained the density GIS layers, explaining these show the current development density. She added that the CCC wants to use this planning opportunity to talk about the importance of density and build-out. When collecting wastewater, it is reasonably affordable to do collection on parcels that are less than 200 feet apart (calculated via road distance). When parcels are farther apart than that, wastewater collection gets really expensive really quickly. The collection portion of a wastewater management solution can comprise 70% of the cost of the infrastructure.

Density Build-Out: Ms. Daley explained that these layers show projected or potential density. On a parcel basis, the CCC determined how much density could be developed or re-developed. This is based only on what zoning will allow. She noted that the MEP includes build-out numbers in their technical reports.

- One participant commented that the point of thinking about build-out is to say: "What areas would be affordable for collection systems?"
    - Ms. Daley replied that part of the goal in looking at build-out possibilities was to see whether doing wastewater collection at scales other than town collection systems would be more sensible and effective. She said that, assuming sewer systems are put in, 30% growth on the Cape will increase capital costs by 40%.
    - Ms. Daley also noted that nitrogen from all new development has to be taken out as well. She said that if the Cape grows in a more compact footprint, putting in wastewater infrastructure will be less expensive. If growth is more spread out, it will be more expensive to collect wastewater.
- Another participant noted that the CCC's build-out projections are lower than the increase in dwellings predicted in LCPs and CWMPs for most of the areas considered. She asked whether it is possible to adjust CCC's build-out projections to fit with town build-out numbers.
    - Ms. Daley said that the CCC will check in with towns and will try to use local build-outs to adjust their numbers. She said that the CCC will need to know what assumptions were built into town build-out projections.

Demographics: Ms. Daley then discussed the census data for demographics, including age, race, seasonal v. year round residence, and water costs for the towns in the working group area.

- In response to census data saying that the cumulative home value for the area is about $5 billion, a participant asked whether this is the cumulative value for homes or for land (homes plus property).
    - Ms. Daley clarified that this is the total assessed value, so the homes plus properties.

Nitrogen Problem: Ms. Daley proceeded to describe the key challenges facing Cape Cod and the Popponesset Bay and Waquoit Bay subarea with regards to wastewater treatment and water quality. She explained that the MEP provides water quality, nutrient loading, and hydrodynamic information,. With the MEP reports, she said, the Cape will be better able to tailor its efforts for each watershed .

- When showing a pie chart of where nitrogen is coming from in each area, a meeting participant pointed out that the number on the Waquoit Bay pie chart needs to say 12% not 2%. The CCC indicated that it would fix the mistake.
- A participant asked where golf courses fit into this discussion
    - Another participant said that Popponesset golf course recycles its water and perhaps that is why it doesn't show up on the nitrogen source chart.

Mr. Shawn Goulet walked through the nitrogen GIS data. In response to participant confusion about nitrogen reduction targeted and total maximum daily loads (TMDLs), he clarified that MEP published two sets of targets: 1) What percent would you have to remove if you aggregate of all sources (i.e., the total load in an embayment); and 2) percentage of septic load you'd have to remove if you ignore all other inputs. He said this is done for the sub-watershed level.

- Scott Michaud from the CCC said there are a number of ways you can look at reduction targets and that this is something that the group can talk about more.
- A participant mentioned that the EPA has done work on nitrogen loads and reduction targets, and asked whether the Cape will explore using these other sources rather than the MEP information. Other participants said this wouldn't make any sense, because the MEP information is much more granular and specific. Everyone agreed that the MEP data should be used.
- One participant asked a question about where the water quality is seriously damaged and which maps indicate this.
    - The CCC staff responded that this is on the GIS layer with environmental indicators.
- One participant said that there is a need to work on the Child's River, which was shown as highly impacted under future build-out scenarios.

Eelgrass Extent: Cape Cod Commission staff then explained the eelgrass extent GIS data, saying this is based on information from a Massachusetts Department of Environmental Protection (DEP) project.

- One participant said that Brian Howes has really good data on eelgrass.
    - Ms. Daley said that the CCC should follow up on this.
    - Another participant said that the Waquoit Bay National Estuarine Research Reserve did a survey last summer on eelgrass and can provide data.

Phosphorus Problem: Ms. Daley clarified that phosphorus and its impacts on freshwater systems is also a problem. The CCC works with SMAST on this. There are volunteer groups that work on data collection in the ponds.

- One participant asked whether the CCC was open to having new ponds added to the GIS data. She said that a local watershed association wants to collect data on one of the ponds.

- Ms. Daley said absolutely yes.
- Another participant said that water transparency is a key indicator of progress.
  - Mr. Michaud from the CCC said that they are looking at this as an indicator.
- A participant asked why there is so much information for some water bodies and not others.
  - Mr. Michaud explained that a lot of the information on phosphorus in freshwater is driven by local communities and groups that are willing to go out and do the sampling.

Existing Infrastructure: Cape Cod Commission staff explained the existing infrastructure GIS layers.

- Participants identified some potential issues with a couple of the GIS layers and thought a couple things needs to be updated
  - Tom from Mashpee saw a number of issues, the CCC will follow up with him to identify these issues and correct if need be.

Potential Title 5 Compliance Issues: Finally, Ms. Daley displayed a map showing various types of Title 5 compliance issues, including groundwater discharge points, locations of loans issued by the County for Title 5 repairs, and areas with potential Title 5 compliance issues.

- One participant asked whether Barnstable County Title 5 loans could only be used for failed systems.
  - Another participant said that her colleague had been interested in using the loan program for their eco-toilet program and that her understanding based on the experience is that loans were only for failed systems.
  - Another participant said it would be helpful to know where Title 5 loan money is going. She said she thought that this money could perhaps be more effective if invested in broader fixes rather than individual issues.

The group took a short break. When everyone reconvened, Mr. Thompson opened up the floor for questions.

Comments and Questions from Attendees

- One participant said he is concerned about environmental justice. He said he would like more clarity on what adaptive management means and what it might look like, so when he talks to people he knows what to tell them. He's also very concerned about climate change; he said his fear is that climate change effects are going to overwhelm the benefits of nutrient management in terms of effect on ecosystems. He thinks the Cape may need to include effects of climate change when setting expectations for water quality improvement.
- Another participant asked whether TMDLs refer to only the controllable nitrogen or all nitrogen in the system.
  - Mr. Michaud from the CCC said that the objective of TMDLs is to achieve a certain nitrogen concentration in the water quality in the embayment. It is also looking at environmental outcomes, for example if we want to get eelgrass back in a place, the TMDL tries to help with that.
  - The participants said they agreed, but asked for clarification on whether this pertains to the controllable nitrogen or total nitrogen in the system.
  - Mr. Michaud clarified that it relates to the total amount of nitrogen, so human-created nitrogen as well as atmospheric nitrogen, soil releases of nitrogen, etc.

  - Some confusion remained about this issue among the participants. Another participant asked a question along the lines of "If you have to remove 70% of the total nitrogen, does that mean that you need to remove 80-90% of your controllable sources?"
    - Mr. Michaud said that could be the result.
  - NOTE: This discussion underscored there seems to be some confusion about what a TMDL is and what it means, as well as how to interpret reduction targets. This may need more clarification for stakeholders and the public.
- One participant asked another participant the clarifying question: "I think you're saying that "global warming" will make the water quality worse?"
  - To which the other participant said yes and that his understanding is that climate change will also affect a number of things often used as indicators of water quality. There are already signs of this in the Gulf of Maine.
- One participant added the comment that when setting goals for removing nitrogen, it is important to really think about what is controllable. He said the Cape needs to be realistic about what you people can do.

Ms. Daley used this point to segue into a conversation about technical options for addressing nitrogen problem.

NEXT STEPS

Ms. Daley, Cape Cod Commission, provided an overview of what the Working Group will be tackling in coming months. She explained that there are many different technologies and options on the table for the group to consider, and that these range in both the type of approach – preventative efforts using regulatory tools, wastewater and stormwater reduction efforts, and remediation of existing water bodies – and in the scale at which the intervention would take place – at the site-level, neighborhood-level, watershed-level, or Cape-wide. She showed the Working Group a technology matrix the CCC has put together to lay out these technological options. This matrix is currently being vetted and will be officially shared with everyone once it's done.

- In response to this figure, one participant said that this diagram seems to assume that atmospheric nitrogen is fixed and can't be changed. She said that alternative transportation modes might be able to reduce the sources of atmospheric nitrogen.
  - Another participant said that measuring this effect would be really challenging.
  - One participant added that controls on powerplants could help by reducing atmospheric nitrogen at a broad scale. He said maybe things will get better quicker than expected due to these powerplant emission controls.
  - Another participant said that land use can be used to remediate nitrogen loads.

Ms. Daley also laid out a seven-step screening process for consideration of different options, which begins with considering targets and goals for the intervention and proceeds progressively from low-cost / low-barrier options to higher-cost options. Ultimately, the CCC will synthesize input received from the eleven Watershed Working Groups and as important input into creating a regional plan for the Cape that offers a series of options to mix and match after considering environmental and economic factors.

- One participant said the CCC needs to add shellfish to number 4 (watershed/embayment options)

- Ms. Daley noted that the Harvard Graduate School of Design is using the Cape wastewater and 208 planning situation as a case study; they may circle around to evaluating overall sustainability of the plan.
- Another participant commented that the CCC's proposed process assumes that alternative methods are more cost effective than sewering. He does not think it is likely that these alternative methods alone will meet TMDLs.
    - Ms. Daley said this is a good point. She explained that the CCC is considering a traditional engineering approach at the same time as it's considering alternative methods. Meeting TMDLs is critical, she said.
- One participant said that no one is talking about dealing with the nitrogenous "muck" because it isn't cost effective. But the muck isn't going to go away, and the environmental impact of this polluted muck won't go away with sewering.
- One participant said that STEP and STEG need to be moved to the collection section (they are currently in the treatment section) of the matrix. A couple other participants thought that some things are in the wrong place on the figures about alternatives and technological options.
- A participant asked whether the Powerpoint presentations and maps are available.
    - Ms Daley said that the Powerpoints are already online. The GIS data will be online next week.

OPERATING PROTOCOLS

Mr. Thompson, the facilitator, reviewed a draft of the operating protocols for upcoming meetings and asked the group for their feedback. He asked them to indicate their willingness to support these discussion guidelines. He synthesized the guidelines to include: 1) Share the floor and other customary courtesies; 2) Listen to understand before evaluating; 3) Feel free to explore without committing; 4) Keep "Beginners Mind" and let expertise inform not constrain the conversation; 5) Consensus is welcome, but not required; and 6) Seek opportunities for mutual gain. He asked the Working Group for comments.

Final Comments and Questions from Attendees

- One participant said that his interest is in getting shellfish and Waquoit Bay higher on Falmouth's interest list, since it is important to him and Mashpee.
- Another participant said he agrees with that point—he wants to see Waquoit Bay higher up on Falmouth's interests. He is also concerned that the group might be biting off more than three meetings can address.
    - CCC staff explained that this group's work is just a piece of a larger project that many other people in the area are working on.
- Another participant followed up to clarify that the group is not trying to figure out a solution for this area, but rather to make suggestions. He wanted confirmation that the group is not trying to come up with a plan.
    - Ms. Daley said that is correct. She explained that the CCC is working with a big engineering firm to make a plan and that "We want you to inform the process."
- Referring to the makeup of the stakeholder group, one participant asked, "These are the usual suspects. Was that intentional?" She said that the challenge tends to be that it is

always the same people in the room who are agreeing or disagreeing about the same issues. She asked whether there was an attempt to engage the "hair dressers" in this process.
    - Ms. Daley explained that there was an attempt to make the group representative. She said that average citizens who do not have a special interest in the issue tend not to show up.
- One participant said that the timing of the meetings excludes a number of people who are working but would otherwise like to be there.
    - Ms. Daley said that the CCC recognizes this, but also recognized that there is never a perfect time. They chose the best time they could.
- A participant said that he thinks this effort is going to require a huge amount of public outreach. These meetings are putting out data and thoughts that people will never see. He asked: "How can that be overcome?"
    - Ms. Daley said that the CCC is trying an online game as a way to increase awareness and engage the public. The CCC is trying to get this game, which was put together by the Emerson Game Lab, into local schools. However, she said that she recognizes that until this issue goes to vote, it is really hard to get people's attention.
- A participant asked whether there is there any restriction on showing presentations or other materials with other people.
    - Ms. Daley clarified that all presentations and information is public. She also explained that meeting notes will be general (i.e., anonymous) to help participants engage openly and freely.
- Ms. Daley closed the discussion by reminding people that any groups that are interested in having the CCC present on the affordability and financing issue or this process should contact her or someone else at the CCC directly.

Closing Remarks

The facilitator, reminded the group that the upcoming meetings will be on October 30th and December 11th, both will be from 1-5pm, and they will be held at the same location.

Appendix A
Attendance

Name	Affiliation
Representatives	
Diane Lang	Trustees of the Reservations
Jessica Rapp Grasselti	Precinct 7 Representative from Barnstable
Art Tracsek	Town of Barnstable
Chuckie Green	Mashpee Wampanoag Tribe
Alison Leschen	Waquoit Bay National Estuarine Research Reserve
Sia Karplus	Water management committee in Falmouth
Peter Hargraves	Falmouth Associations Concerned with Estuaries and Saltmarshes (FACES)
Rick York	Shellfish Constable, Town of Mashpee
Peter White	Community Organizer
Tom Fudala	Town Planner, Town of Mashpee
Public Attendees	
Tim Lynch	Fisherman
Jane Abbott	Falmouth League of Women's Voters
Win Monro	Falmouth W2MC
David Dow	Sierra Club
David Saad	Barnstable Department of Public Works
Staff	
Patty Daley	Cape Cod Commission
Scott Michaud	Cape Cod Commission
Shawn Goulet	Cape Cod Commission
Maria McCauley	Cape Cod Commission
Doug Thompson	Consensus Building Institute
Danya Rumore	Consensus Building Institute

Cape Cod 208 Area Water Quality Planning
Wellfleet Harbor and Pamet River Watershed Working Group

Meeting One
Wednesday, September 25, 2013
Wellfleet Council on Aging, 715 Old King's Highway, Wellfleet, MA 02667

Meeting Agenda

1:00 pm Welcome – *Cape Cod Commission*

1:05 Introductions, confirm working group membership and participation – *Kate Harvey (Facilitator) and Working Group*

1:30 Review 208 goals and process and the goals of today's meeting – *Cape Cod Commission*

1:45 Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – *Cape Cod Commission*

2:00 Review and add to chronology of work to date – *Working Group*

2:15 Discussion: drawing on past work to move forward – *Kate Harvey (Facilitator) and Working Group*

2:30 Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – *Scott Horsley (Area Manager)*

3:15 Break

3:30 Discussion of Baseline Conditions - *Kate Harvey (Facilitator) and Working Group*

4:00 Framework for Moving Forward: Preview Meetings 2 and 3 – *Scott Horsley (Area Manager)*

4:20 Review/Discuss Process Protocols - *Kate Harvey (Facilitator) and Working Group*

4:40 Public Comments

5:00 Adjourn

Wellfleet Harbor & Pamet River Group

Baseline Conditions & Needs Assessment

What is the 208 Plan?

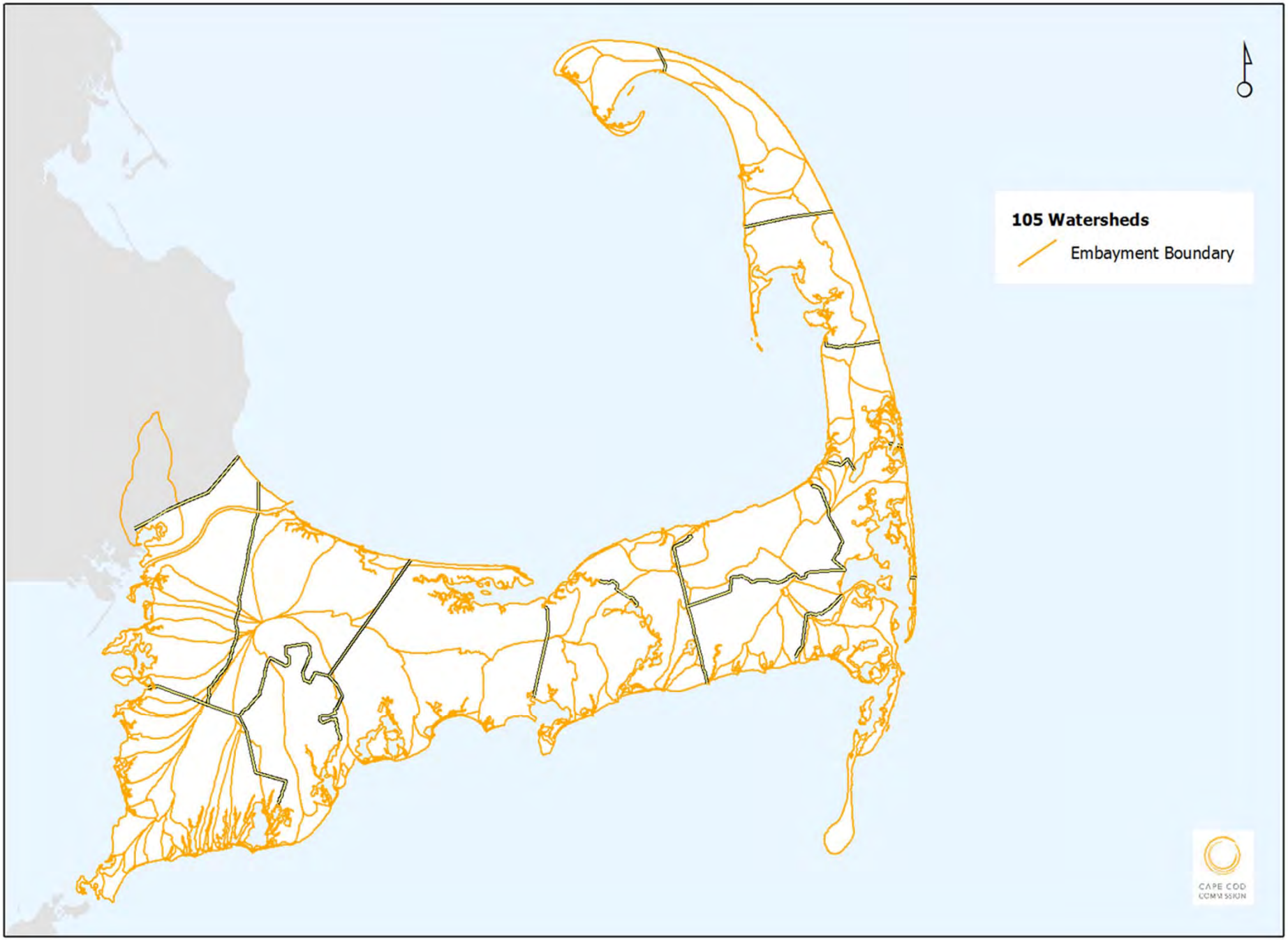
Clean Water Act Section 208

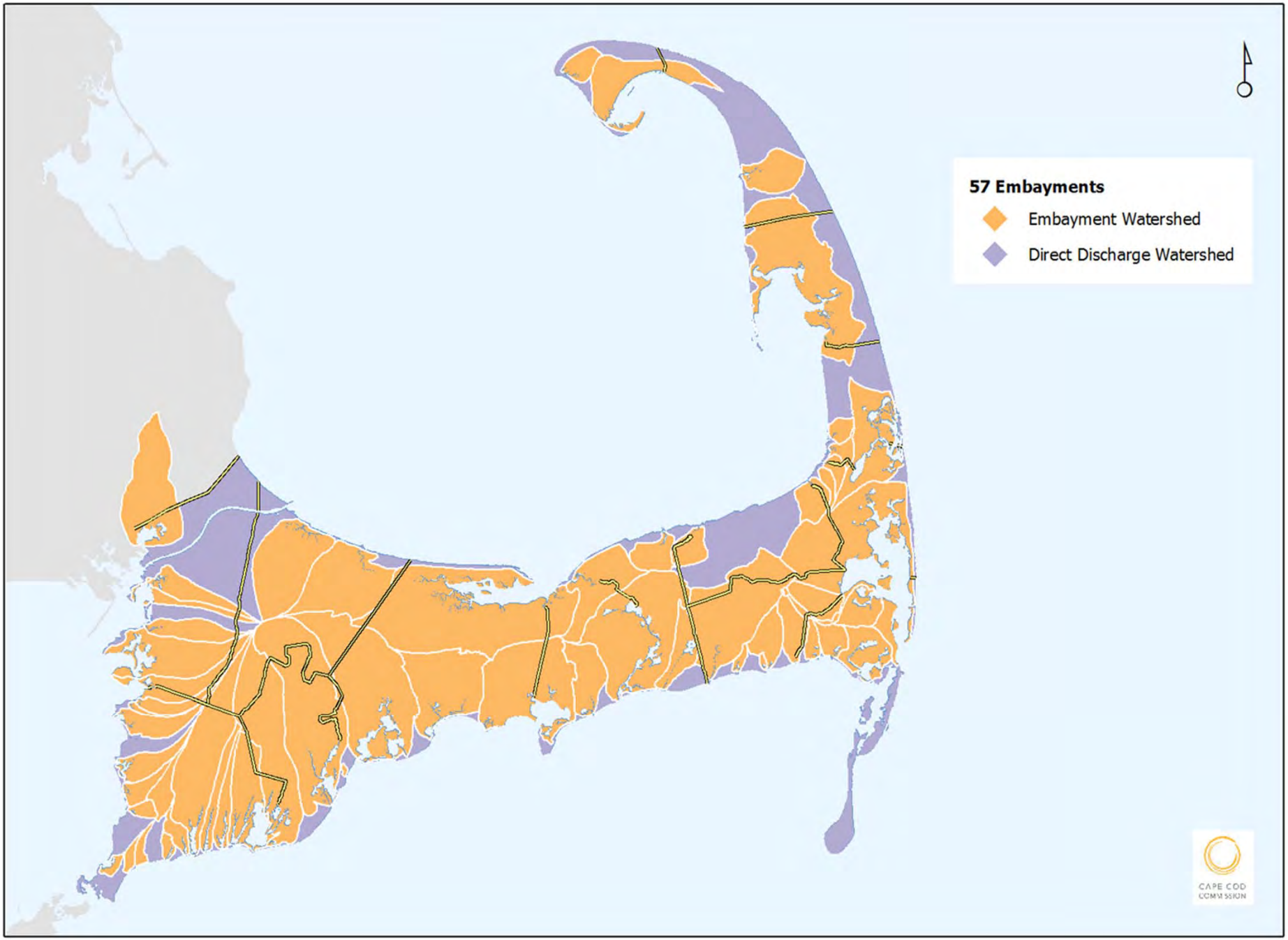
The Commission was directed to update the 1978 Plan

