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

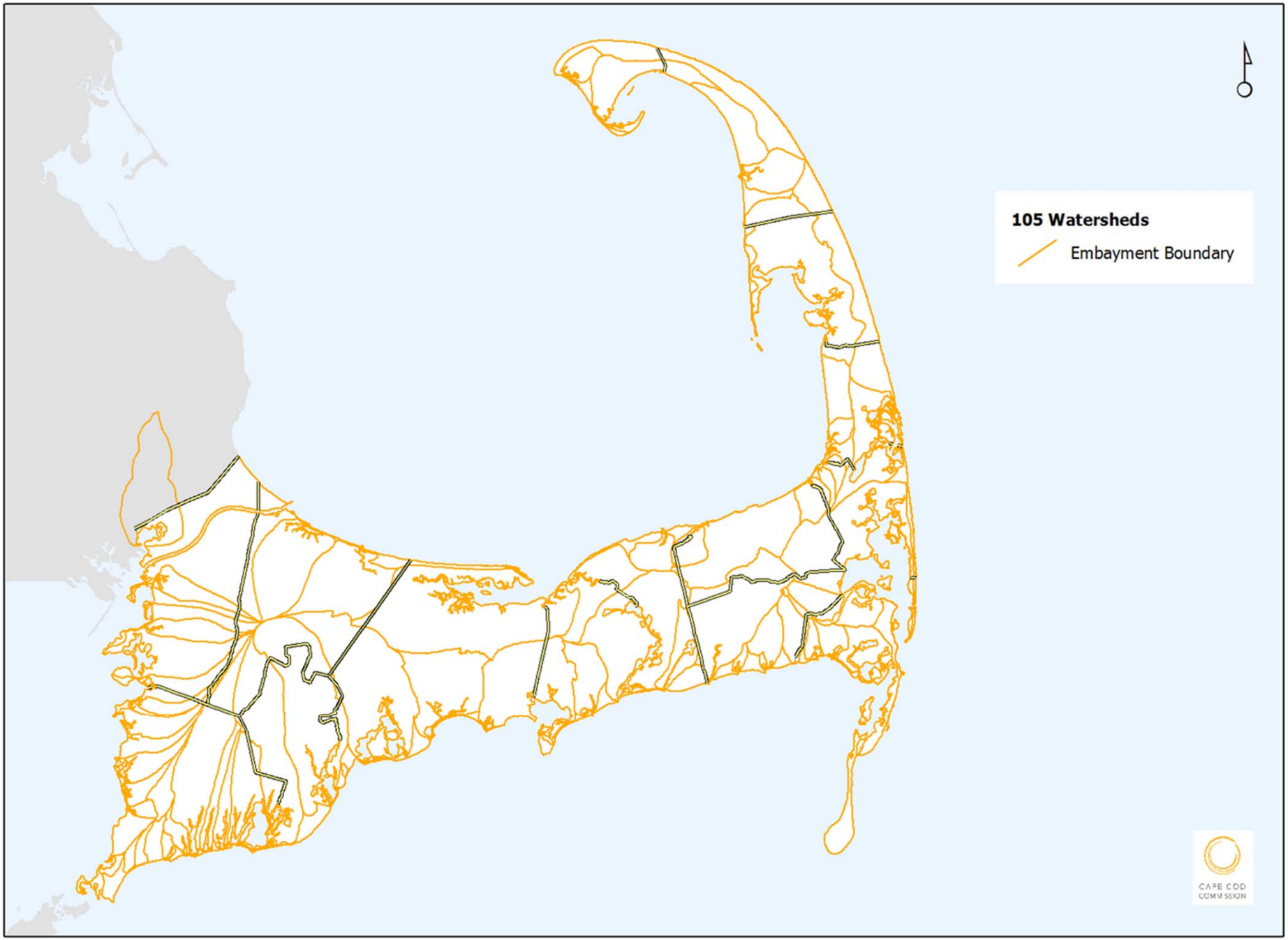
The Commission was directed to update the 1978 Plan

The Commonwealth provided $3 million to fund the project

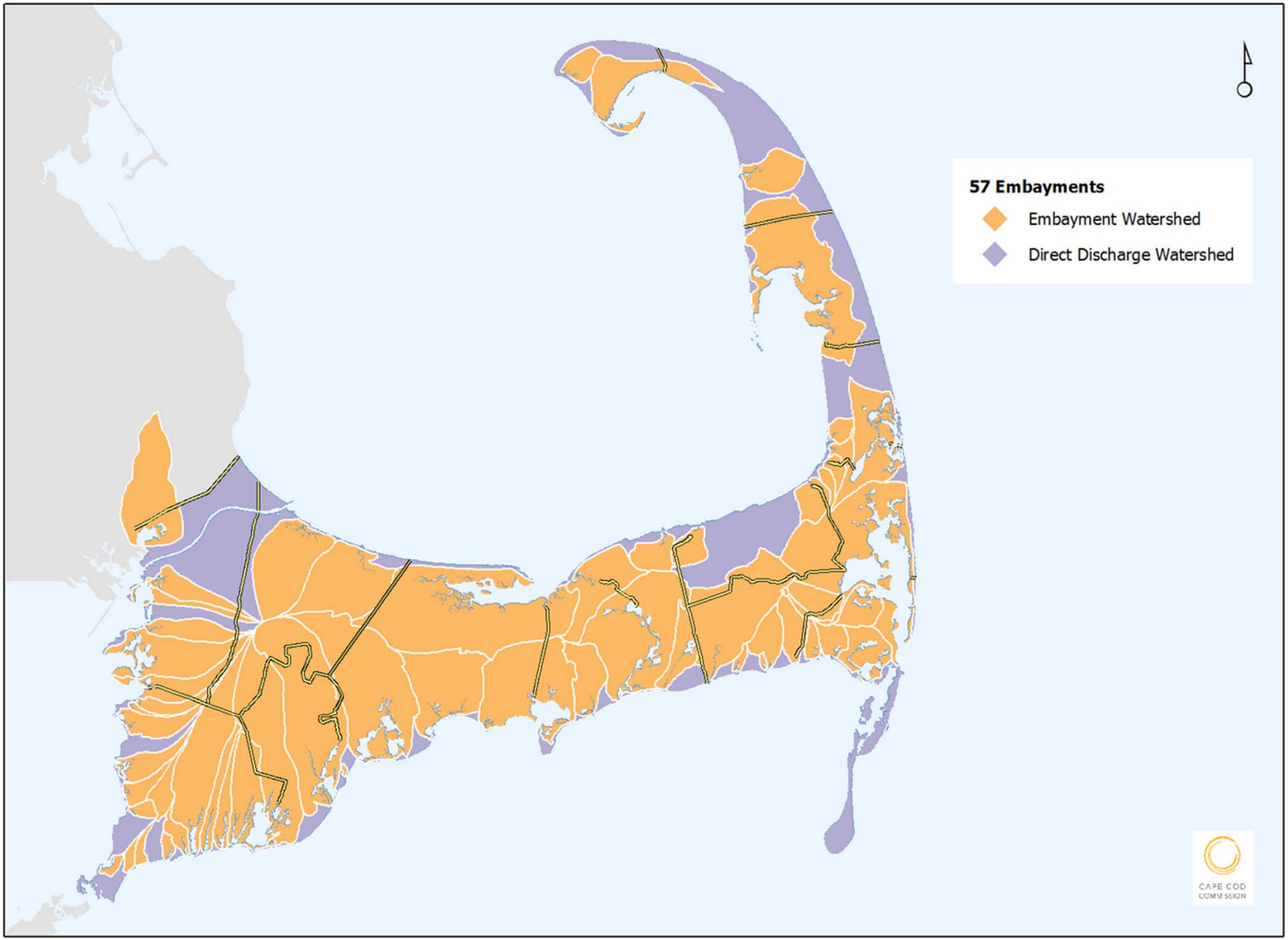
Focus on 21st Century Problems

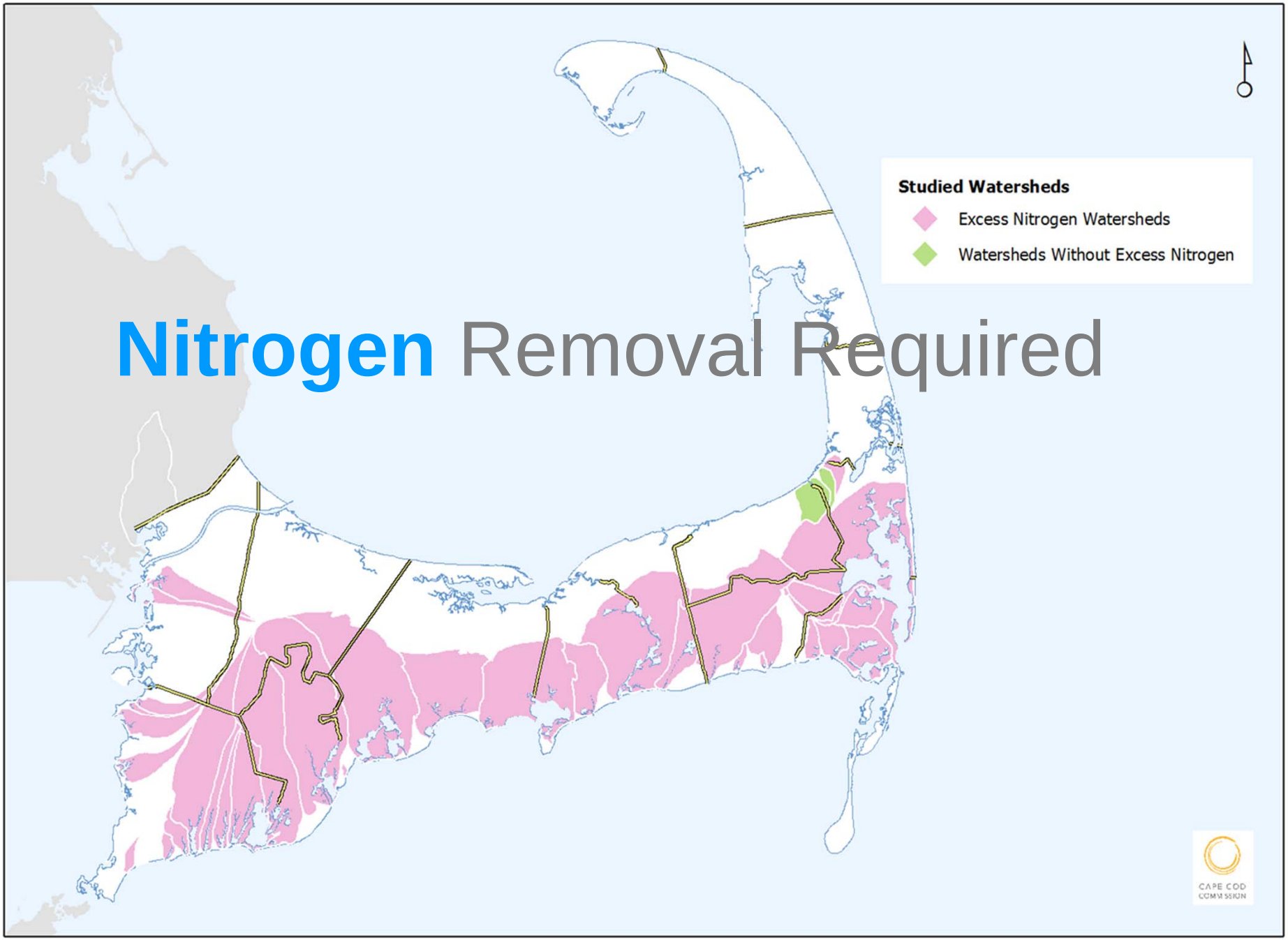
- Nitrogen: Saline Waters
- Phosphorus: Fresh Waters
- Growth & Title 5 Limitations

"Watershed Working Group - Stage Harbor - Workshop 1"

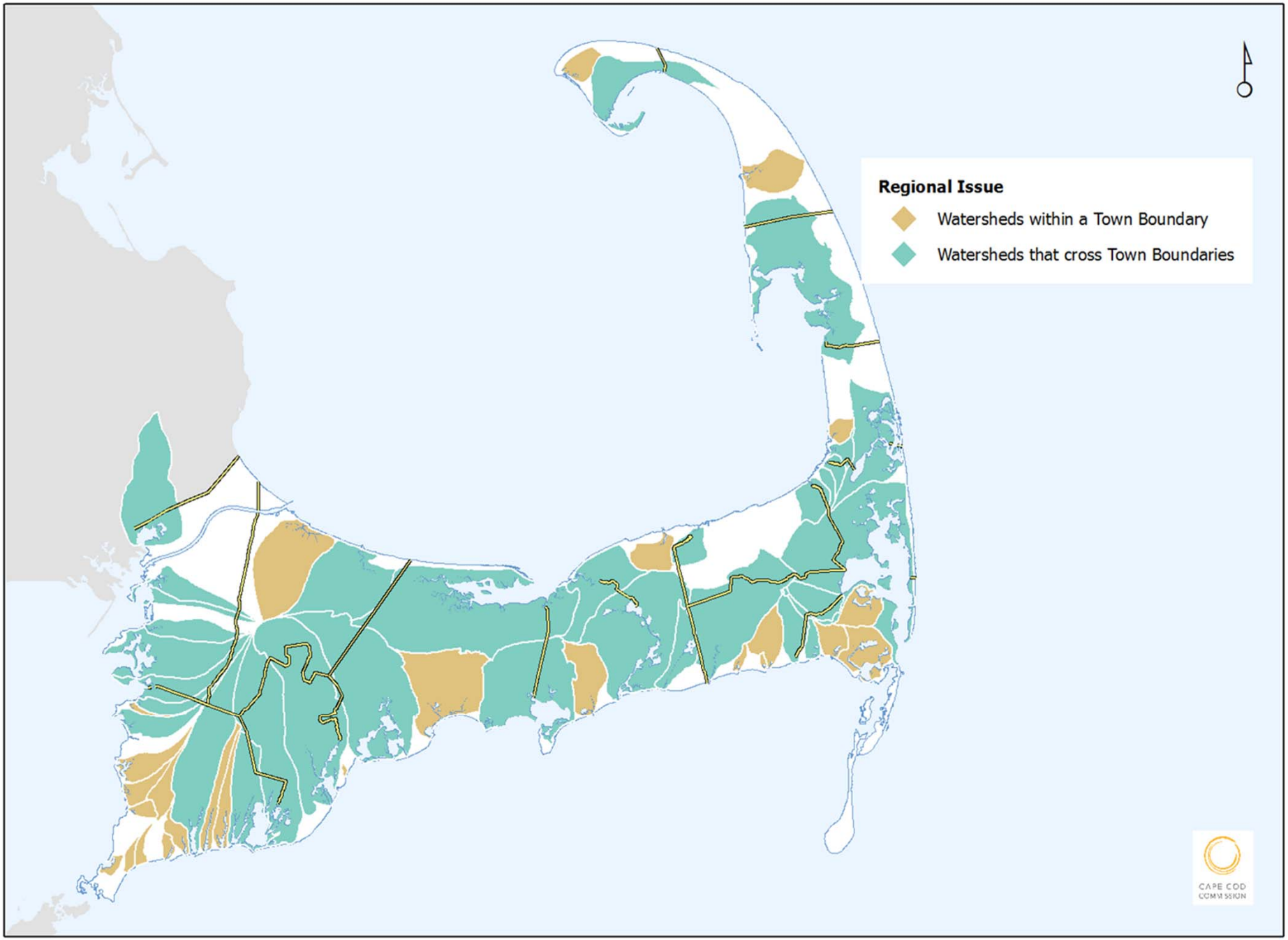


"Watershed Working Group - Stage Harbor - Workshop 1"




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

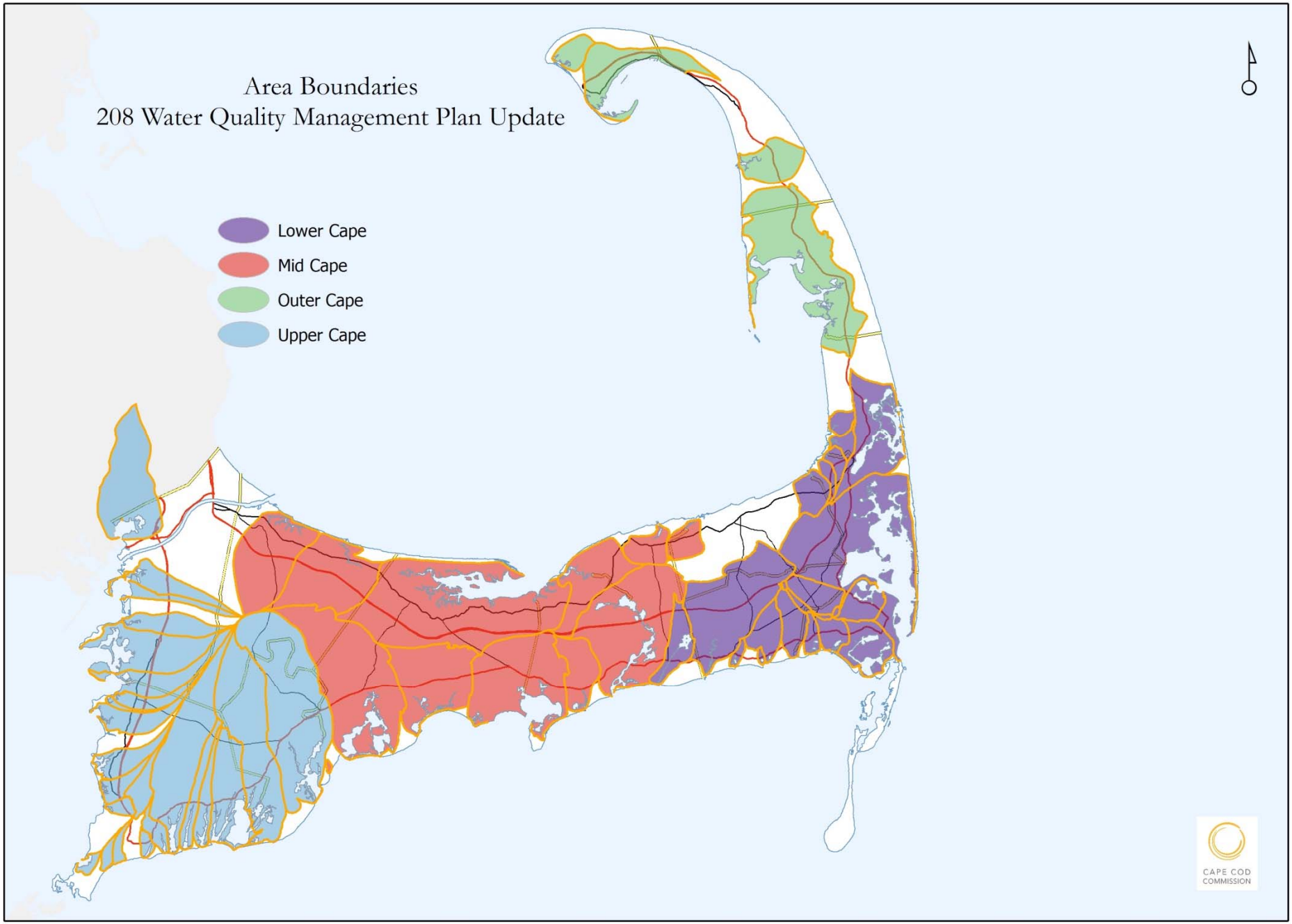
"Watershed Working Group - Stage Harbor - Workshop 1"

