

**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

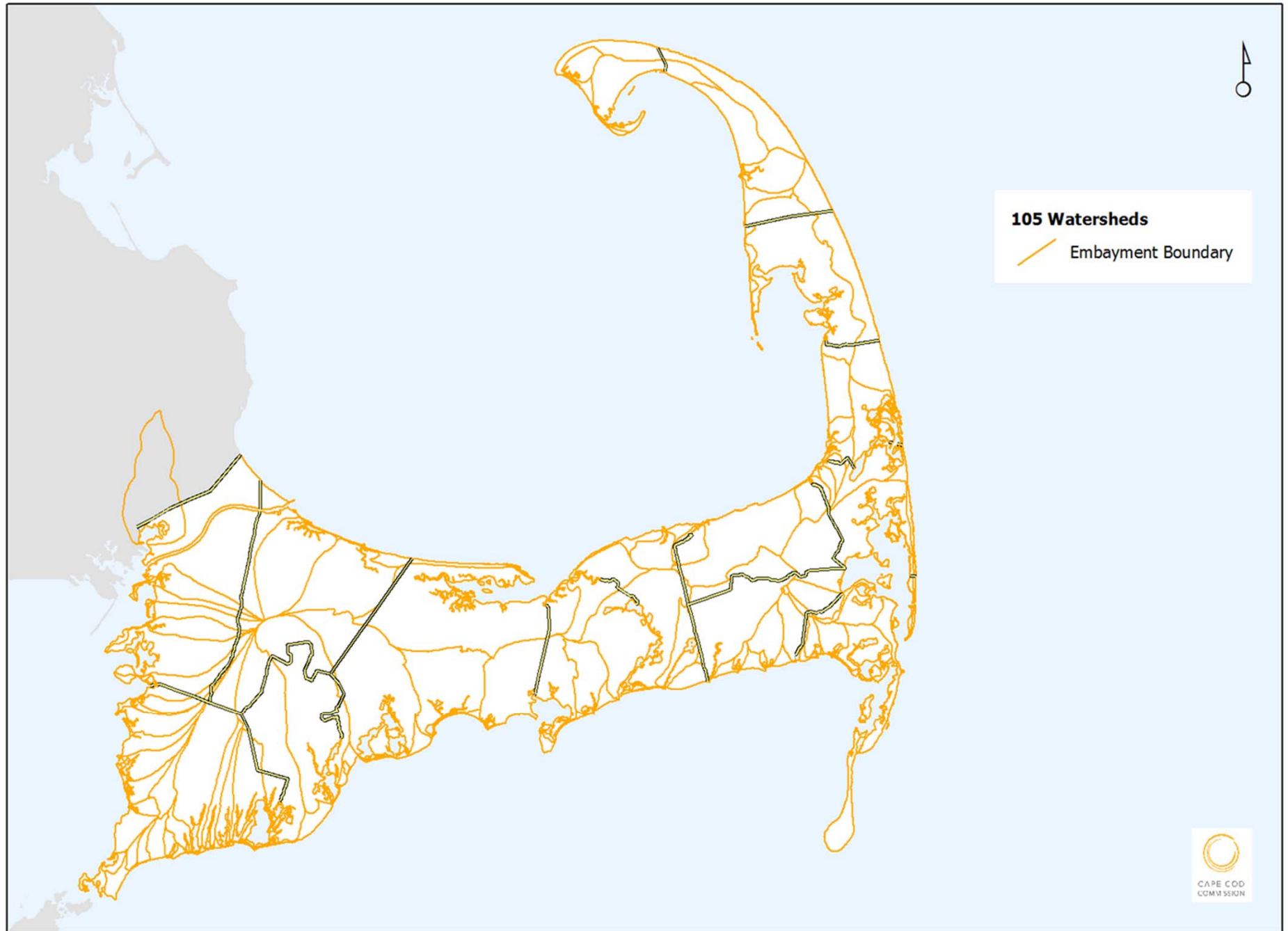