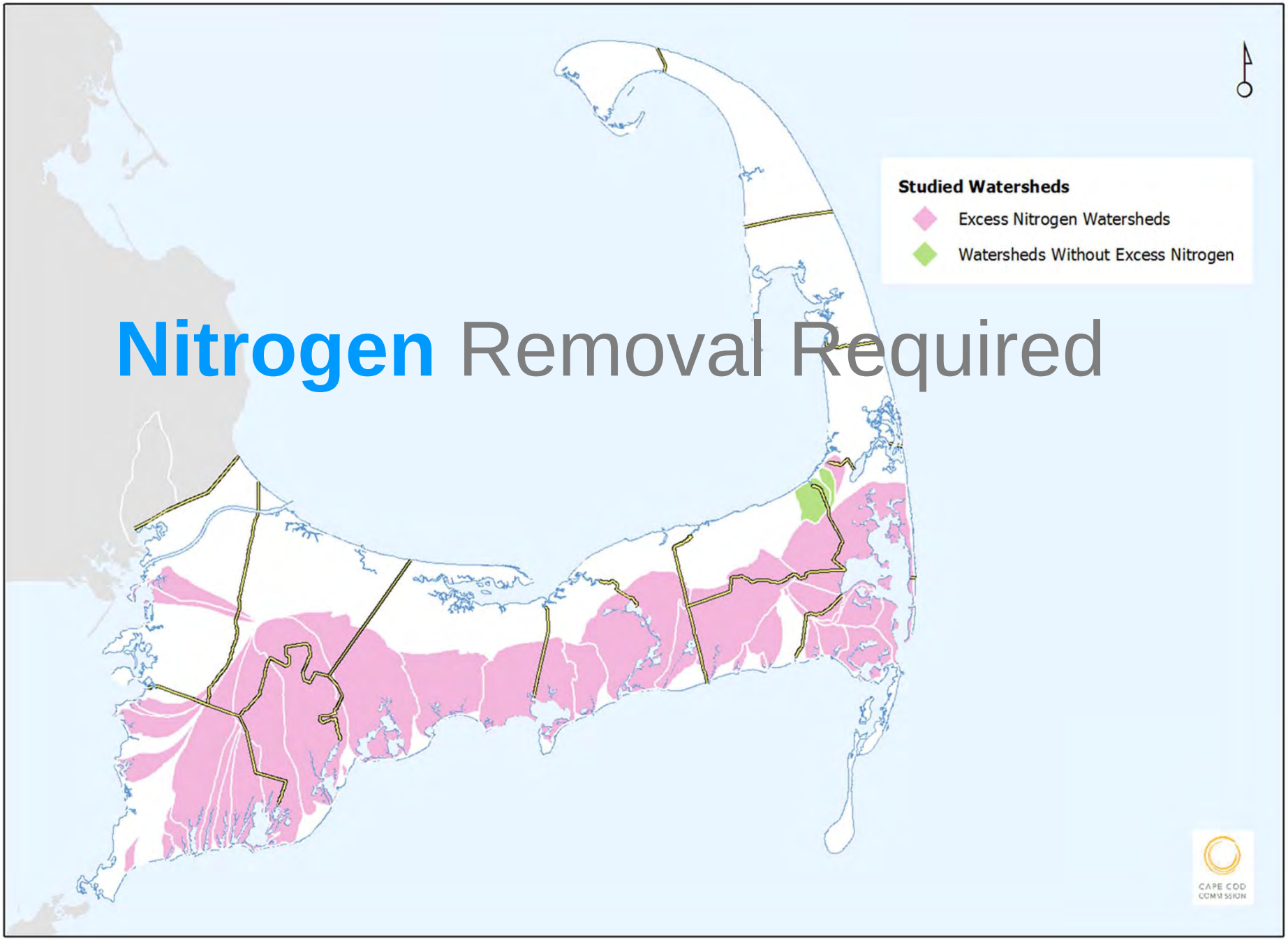
The Commonwealth provided $3 million to fund the project

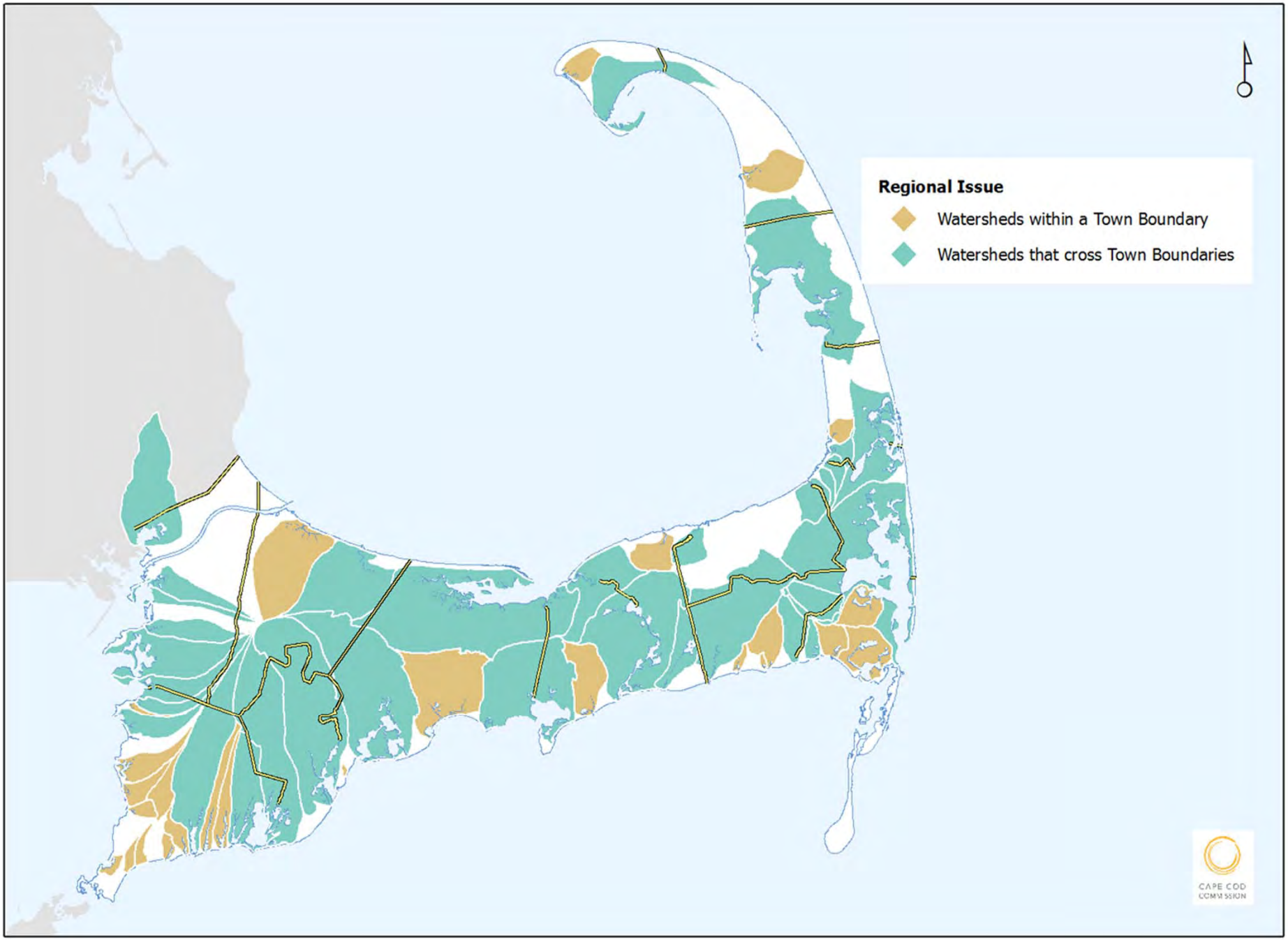
Focus on 21st Century Problems

- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

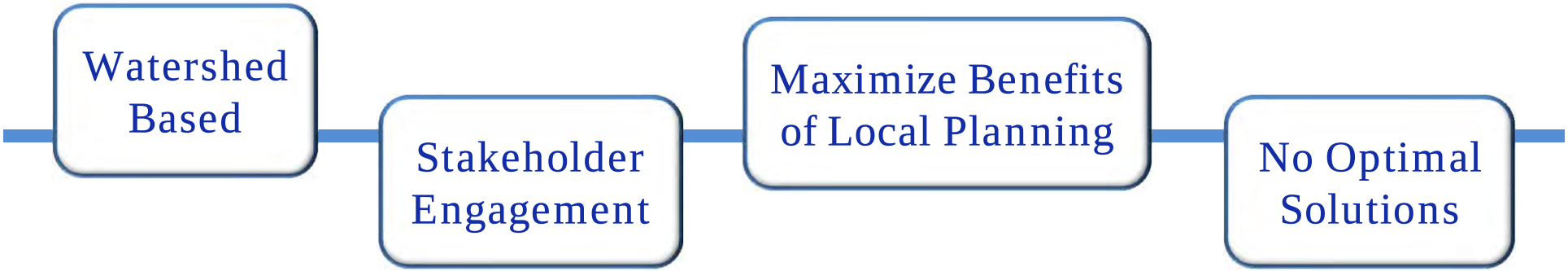

105 Watersheds
Embayment Boundary
CAPE COD COMMISSION


57 Embayments
Embayment Watershed
Direct Discharge Watershed
CAPE COD COMMISSION

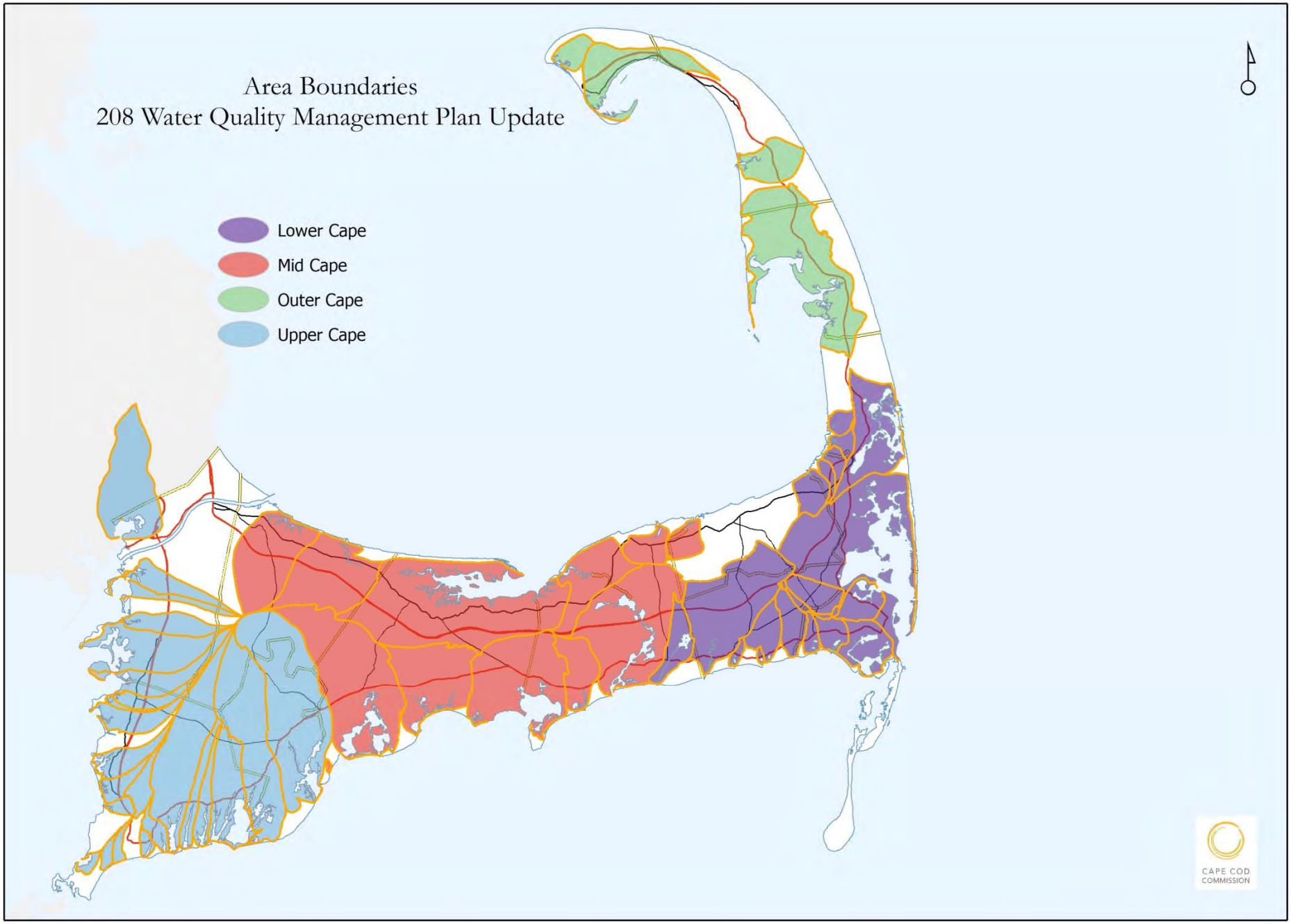

Studied Watersheds
Excess Nitrogen Watersheds
Watersheds Without Excess Nitrogen
Nitrogen Removal Required
CAPE COD COMMISSION

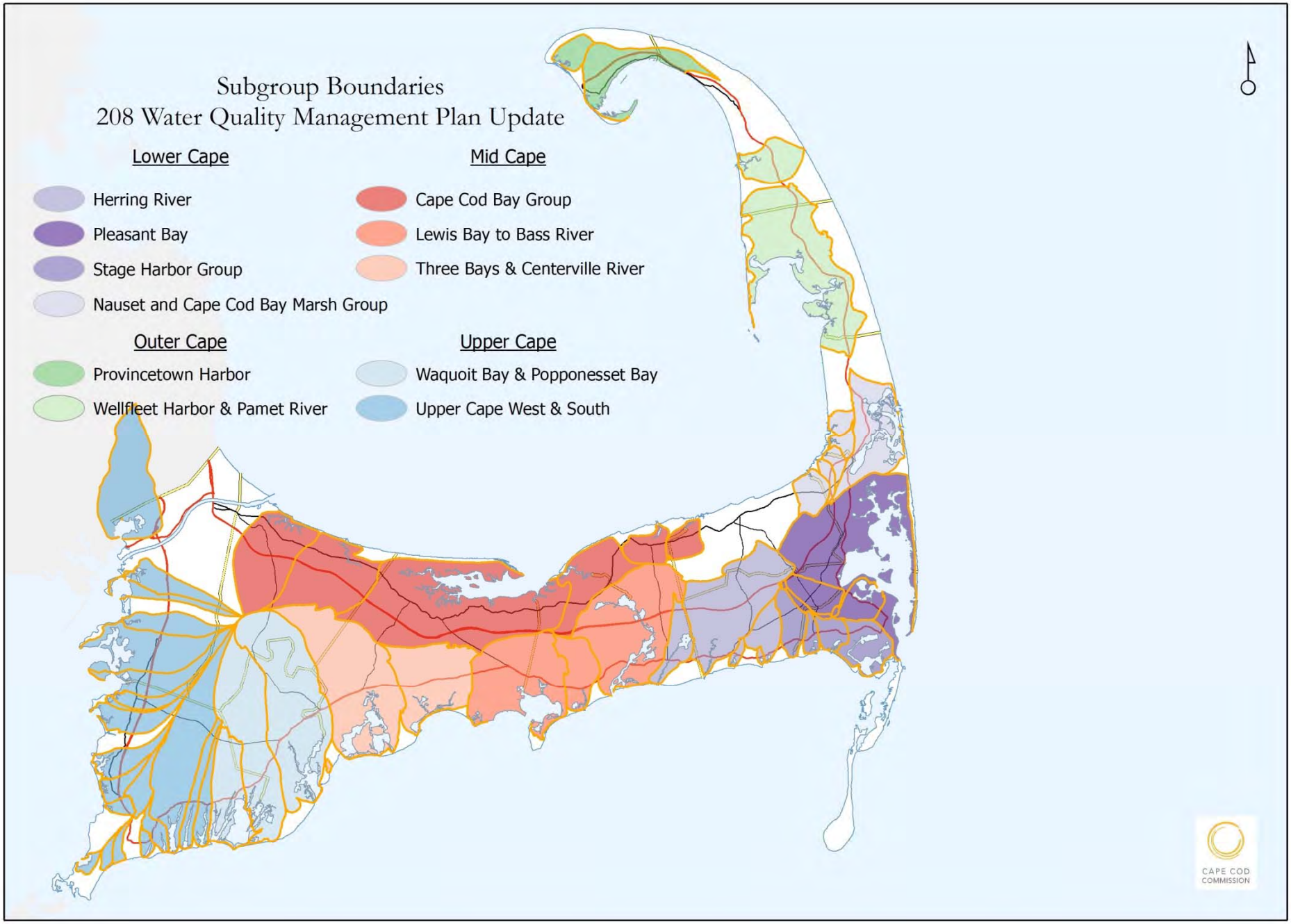

Regional Issue
Watersheds within a Town Boundary
Watersheds that cross Town Boundaries
CAPE COD COMMISSION

Approach to the 208 Plan Update

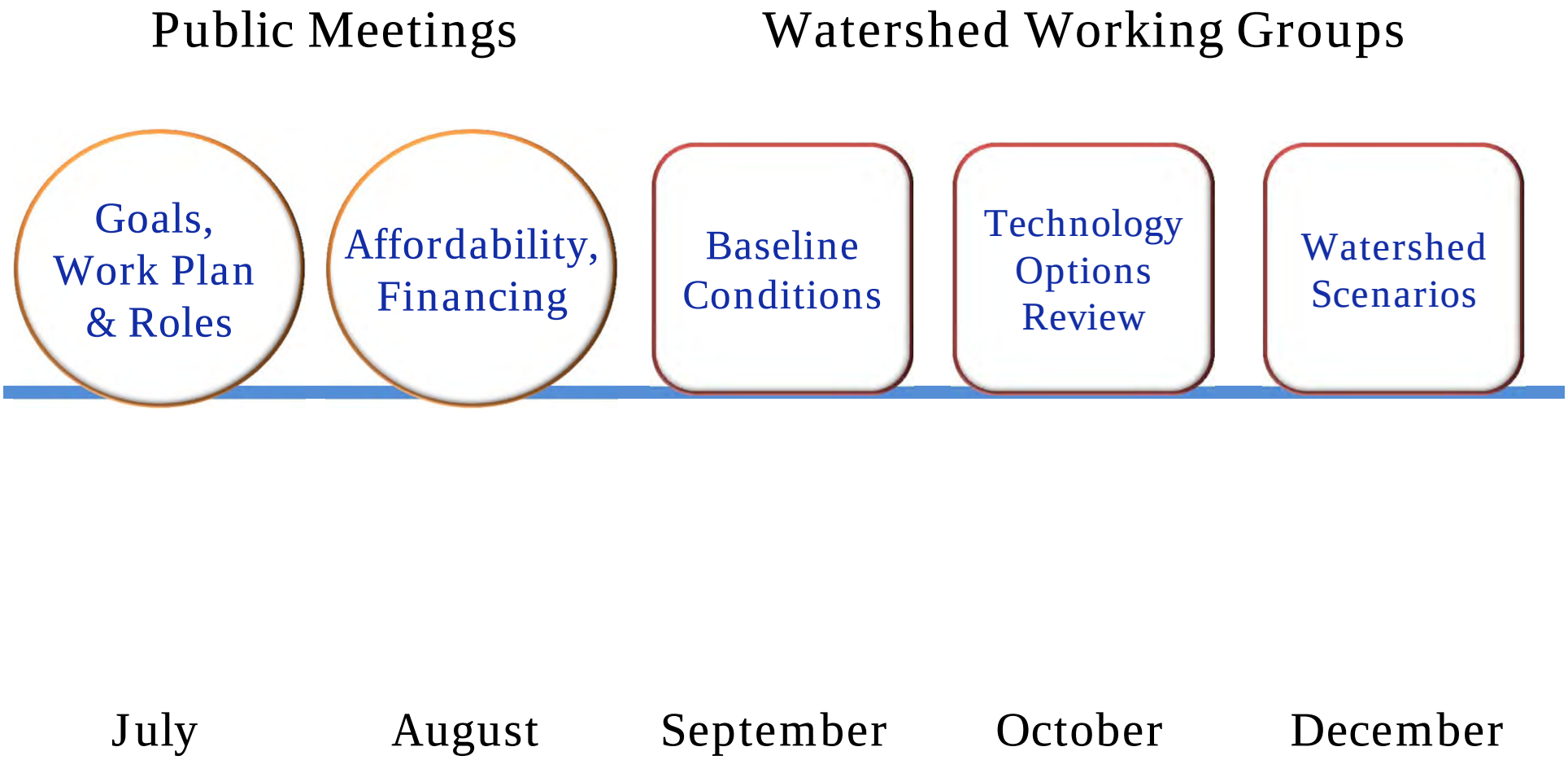


Goal:
To generate a series of approaches in each watershed that will meet water quality standards