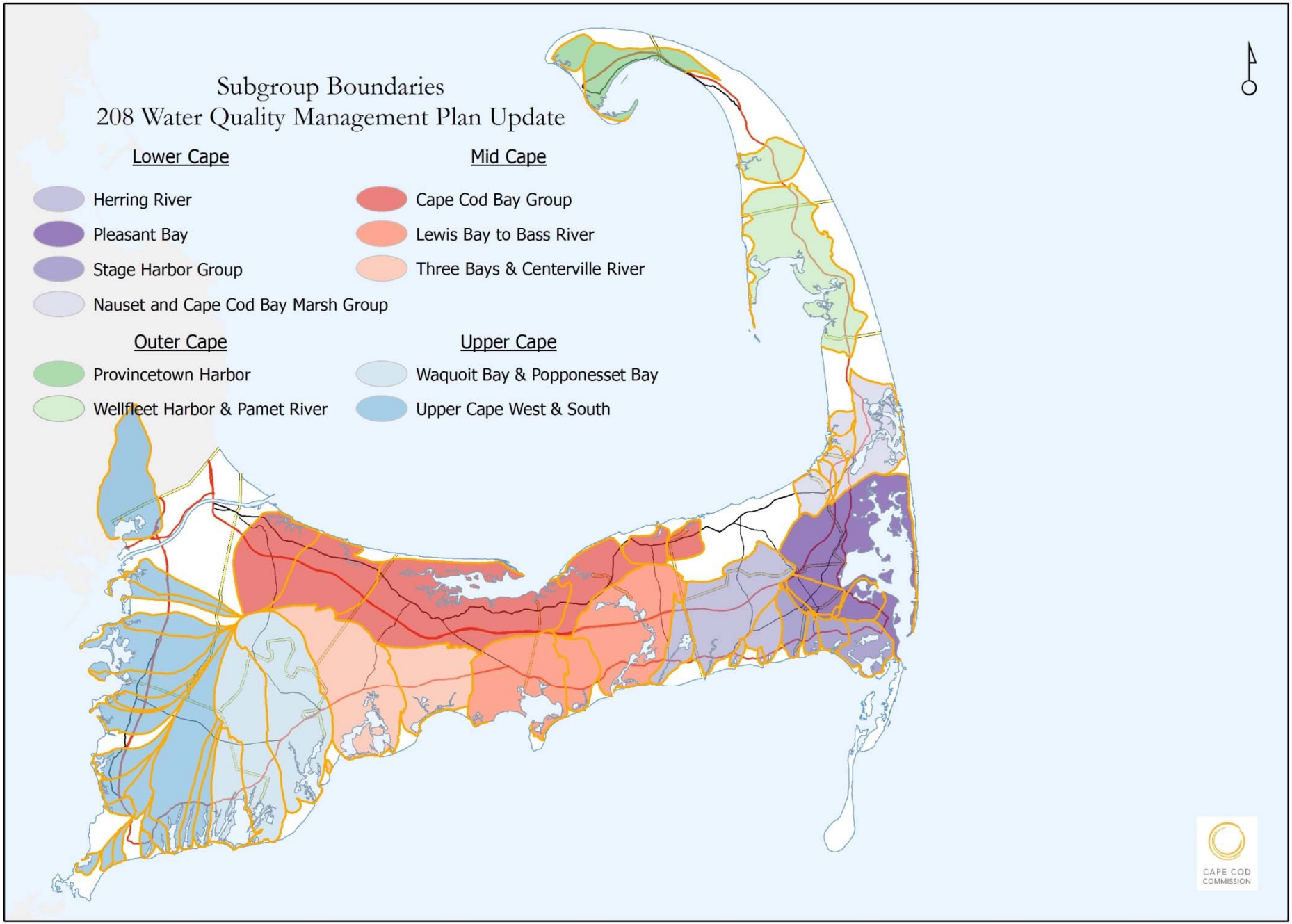


Approach to the 208 Plan Update

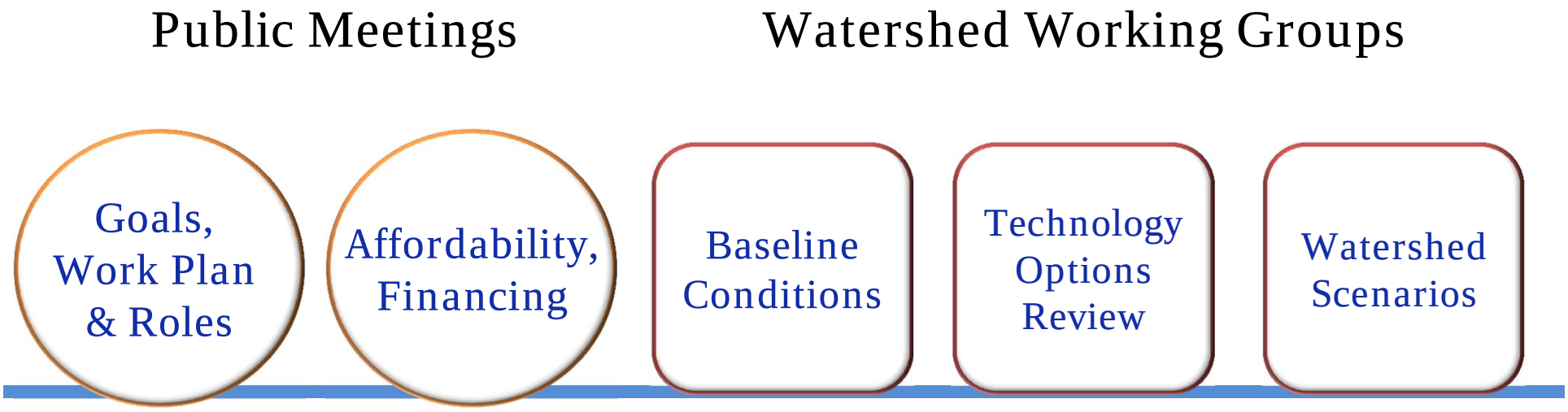
- Watershed Based
- Stakeholder Engagement
- Maximize Benefits of Local Planning
- No Optimal Solutions

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

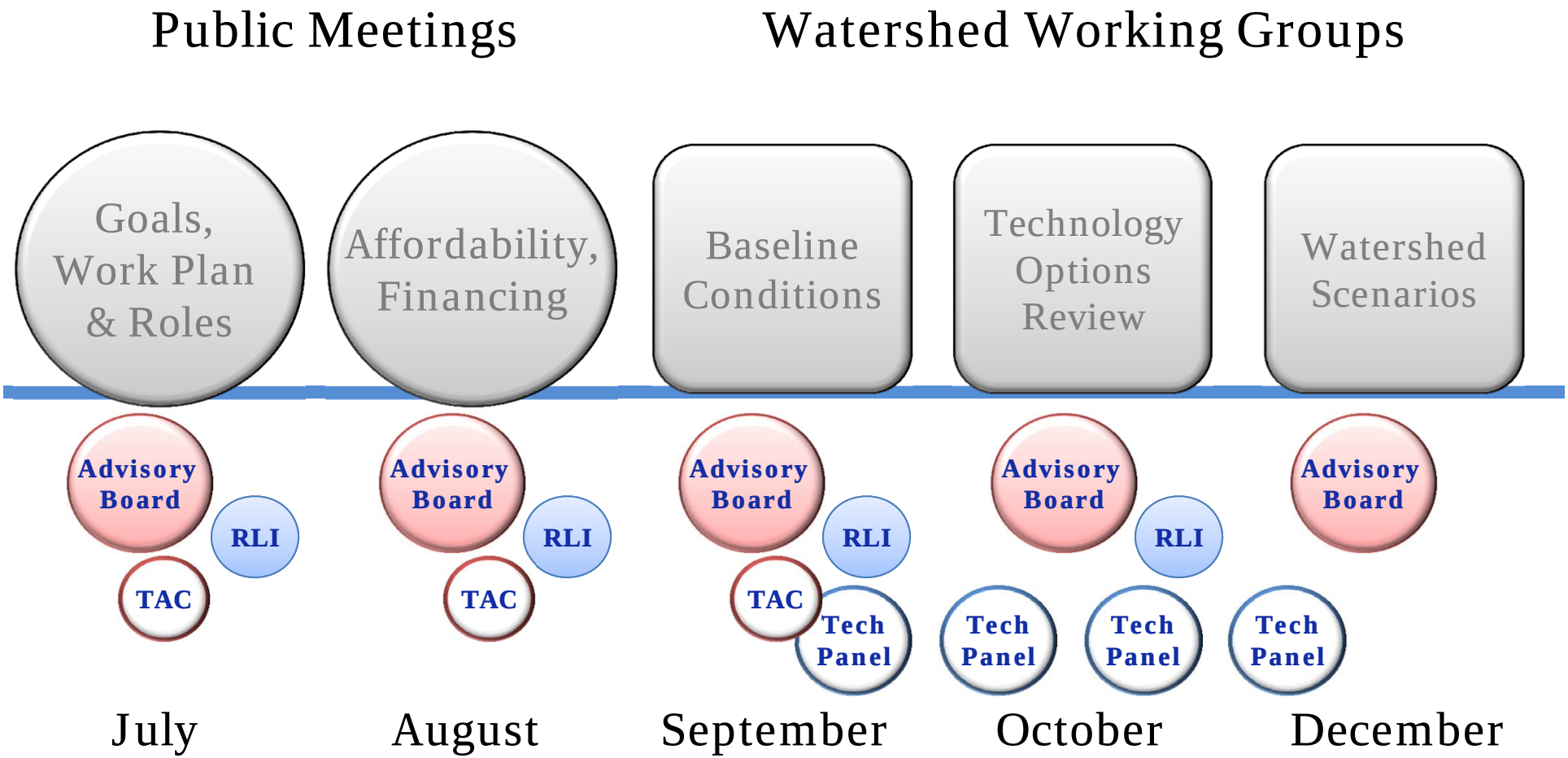

Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION


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



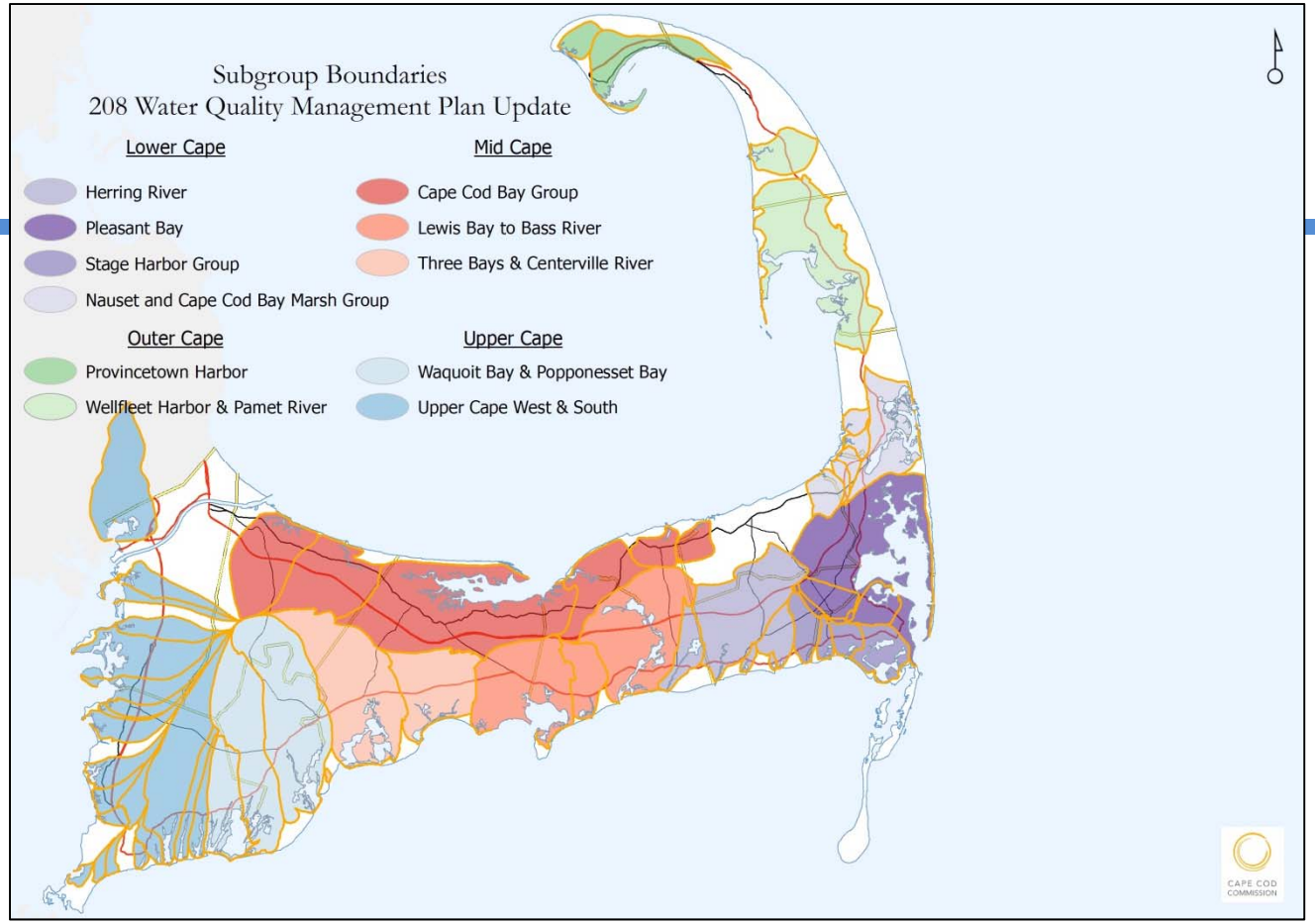
RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

Baseline Conditions

11 Working Group Meetings: Sept 18-27



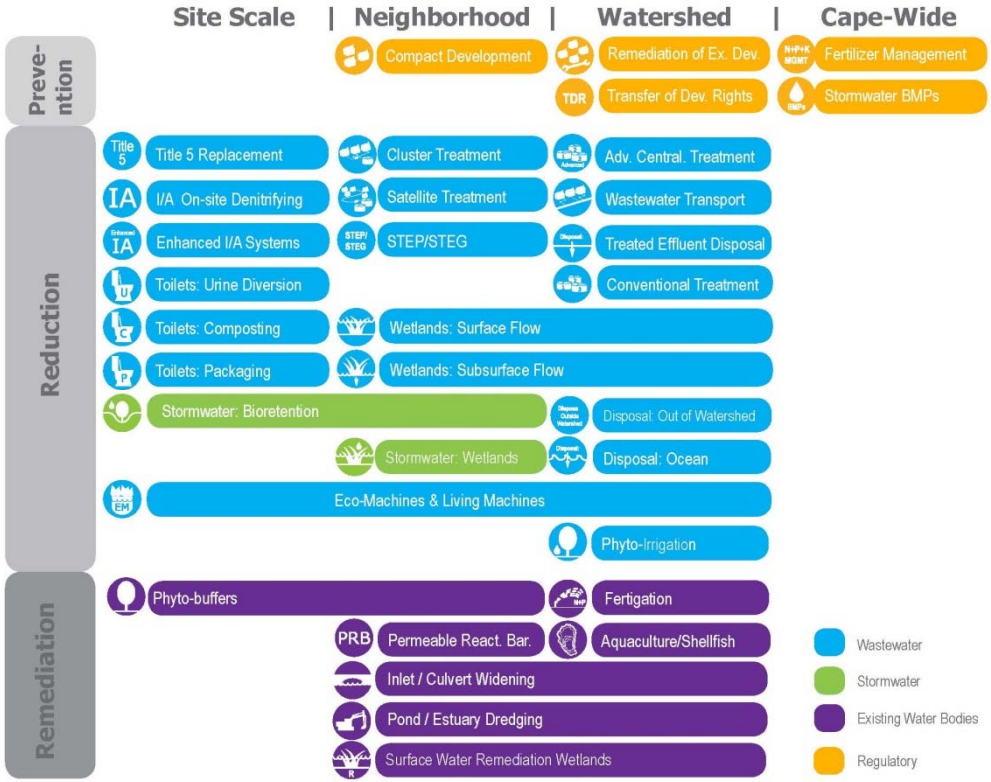
208 Planning Process

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

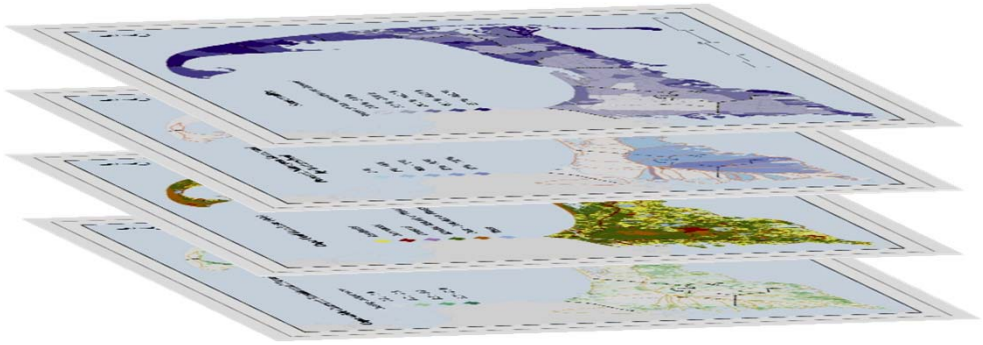
11 Working Group Meetings: Sept 18-27

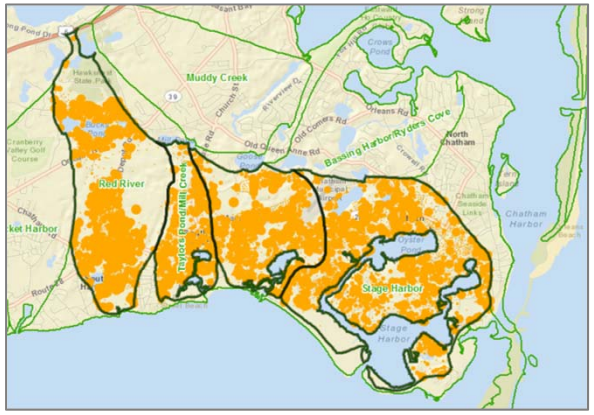
Technology Options Review

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

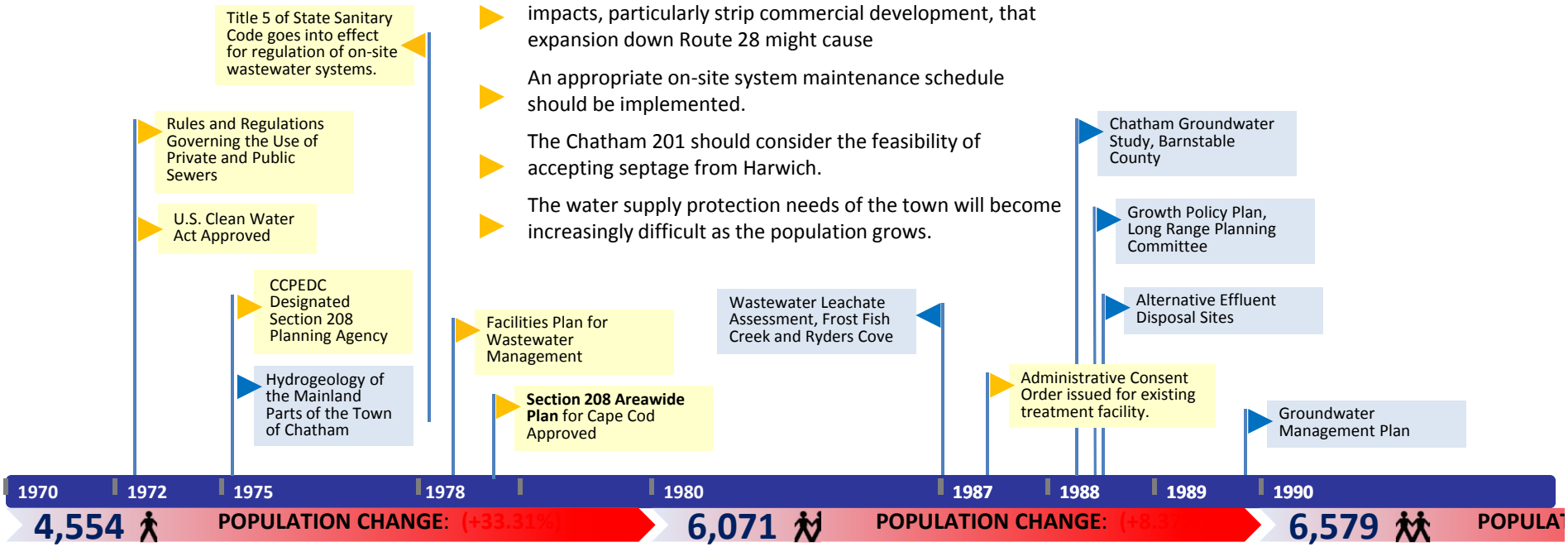
Local Progress to Date

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

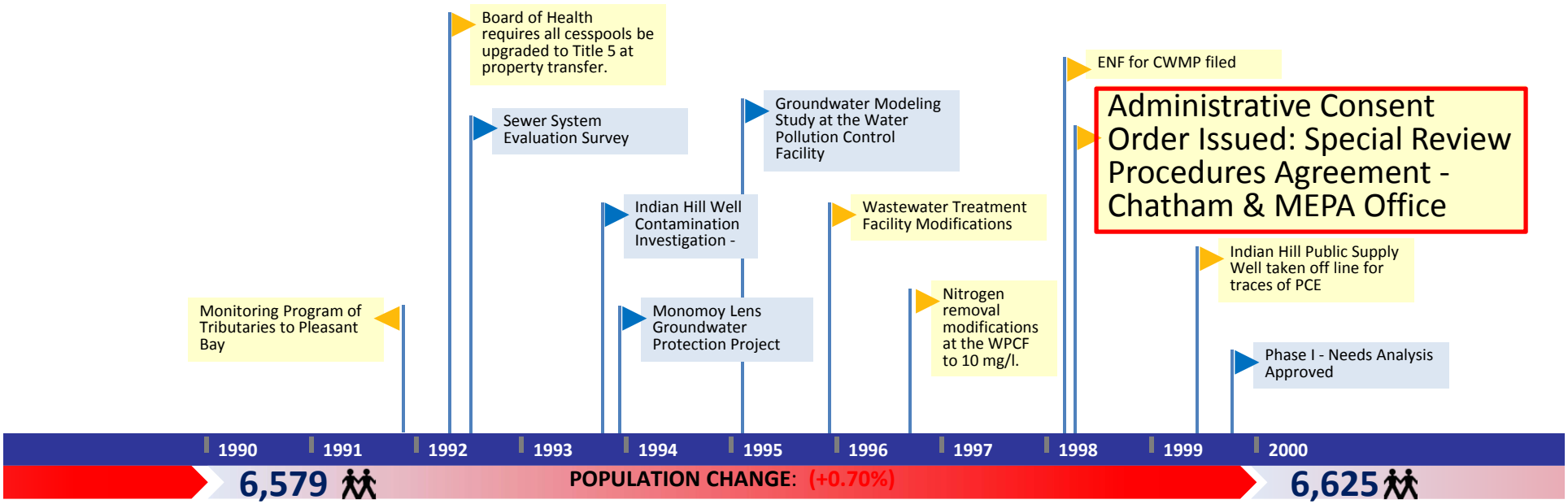
Chatham

From 1978 Section 208 Plan

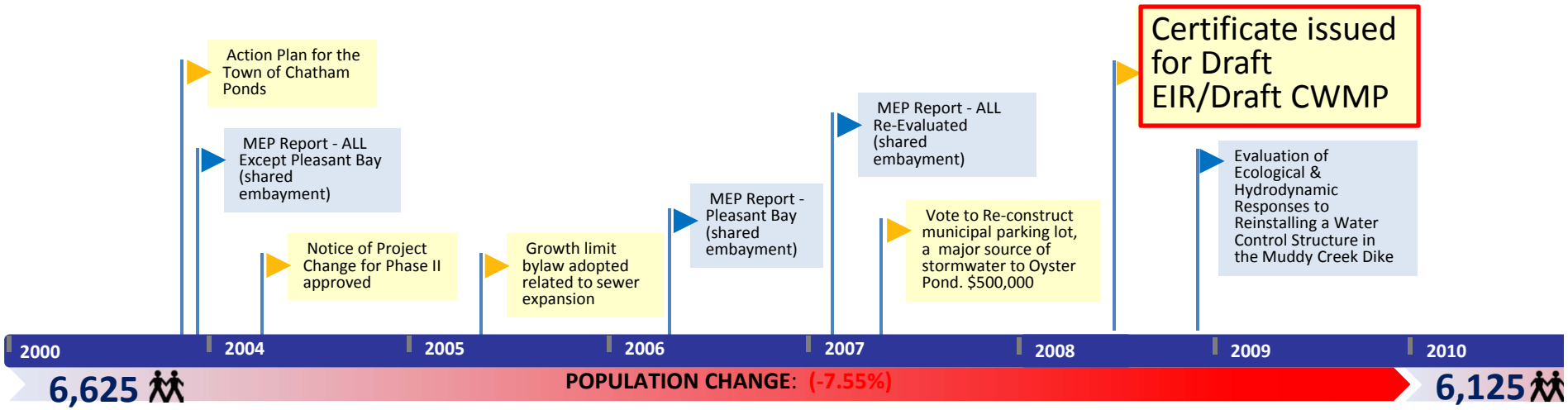
- A study is needed to examine the present capacity of the town's sewage treatment plant and the possible need to expand the present collection system.
- The 201 facility plan should be town-wide in scope and should fully evaluate all problem areas in the town including coastal water problems.
- The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