Focus on 21st Century Problems

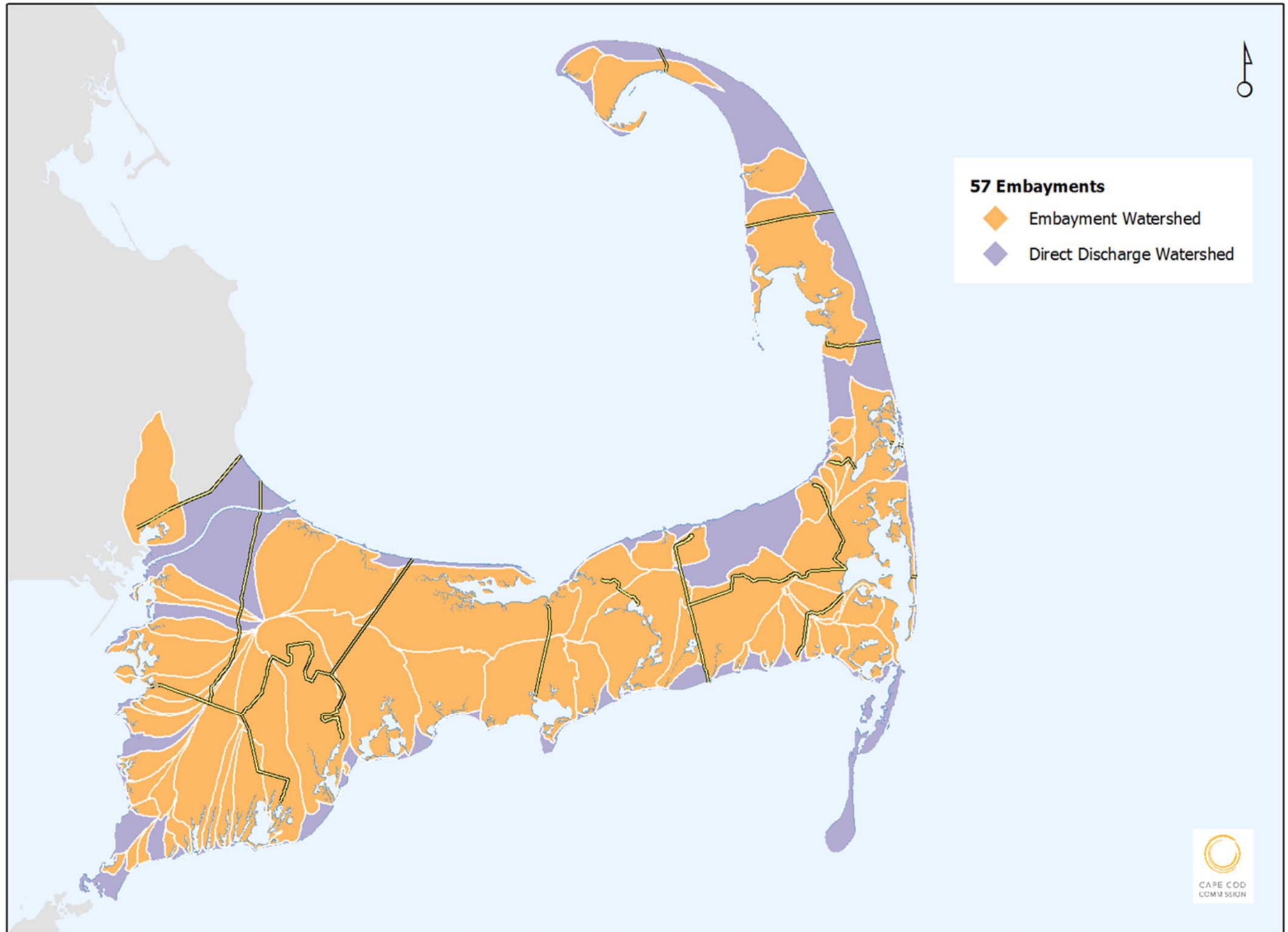