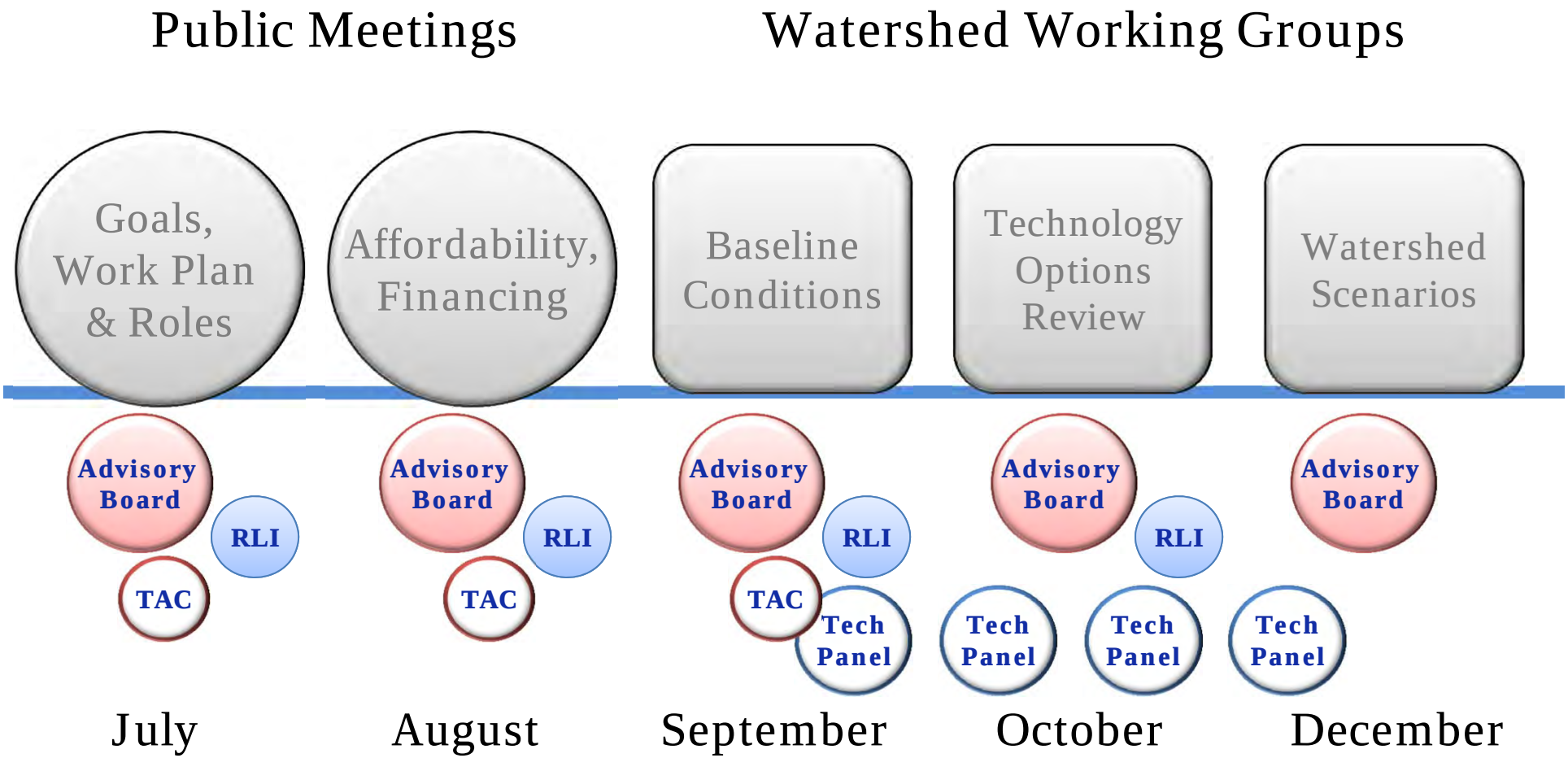

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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
CAPE COD COMMISSION

What is the stakeholder process?



208 Planning Process



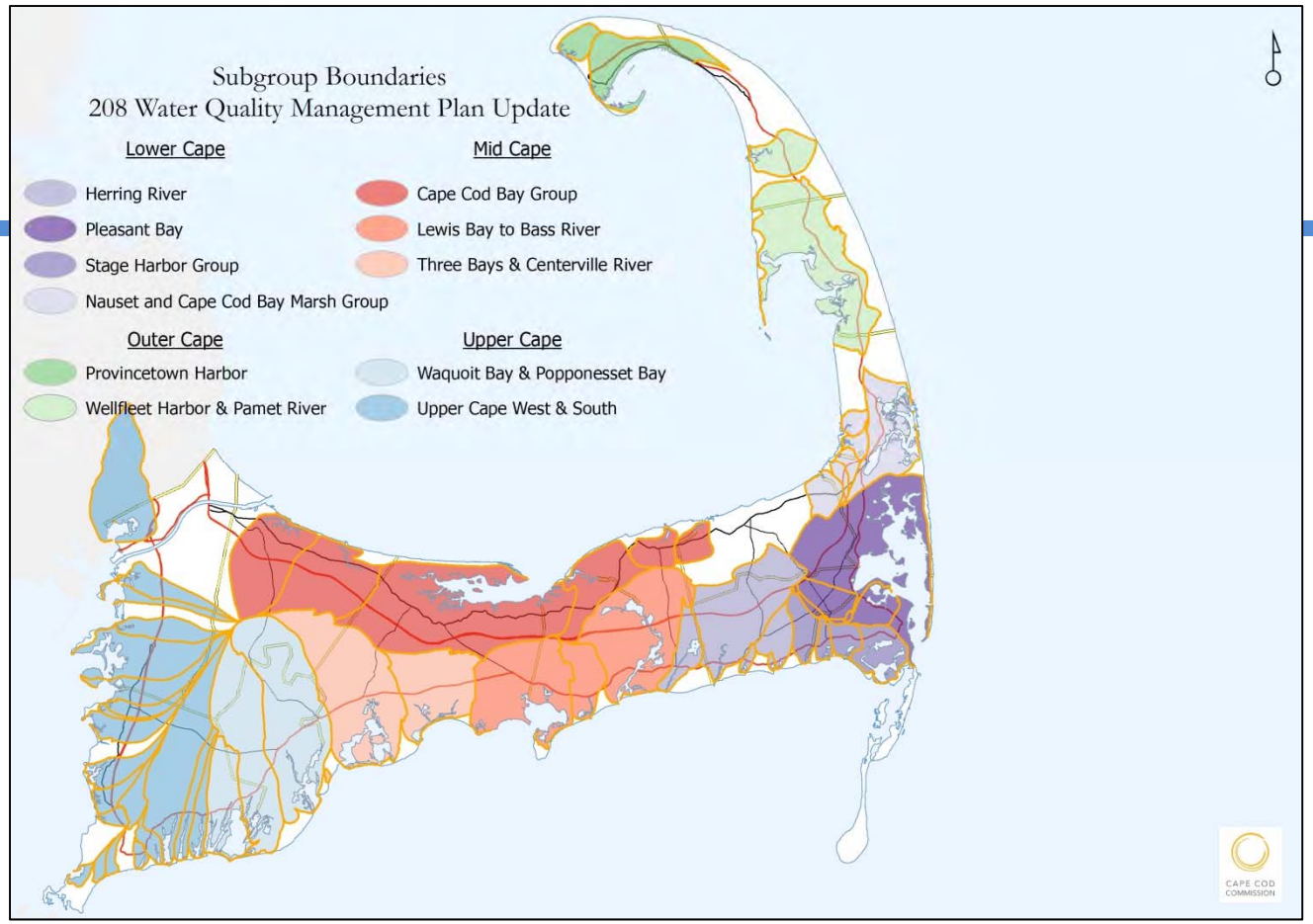
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



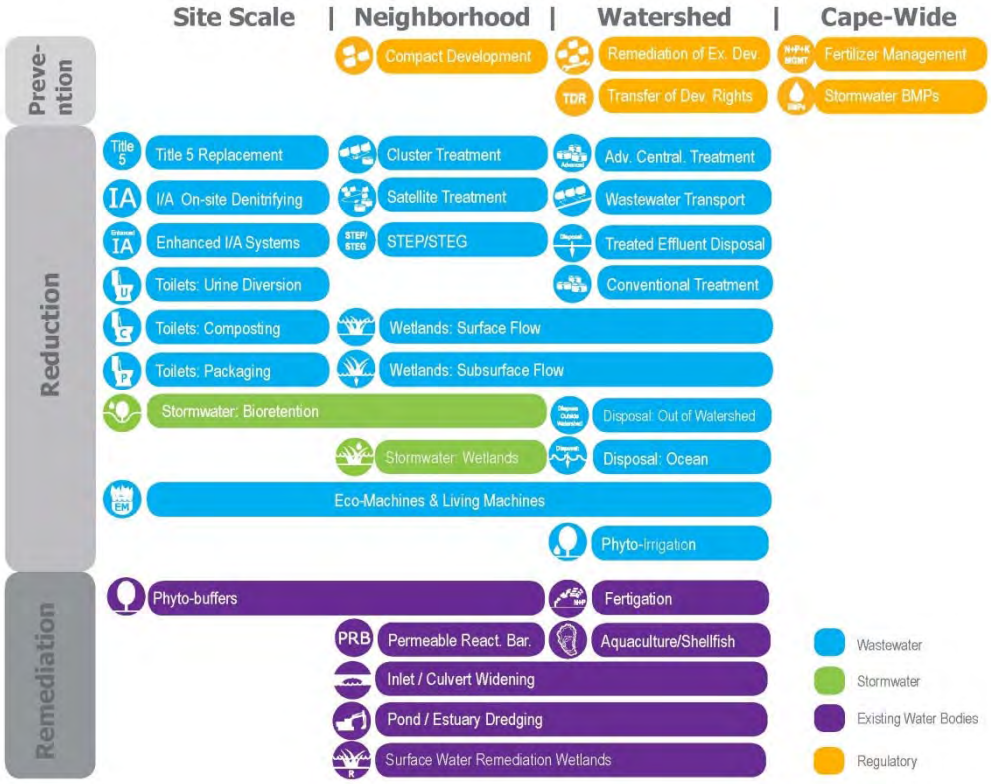
208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5



208 Planning Process

Baseline Conditions

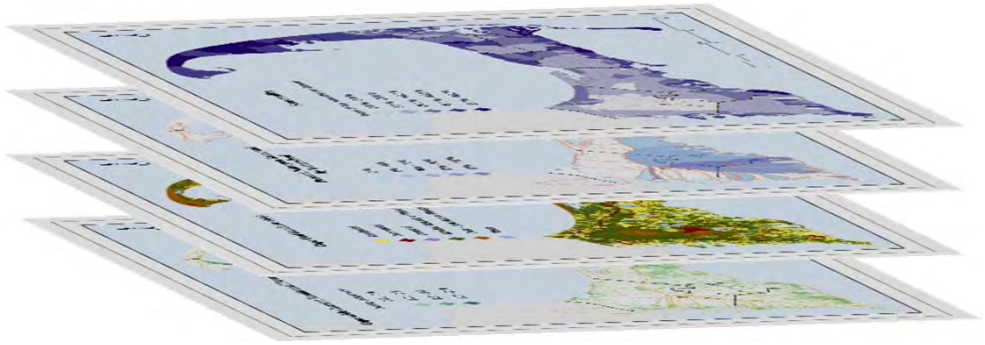
11 Working Group Meetings: Sept 18-27

Technology Options Review

11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios

11 Working Group Meetings: Dec 2-11



208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27

Goal of Today's Meeting:

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

208 Planning Process

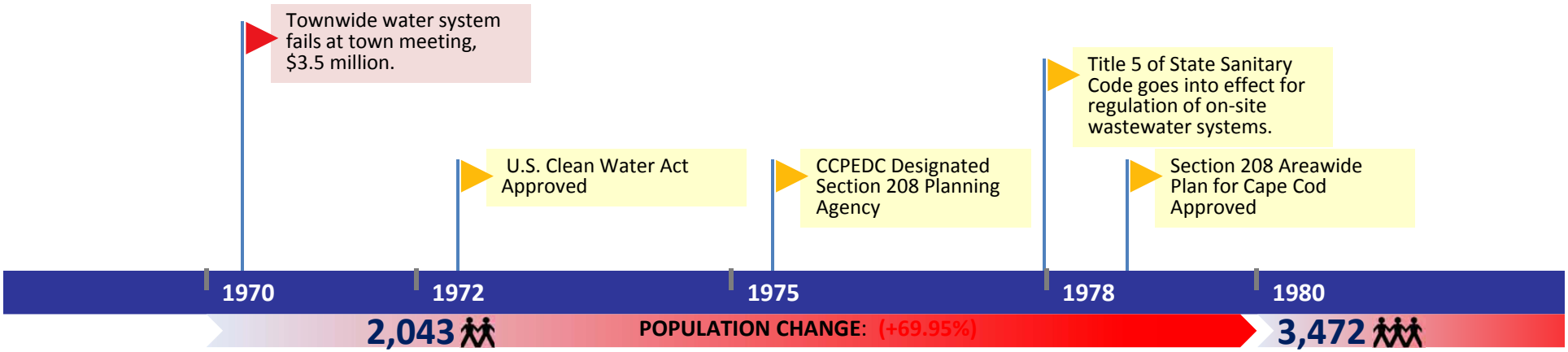
Local Progress to Date

Pamet River
Wellfleet Harbor

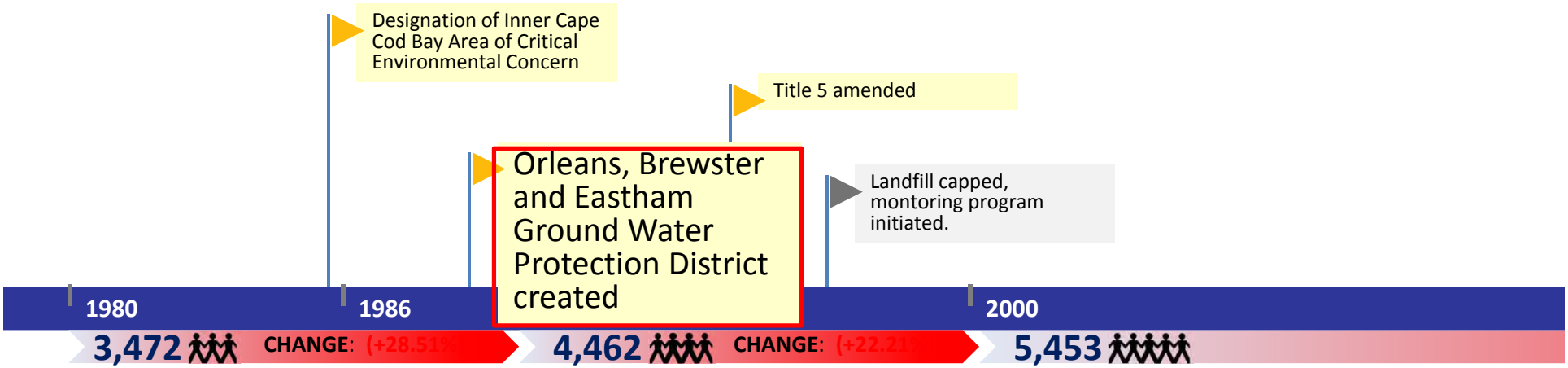
Eastham

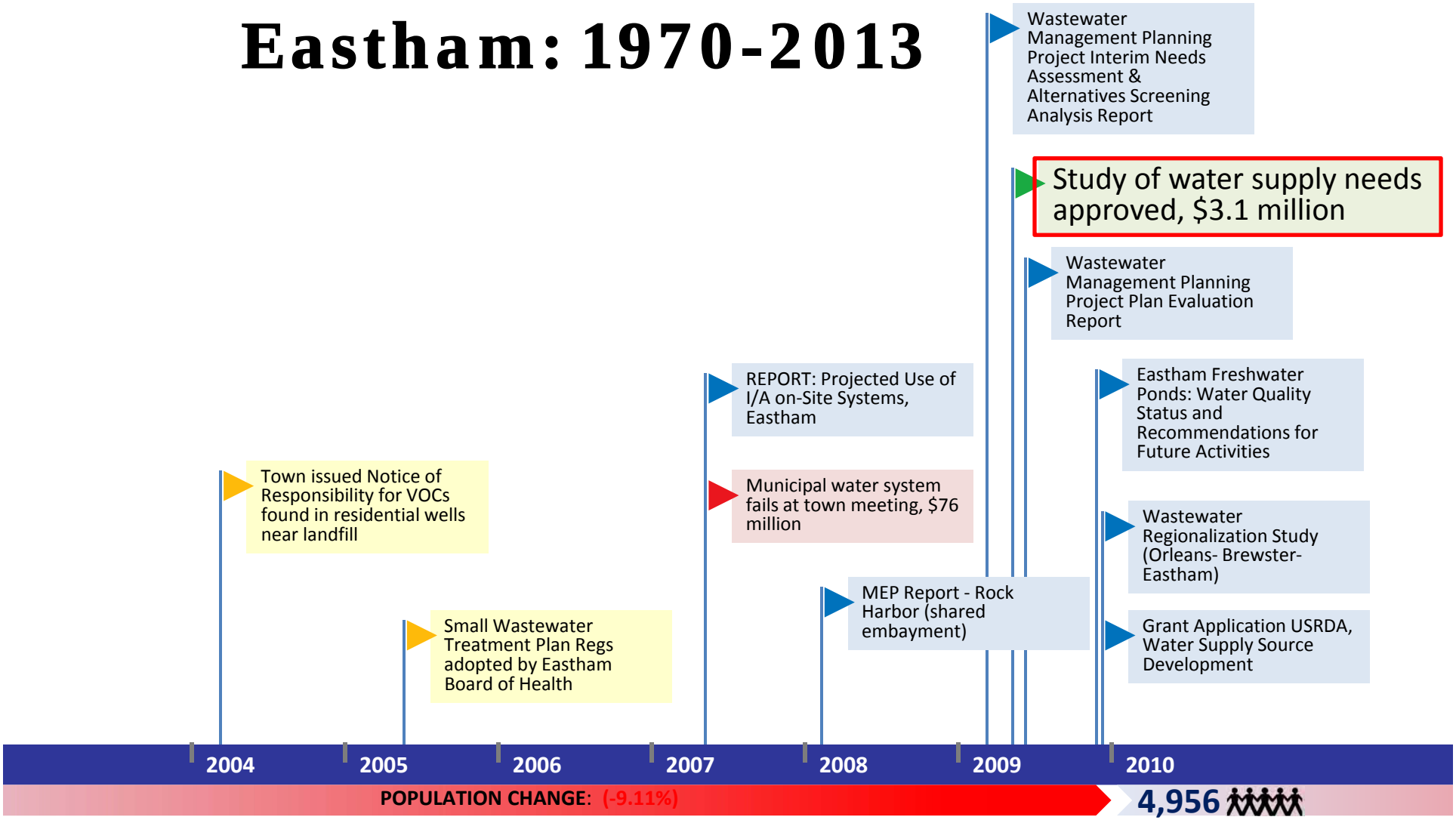
From 1978 Section 208 Plan

- Eastham should give priority to improving Title 5 enforcement and controlling conversion of seasonal dwellings.
- The town should work with CCPEDC to implement a Seasonal Residential District for the western shore of Eastham.
- Water supply is also of concern in Eastham. The high density areas and the town's present 20,000 square foot minimum lot size are not considered to provide adequate protection of private wells.
- It is suggested that the town begin to implement its water supply plan in the near future to serve densely populated areas, and areas around the town landfill.
- The town should install water table wells around the existing landfill to determine the probable direction of groundwater flow from the site.
- Further studies in cooperation with USGS may be necessary to locate the plume, since public water is not available and development is encroaching on the landfill area.
- The town should join regional waste disposal planning efforts in the hopes that a regional solution will be available before the existing site is exhausted.
- Eastham should join with Orleans in construction of a regional septage facility.