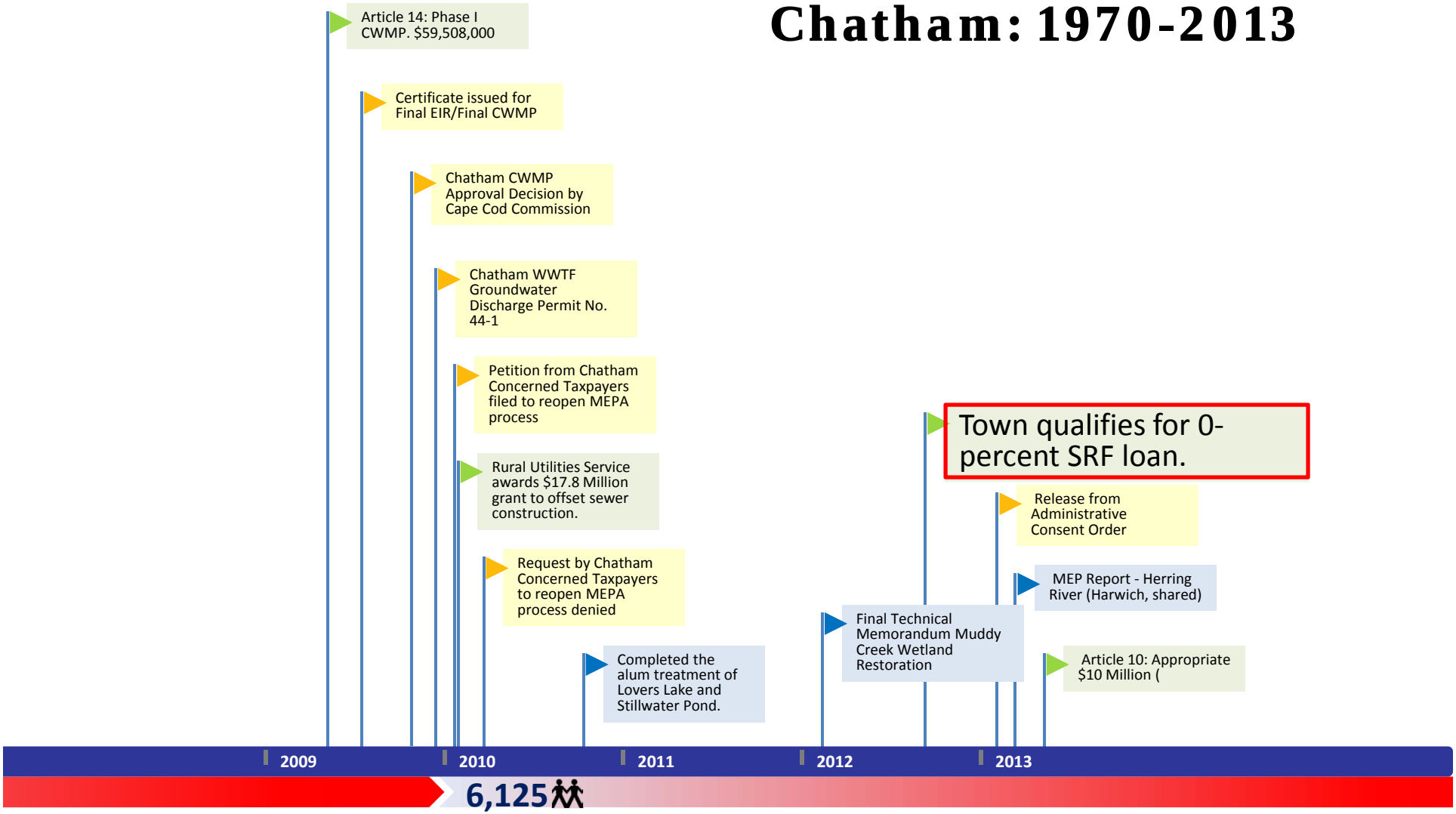
Chatham: 1970-2013



Chatham: 1970-2013



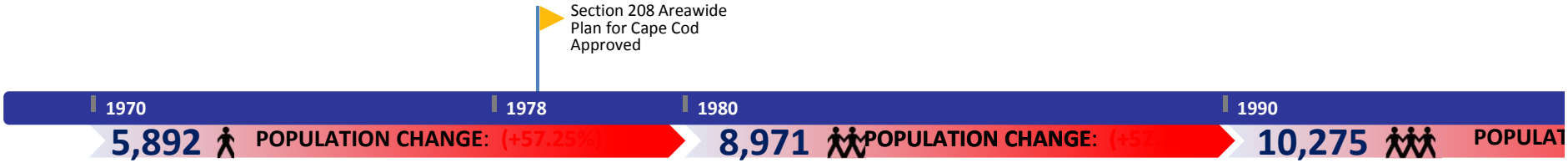
Chatham: 1970-2013



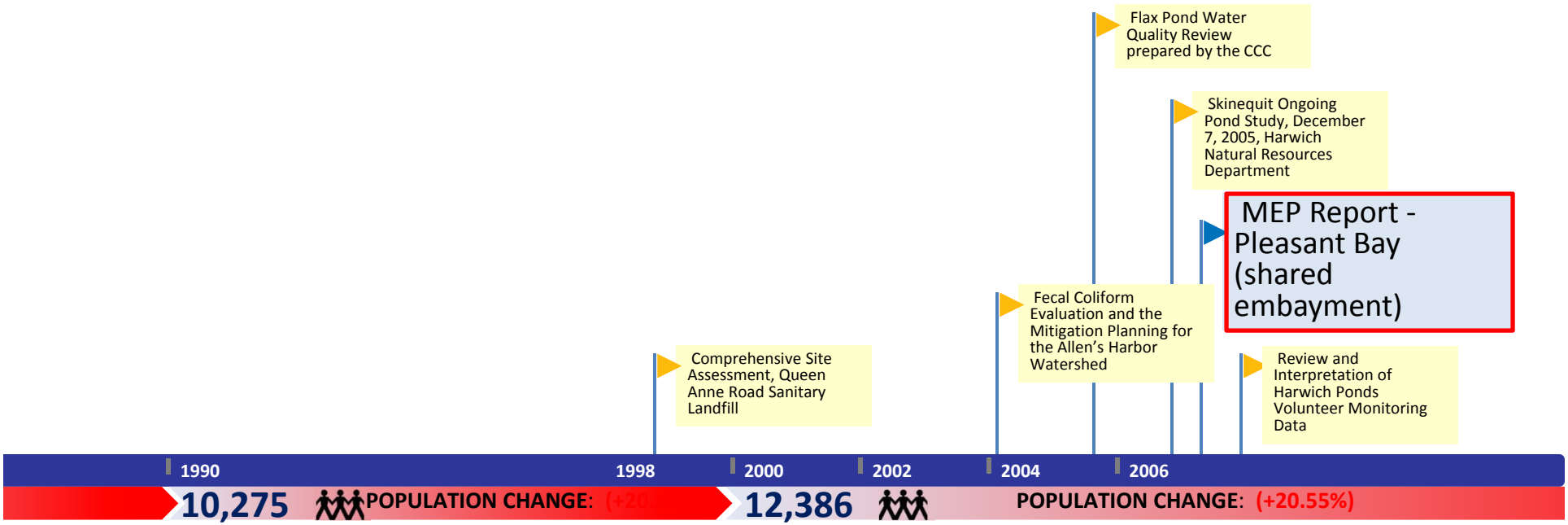
Harwich

From 1978 Section 208 Plan

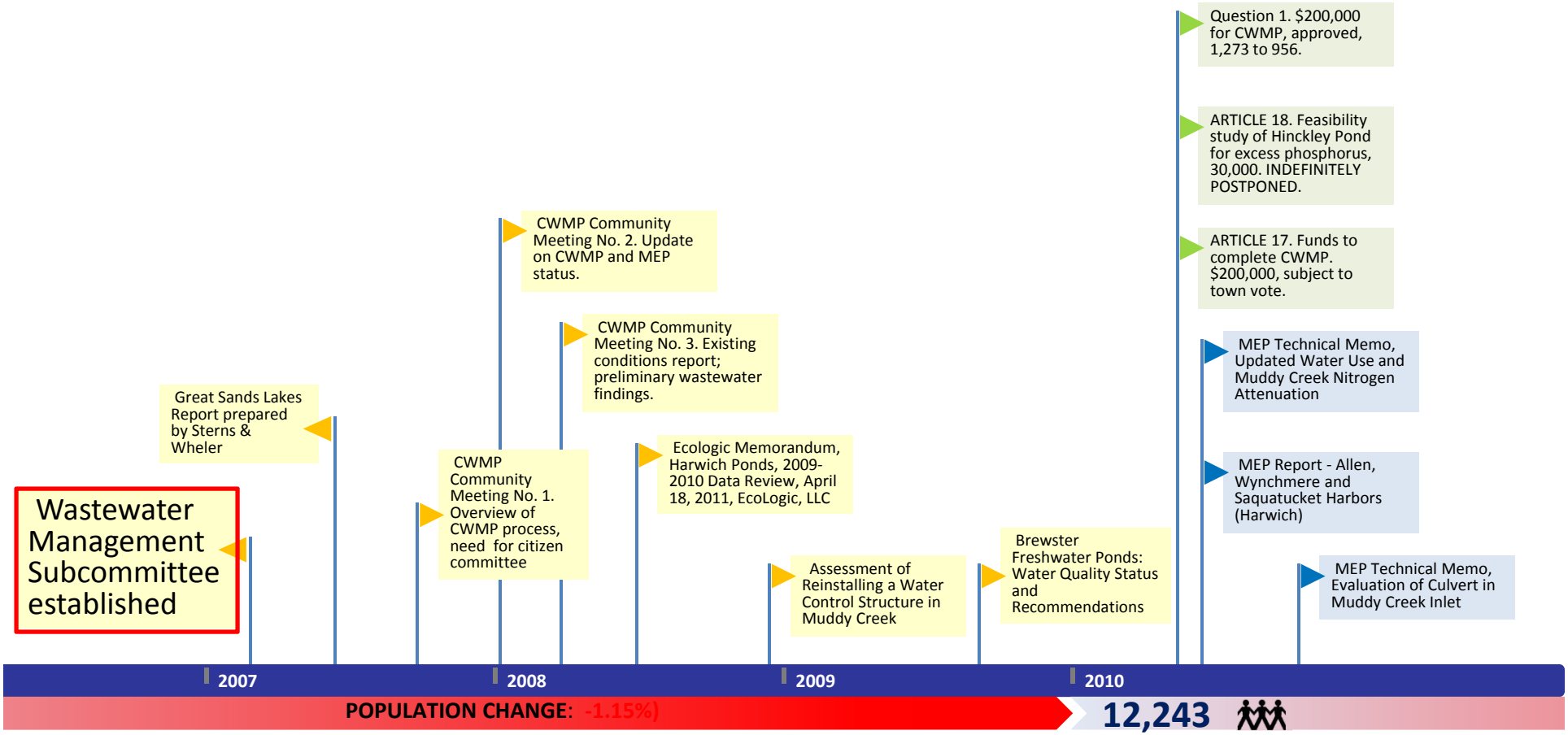
- That the town recognize that the Category 2 problem areas on the south side of town need special attention.
- It is also suggested that the town consider establishing "Seasonal Residential Districts" in this area to control the conversion of seasonal dwellings to year-round occupancy.
- The 208 plan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



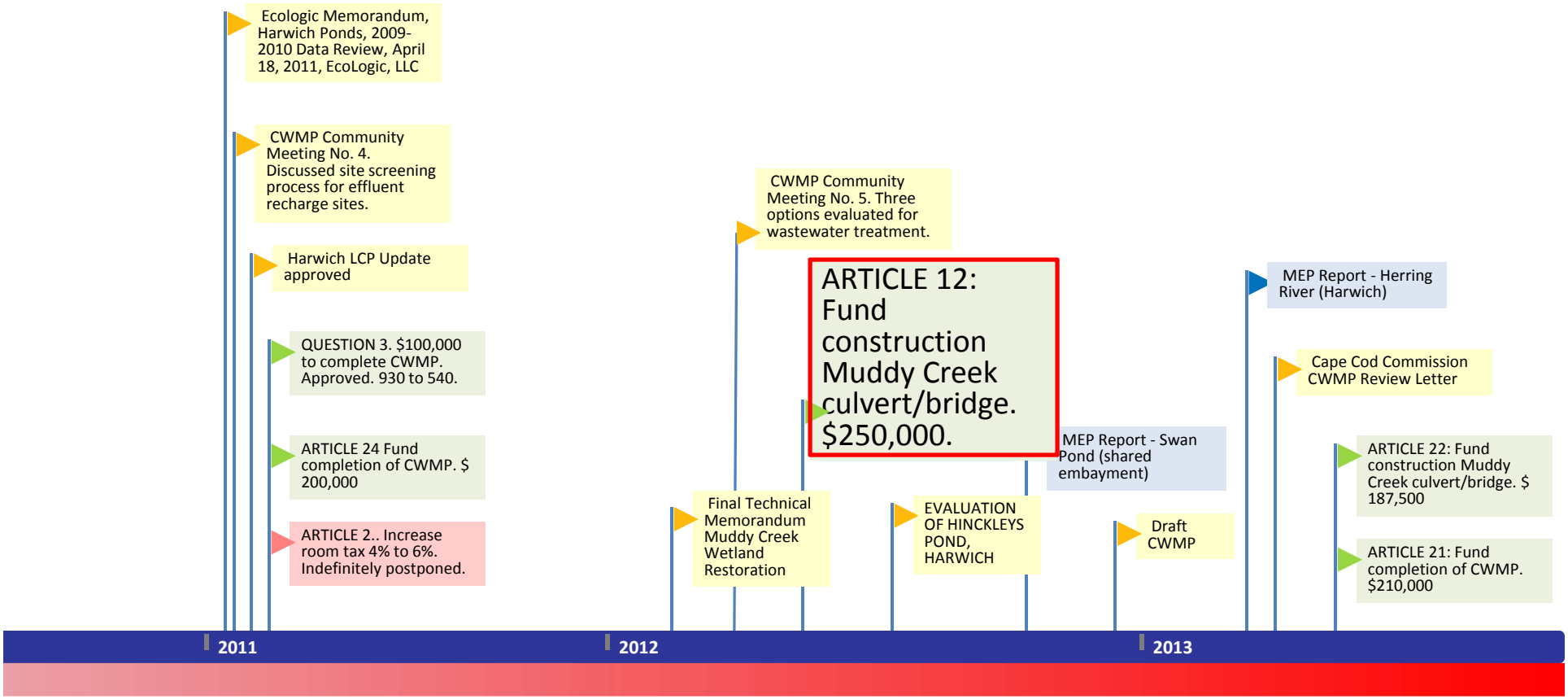
Harwich: 1970-2013



Harwich: 1970-2013



Harwich: 1970-2013

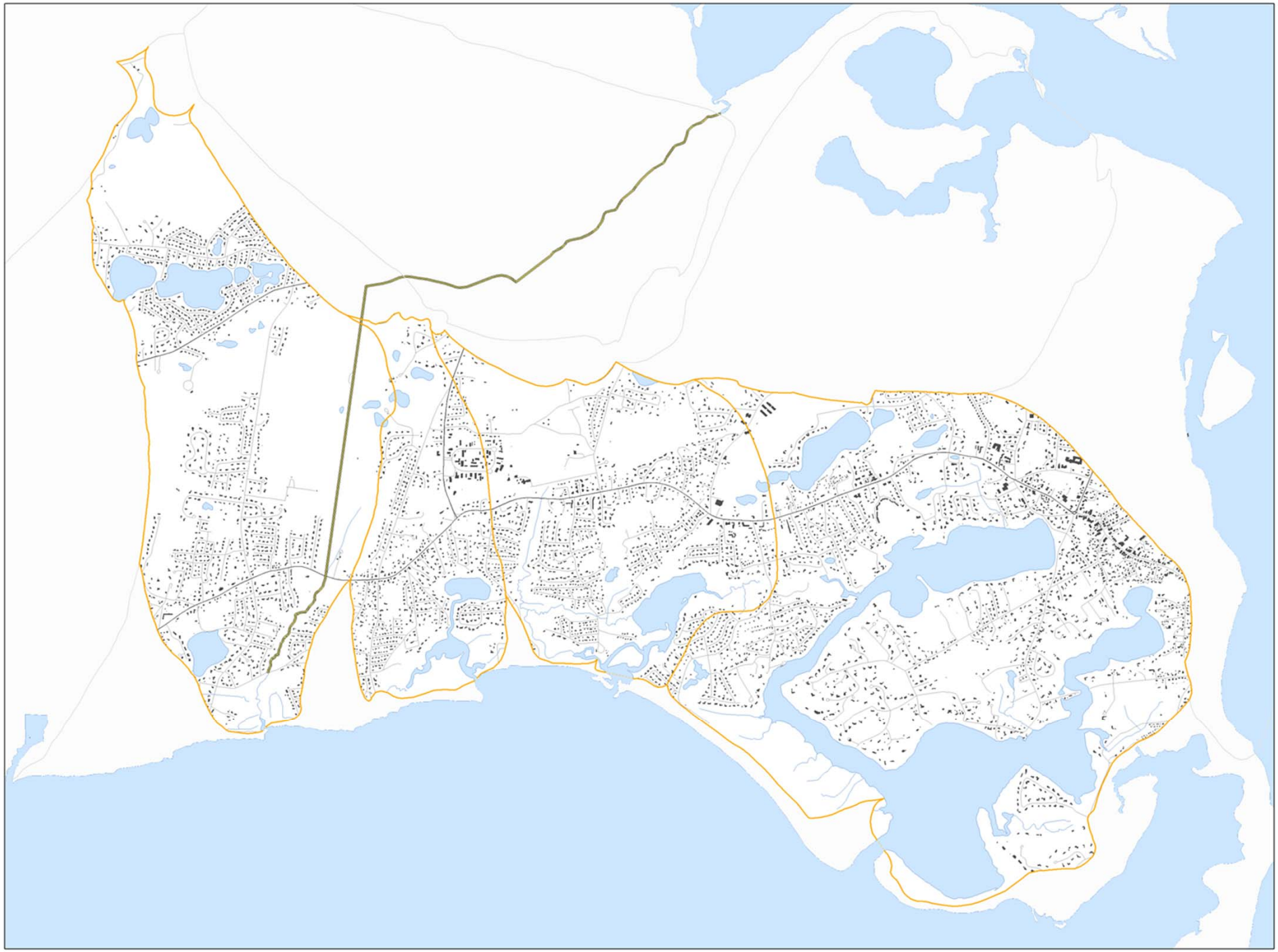


Did we miss anything?