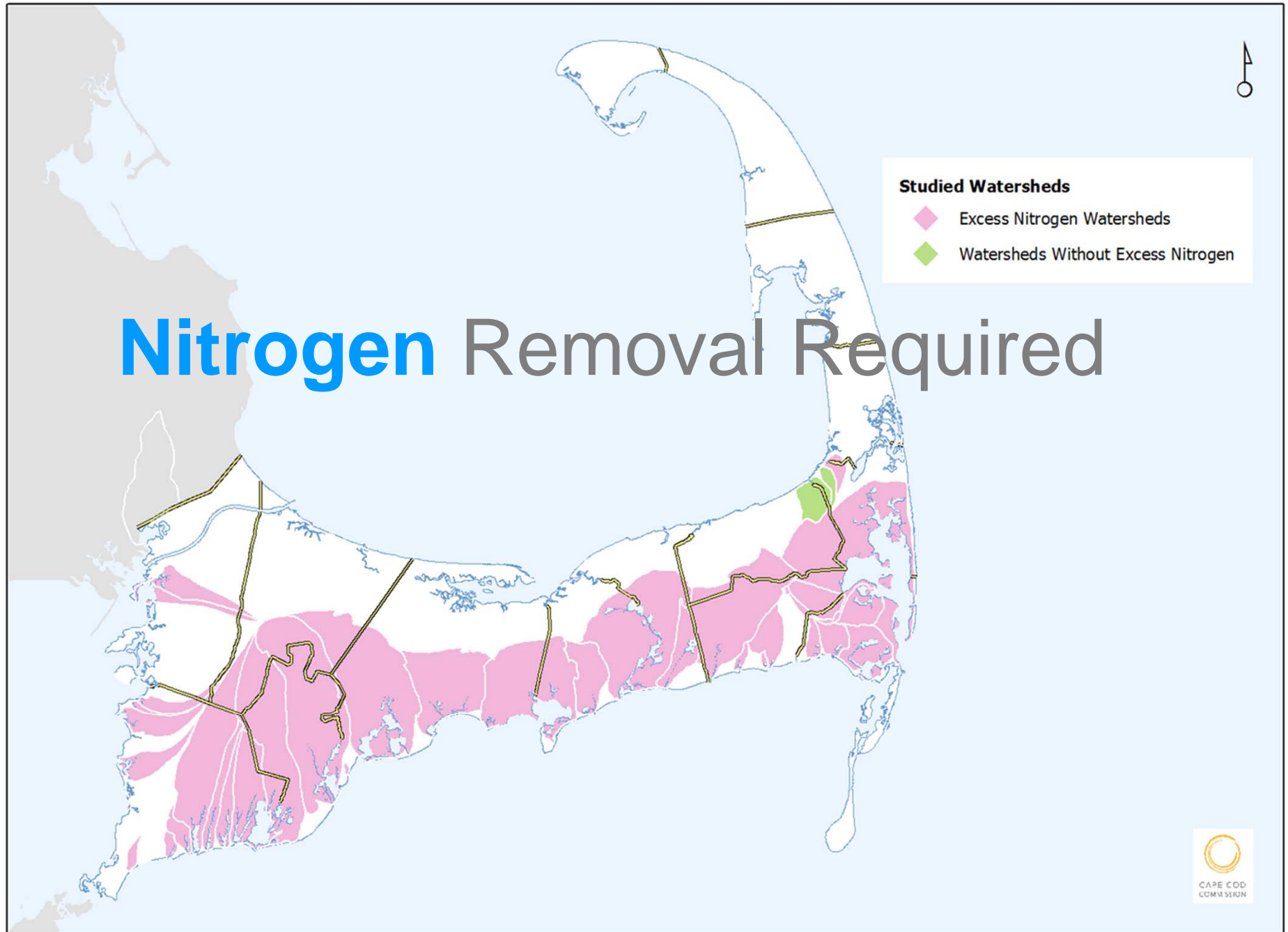
**Nitrogen:
Saline Waters**