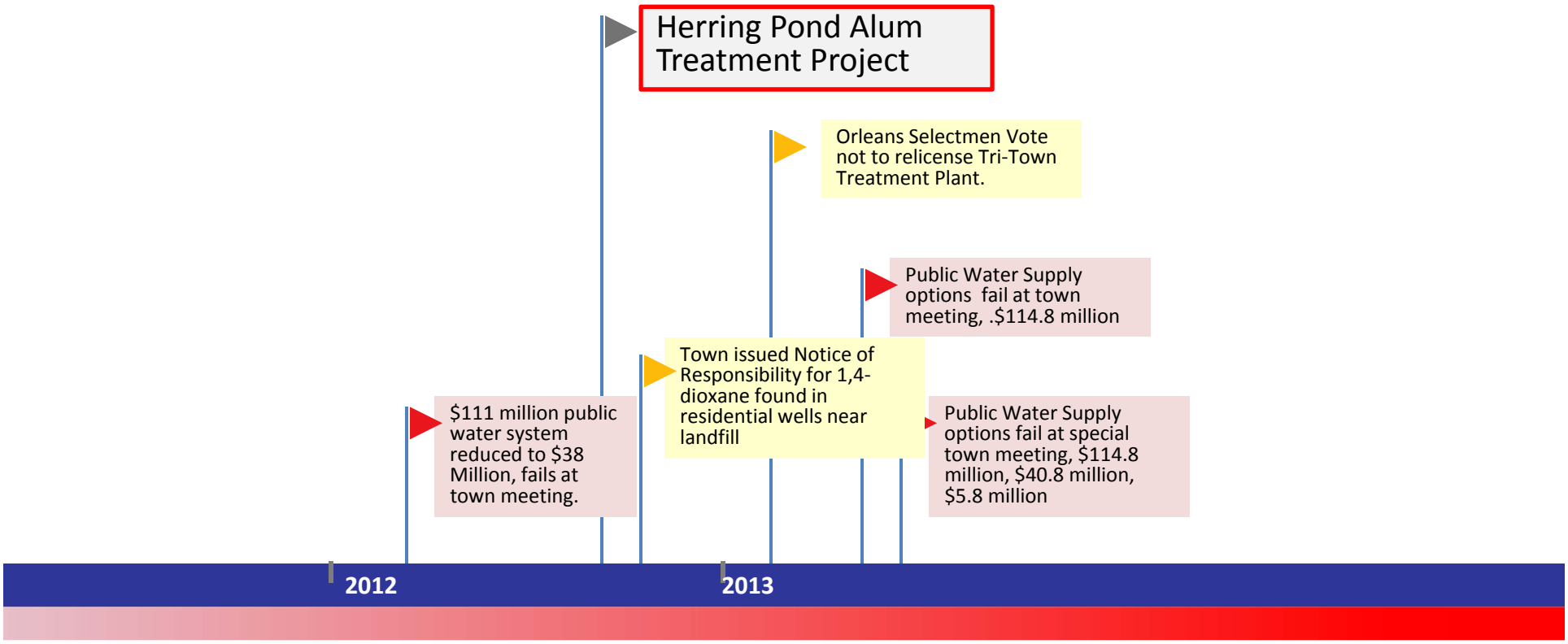


Eastham: 1970-2013




Eastham: 1970-2013
Wastewater Management Planning Project Interim Needs Assessment & Alternatives Screening Analysis Report
Study of water supply needs approved, $3.1 million
Wastewater Management Planning Project Plan Evaluation Report
REPORT: Projected Use of I/A on-Site Systems, Eastham
Eastham Freshwater Ponds: Water Quality Status and Recommendations for Future Activities
Town issued Notice of Responsibility for VOCs found in residential wells near landfill
Municipal water system fails at town meeting, $76 million
Wastewater Regionalization Study (Orleans- Brewster-Eastham)
MEP Report - Rock Harbor (shared embayment)
Small Wastewater Treatment Plan Regs adopted by Eastham Board of Health
Grant Application USRDA, Water Supply Source Development
2004
2005
2006
2007
2008
2009
2010
POPULATION CHANGE: (-9.11%)
4,956

Eastham: 1970-2013



Truro: 1970-2013

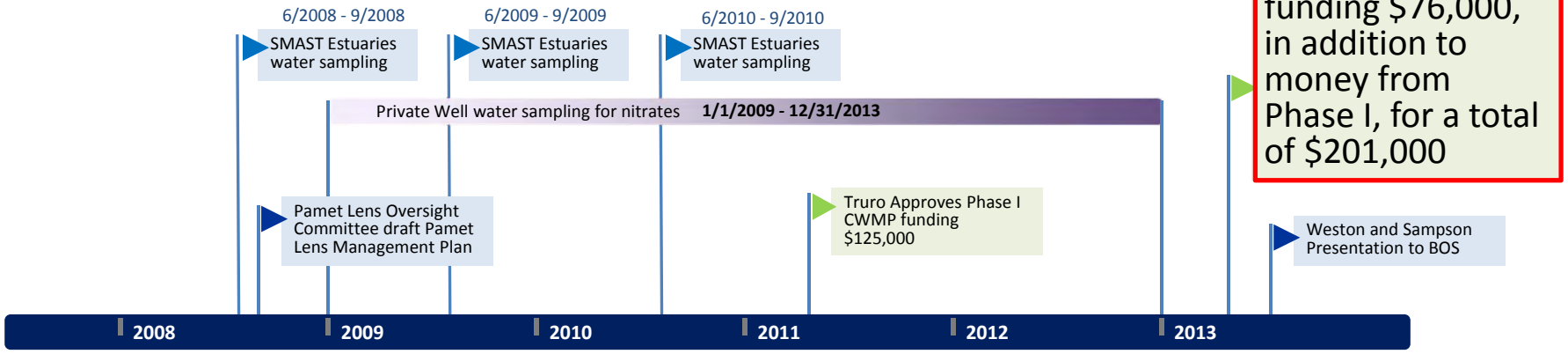
From 1978 Section 208 Plan

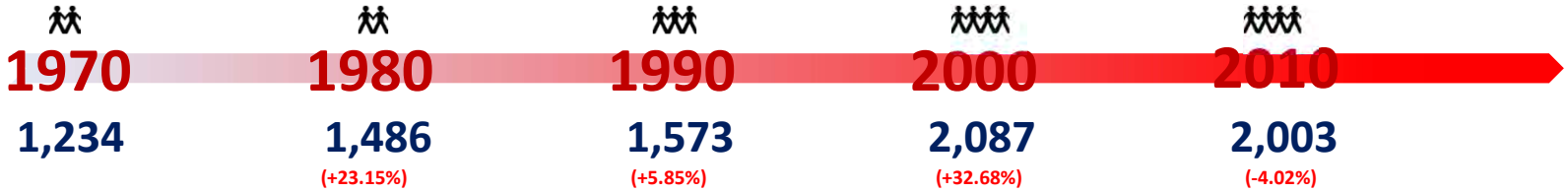
- A recent gasoline spill from a leaking service station storage tank has resulted in contamination of the groundwater approximately 600 feet from the South Hollow Well field.
- Even if the South Hollow Wellfield is put back into production, however, Provincetown presently needs an additional permanent water supply.
- Development of a water supply plan for the outer Cape groundwater basins should be given immediate priority by local, regional and federal agencies.
- Growth controls and water conservation must be given full consideration in such a planning effort to assure that the groundwater resource is not overdeveloped.
- With Truro' s naturally sandy soils, the town's wastewater problems are limited to a small strip of commercial development along a low-lying barrier beach known as Beach Point.

This area of was included in the Sewer Service Areas Map on the basis of the likely cost-effectiveness if a sewer is built for Provincetown.

- Local officials of Truro expressed concern over possible growth impacts of sewering. A means of growth control should be included in any facility plan for this reason.

Further investigation is also recommended of the water quality impacts of the landfill and septage pits.

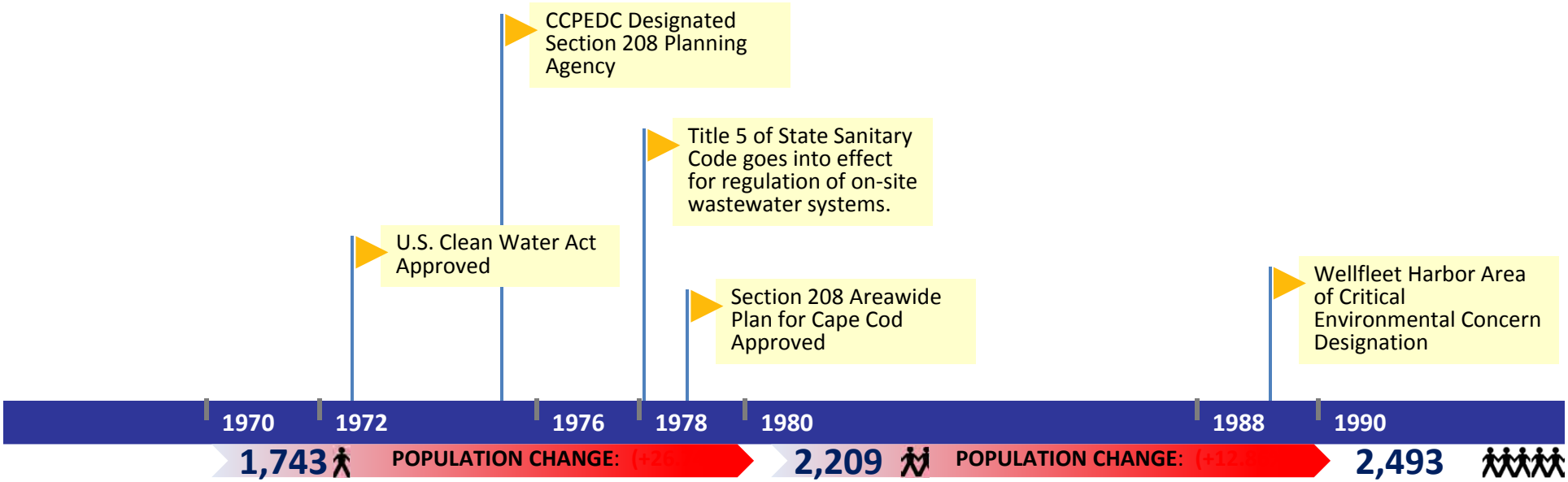




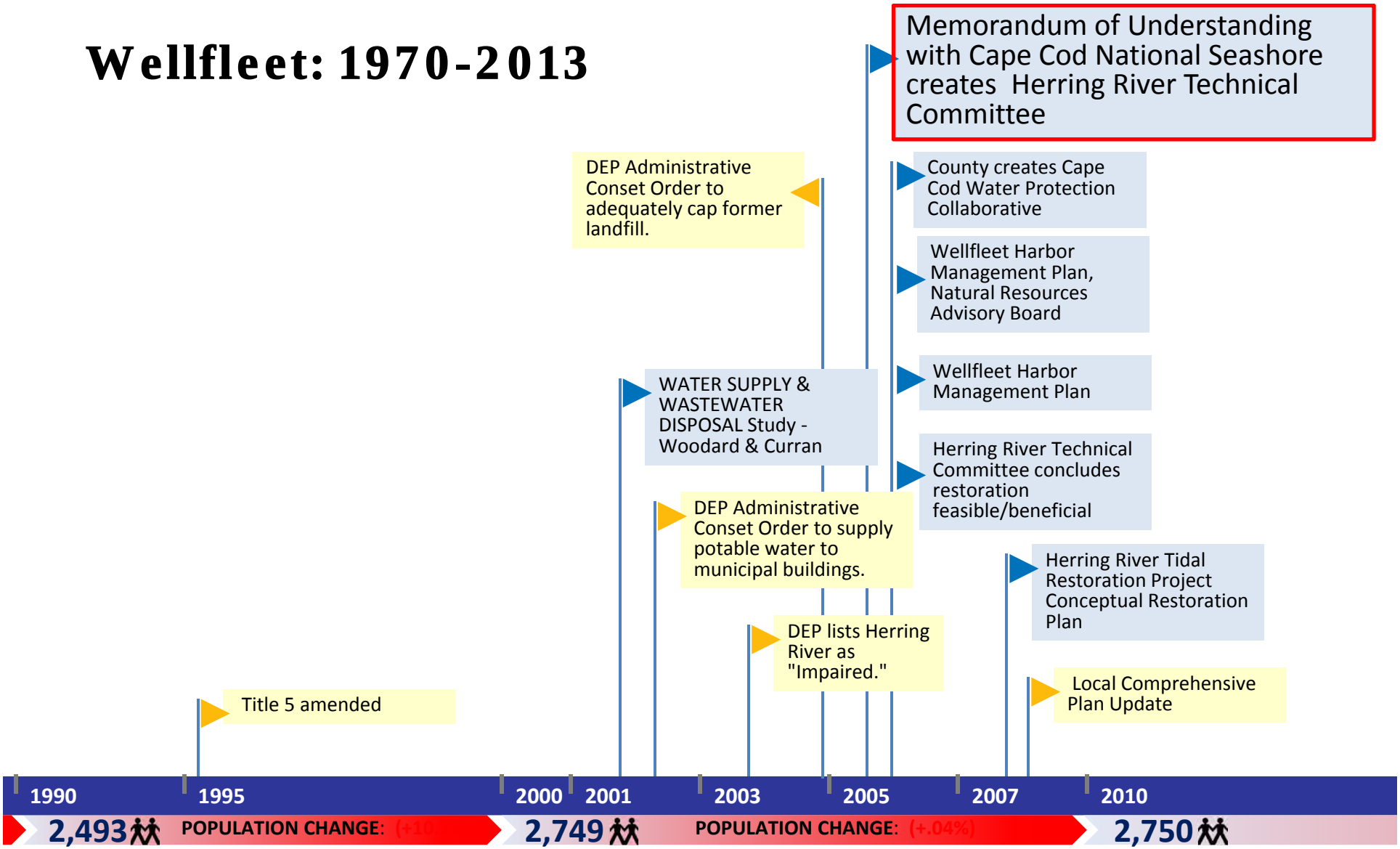
Wellfleet:

From 1978 Section 208 Plan

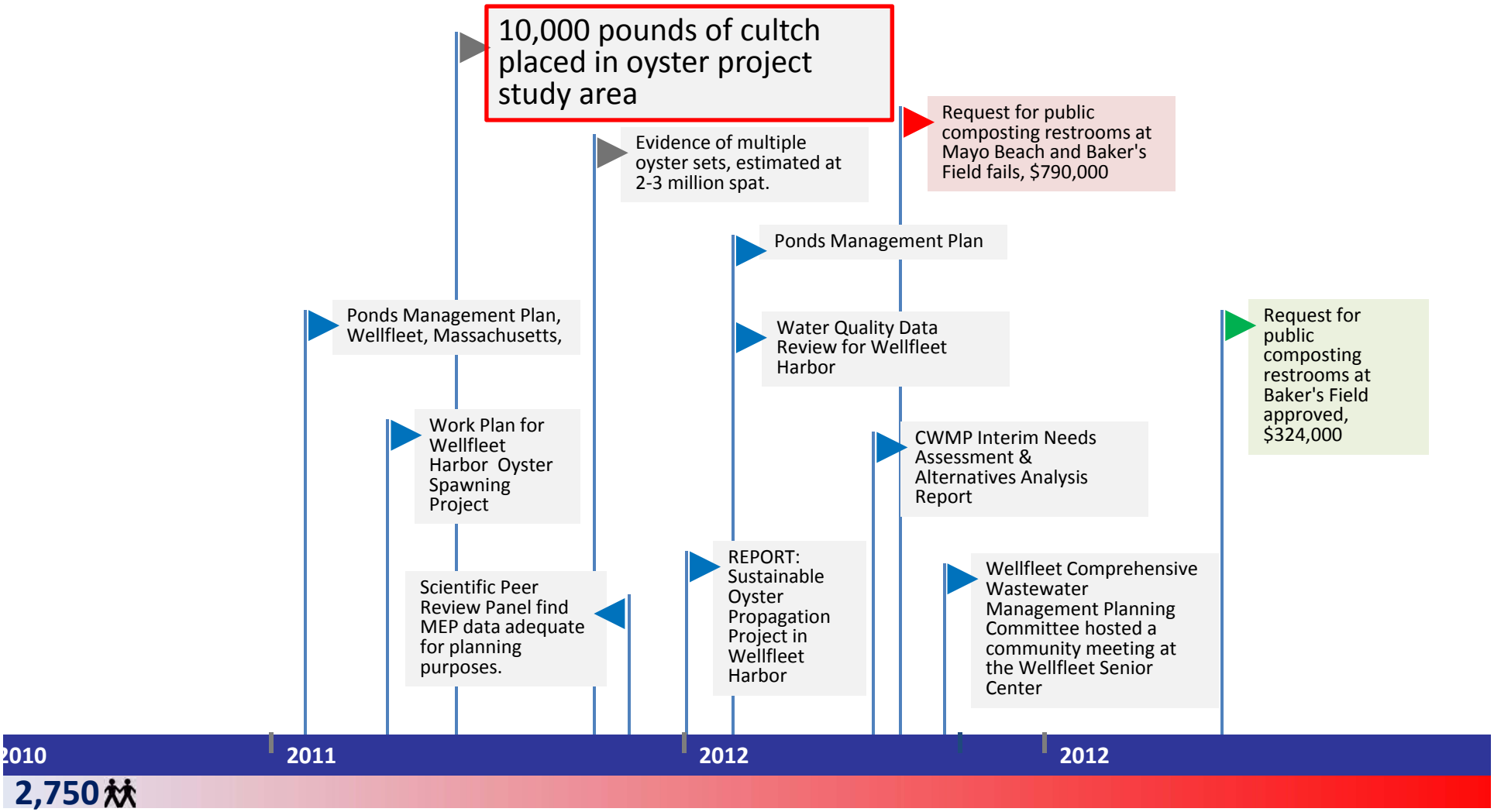
- The Town of Wellfleet is similar to Eastham and Truro in that it has a high influx of summer population and has no municipal water or sewer system.
- Wellfleet has a relatively densely populated downtown area which is indicated in the Wastewater Problem Areas Map
- It is recommended that the town regionalize with Truro for construction of a septage facility.
- Since Wellfleet has a major Category 2 problem area it would be the most appropriate town to be a lead agency and conduct a full 201 facility plan.
- On-site system installation and management should be administered by a professional health agent. Wellfleet should join with either Eastham or Truro and apply for state funds for a shared health agent.
- There's an immediate need for a public water supply in Wellfleet Center.
- Since Wellfleet is one of the few Cape Cod towns which has no water supply engineering plan, a combined water and sewer study would be desirable.
- The town planning board is presently revising its master plan. Water quality should be a priority consideration, and should be coordinated through the establishment of a water quality advisory committee.



Wellfleet: 1970-2013



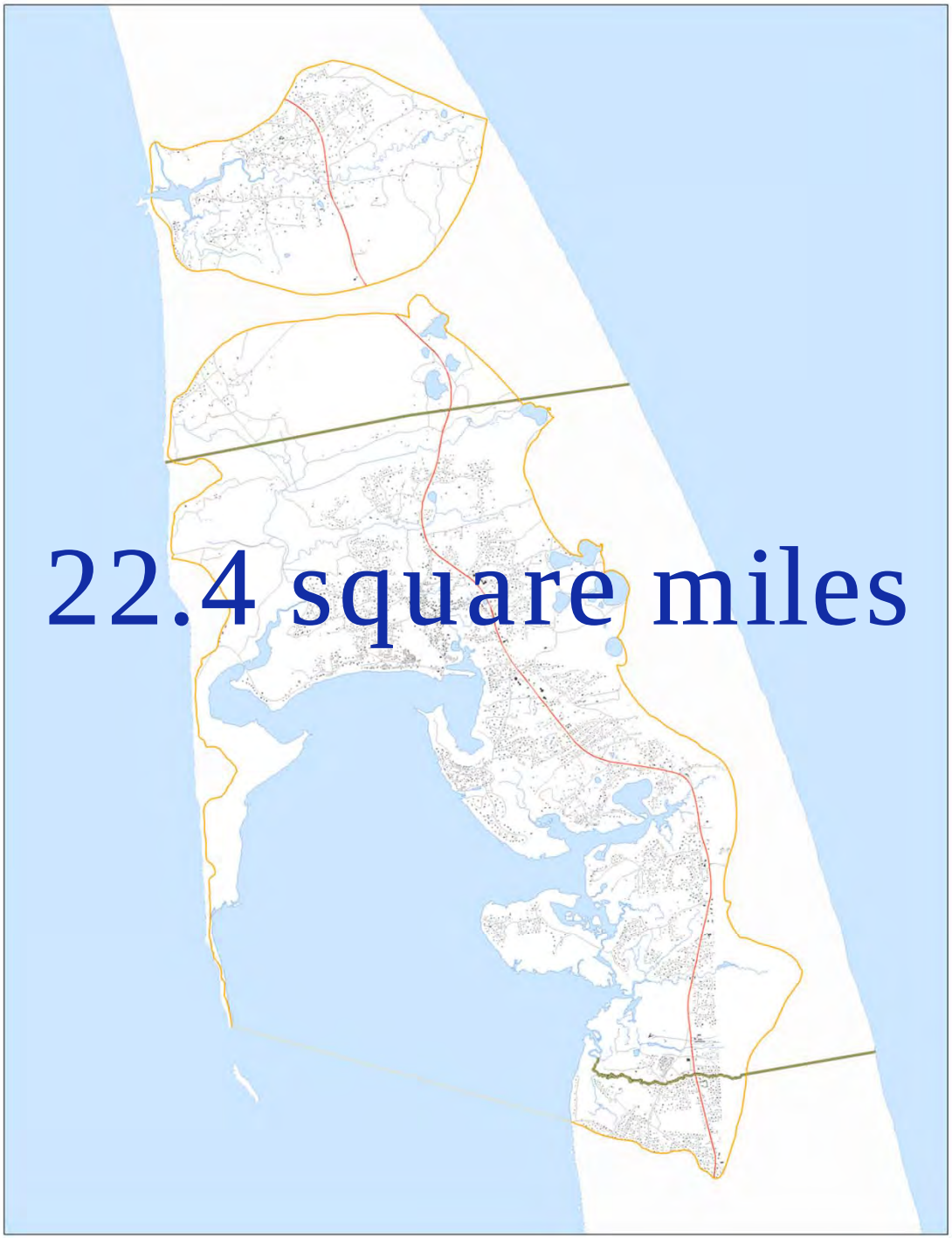
Wellfleet: 1970-2013



Did we miss anything?