Your Watersheds

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

"Watershed Working Group - Stage Harbor - Workshop 1"




8.8 square miles

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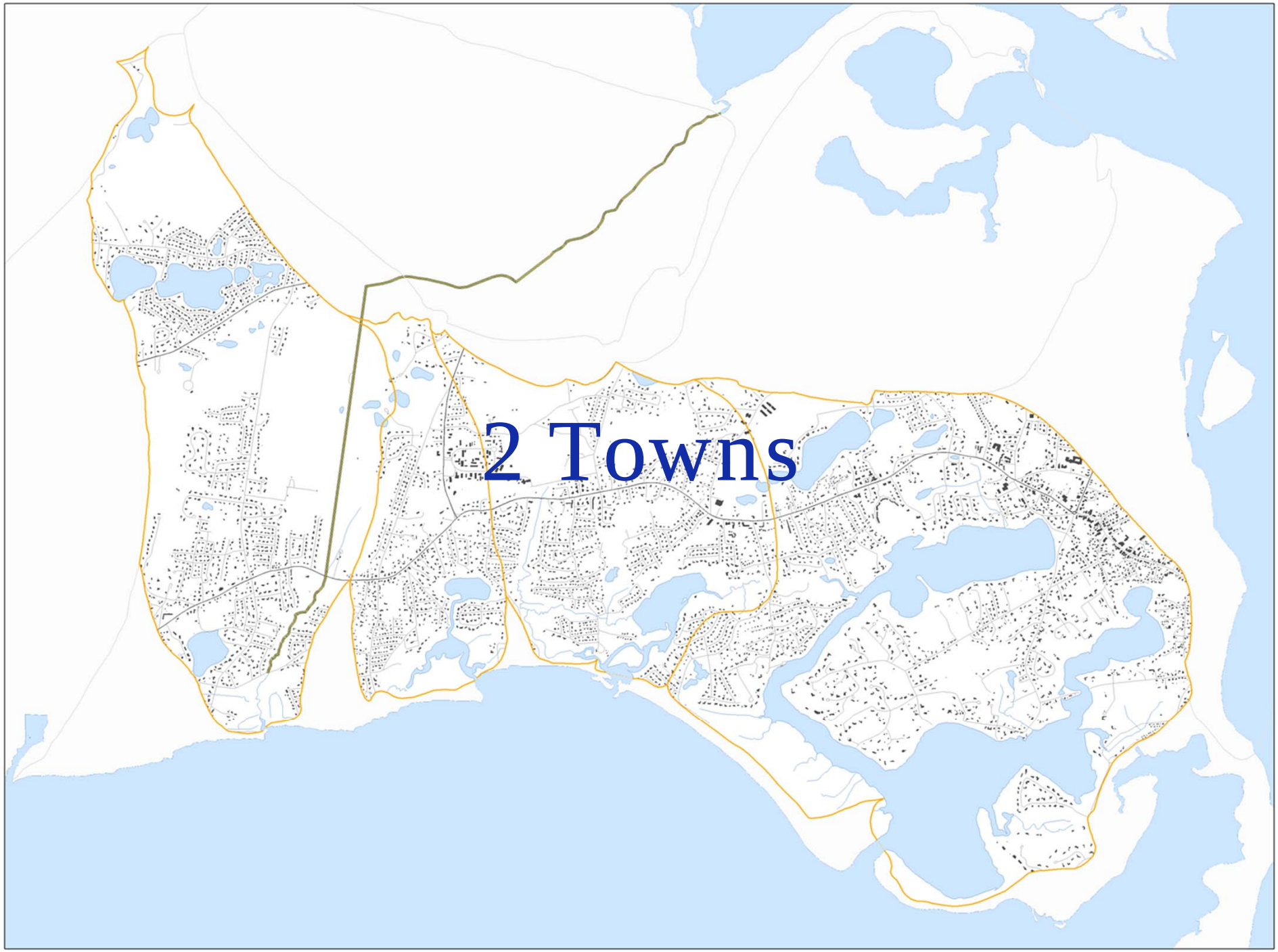


Natural Features

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

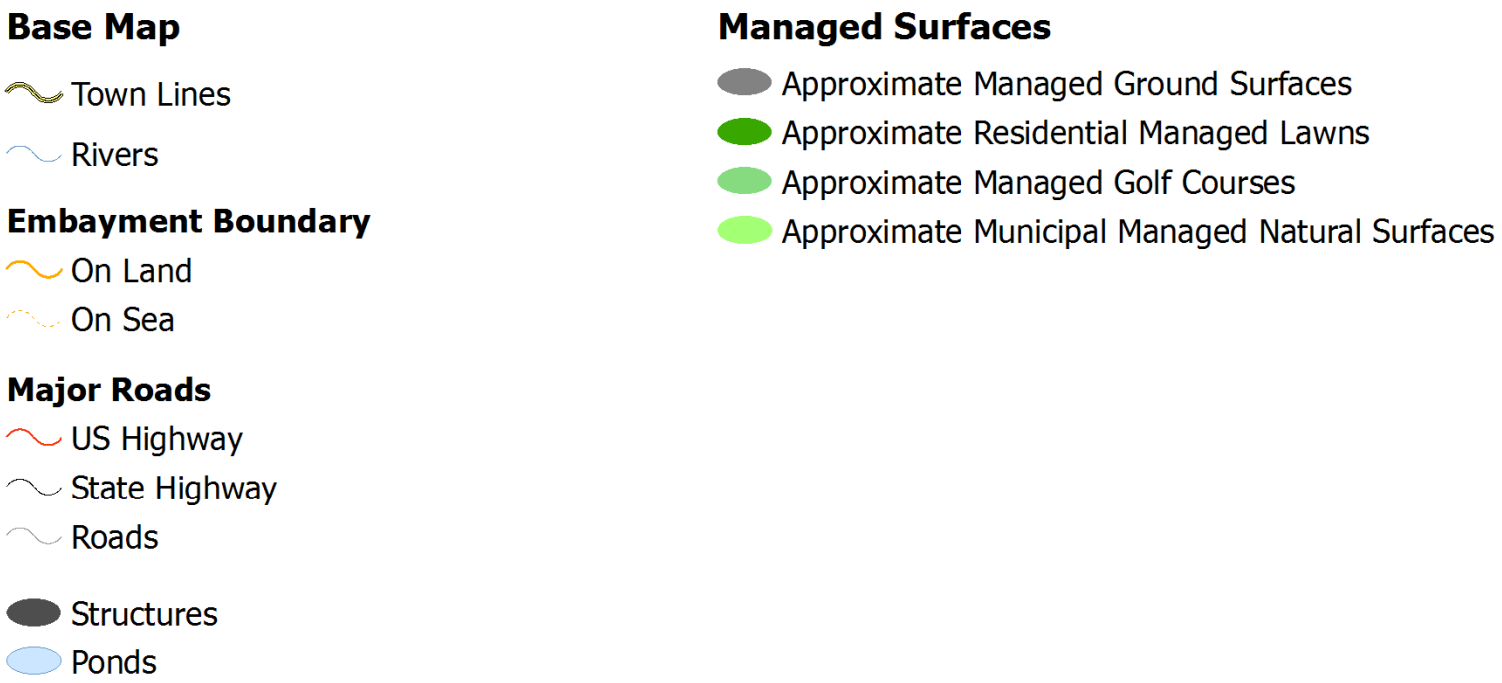
- Structures
- Ponds

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

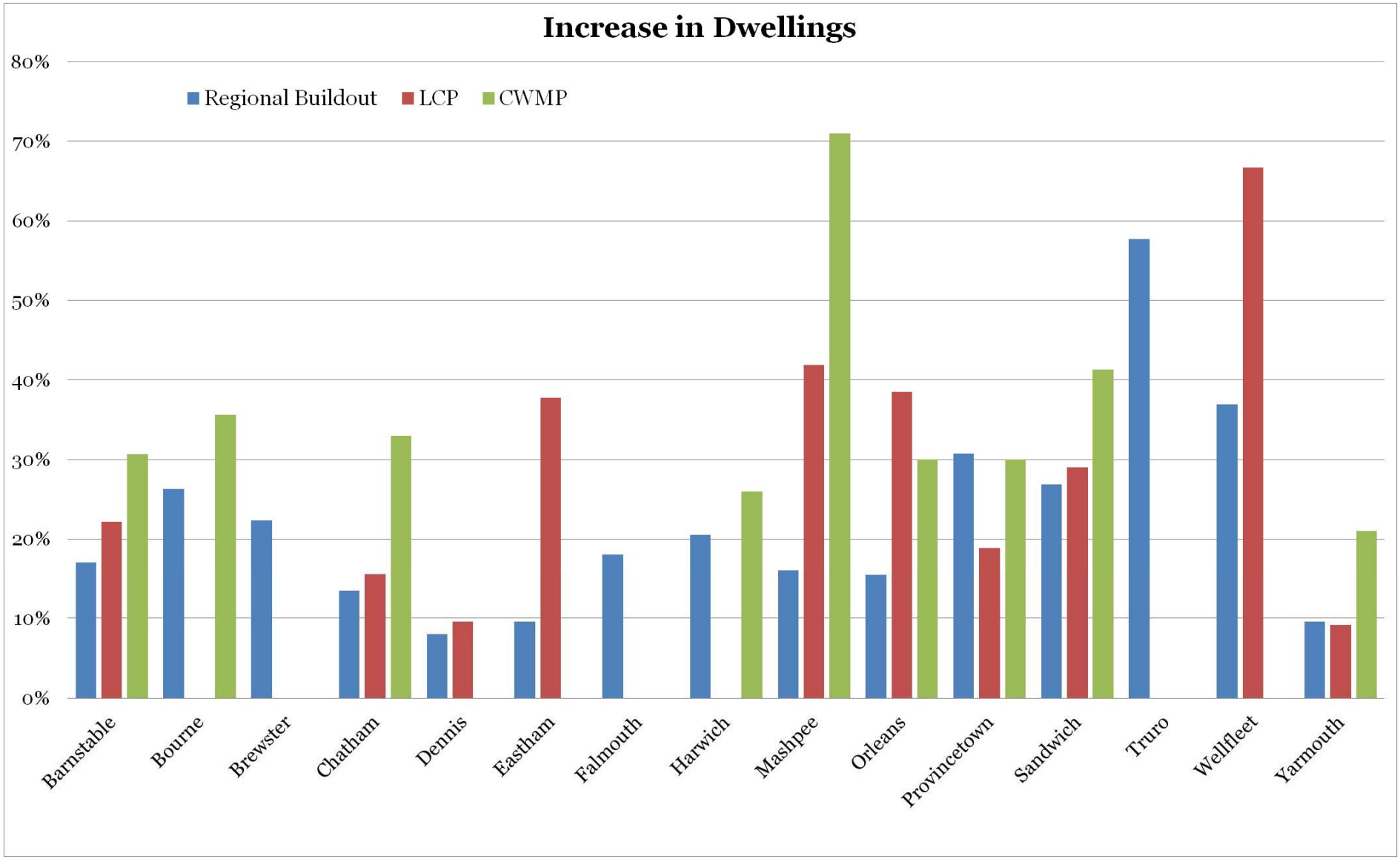
Sources: MassGIS, MassDOT

Density

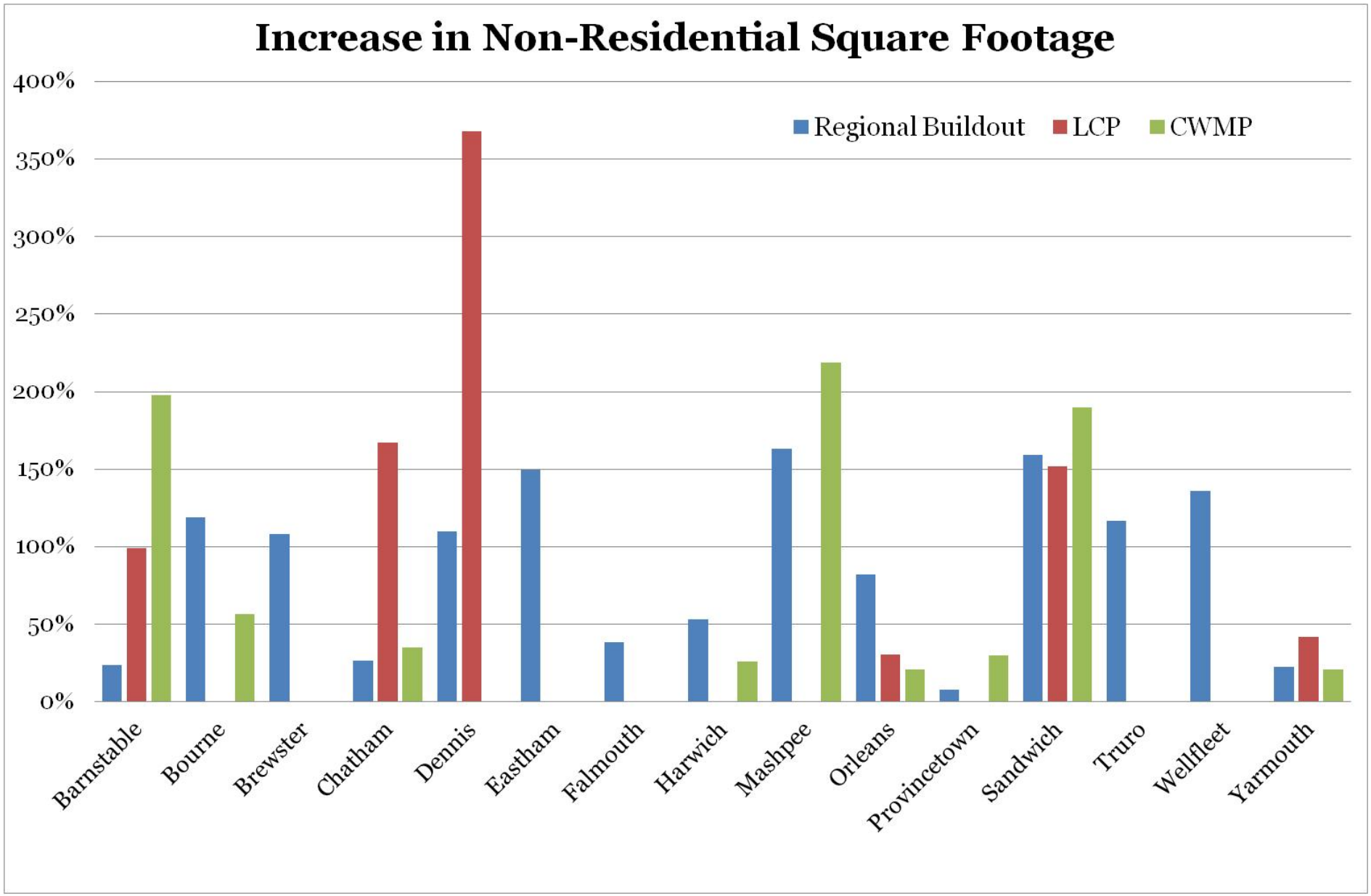
Cape Wide Cost Estimate:

30% growth will increase capital costs by 40%

Buildout

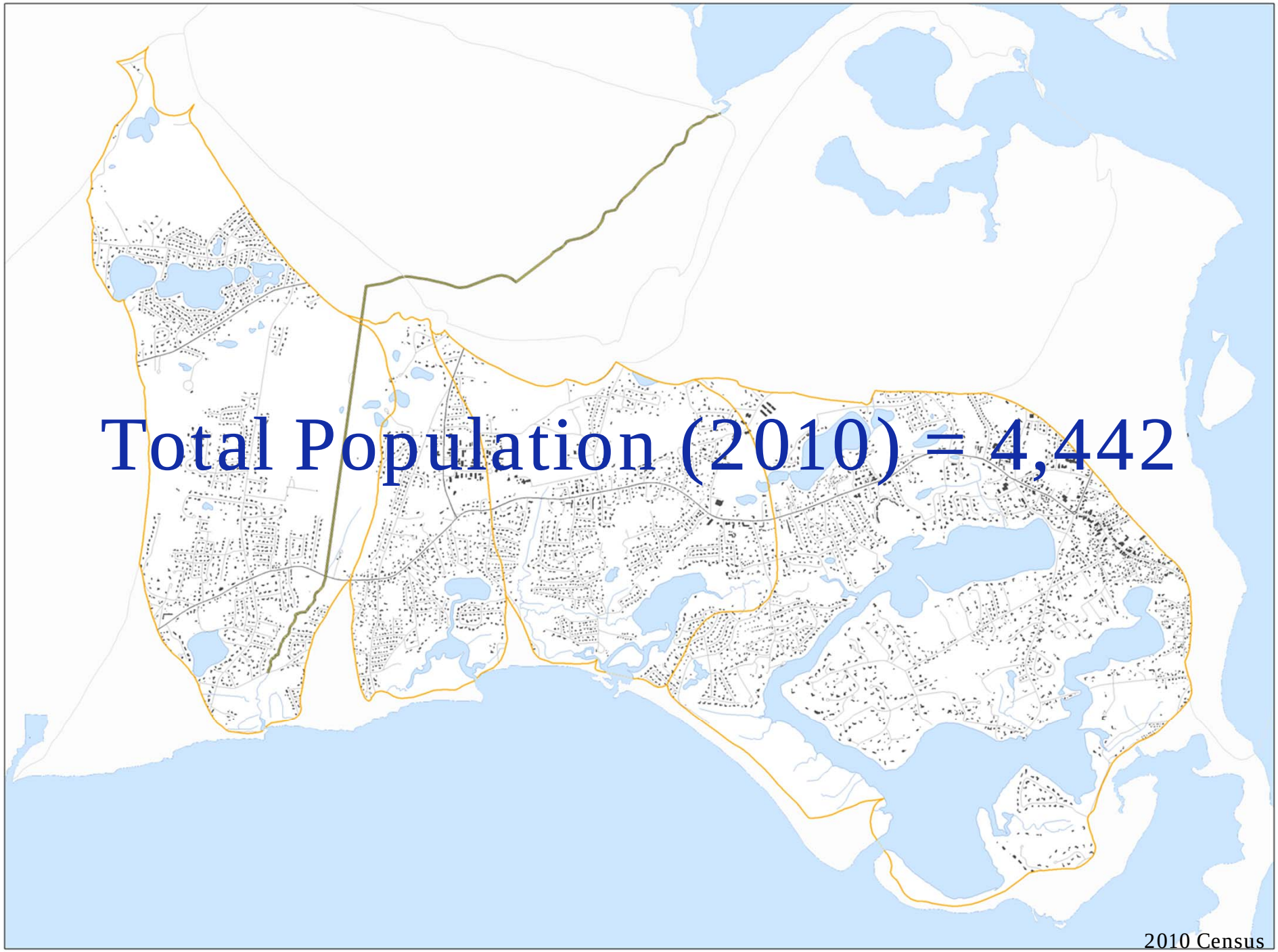

Increase in Dwellings
80%
70%
60%
50%
40%
30%
20%
10%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

Buildout

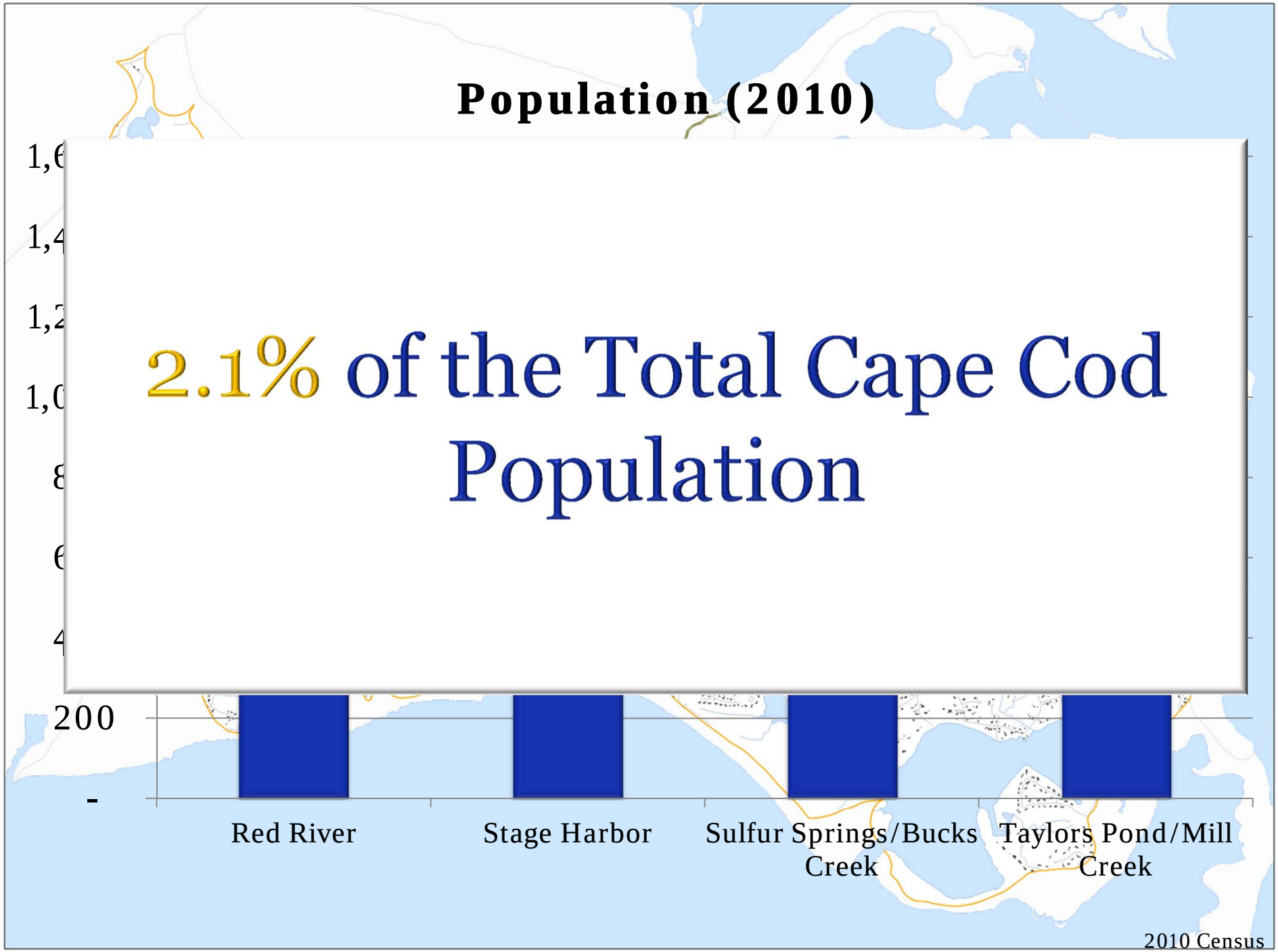

Increase in Non-Residential Square Footage
400%
350%
300%
250%
200%
150%
100%
50%
0%
Regional Buildout
LCP
CWMP
Barnstable
Bourne
Brewster
Chatham
Dennis
Eastham
Falmouth
Harwich
Mashpee
Orleans
Provincetown
Sandwich
Truro
Wellfleet
Yarmouth