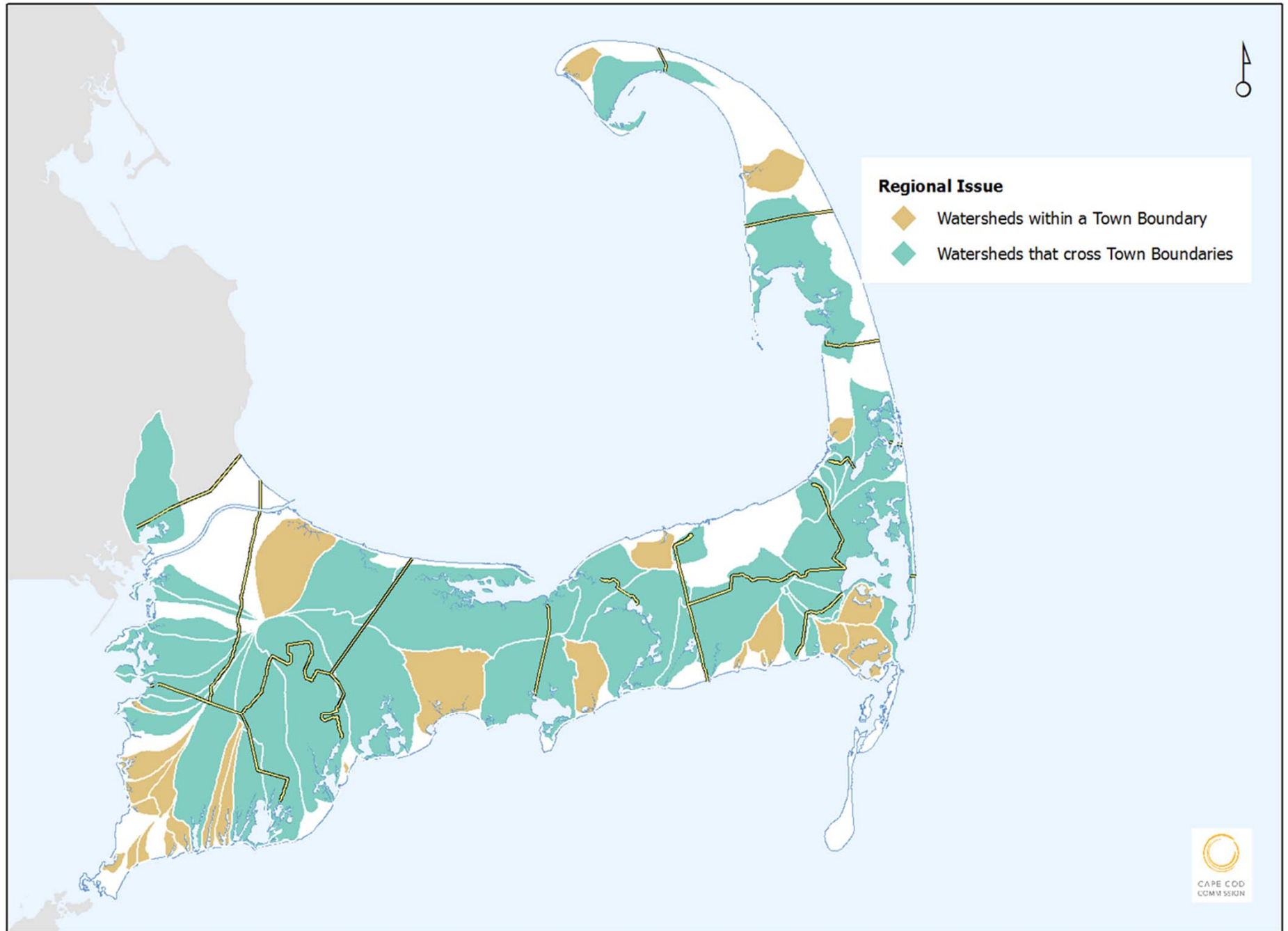
**Phosphorus:
Fresh Waters**

**Growth &
Title 5
Limitations**