Your Watersheds

Pamet River
Wellfleet Harbor


22.4 square miles


3 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 Sprcies 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

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, CCC

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

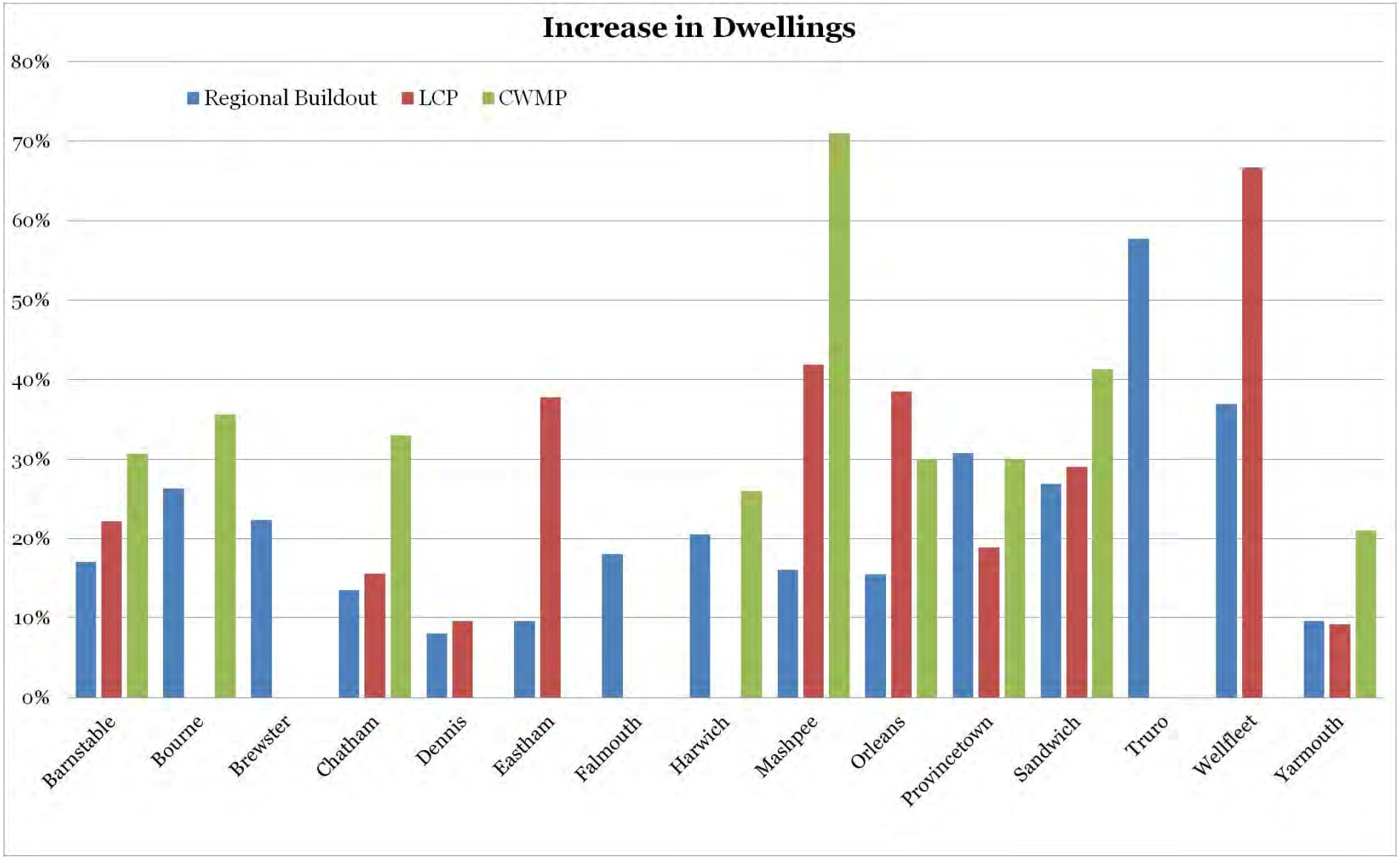
Sources: MassGIS, MassDOT

Density

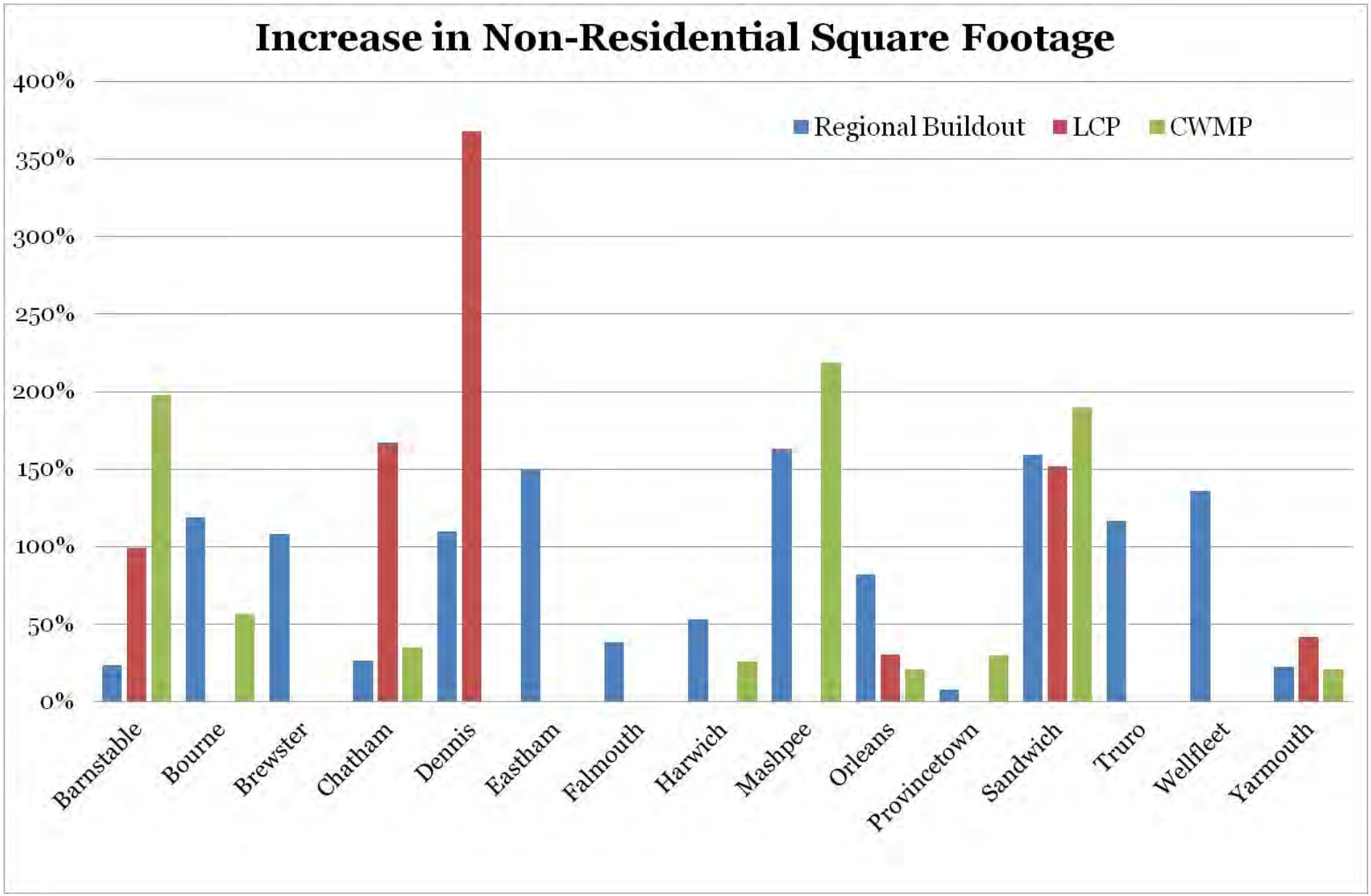
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