The People

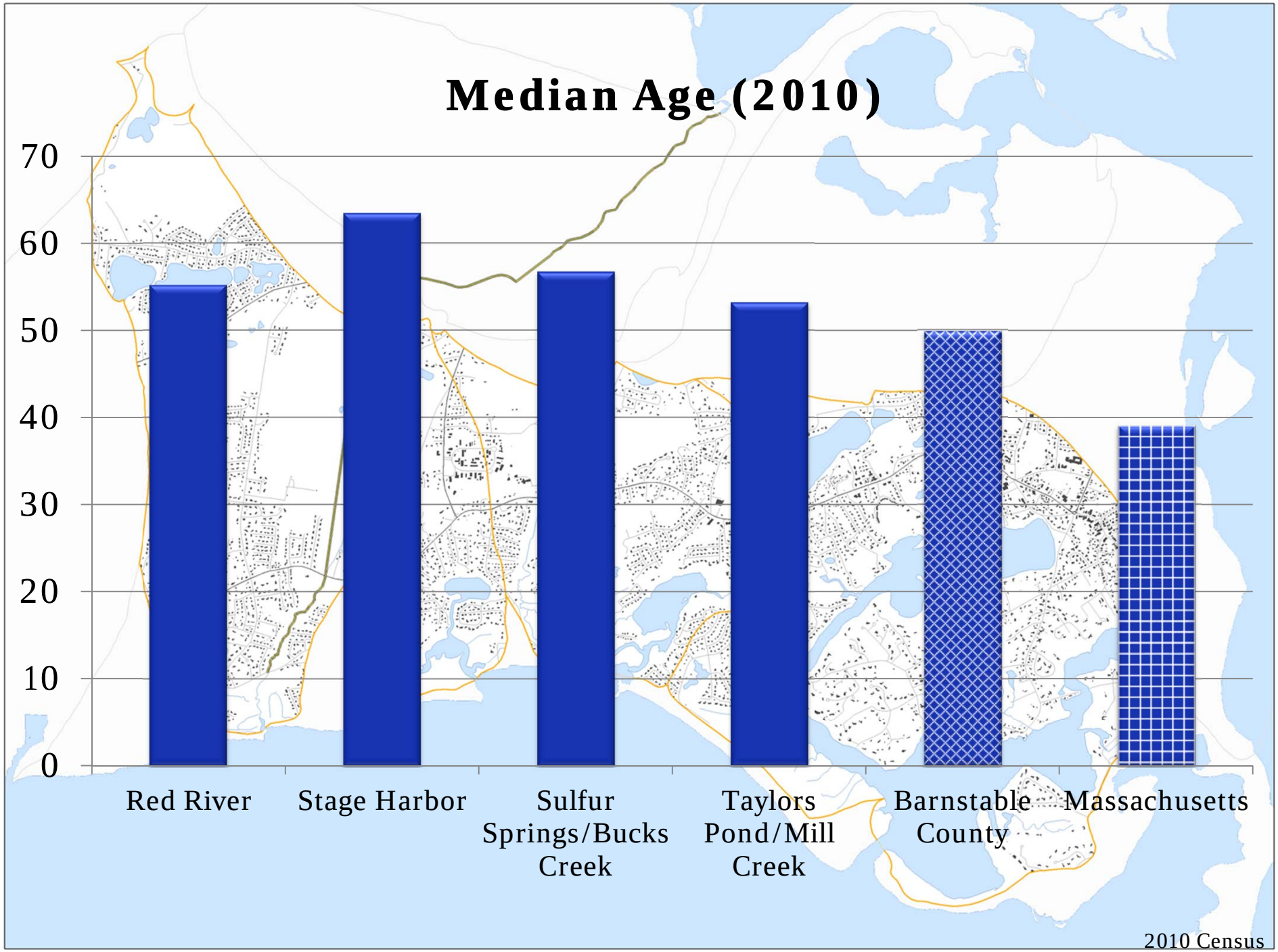
Red River
Stage Harbor
Sulfur Springs/Bucks Creek
Taylors Pond/Mill Creek

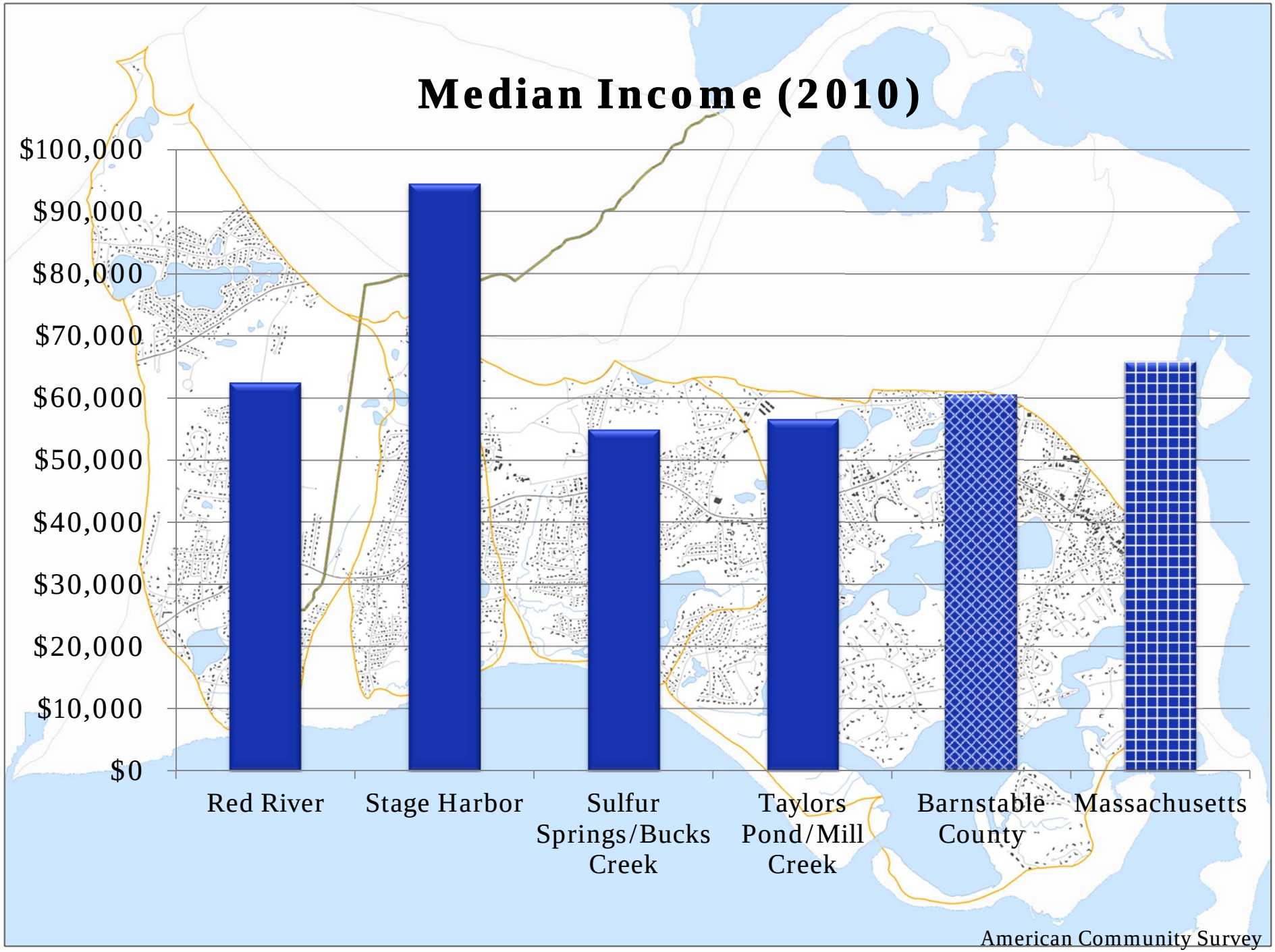

Total Population (2010) = 4,442
2010 Census

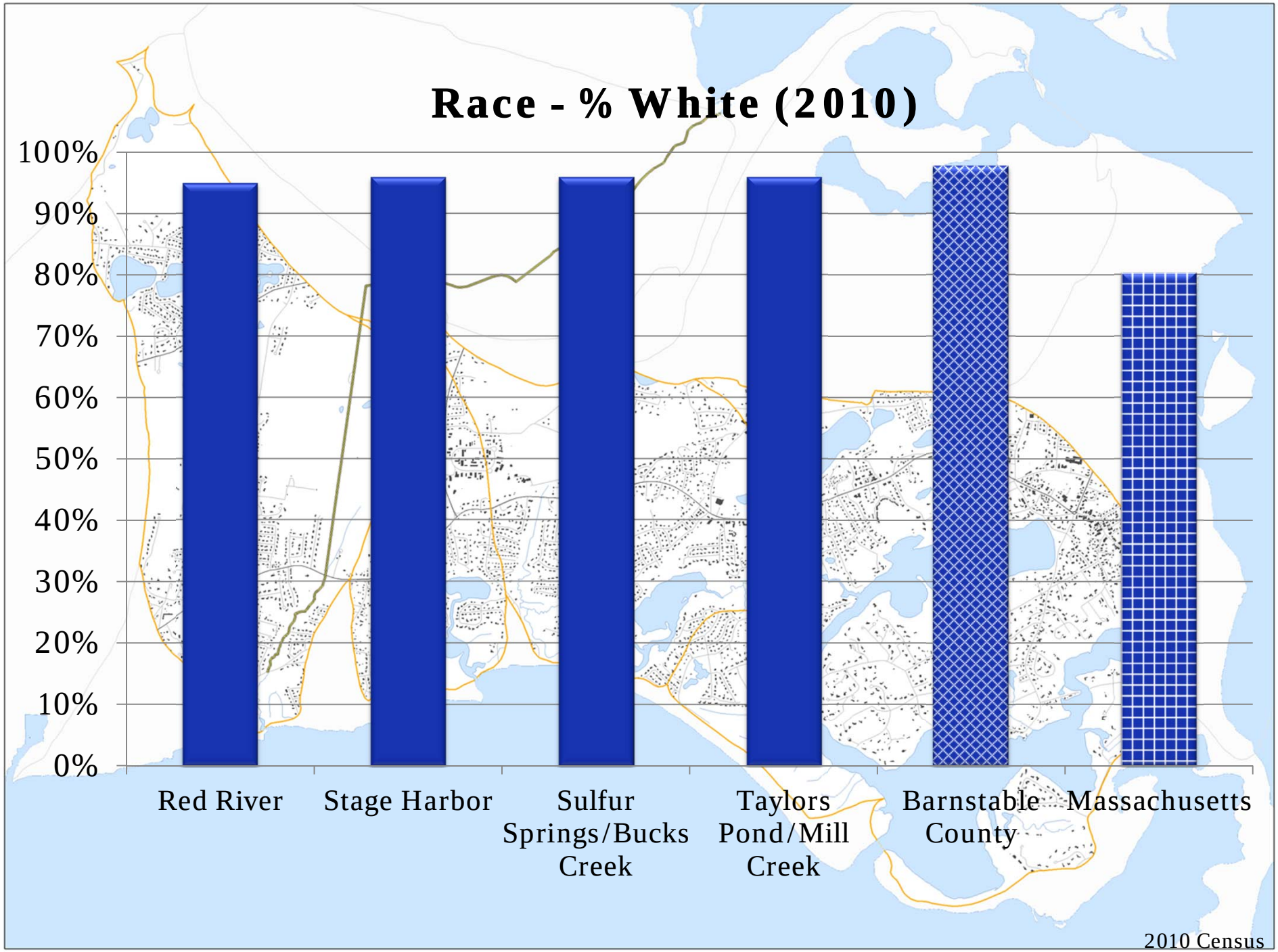
Population (2010)

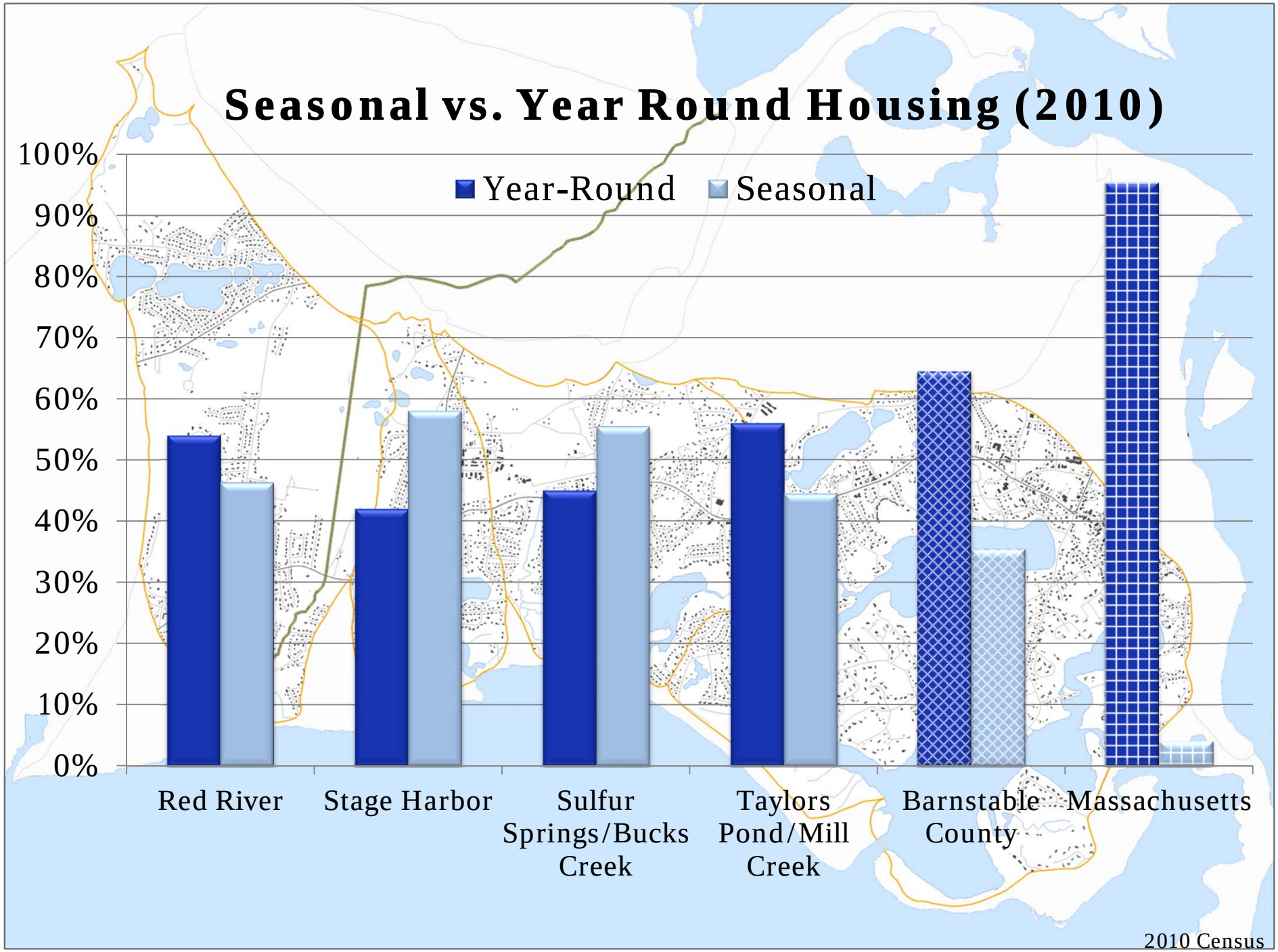


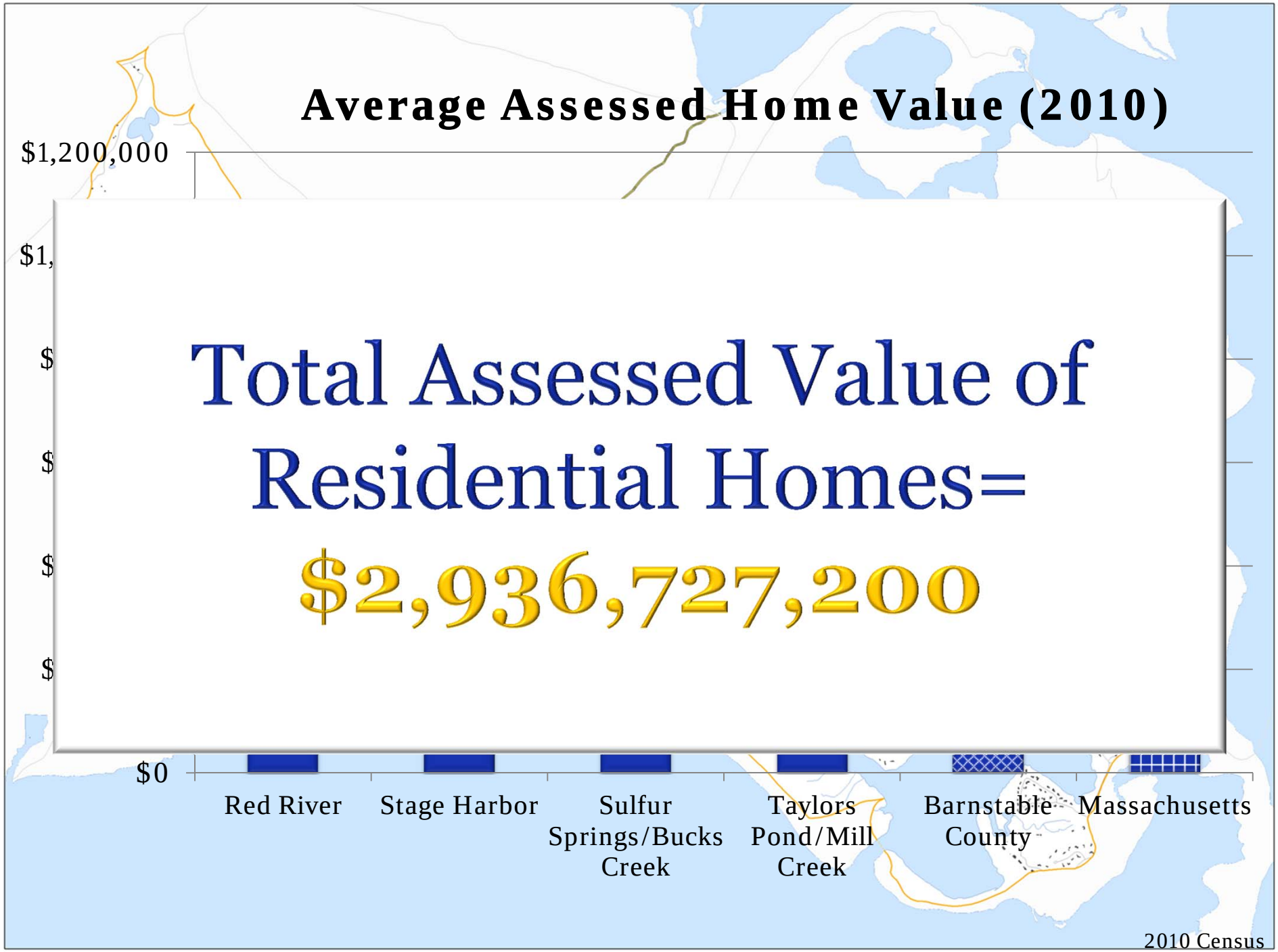
2.1% of the Total Cape Cod Population


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

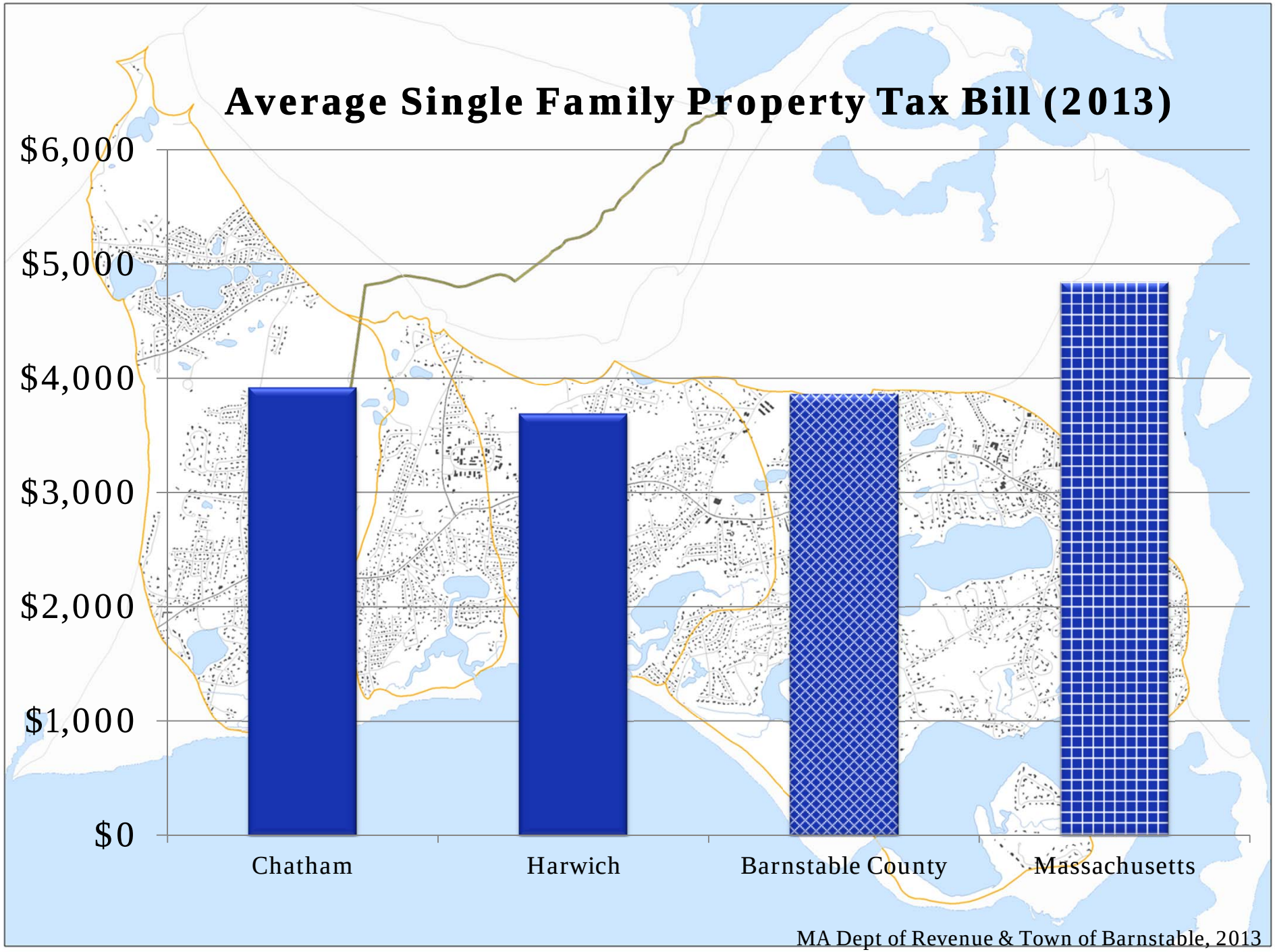


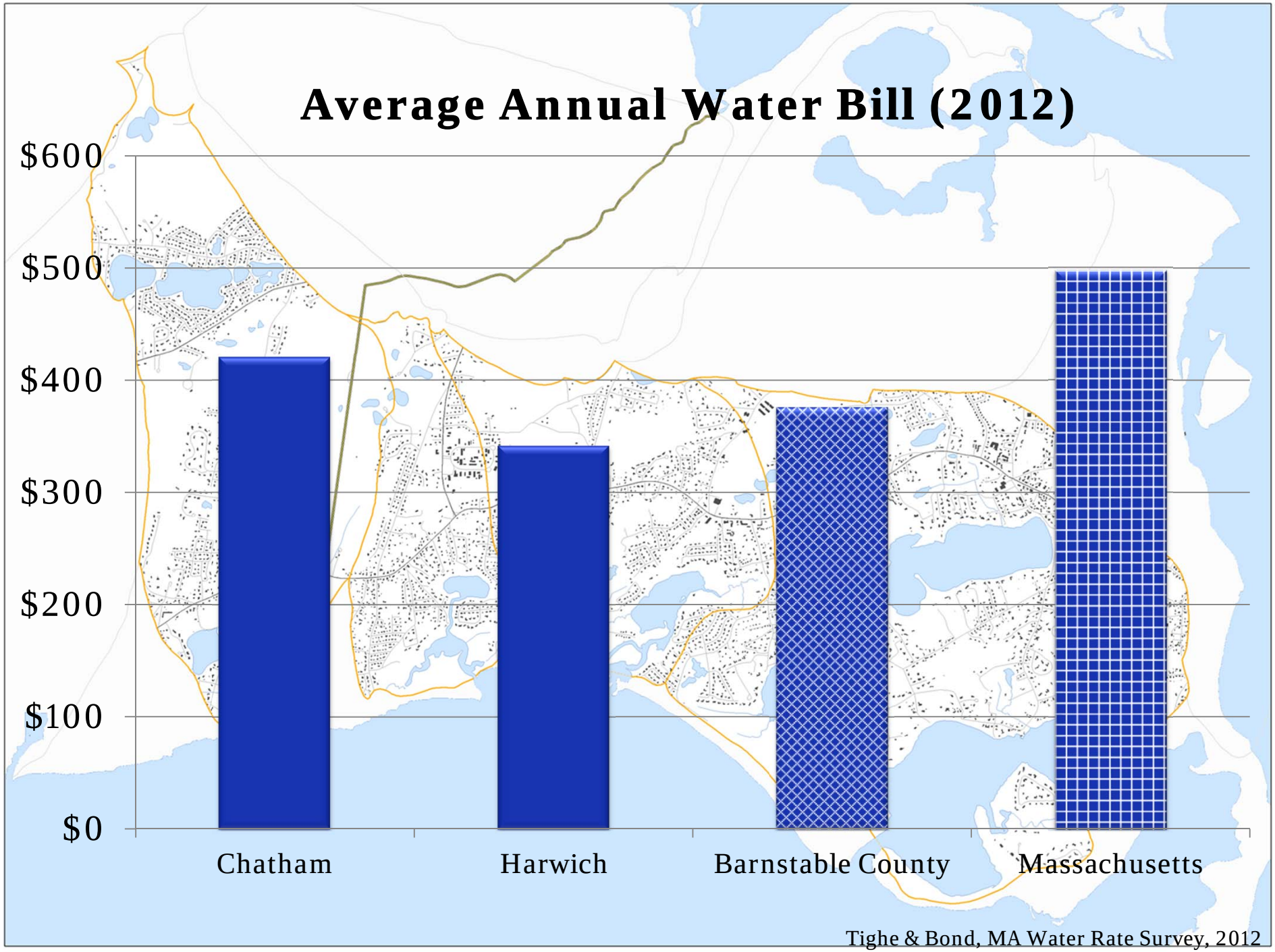
Total Assessed Value of Residential Homes=