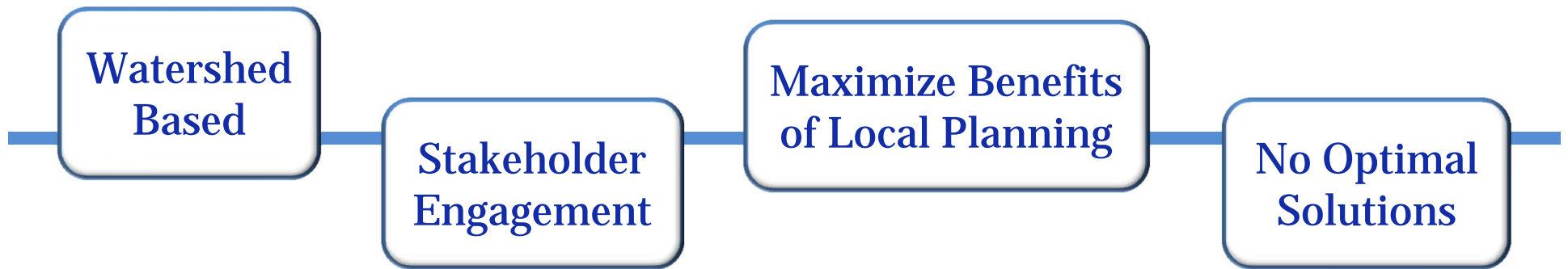






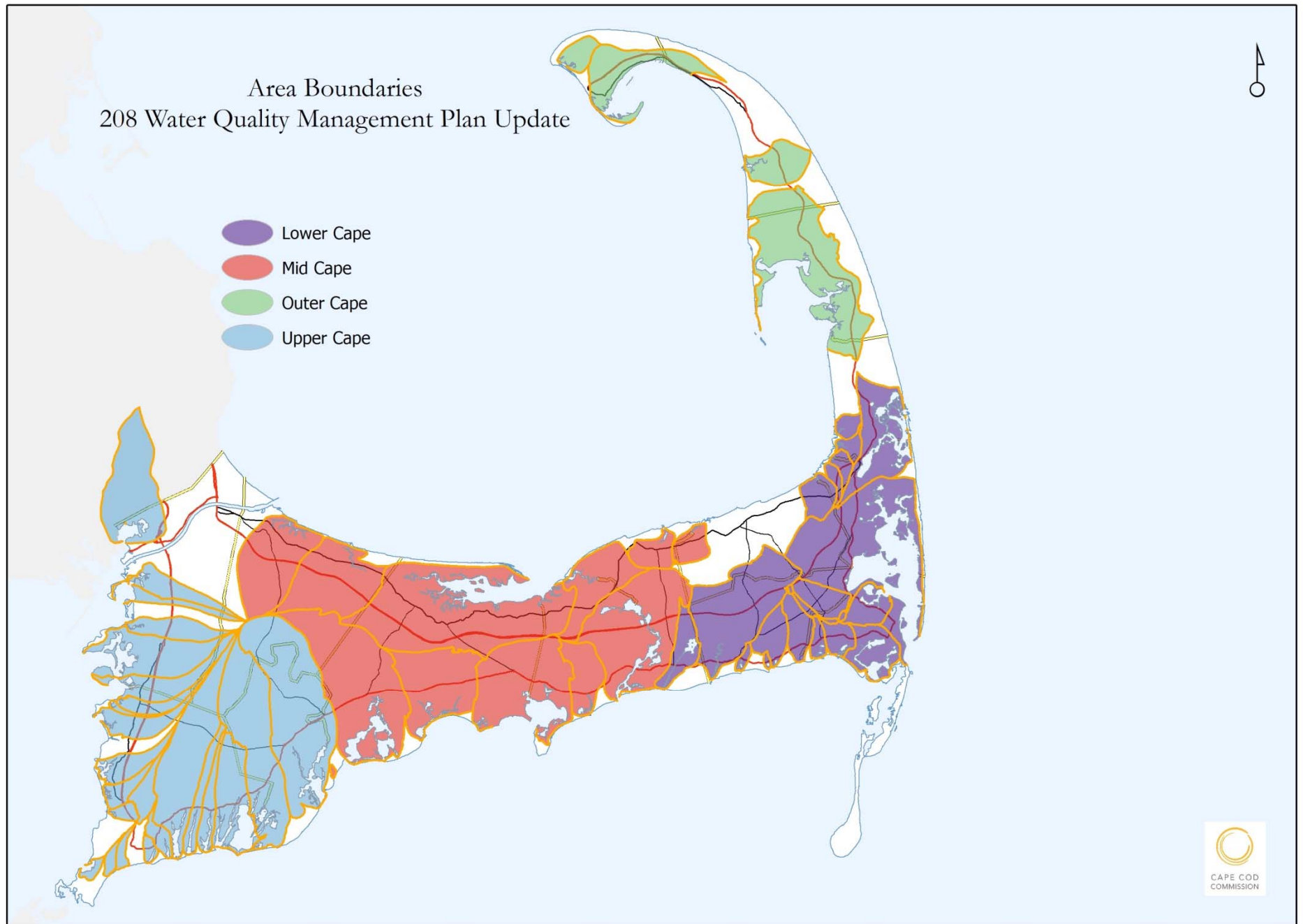