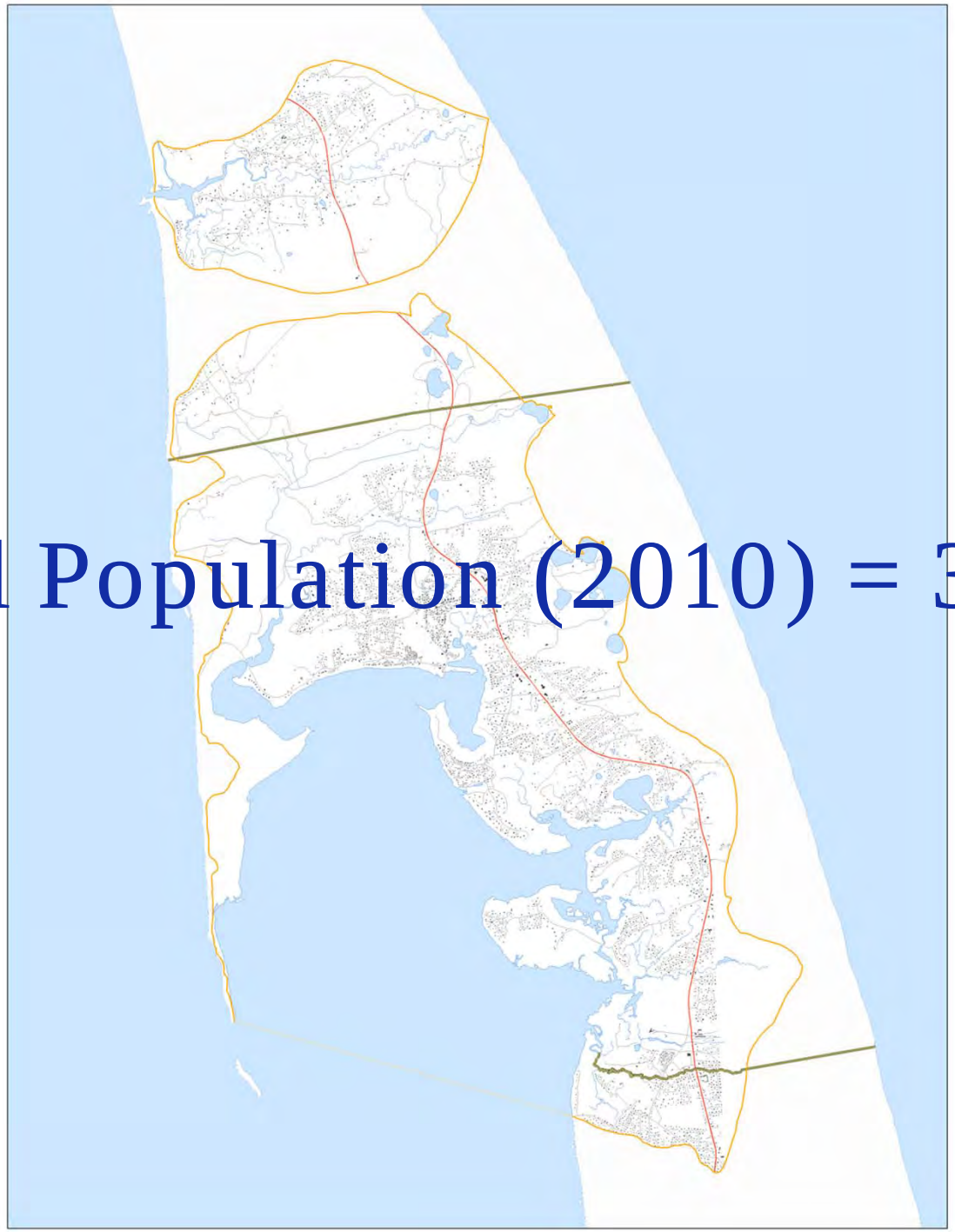

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout


Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

The People

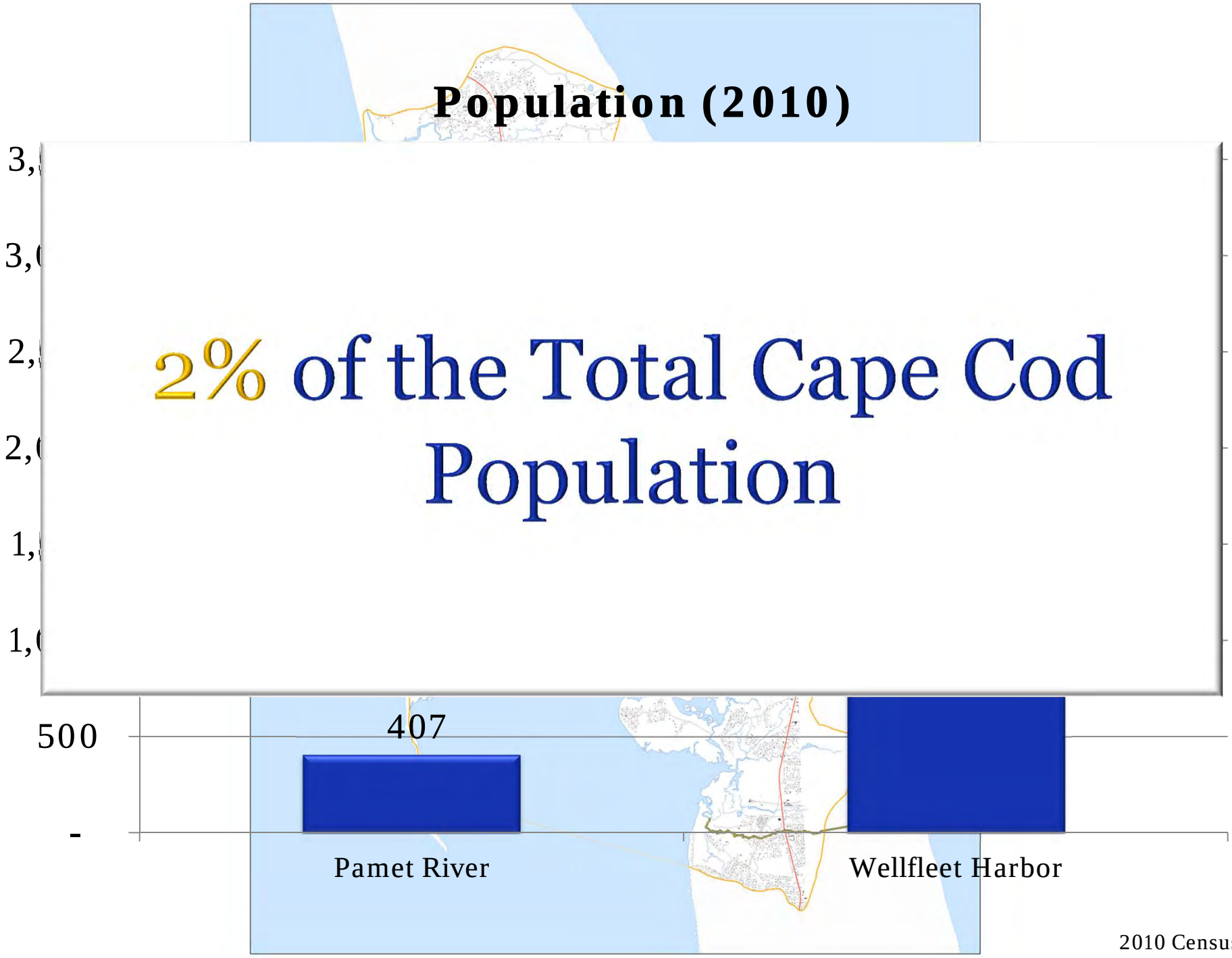
Pamet River
Wellfleet Harbor



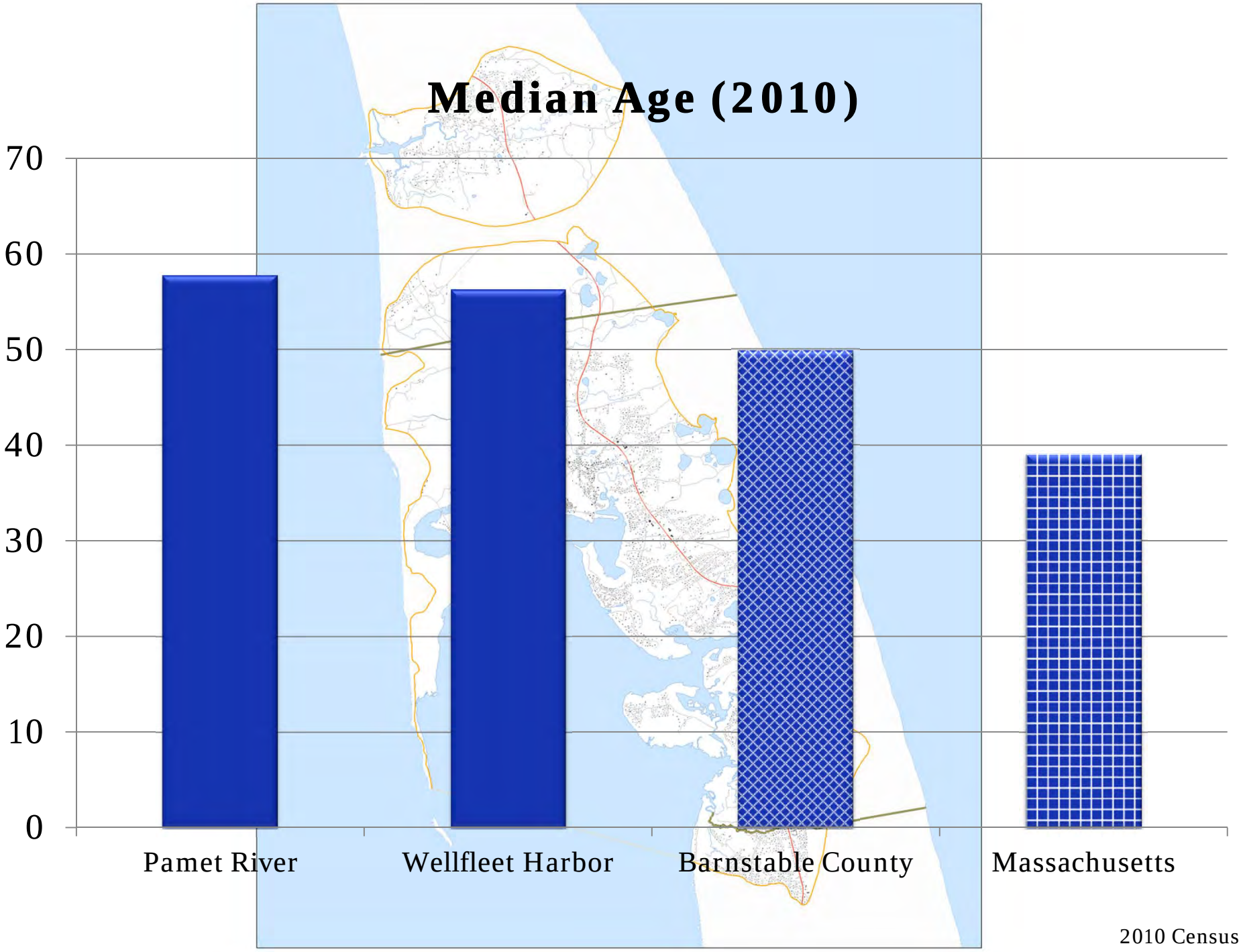
Total Population (2010) = 3,447

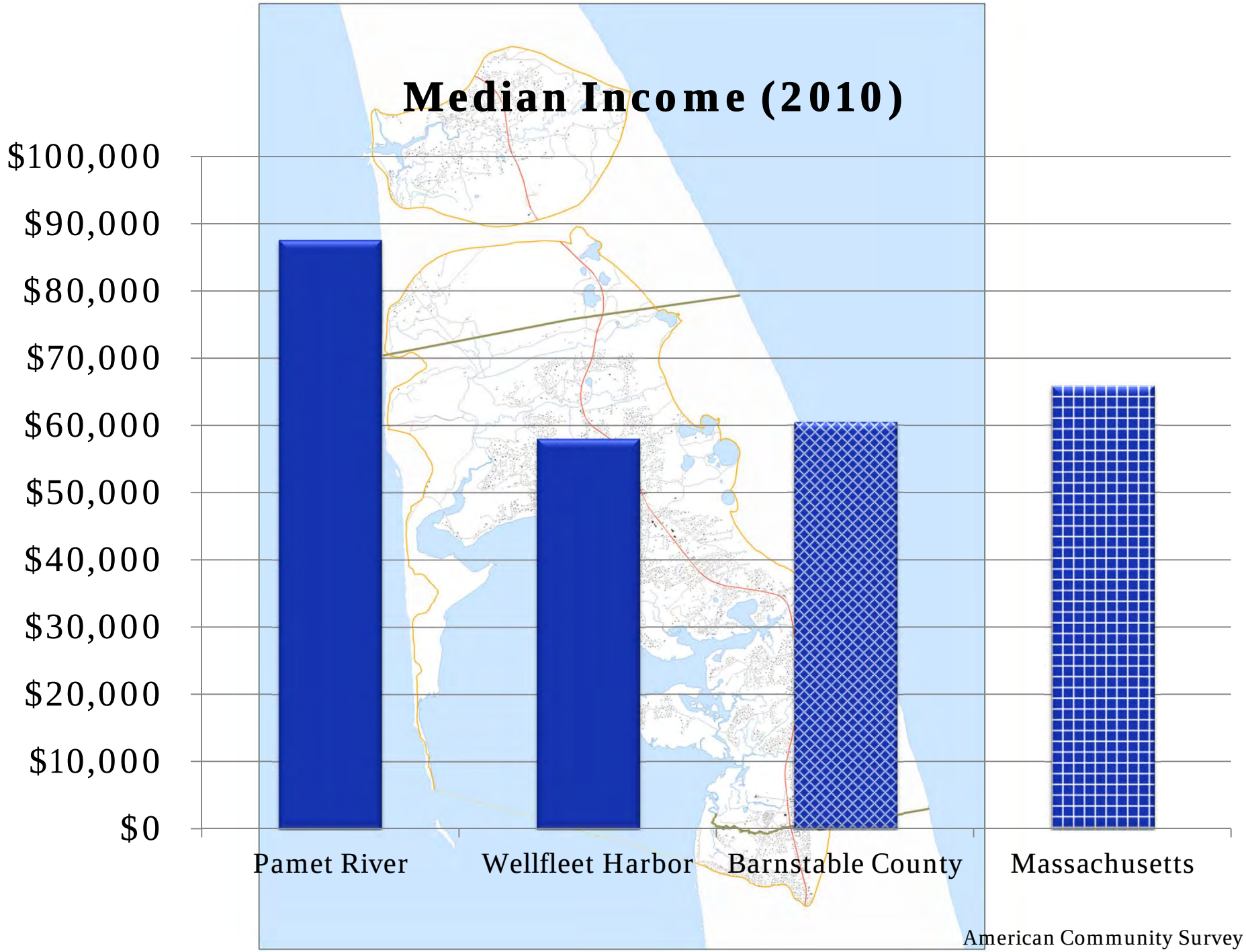
2010 Census

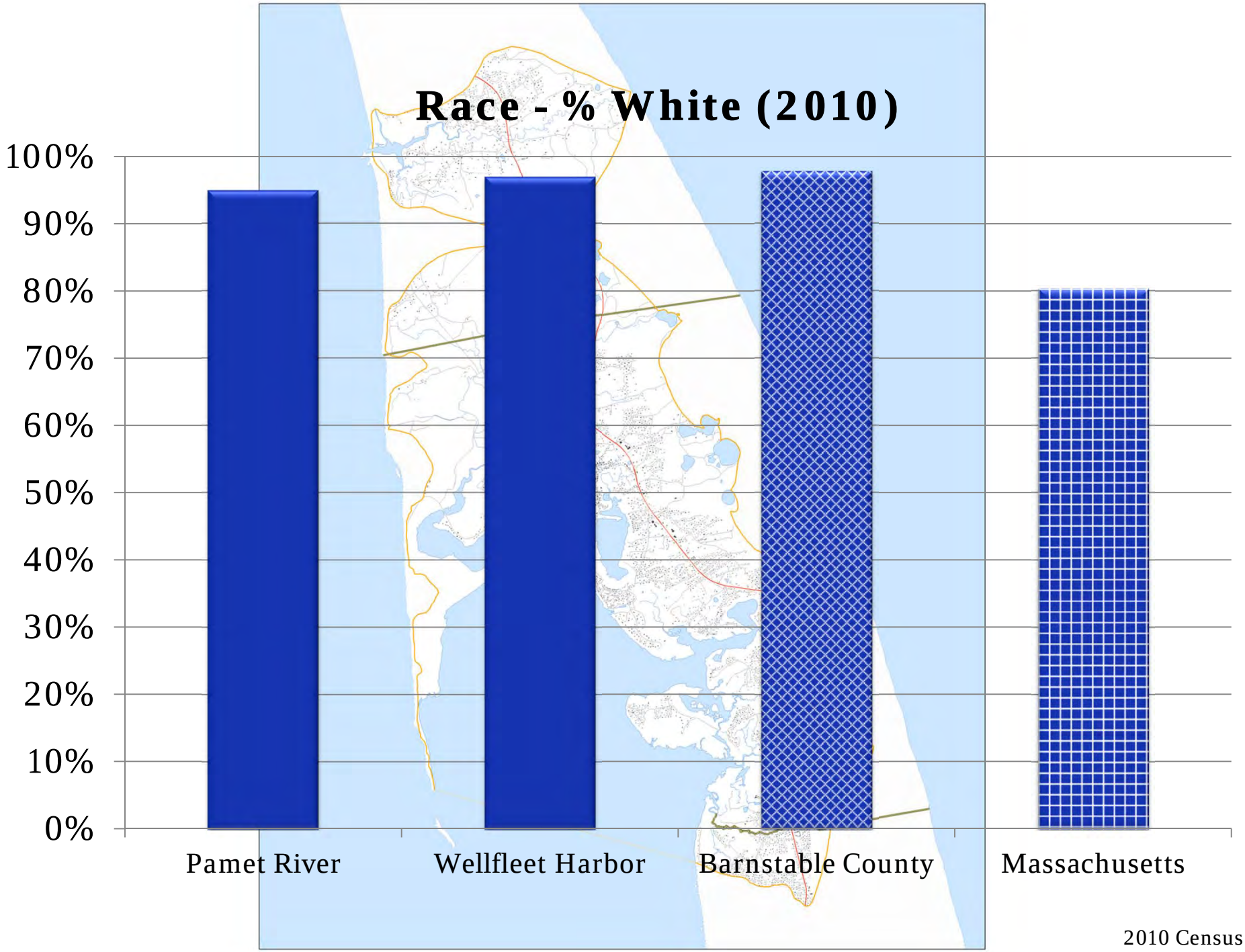
Population (2010)

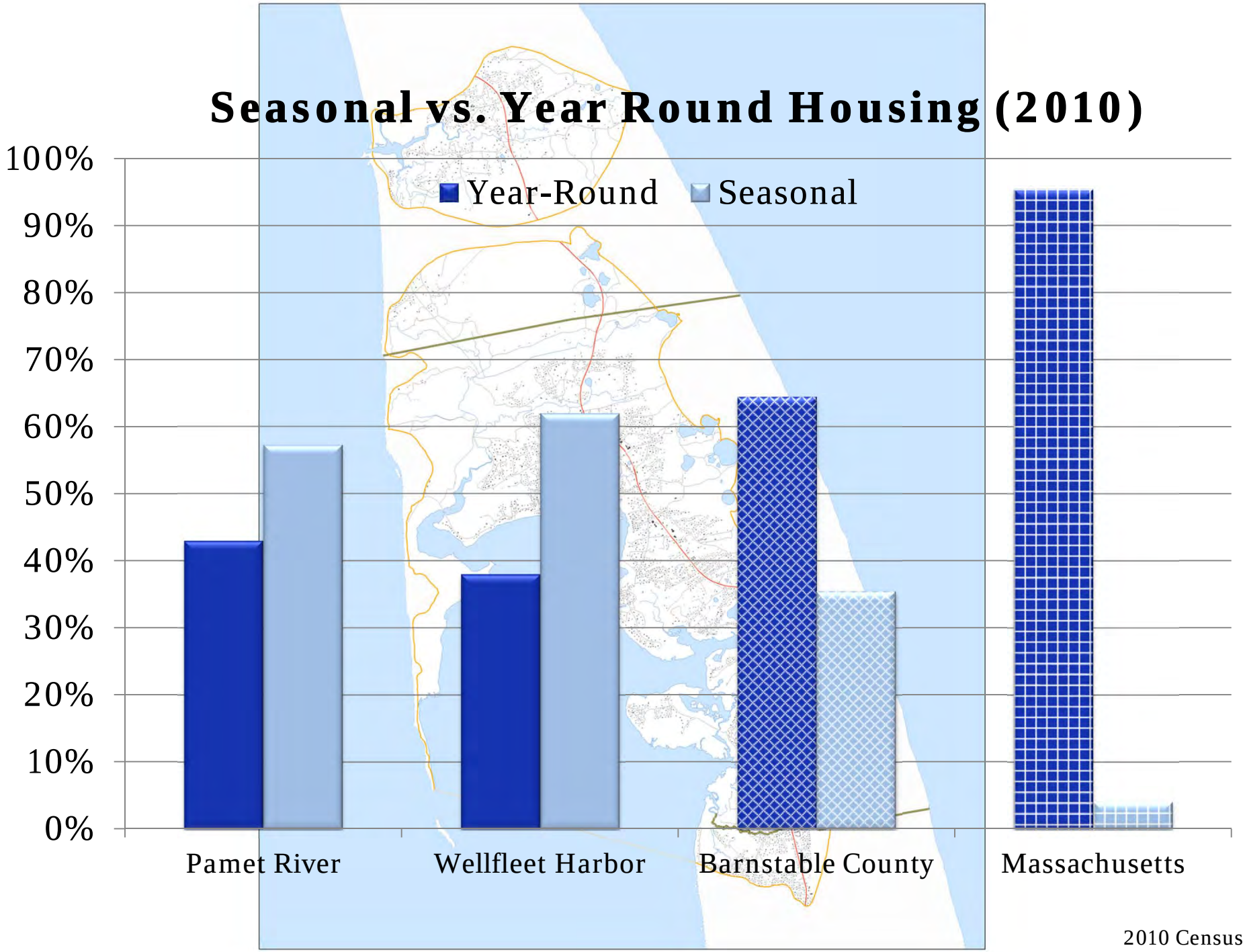


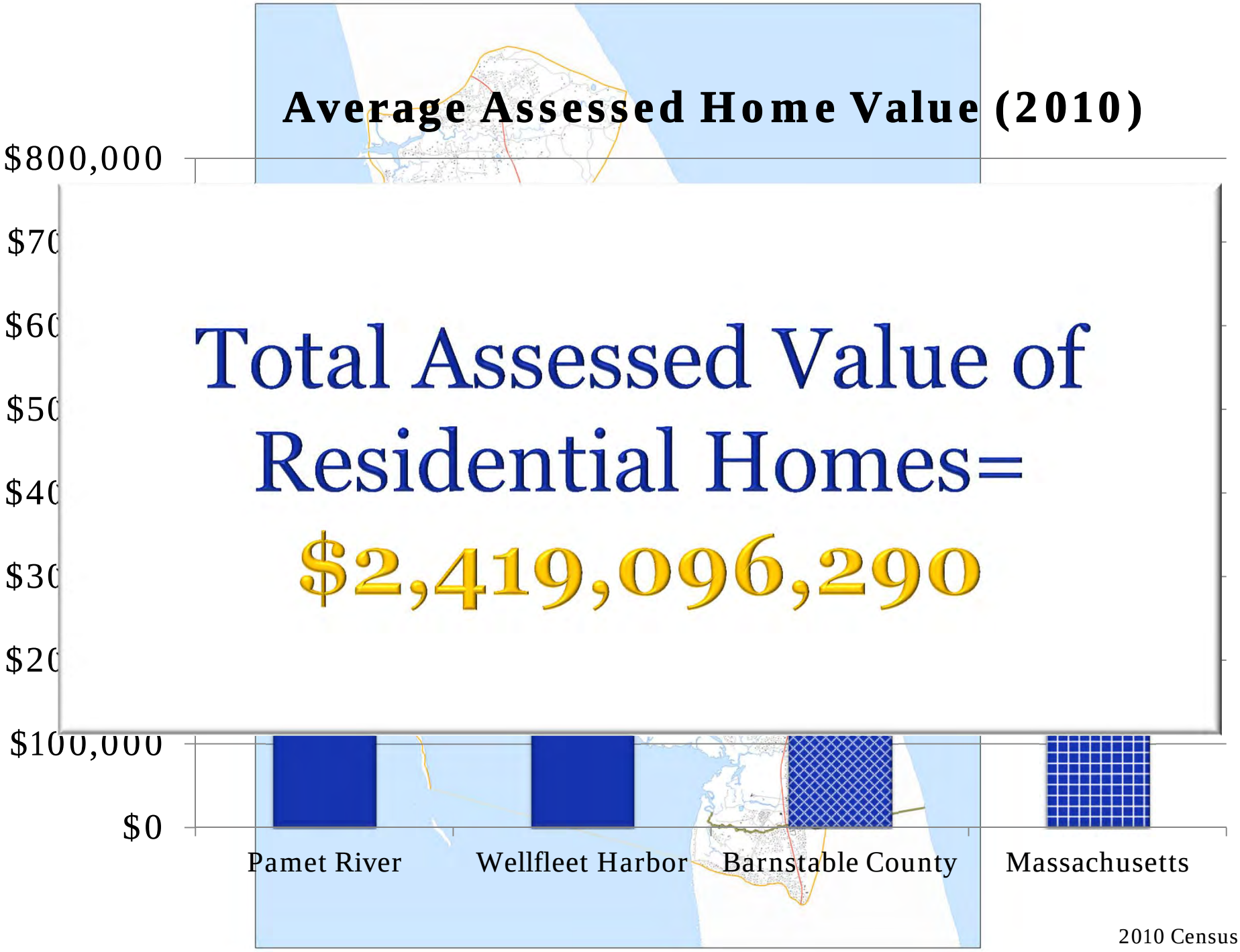
2% of the Total Cape Cod Population


Median Age (2010)
70
60
50
40
30
20
10
0
Pamet River
Wellfleet Harbor
Barnstable County
Massachusetts
2010 Census


Median Income (2010)
$100,000
$90,000
$80,000
$70,000
$60,000
$50,000
$40,000
$30,000
$20,000
$10,000
$0
Pamet River
Wellfleet Harbor
Barnstable County
Massachusetts
American Community Survey

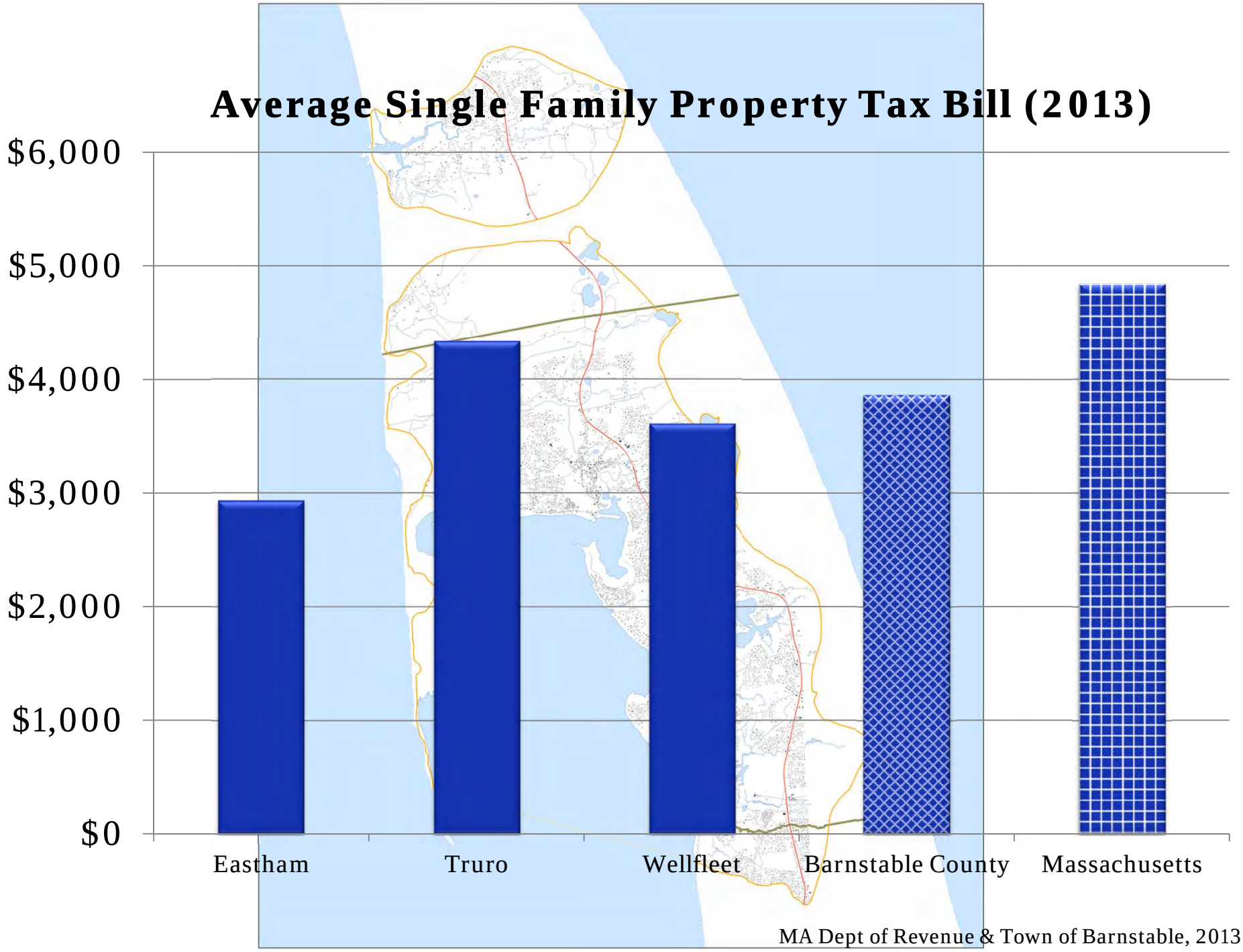

Race - % White (2010)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Pamet River
Wellfleet Harbor
Barnstable County
Massachusetts
2010 Census

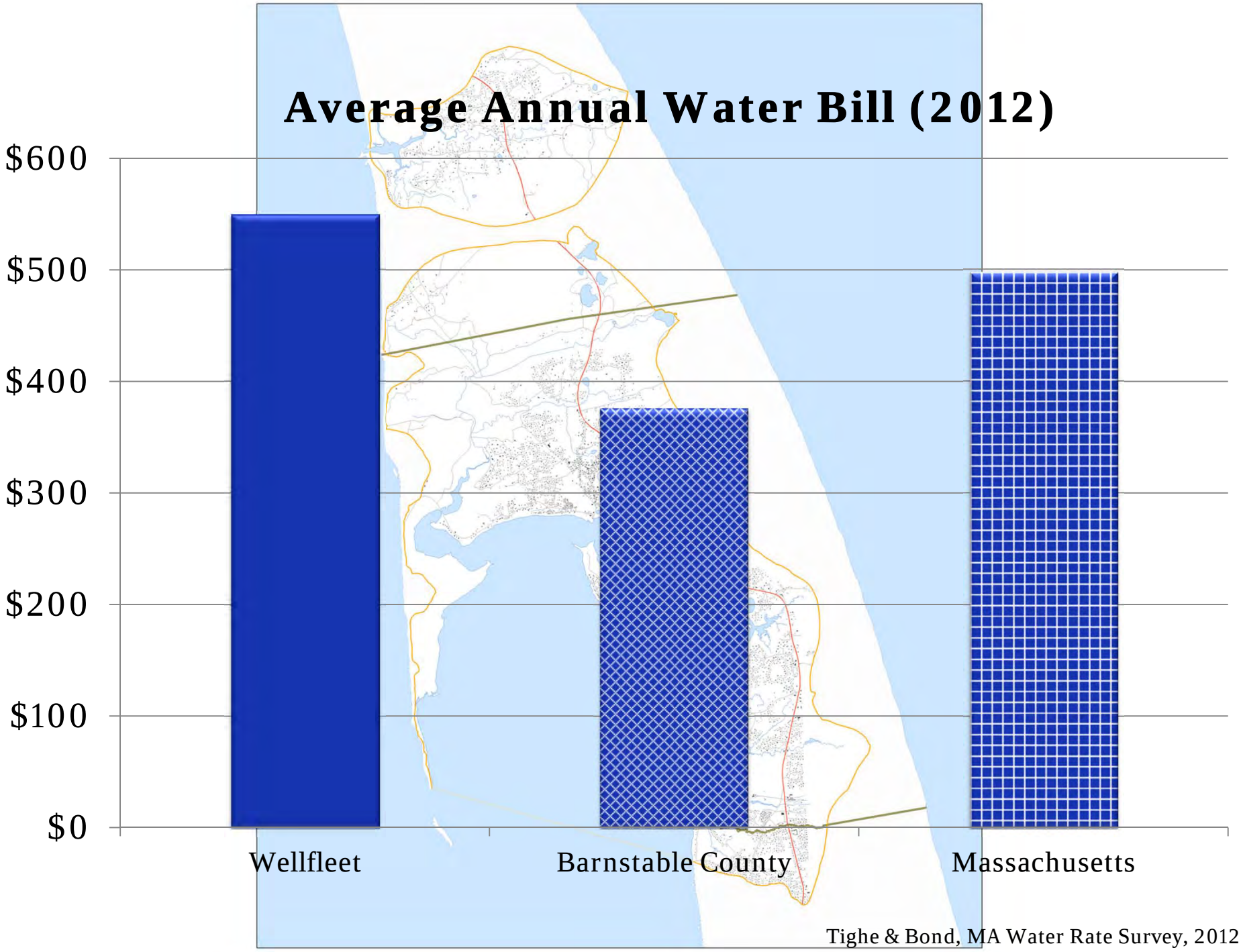

Seasonal vs. Year Round Housing (2010)
Year-Round
Seasonal
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Pamet River
Wellfleet Harbor
Barnstable County
Massachusetts
2010 Census


Average Assessed Home Value (2010)
$800,000
$70
$60
$50
$40
$30
$20
$100,000
$0
Total Assessed Value of Residential Homes=
$2,419,096,290
Pamet River
Wellfleet Harbor
Barnstable County
Massachusetts
2010 Census