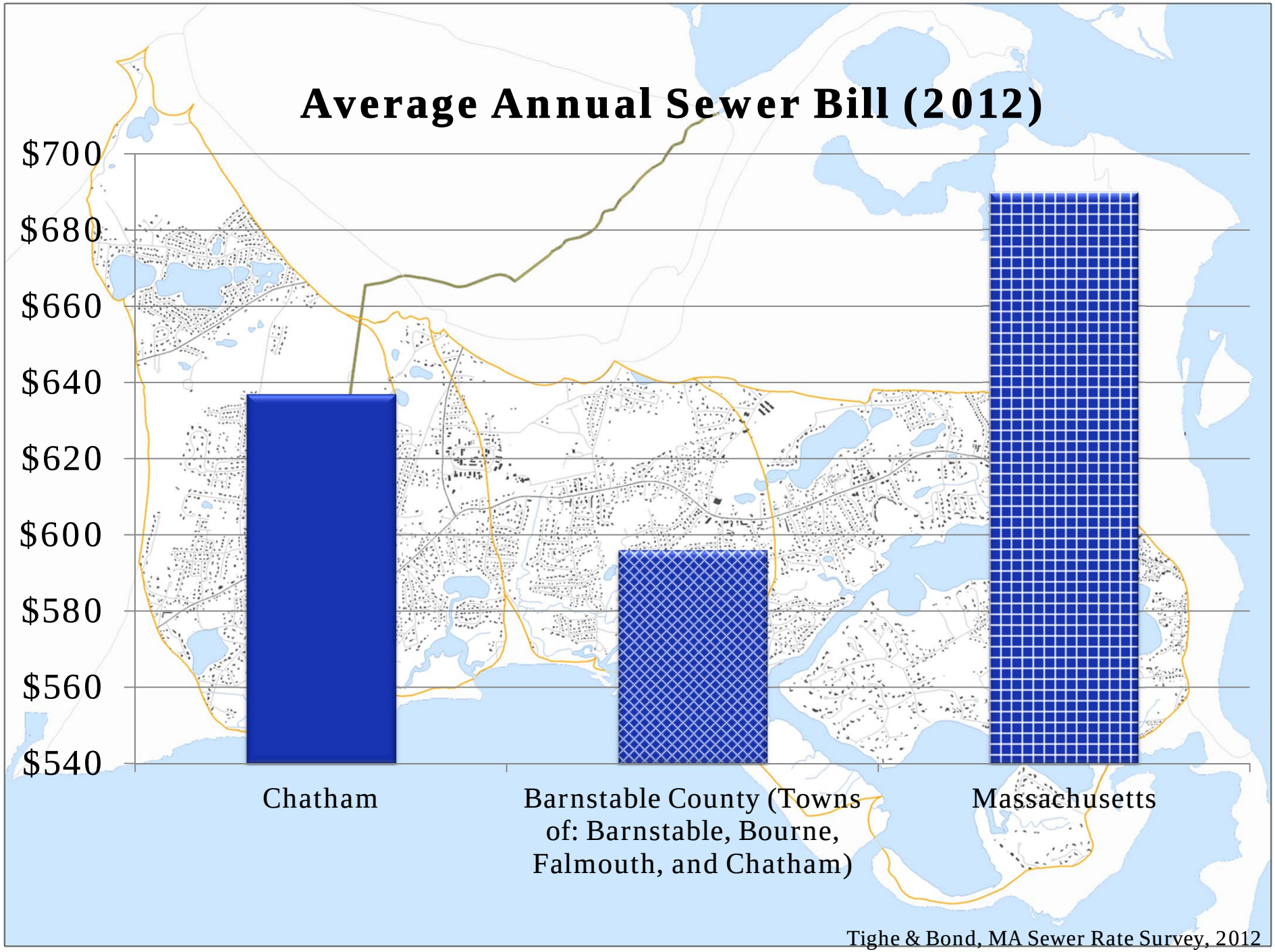
$2,936,727,200

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

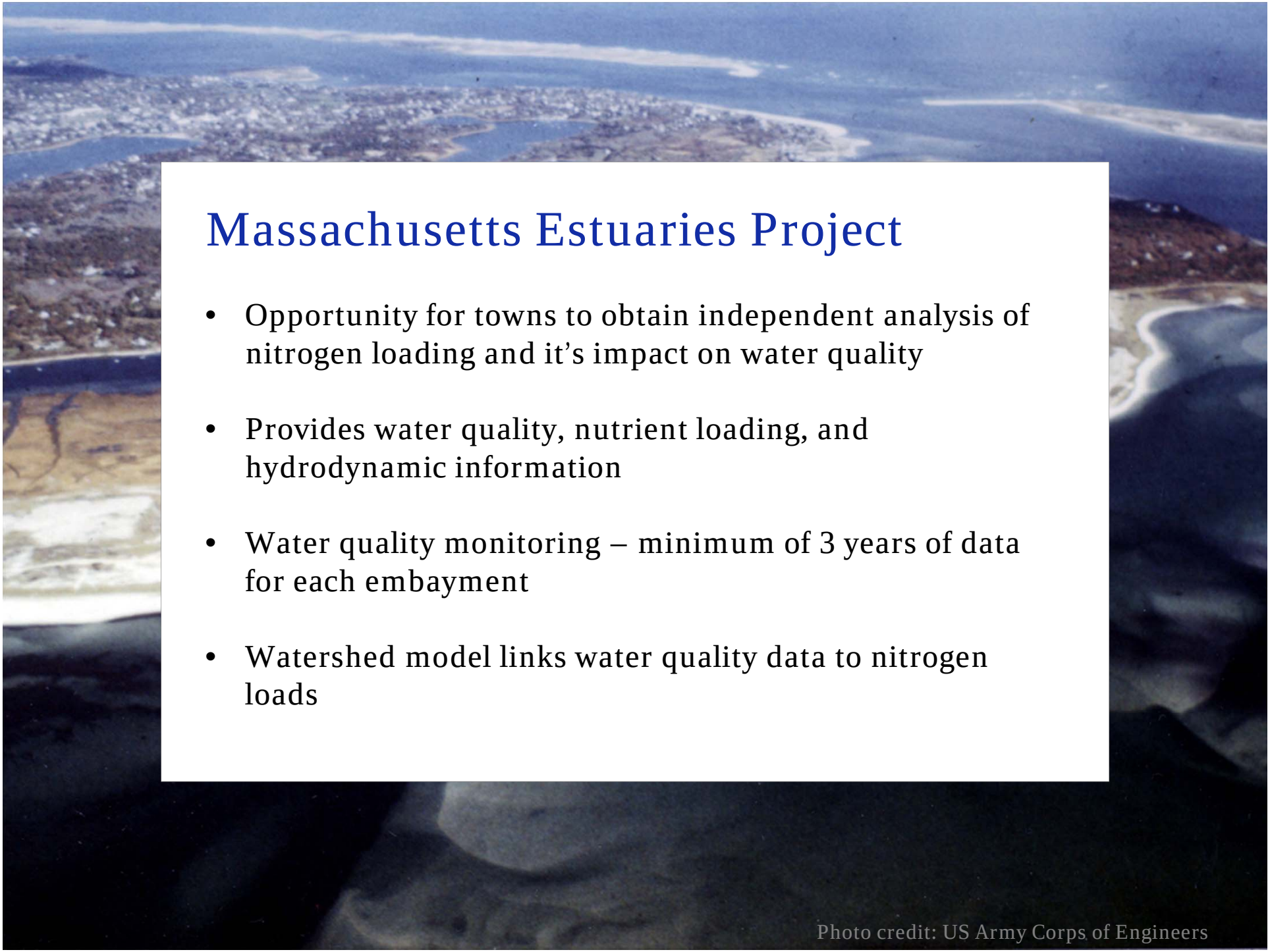

Average Annual Water Bill (2012)
$600
$500
$400
$300
$200
$100
$0
Chatham
Harwich
Barnstable County
Massachusetts
Tighe & Bond, MA Water Rate Survey, 2012


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

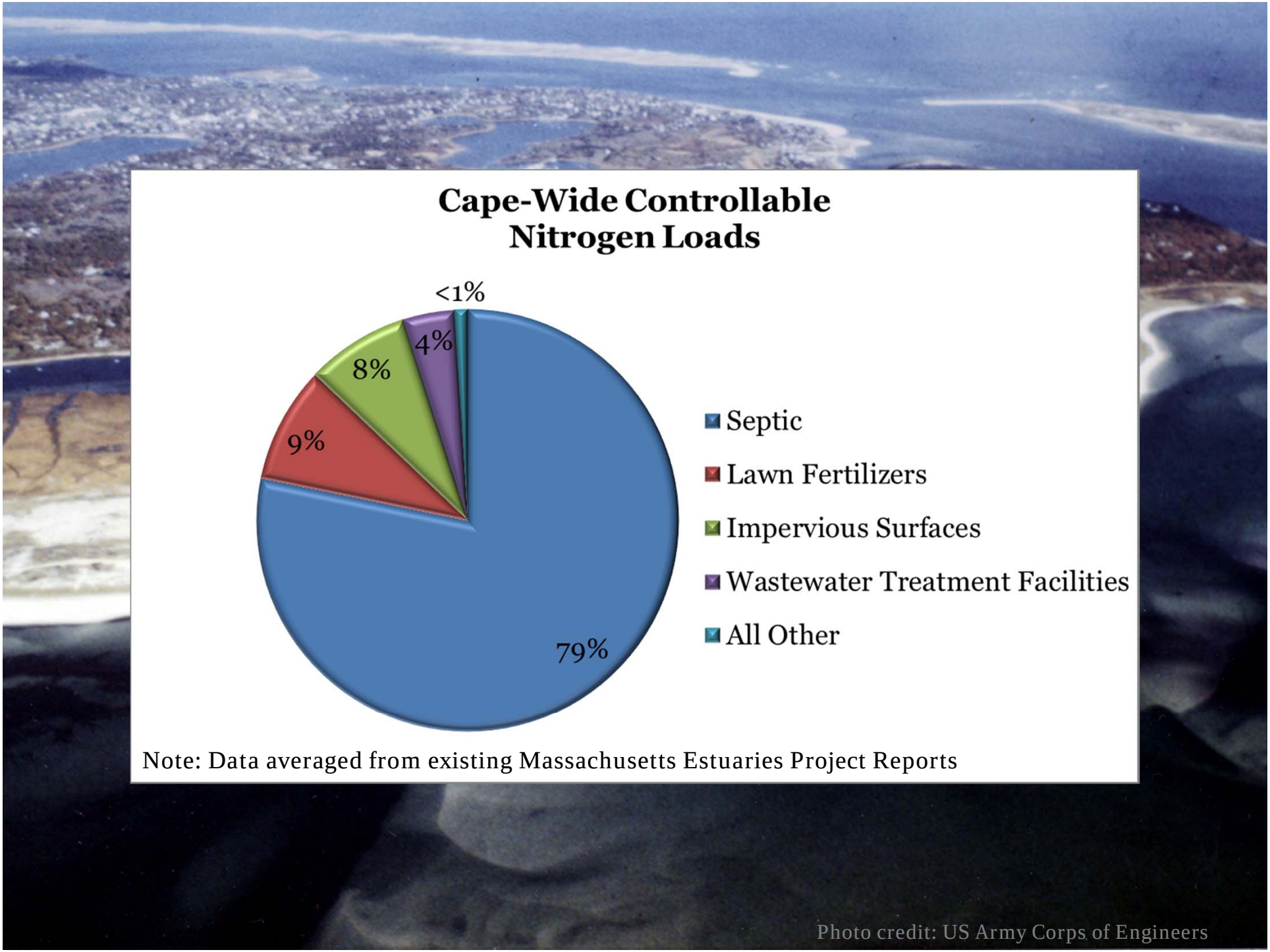
"Watershed Working Group - Stage Harbor - Workshop 1"

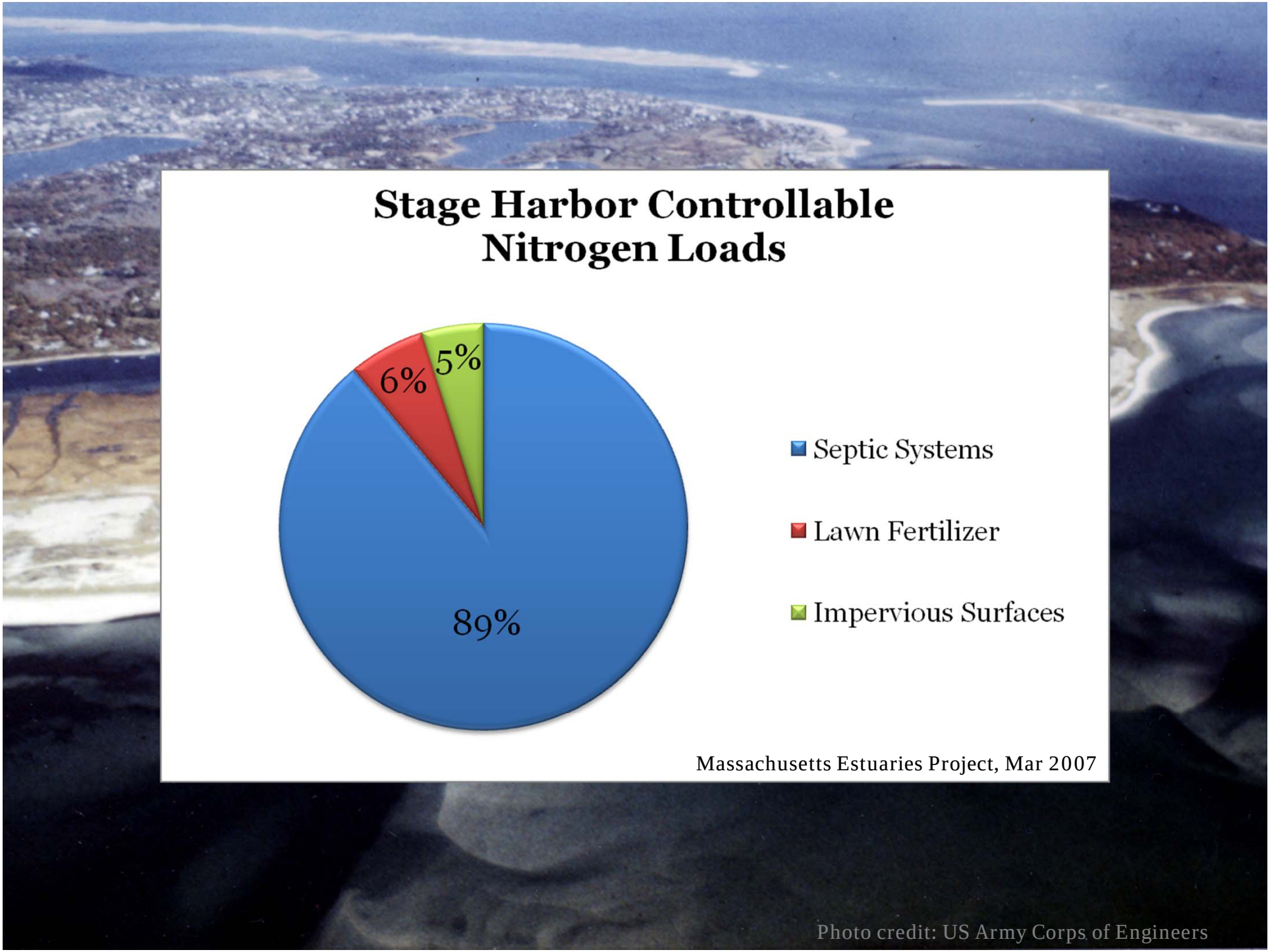


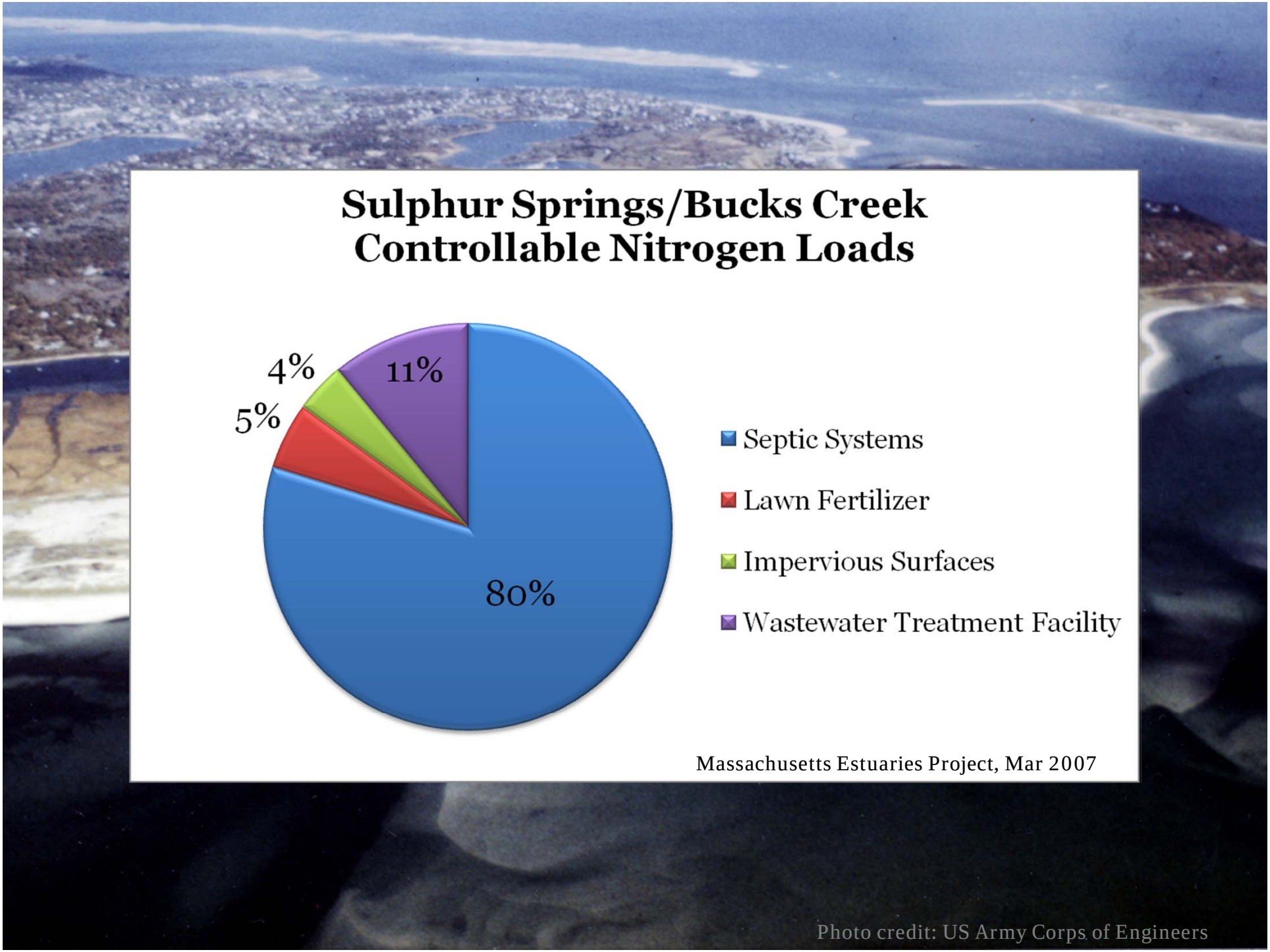
Massachusetts Estuaries Project

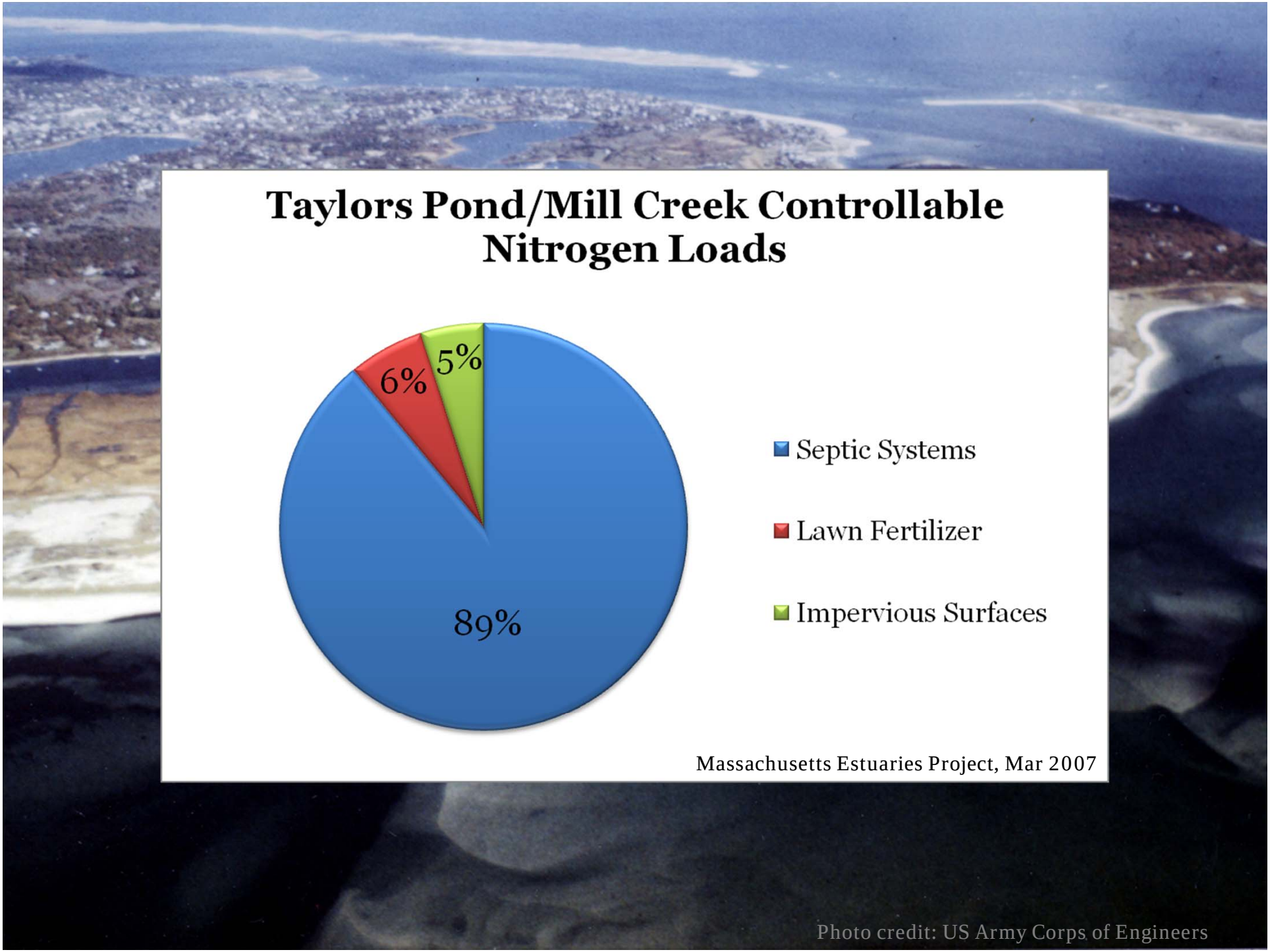
- Opportunity for towns to obtain independent analysis of nitrogen loading and it's impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

- Structures
- Ponds

Nitrogen

Ecological Indicators

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

Yearly Nitrate Concentration Averages in Public Supply Wells

- 0 - 0.5 mg/l
- 0.5 - 1 mg/l
- 1 - 2.5 mg/l
- 2.5 - 5 mg/l

Embayments with Removal Target

Total NLoad Percent Removal

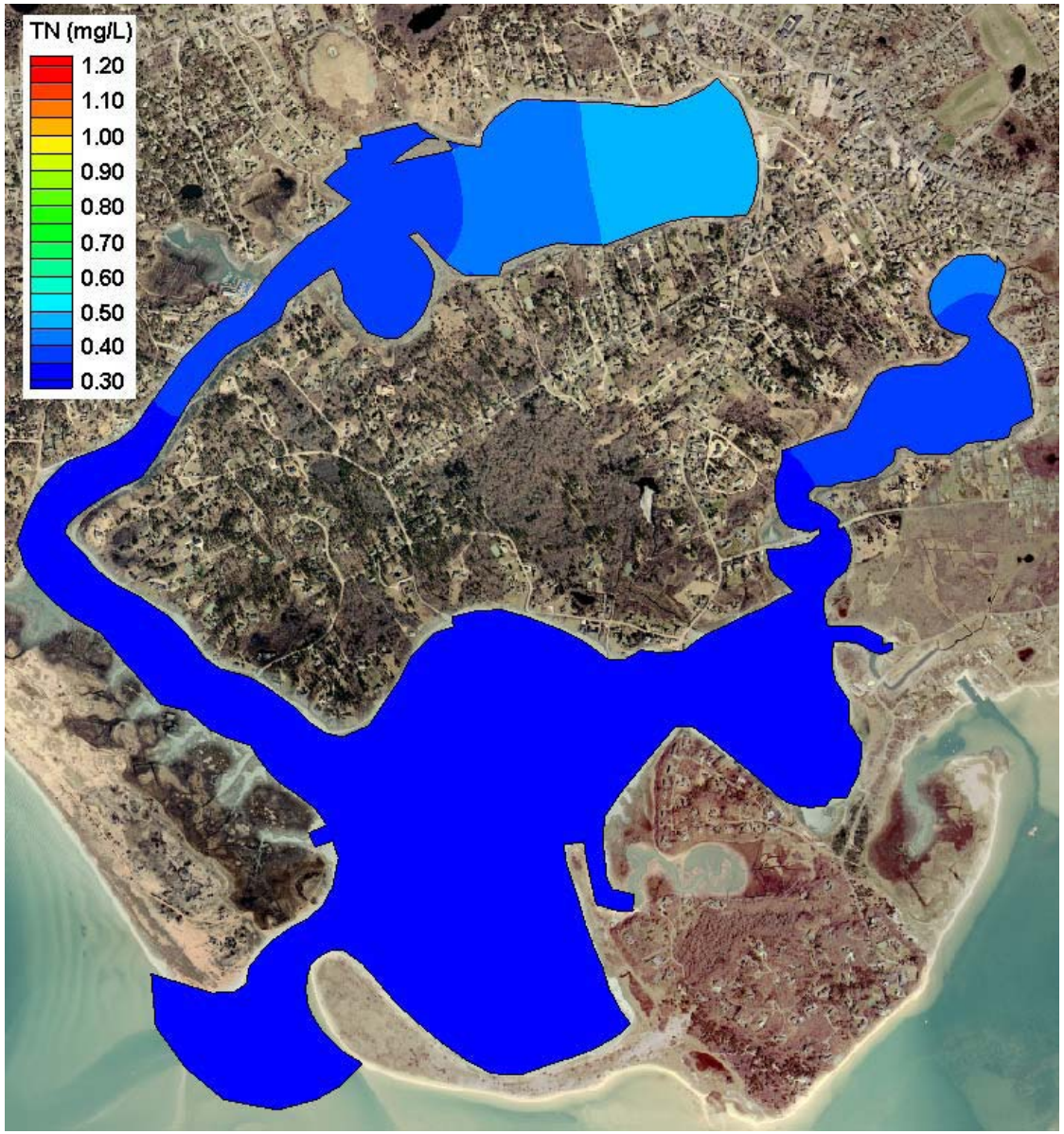
- 0 %
- 1 - 52 %
- 53 - 72 %
- 73 - 86 %
- 87 - 100 %

Subwatersheds with Removal Target

Total NLoad Percent Removal

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

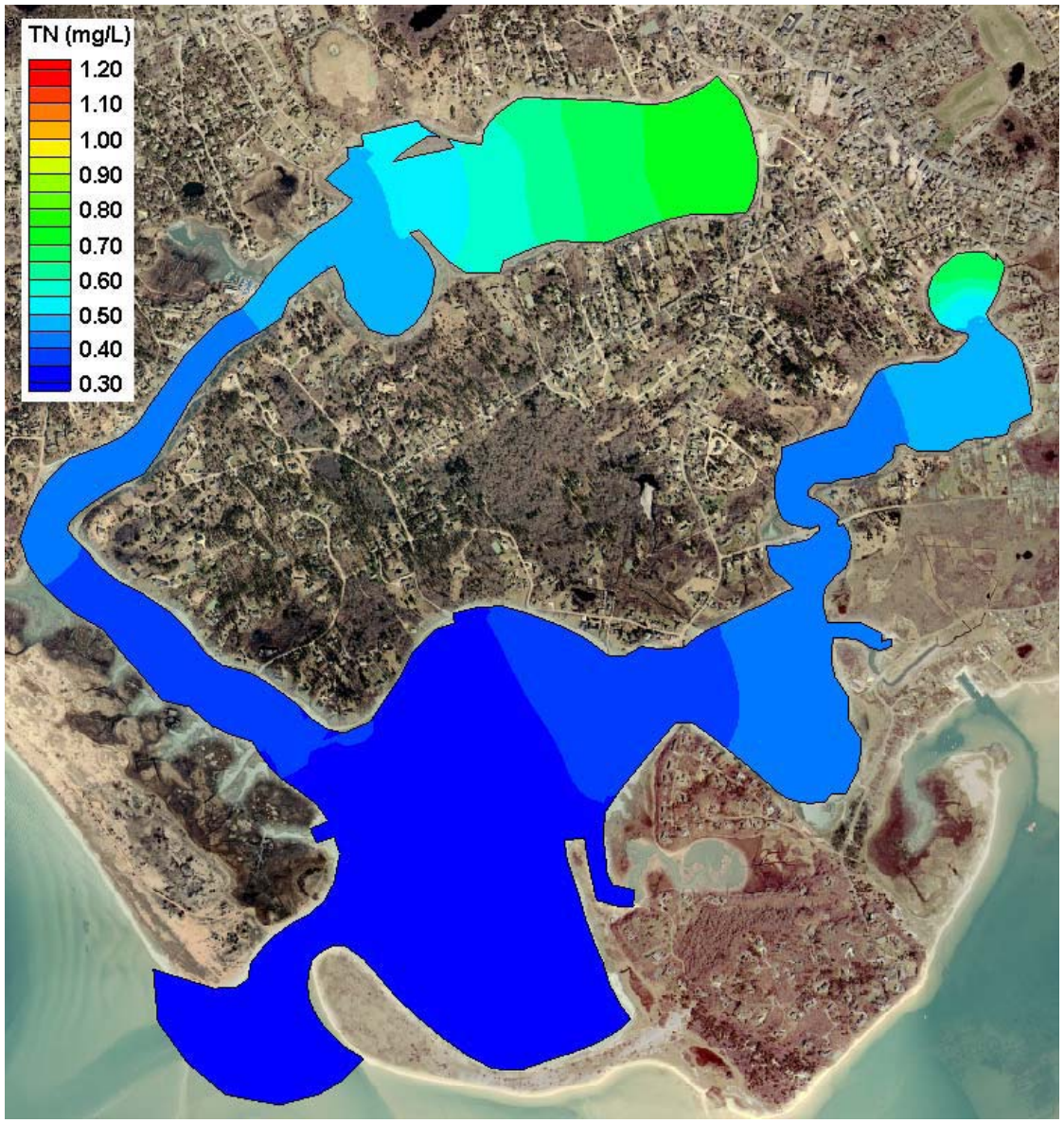
Sources: MassGIS, MEP, CCC



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

(Source: MEP 2007)

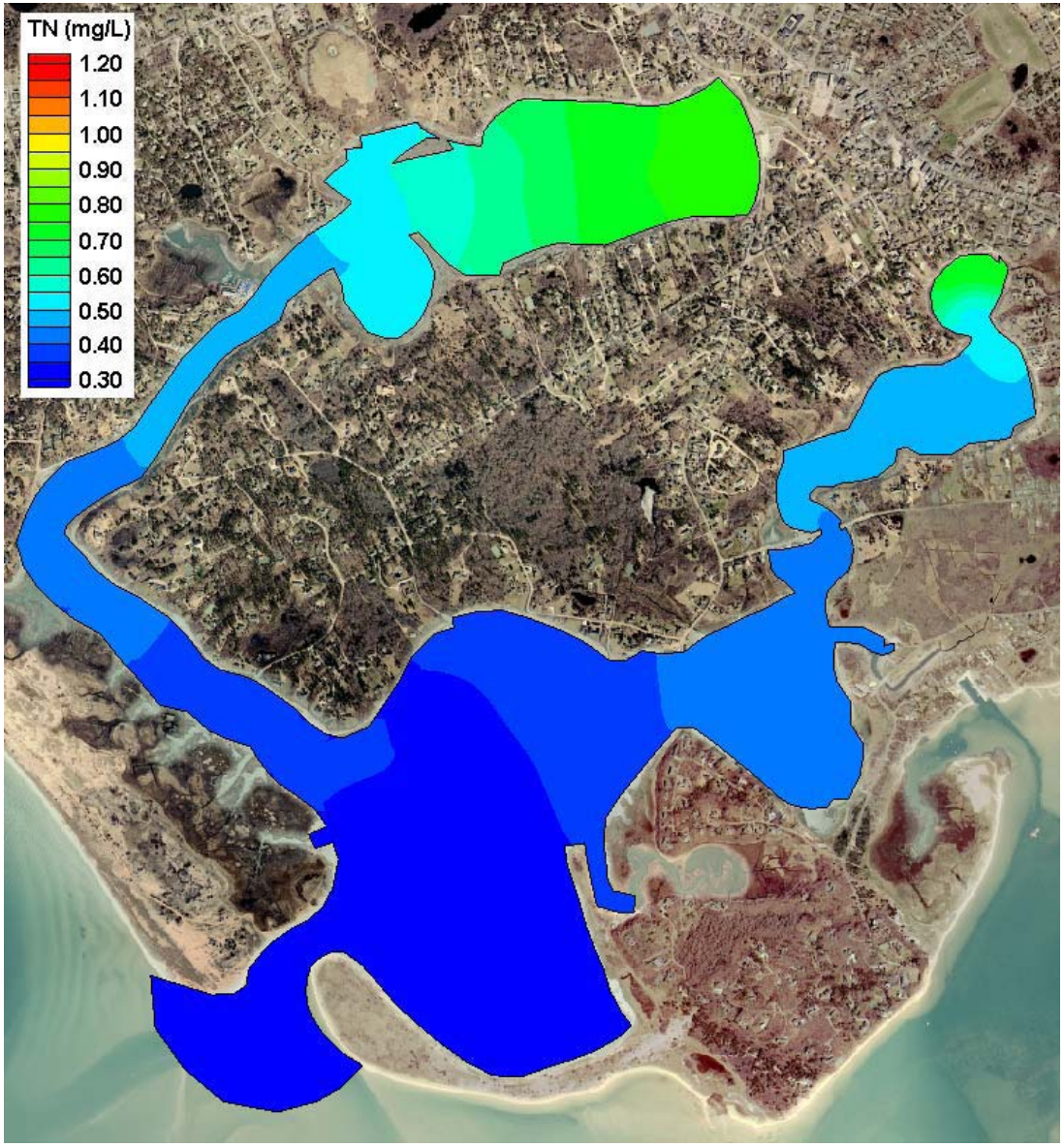
Pre-Colonial Conditions: Stage Harbor



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

(Source: MEP 2007)

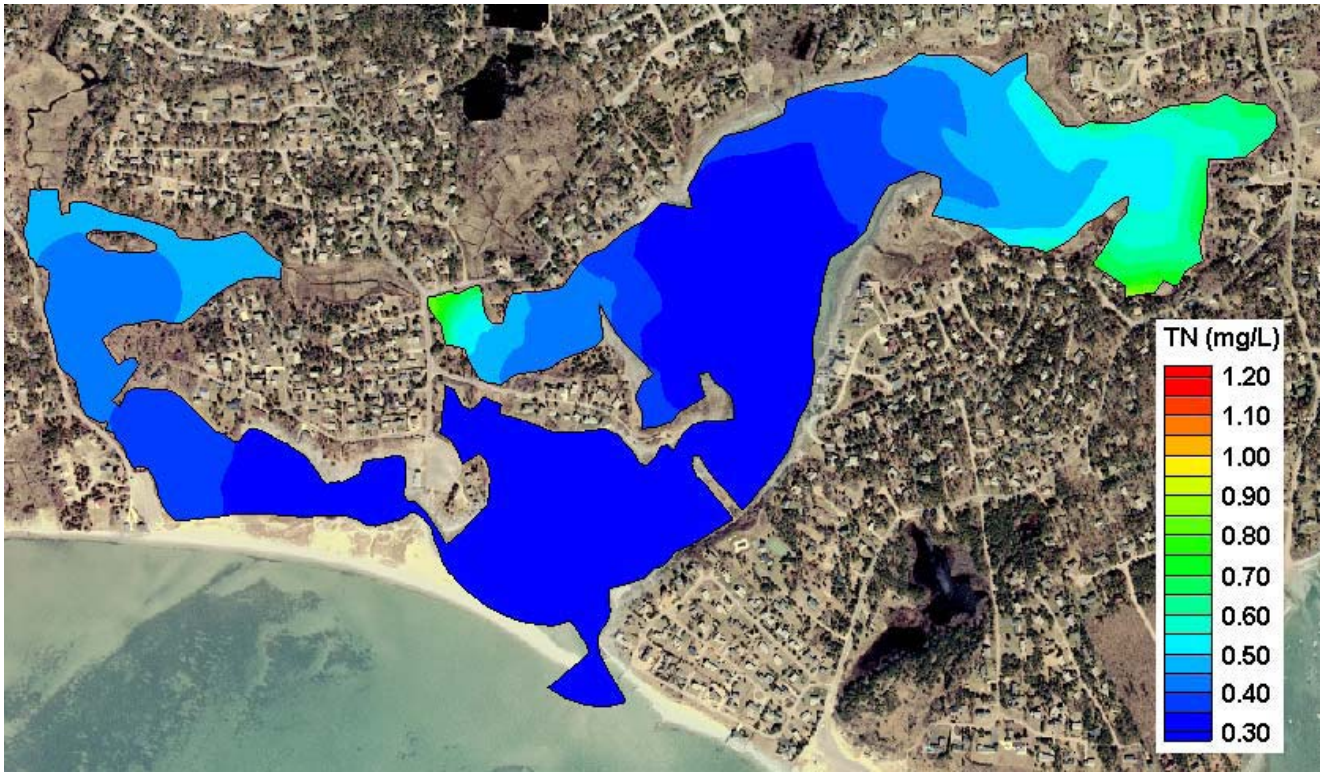
Present Conditions: Stage Harbor



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

(Source: MEP 2007)

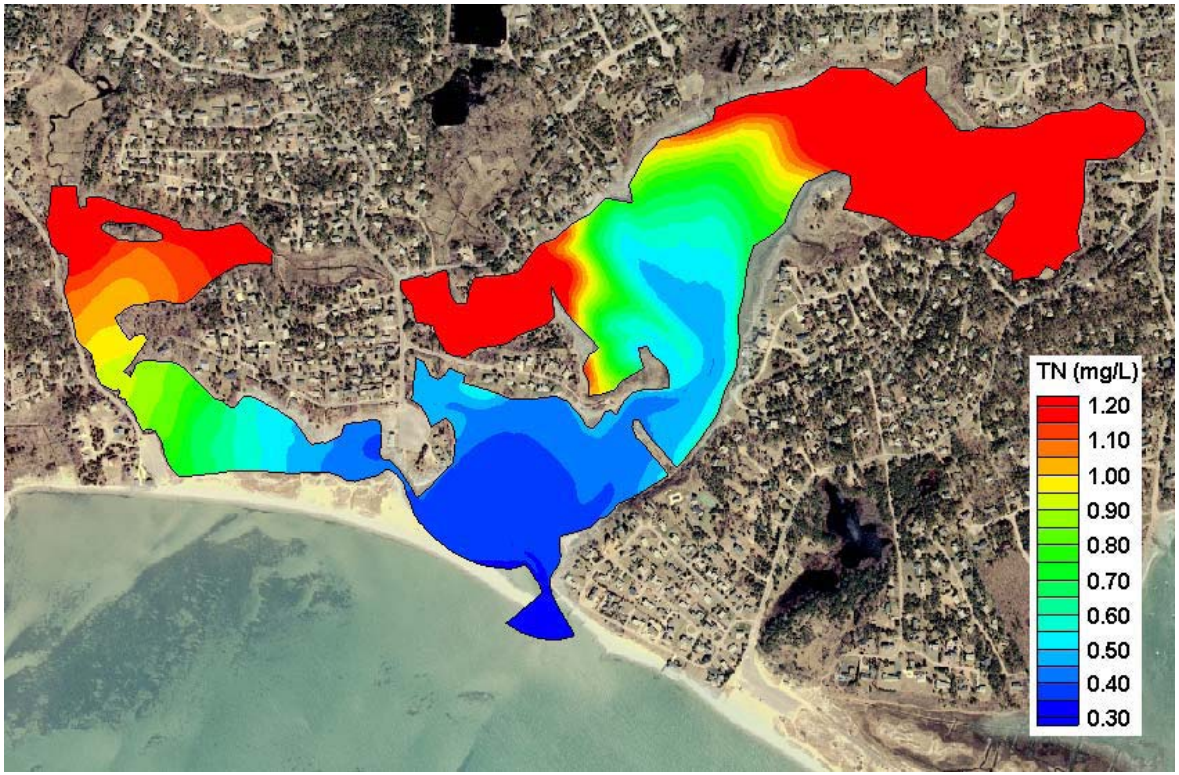
Build-out Conditions: Stage Harbor



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)