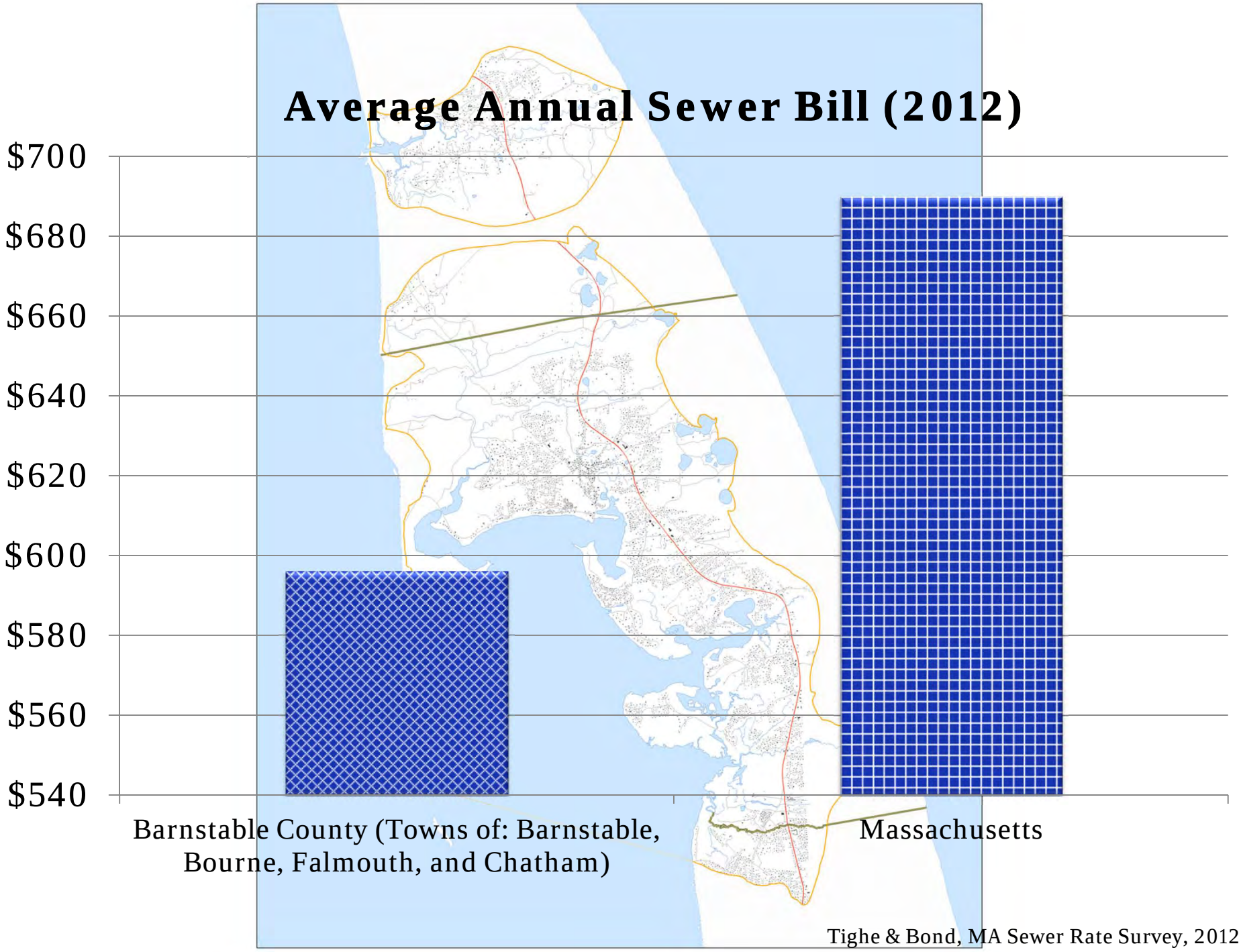
Your Government & Taxes

Pamet River
Wellfleet Harbor


Average Single Family Property Tax Bill (2013)
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
Eastham
Truro
Wellfleet
Barnstable County
Massachusetts
MA Dept of Revenue & Town of Barnstable, 2013



Tighe & Bond, MA Water Rate Survey, 2012

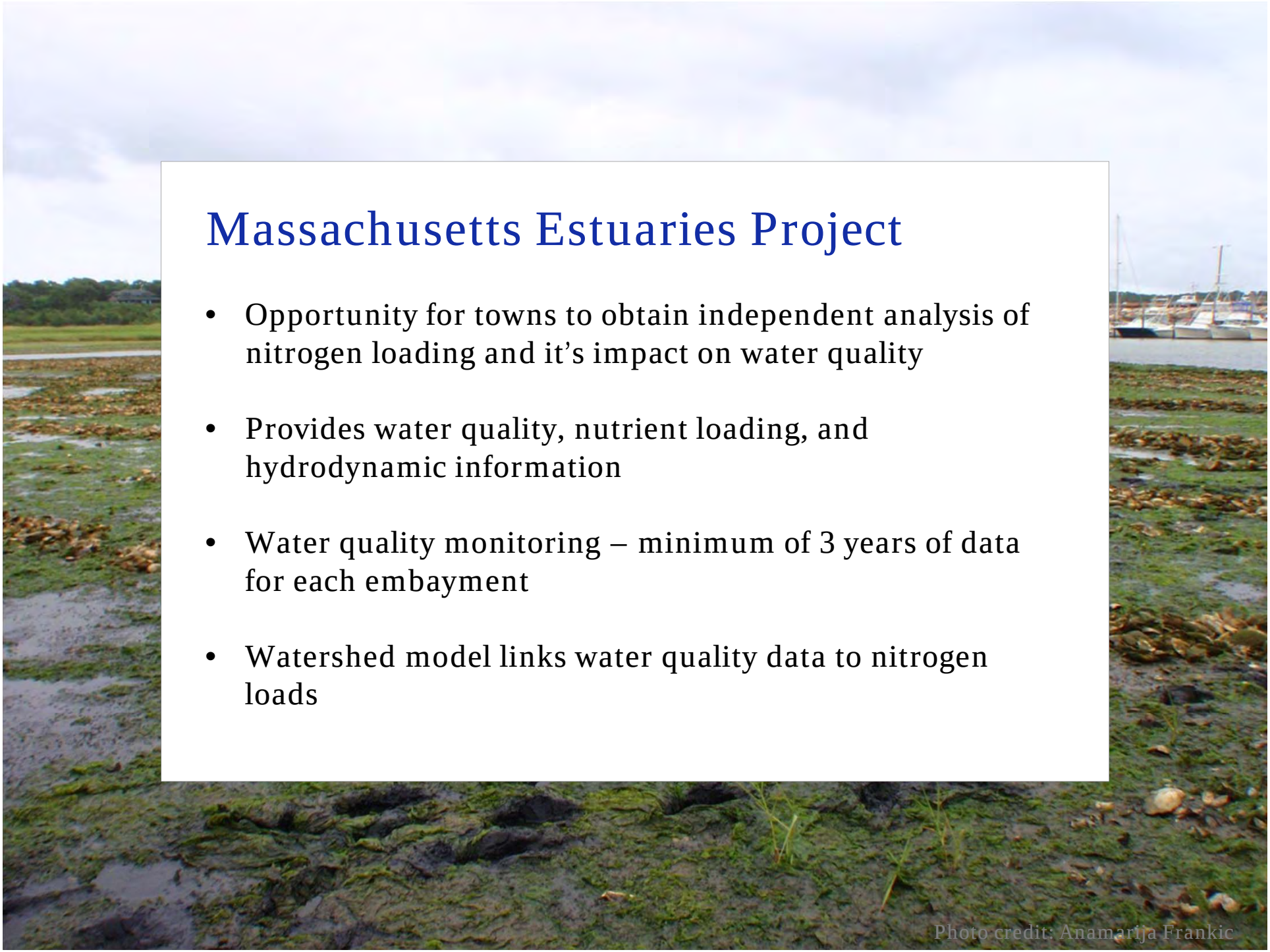


Tighe & Bond, MA Sewer Rate Survey, 2012

The Problem

Pamet River
Wellfleet Harbor

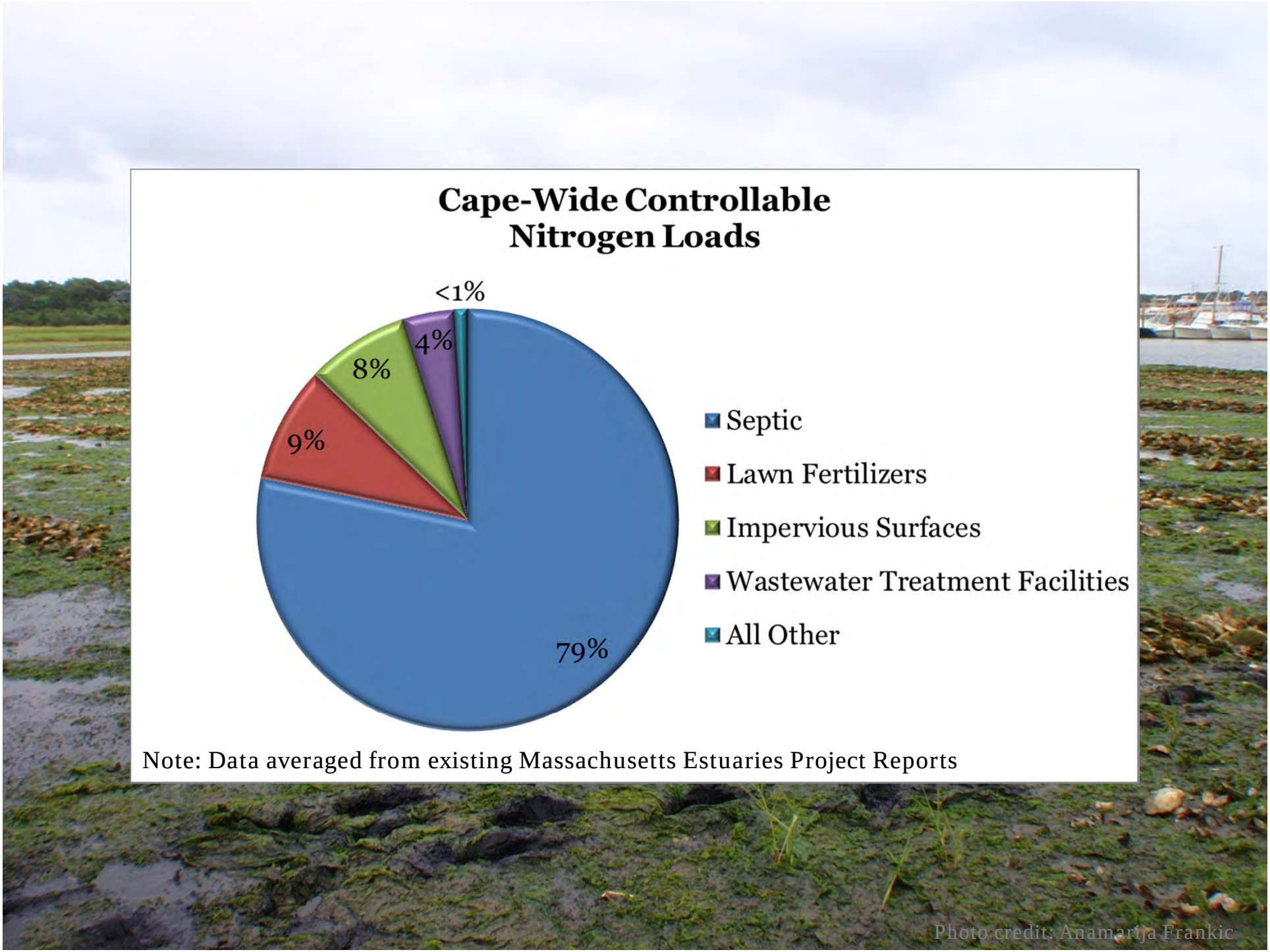

Photo credit: Anamarija Frankic

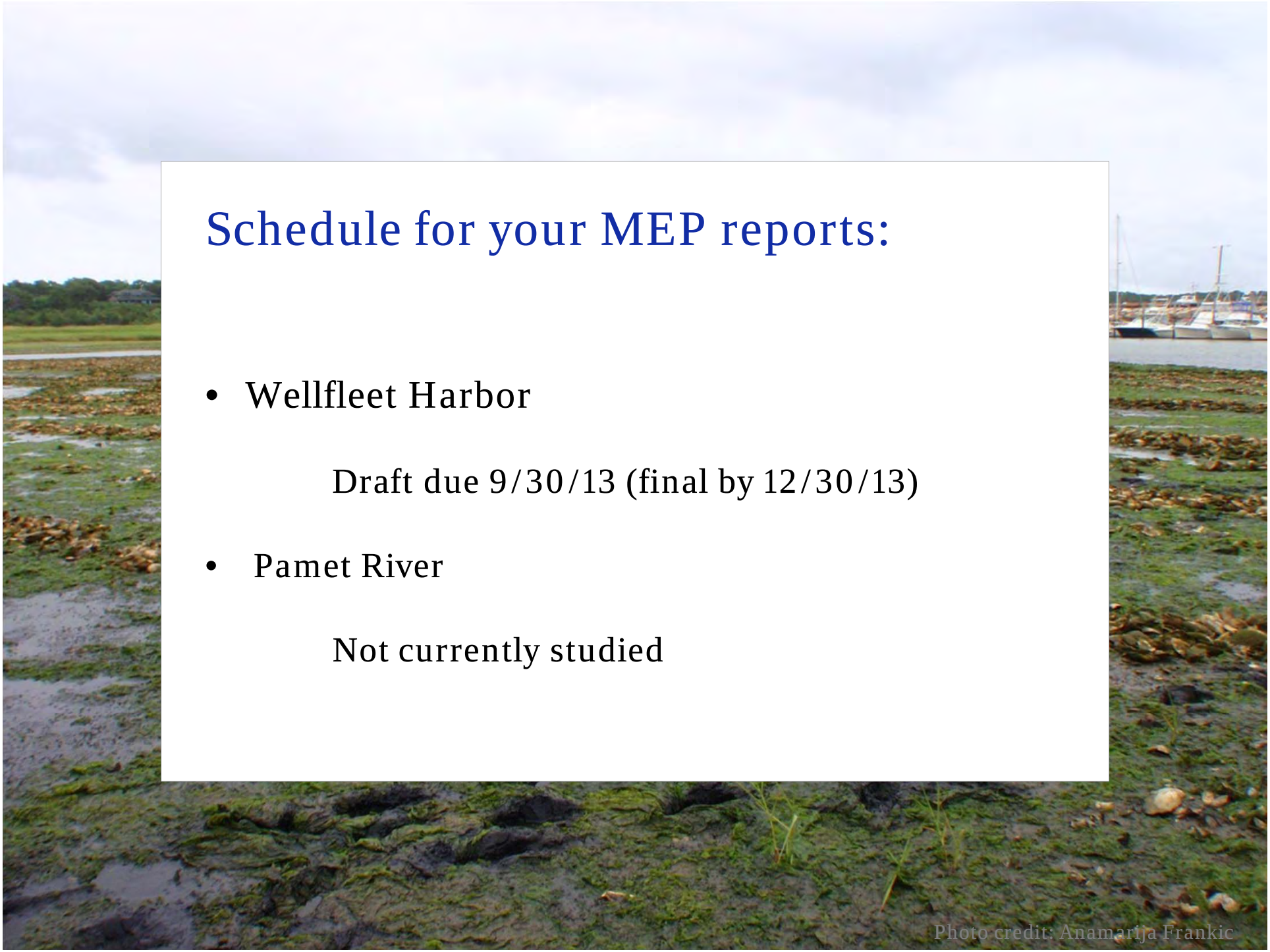


Massachusetts Estuaries Project

- Opportunity for towns to obtain independent analysis of nitrogen loading and it's 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

Photo credit: Anamarija Frankic


Cape-Wide Controllable Nitrogen Loads
<1%
4%
8%
9%
79%
Septic
Lawn Fertilizers
Impervious Surfaces
Wastewater Treatment Facilities
All Other
Note: Data averaged from existing Massachusetts Estuaries Project Reports
Photo credit: Anamarija Frankic



Schedule for your MEP reports:

- Wellfleet Harbor

  Draft due 9/30/13 (final by 12/30/13)

- Pamet River

  Not currently studied

Photo credit: Anamarija Frankic

Wellfleet Harbor Sampling

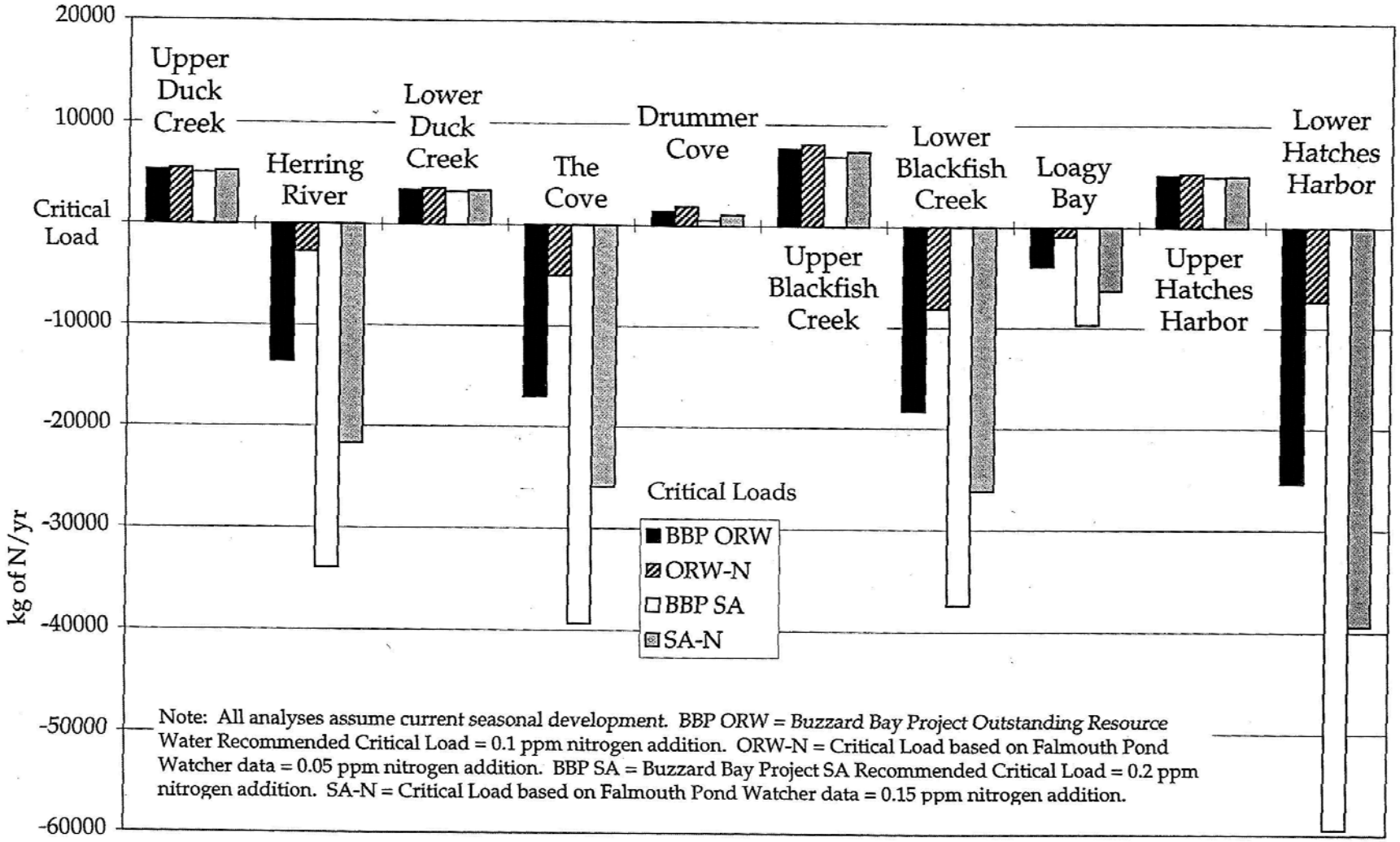
Photo credit: UMass Boston

Figure 22.