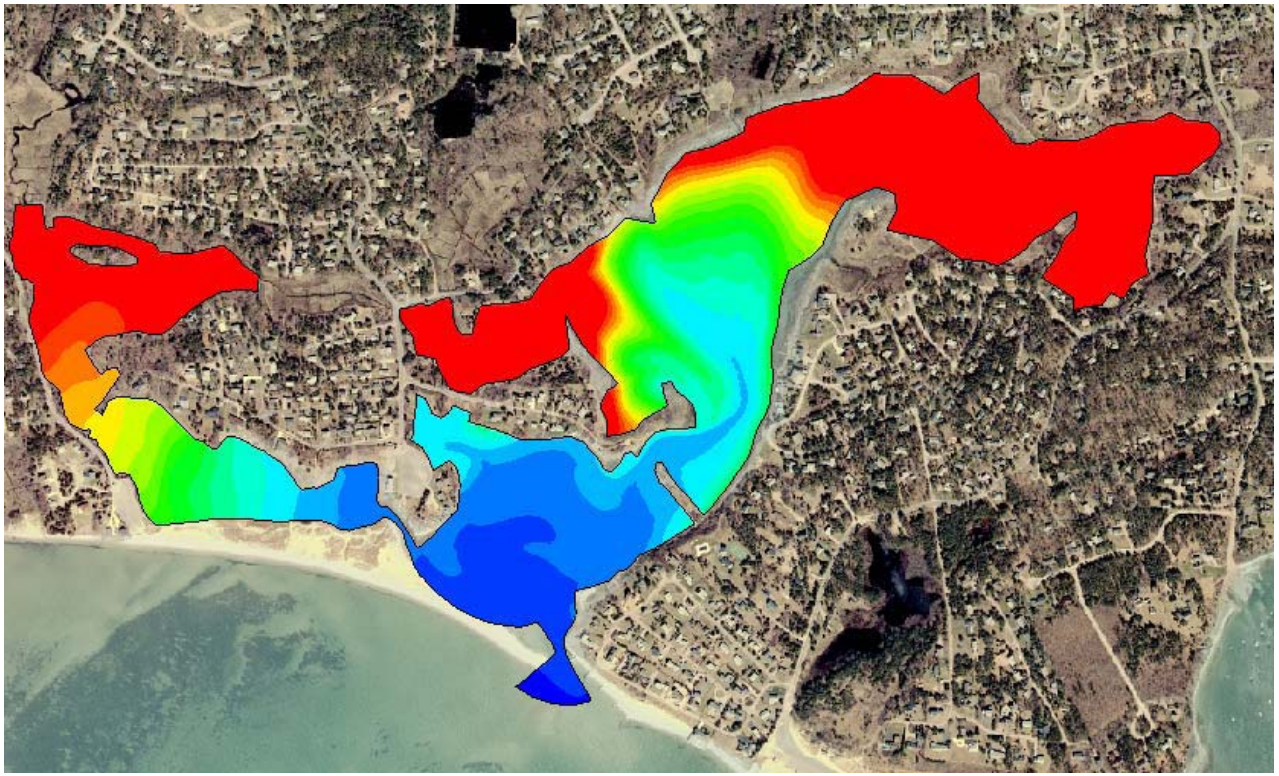
Pre-Colonial Conditions: Sulfur Springs/Bucks Creek



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

(Source: MEP 2007)

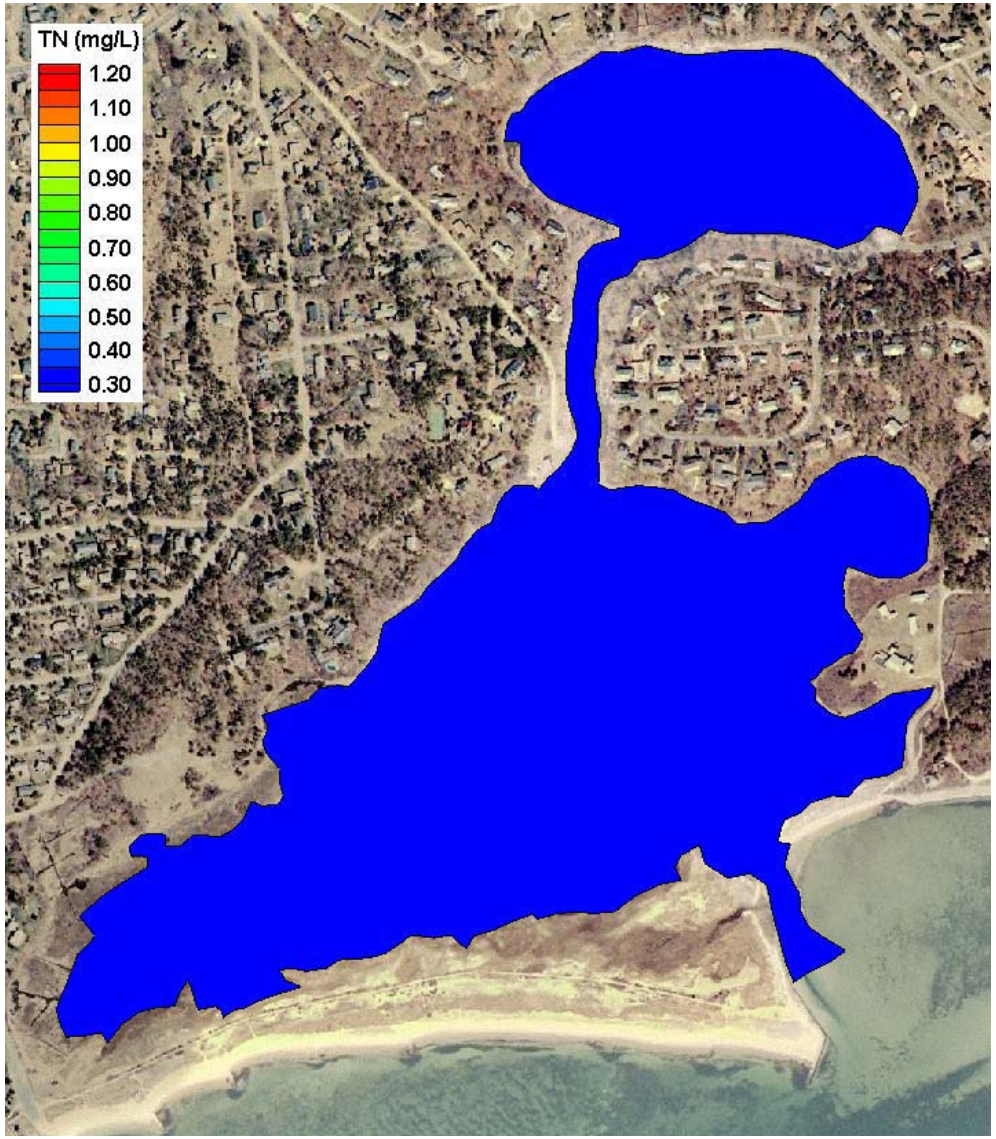
Present Conditions: Sulfur Springs/Bucks Creek



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)

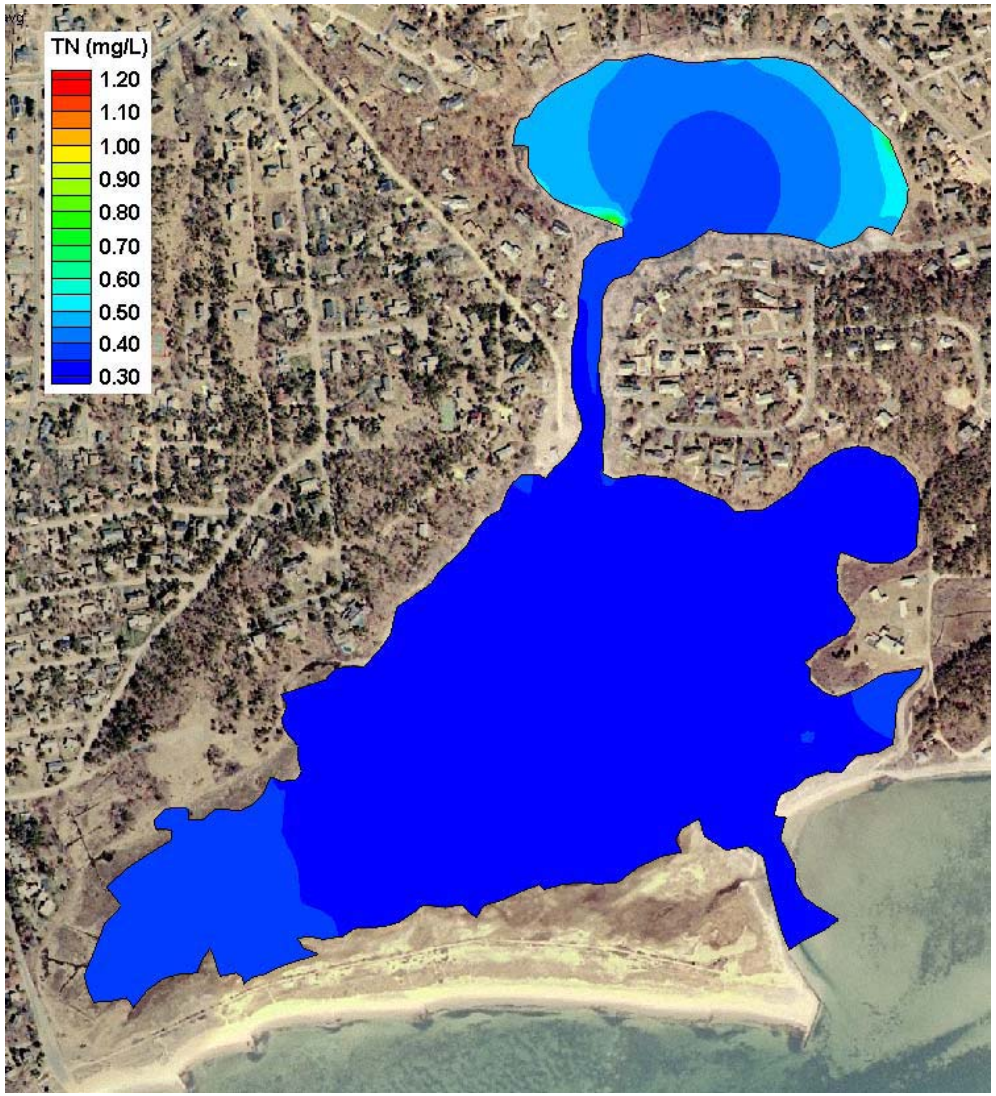
Build-out Conditions: Sulfur Springs/Bucks Creek



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

(Source: MEP 2007)

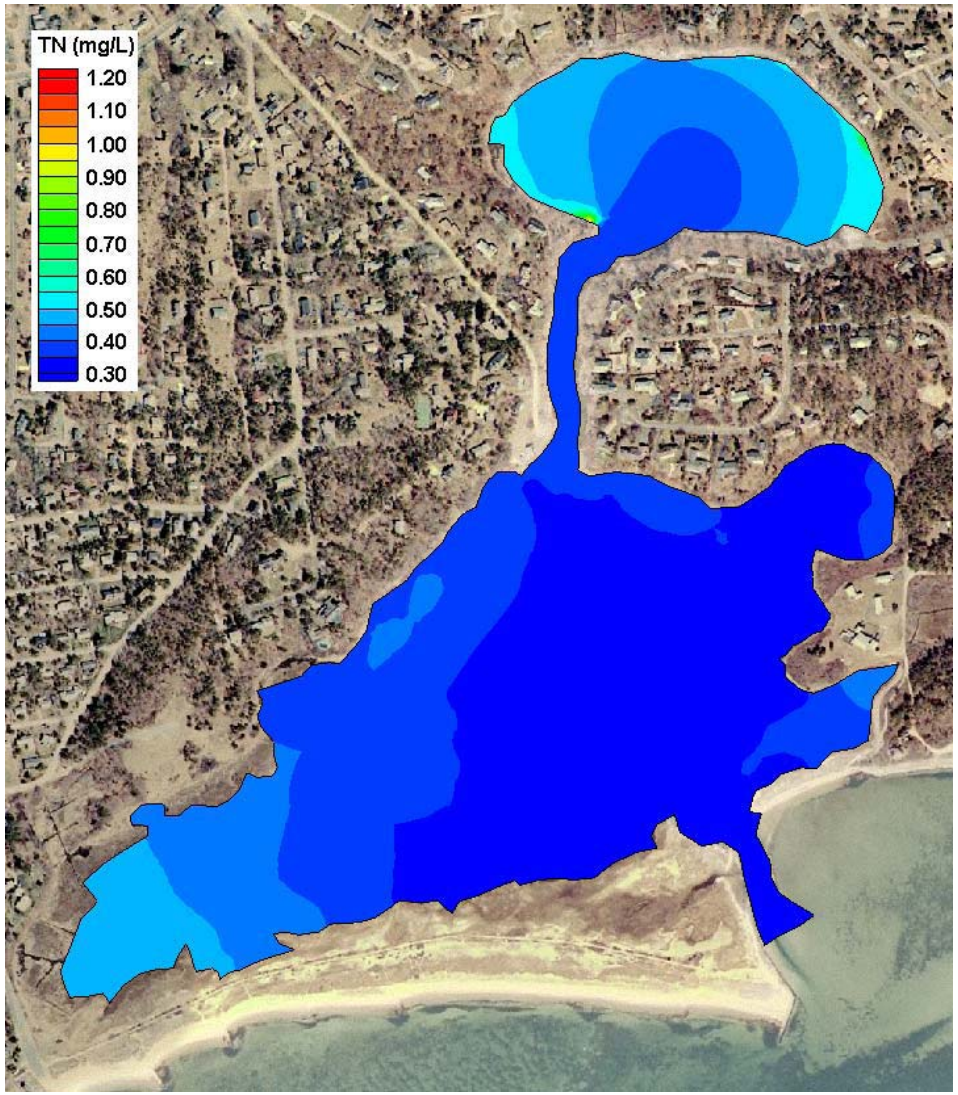
Pre-Colonial Conditions: Taylors Pond/Mill Creek



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

Base Map

- Town Lines
- Rivers

Embayment Boundary

- On Land
- On Sea

Major Roads

- US Highway
- State Highway
- Roads

- Structures
- Ponds

Nitrogen

Ecological Indicators

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

Yearly Nitrate Concentration Averages in Public Supply Wells

- 0 - 0.5 mg/l
- 0.5 - 1 mg/l
- 1 - 2.5 mg/l
- 2.5 - 5 mg/l

Embayments with Removal Target

Total NLoad Percent Removal

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

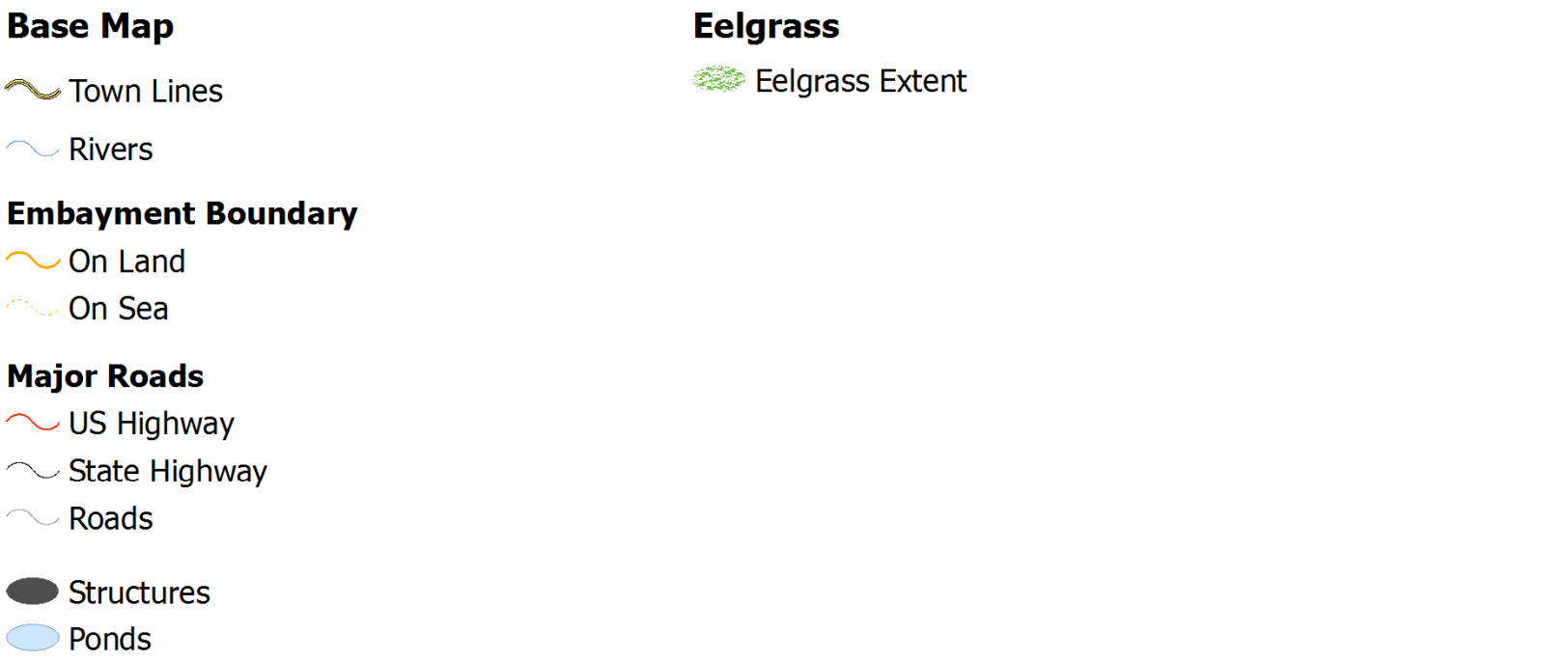
Subwatersheds with Removal Target

Total NLoad Percent Removal

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

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

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

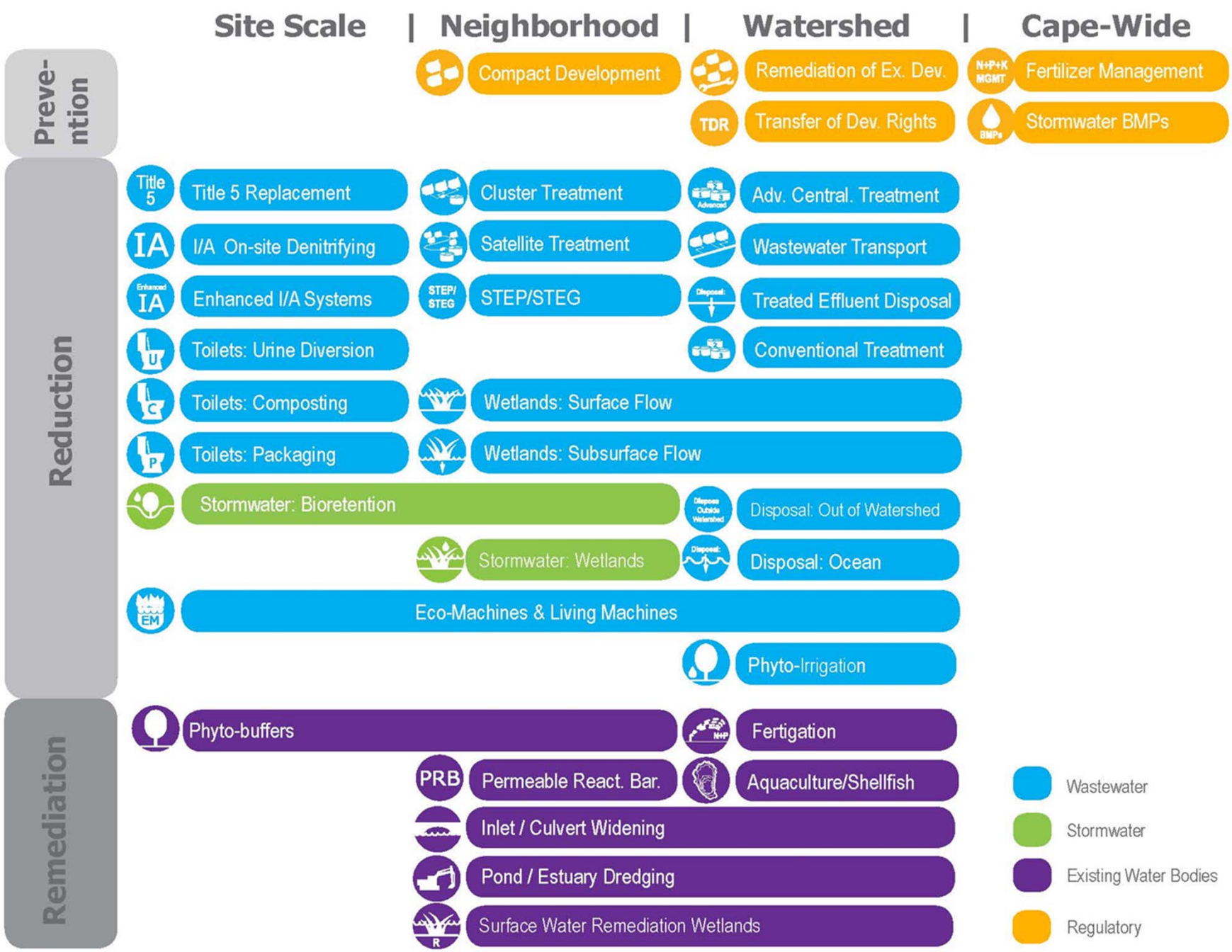
- 2001 - 2010
- 2011 - 2020
- 2021 - 2030
- 2031 - 2040
- 2041 - 2050

Sources: MassGIS, MassDOT, CCC

Framework for Addressing Solutions Moving Forward

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

"Watershed Working Group - Stage Harbor - Workshop 1"




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

DRAFT

- 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.

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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.”

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[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.

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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.*

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- 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

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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.

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- 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.

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- 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.*

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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.

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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

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