Buildout Nitrogen Loading

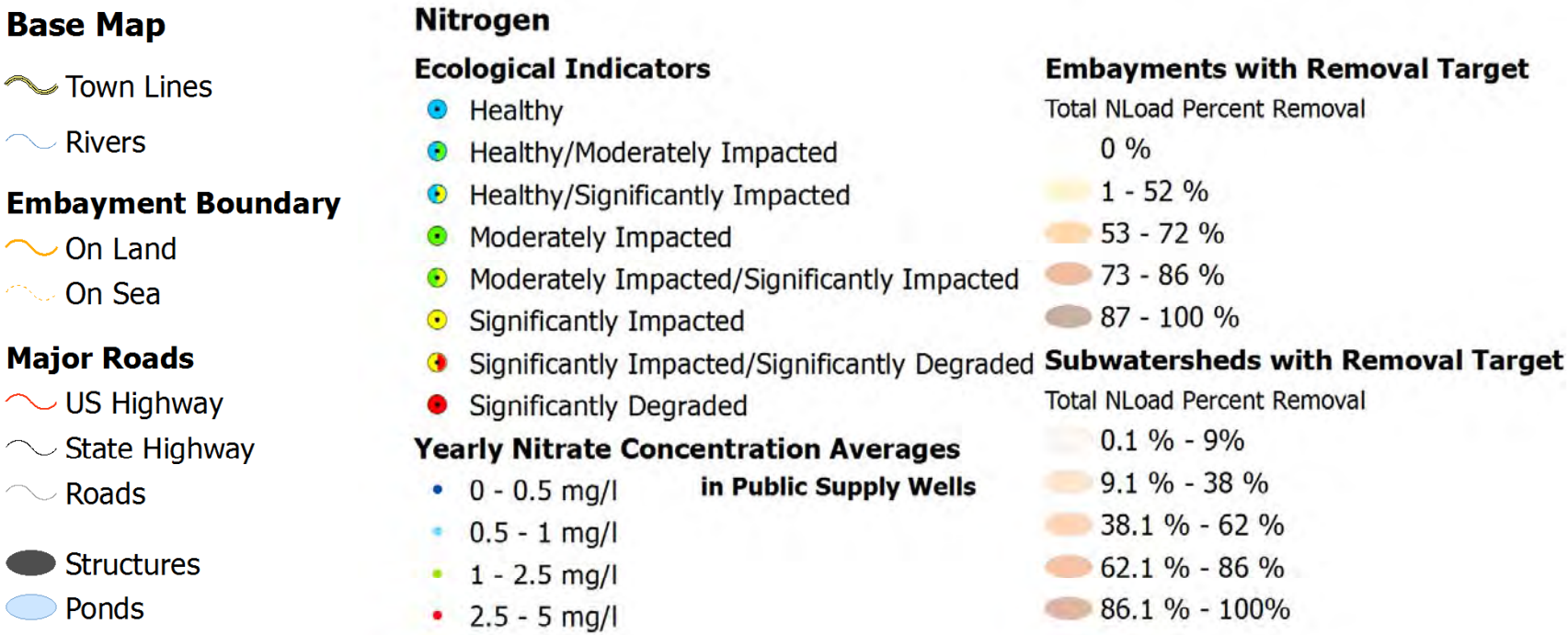
Wellfleet Harbor System, MA

Adjusted Nitrogen Loads/System Residence Time Nitrogen Limits



Cape Cod Commission, 1998

Nitrogen Problem



Sources: MassGIS, MEP, CCC

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

Sources: MassGIS

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

Sources: MassGIS, MassDOT, CCC

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

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

Existing & Proposed Solutions

Pamet River
Wellfleet Harbor

Existing Infrastructure

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

- Structures
- Ponds

Existing Conditions

- Approx. Locations of Loans Issued for Title 5 Repair
- Potential Title 5 Compliance Issues
- Wastewater Treatment Facility
- Groundwater Discharge Points
- Sewered Parcels

Enhanced Attenuation Sites

- Pipe
- Stormwater

Public Supply Wells

- Public Water Supply Well
- Small Volume Wells, Non-Transient
- Proposed Public Water Supply Well
- Surface Water Supply
- Small Volume Wells, Transient

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC

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

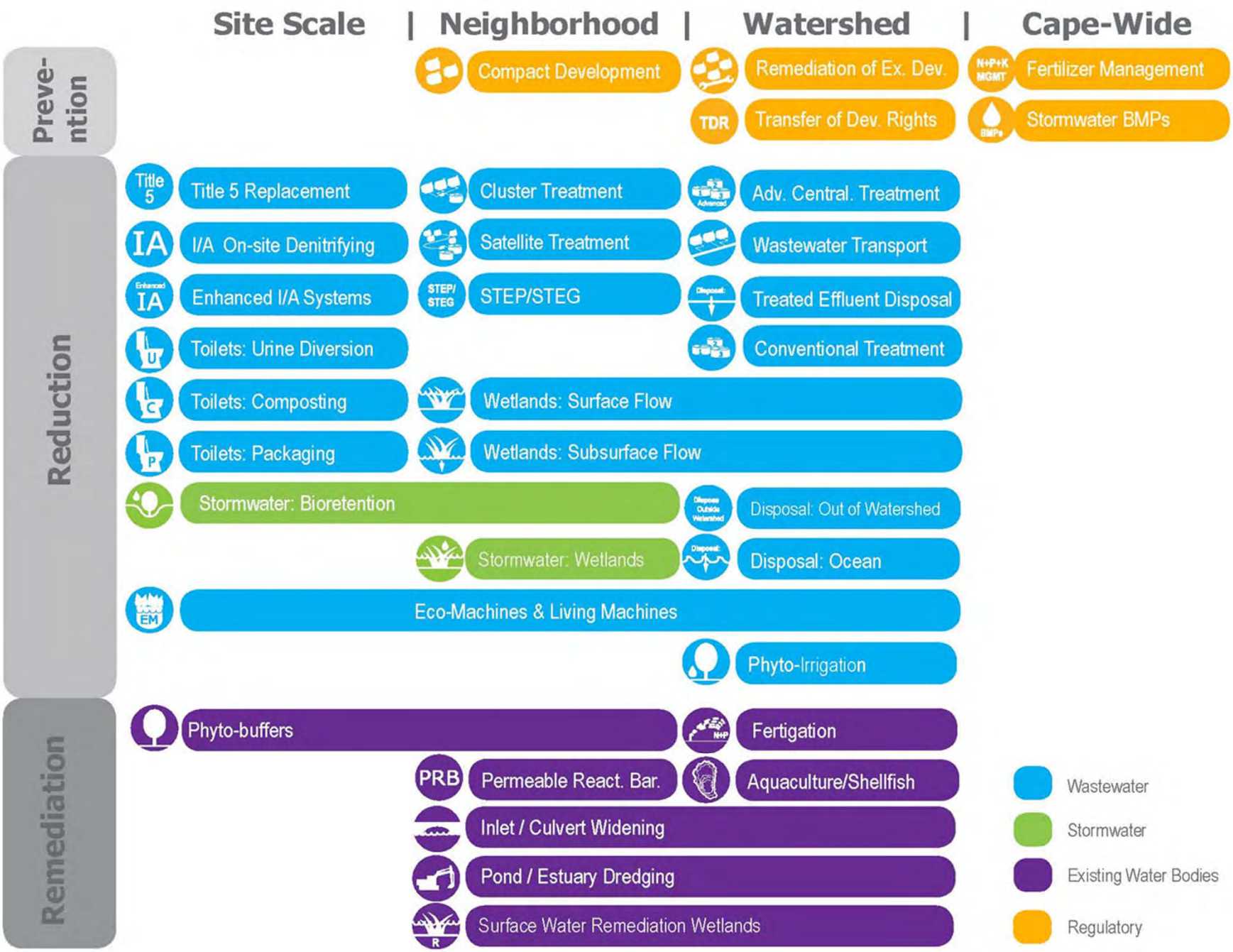
Phase Date

- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

Pamet River
Wellfleet Harbor


Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Compact Development
Remediation of Ex. Dev.
TDR
Transfer of Dev. Rights
N+P+K MGMT
Fertilizer Management
BMPs
Stormwater BMPs
Reduction
Title 5
Title 5 Replacement
Cluster Treatment
Adv. Central. Treatment
IA
I/A On-site Denitrifying
Satellite Treatment
Wastewater Transport
Enhanced IA
Enhanced I/A Systems
STEP/ STEG
STEP/STEG
Disposal:
Treated Effluent Disposal
Toilets: Urine Diversion
Conventional Treatment
Toilets: Composting
Wetlands: Surface Flow
Toilets: Packaging
Wetlands: Subsurface Flow
Stormwater: Bioretention
Disposal: Out of Watershed
Stormwater: Wetlands
Disposal: Ocean
EM
Eco-Machines & Living Machines
Phyto-Irrigation
Remediation
Phyto-buffers
Fertigation
PRB
Permeable React. Bar.
Aquaculture/Shellfish
Inlet / Culvert Widening
Pond / Estuary Dredging
Surface Water Remediation Wetlands
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
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Dredging
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced
IA
IA
C
U
P
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal
STEP/ STEG
Supplemental Sewering
Advanced

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

http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/wellfleet-harbor-pamet-river

Pamet River
Wellfleet Harbor

Cape Cod 208 Area Water Quality Planning
Wellfleet Harbor and Pamet River Watershed Working Group

Meeting One
Wednesday, September 25, 2013
1:00 to 5:00 pm
Wellfleet Council on Aging
715 Old King's Highway, Wellfleet, MA 02667

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: Wednesday, October 30, 2013
1:00 pm - 5:00 pm
Wellfleet Council on Aging

- 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 (see pages 3-4 for discussion of chronologies and Working Group suggestions).
  - Review technology fact-sheets in advance of the October 30 meeting. (Technology fact sheets will be distributed in early October).
- Cape Cod Commission
  - Contact Charlene Greenhalgh to obtain Truro specific data on residential managed lawns.
  - Obtain salt marsh and aquaculture layers from the towns.
  - Include on the GIS layers the private lands located within the Cape Cod National Seashore boundaries.
  - Check to see if the Cape Cod National Seashore areas were excluded from the buildout and density layers.
  - Ask the Cape Cod National Seashore for ponds and lake data from the Kettle Pond Atlas of 2001 and other pond monitoring programs.
  - Share dates of the finance committee meetings.
- CBI
  - Distribute the link to the slides and notes from the Cape Cod Commission's affordability/financial presentation.
  - Distribute September meeting summary.
  - Distribute meeting materials for October meeting: fact sheets and agendas
  - Coordinate a discussion with the Wellfleet Comprehensive Wastewater Management Committee, the Commission, and CBI about how to interface with the CWMC during the 208 Plan Update process.

WELCOME AND INTRODUCTIONS

Ms. Erin Perry, Special Projects Coordinator, Cape Cod Commission welcomed the members of the Wellfleet Harbor and Pamet River Watershed Working Group. Appendix A contains a list of the group members who were in attendance. All meeting documents and presentations for the Wellfleet Harbor and Pamet River Watershed Working Group are located here: http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/wellfleet-harbor-pamet-river

Ms. Kate Harvey, Facilitator from the Consensus Building Institute (CBI), described CBI's role and the member selection process.[1] She then described the role of Mr. Scott Horsely, Area Manager for the Outer Cape. Mr. Horsely will attend the stakeholder workshops and prepare materials for subsequent workshops. In Spring 2014, he will work with the Cape Cod Commission staff to draft a comprehensive Cape-wide plan that combines the specific recommendations from the Wellfleet Harbor and Pamet River Working Group with the recommendations of the other 11 watershed working groups on the Cape.

She 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.

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.

[1] CBI's role and the participant selection process are described in detail in the Draft Process Protocols located on the Wellfleet Harbor and Pamet River Watershed Working Group website: http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/wellfleet-harbor-pamet-river

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.[2] As previously noted, the September working group meetings were focused on baseline conditions. During the next working group meeting 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 Corps of Engineers, and other state and federal partners comprise the RLI. Local, regional, national, and international experts on water quality management technologies comprise the TAC, which is a committee of the Cape Cod Water Protection Collaborative. The Technology Panel consists of academic and research institutions, state watershed managers, and consultants.

LOCAL PROGRESS TO DATE

On three separate chronologies, Mr. Horsley highlighted past actions that had been taken in Eastham, Wellfleet, and Truro that would either protect or inhibit water quality in the Pamet River and Wellfleet Harbor.[3] Working group members 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.

Participants made the following comments and suggestions on the Wellfleet chronology:

- Include the pond-monitoring program from the Cape Cod National Seashore.
- Add the adoption of a local comprehensive plan and harbor management plan in 1995.
- Include the municipal water approval in phases. Phase 1 started in 2010. Phase 2 started in 2012. Bids are currently open for Phase 3.
- Indicate the increase in minimum residential lot size from 20,000 square feet to 30,000 square feet in 1984.
- Include the preliminary results of nitrogen reduction fro the oyster project between 2011-2012.
- A third MOU and a three million dollar grant from NOAA for redesign of the dike could also be included.

[2] Contact Erin Perry (eperry@capecodcommission.org) if you would like to schedule an Affordability and Financing presentation.

[3] Detailed chronologies are available in the Wellfleet Harbor and Pamet River Baseline Data Presentation located here: http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/wellfleet-harbor-pamet-river

Participants made the following comments and suggestions on the Truro chronology:

- Include information about when the town changed minimum lot sizes in the 1980s.
- Noting the connection between groundwater and freshwater ponds, a participant suggested including information about the commencement of freshwater pond monitoring.

Participants made the following comments and suggestions on the Eastham chronology:

- Add culvert reconstructions on Herring Brook and at Coles Beach. Other potential items to include are the moving of a dike to increase flushing of the salt marsh, and correction of a stormwater runoff situation by installing permeable asphalt.
- Include the vote to approve funding for an alum treatment in Great Pond in 2013.
- Include the commencement of PALs testing in 2003.
- Add the failure to pass in 2007 town meeting an article to establish a Municipal Water District.

Reflecting on the chronologies, the members identified the following lessons learned to keep in mind while beginning the evaluation process of the 208 Plan Update:

- The cost will increase the longer we wait.
- Remember the seaside impacts: the ocean is a nitrogen sink, but it also has a limited capacity. Once we pass the threshold, impacts will occur in the ocean too.
- New infrastructure should be located in places where it will not be vulnerable to flooding, storm surge impacts, or climate change.
- Use real examples to create context for public education. For example, the break through of the Atlantic Ocean into the Pamet River served as an educational tool to inform people about the freshwater aquifer feeding the Pamet.
- Monitor the closed Truro landfill.
- Consider alternative technologies.

BASELINE CONDITIONS

Mr. Horsely 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 Wellfleet Harbor and Pamet River. Working group members and members of the public are encouraged to view the layers on the Cape Cod Commission website.[4] 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.

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.

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

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. Land Use Vision Map data delineates economic centers; industrial and service trade areas, village boundaries, resource protection areas, other designations, and undesignated lands.

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

Density and Buildout Layers – The density layer shows the current per acre density of existing dwelling units in quarter square mile grids. The regional buildout layer shows the maximum potential buildout over a 20-25 year time horizon using the towns zoning regulations and normalizing that data by applying state designated zoning layers. Mr. Horsley emphasized that buildout scenarios are an art, not a science, and that there are many ways to conduct a buildout analysis. He illustrated this point by showing a slide that depicted differences between the Regional Buildout, the Comprehensive Waste Management Plan buildout, and the Local Comprehensive Planning Buildout for communities across the Cape. He explained that the Cape Cod Commission's approach to the buildout analysis enables comparison of potential buildout across the entire Cape, but eliminates some detail on the local level. Mr. Horsely noted that density is a critical component to the 208 Update Plan since 30% growth will increase capital costs by 40%.

Working group members made the following comments or posed the following questions after the data layer presentation. *Responses from the Commission or the Consensus Building Institute are italicized.*

- One member asked about the maintenance required with porous pavement. A representative of the Commission said vacuuming is one of the maintenance actions. But, after approximately 20 years the pours are filled and the roadway essential acts as a normal roadway.
- A group member said there is a cranberry bog off of North Pamet Road in Truro.
- A member asked if the assumption is that all lawns receive fertilizer. The member said there are many homes with 'wild cape' landscaping, which is not managed, so the area estimated in residential managed lawns may be overly conservative. *Mr. Horsely commented that the Commission would like to ground truth fertilizer application estimates, but this is not included in the current scope.*

- Another member said Truro estimated the group cover that would receive fertilizer and ground-truthed the data while completing Phase 1 of the CWMP.
- One member asked if the Commission has data layers to indicate the locations of private lands within the Cape Cod National Seashore boundaries. *Mr. Detjens said the Commission has this data, but it is not yet included.* Another member said Truro and Wellfleet have 211 and 256 parcels, respectively, located within the Seashore boundaries.
- A participant suggested obtaining salt marsh and aquaculture layers from the towns as well.
- One discussant cautioned the use of buildout in place of population forecast since the two parameters will create very different outcomes in a model.
- Some members said the projected buildouts do not look accurate. They mentioned that in Truro and Wellfleet, the zoning is three acres in the seashore district; but this is not possible by the looks of these projections. Members also asked if the seashore zone was demarcated as a no growth zone in the GIS layers.

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. Approximately 3.447 people, or 2% of Cape Cod's total population, live in the Wellfleet Harbor and Pamet River watersheds. Those living in Wellfleet Harbor watershed are approximately 56 years of age on average and their average median income is slightly less than $60,000. Those living in the Pamet River watershed are approximately 58 years of age on average and their median income is slightly less than $90,000. Over 90% of the population in the watersheds is white. Wellfleet Harbor has a year round population of approximately 38% and a seasonal population of approximately 62%. Pamet River has a year round population of approximately 42% and a seasonal population of approximately 58%. The total assessed value of residential homes in the study area is 2.4 billion dollars. The average single-family property tax bill (2013) is approximately $3,000 in Eastham, $4,400 in Truro, and $3,600 in Wellfleet. The annual water bill is approximately $550 in Wellfleet.

Working group members made the following comments on the people data inputs:

- The seasonal vs. year round housing estimate for the Pamet River appears correct.
- In Wellfleet, the seasonal to year round ration is closer to 7:1.
- One commenter suggested that state aid to the area is reduced because the residents in the area are perceived to be wealthy.
- A member asked why it is important to know the average cost of sewer bills. *Mr. Horsely said the sewer bills were just to give an indication of the annual cost to build and maintain sewer systems.*

THE PROBLEM

Mr. Horsely explained that eutrophication from nitrogen loading in coastal estuaries and phosphorous loading in ponds and lakes is the primary problem to solve. In many areas of the Cape, the Massachusetts Estuary Project (MEP) provides three years of nutrient loading, water quality monitoring data, and hydrodynamic information to link water quality data to nitrogen loads. However, site specific MEP reports for Wellfleet will not be final until December 30, 2013, so Cape-wide MEP data may be used in the analysis.

Mr. Horsely 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 wasterwater treatment facility effluent and natural sources comprise the remaining one percent. He also reviewed buildout nitrogen loading estimates for Wellfleet Harbor that were produced by the Commission in 1998. This data shows that the Herring River can assimilate more nitrogen. Eelgrass data layers collected by aerial analysis can also be reviewed as an indicator of change; however, the accuracy of this data source is questionable.

To address the phosphorous problem, 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 ponds highlighted as 'priority' on the GIS layers have not been prioritized. Instead, they represent ponds that have been sampled.

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 offered a few caveats with the data: 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 more likely to exhibit compliance issues due to the small size of the land parcels, shallow depth to groundwater at the parcel locations, soil structure, 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.

Group members made the following comments on the presentation of the problem:

- One commenter noted a gap in the MEP study design; the MEP does not consider the use of shellfish for nitrogen reduction.
- A group member said the Pamet River had been studied; but it is not part of a final MEP report.
- In regards to the slide on Cape Wide Nitrogen sources, a participant said the pie chart may only represent five percent of the total nitrogen in the environment, which could ultimately misrepresent the problem at hand. The group member said the assumption is that you can tackle the nitrogen issue; but other landscape features such as salt marsh restorations, eel grass plantings, and aquaculture projects could dramatically reduce nitrogen levels.
- Another group member said Roger may have more detailed eelgrass data to provide.
- A discussant suggested using the data in the Cape Cod National Seashore's 2001 Kettle Pond Atlas and requested clarification on the connection between groundwater and surface water.
- A participant said he had a data layer showing the locations of Title 5 failures
- A group member suggested using the 2011 LIDAR data to build the contour map.

EXISTING AND PROPOSED INFRASTRUCTURE

Mr. Horsely 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 sewershed phasing, if applicable. They requested group members provide additional information on planned stormwater upgrades to existing infrastructure. A group member said Provincetown has a list of areas planned for stormwater upgrades, which they are completing at a rate of one to two projects per year.

Group members made the following comments about the existing and proposed infrastructure layers:

- Charlene Greenhalgh has information about naturally widening flowways in the study area.

WORKING GROUP FEEDBACK

Ms. Harvey then asked group members to identify any key priorities, challenges, or needs they foresee in Wellfleet Harbor and Pamet River watersheds. The members suggested the following priorities, challenges and needs:

- One member suggested educating both the public and the regulators about potential alternative technologies would be both a challenge to overcome.
- A member suggested a need to map the kettle ponds and their connection to Title 5 systems. Referring to this comment, another member said the Title 5 solution addresses a different problem and that Title 5 systems do not contribute a lot of nitrogen to the system.
- Another member proposed the need to identify and force the closure of existing cesspools in the Pamet River watershed.
- A member said the MassDOT should be involved since the roadways are a large source of stormwater runoff. In response to this statement, another group member identified Route 6 as a priority area. The member said Route 6 hampers slat marsh restoration in the area.
- A participant said that the group must be well prepared and ensure the right people present the information at town meeting since this is where the solutions will ultimately be decided.
- A participant said a key challenge to using aquaculture or oyster bed restoration as a nitrogen removal technique is state regulations in the division of marine fisheries.
- One participant suggested adding contaminants of emerging concern as a challenge and priority.
- A group member suggested adding phytoremediation as a key priority.

NEXT STEPS

Mr. Horsely 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. He noted that the packaging toilets option would likely be removed from the matrix. 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.

- A group member suggested adding aquaculture, salt marsh restoration, and bioremediation as potential options for reducing nitrogen concentration levels.

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

1) Establish targets and articulate project goals.
2) Identify priority geographic areas
3) Determine which management activities should definitely be implemented. These might be the easiest and least costly management activities that should be undertaken regardless of other management actions.
4) Assess alternative options to implement at the watershed or embayment scale
5) Assess options to implement at the site-level
6) Examine priority collection/high density areas
7) Consider traditional sewering or other grey infrastructure management options

OPERATING PROTOCOLS

Ms. Harvey 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.

PUBLIC COMMENTS

The facilitator opened the floor for public comments of three minutes or less each. There were no comments.

Appendix A
Attendance

Name	Affiliation
Curt Felix	Comprehensive Wastewater Planning Committee, Wellfleet
Deborah Freeman	Wellfleet Conservation Trust
Charleen Greenhalgh	Town Planner, Truro
Suzanne Grout Thomas	Beach Administrator, Wellfleet
Mike Guzowski	Water Management Committee, Eastham
Charles Harris	Water Management Committee, Eastham
Ned Hitchcock	Wastewater Committee, Wellfleet
Laura Kelly	Littlefield Landscaping
Lauren McKean	National Parks Service
John Morrissey	Selectman, Wellfleet
Patricia Pajaron	Health Agent, Truro
Tracey Rose	Real Estate Agent, Thomas D. Brown Real Estate Agency
May Ruth Seidel	Wellfleet Non-Resident Taxpayer Association
Harry Terkanian	Town Administrator, Wellfleet
Robert Weinstein	Planning Board, Truro
Bill Worthington	Planning Board, Truro
Staff	
Kate Harvey	Consensus Building Institute
Eric Roberts	Consensus Building Institute
Jay Detjens	Cape Cod Commission
Scott Horsley	Cape Cod Commission
Anne McGuire	Cape Cod Commission
Erin Perry	Cape Cod Commission
James Sherrand	Cape Cod Commission
Observers	
Dan Milz	PhD Candidate, University of Chicago