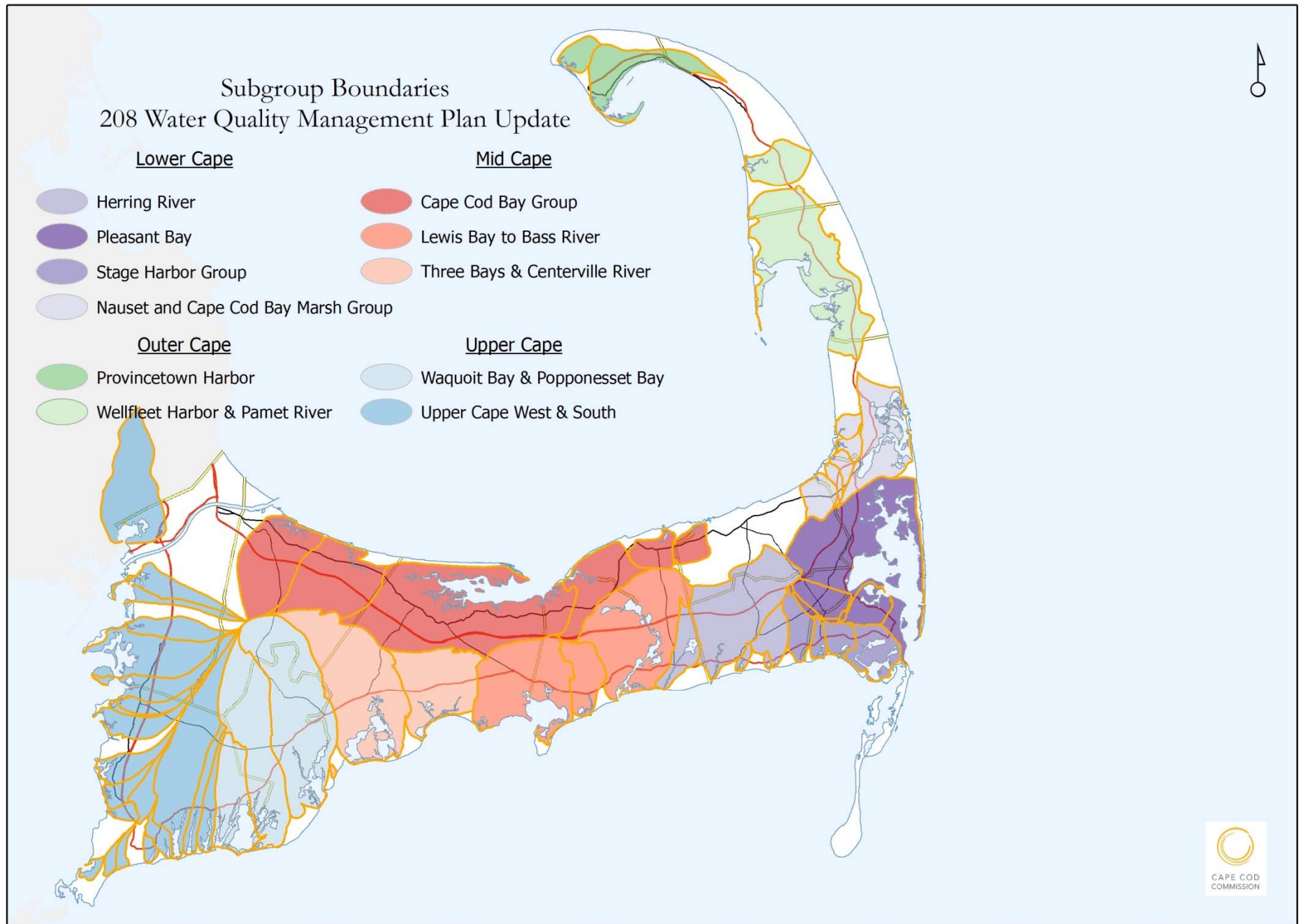
Approach to the 208 Plan Update



Goal:

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

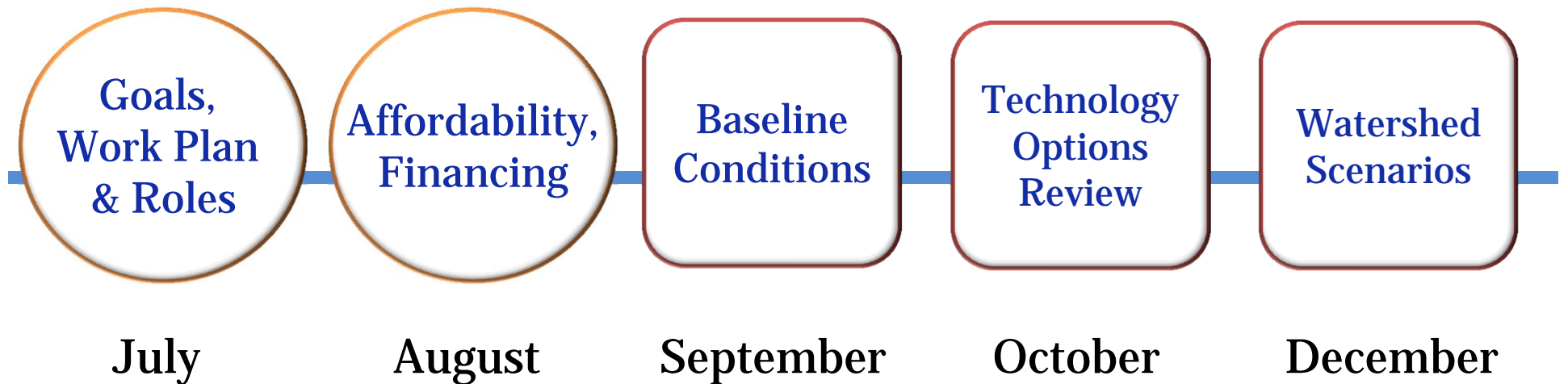




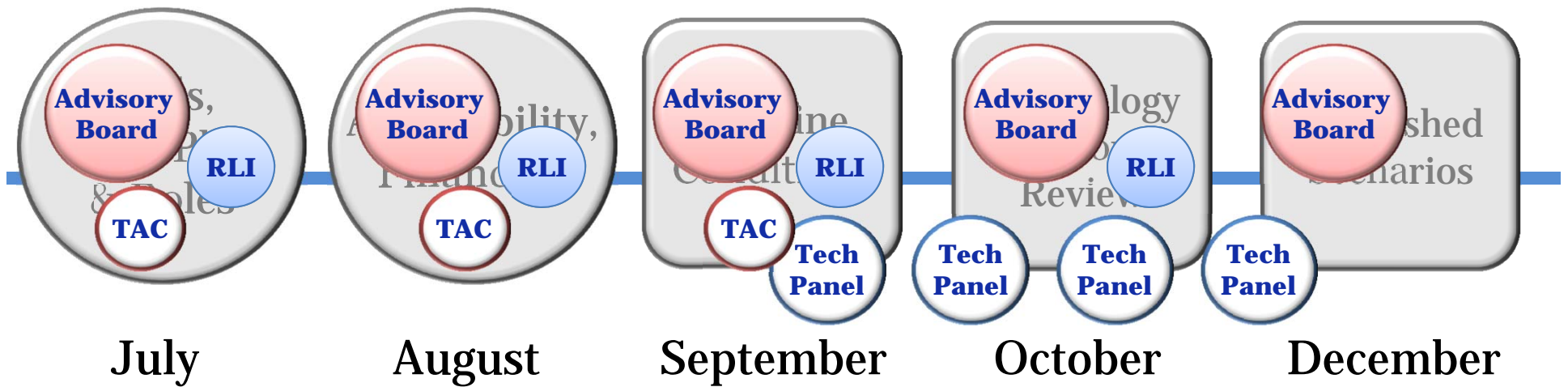
What is the stakeholder process?

Public Meetings

Watershed Working Groups



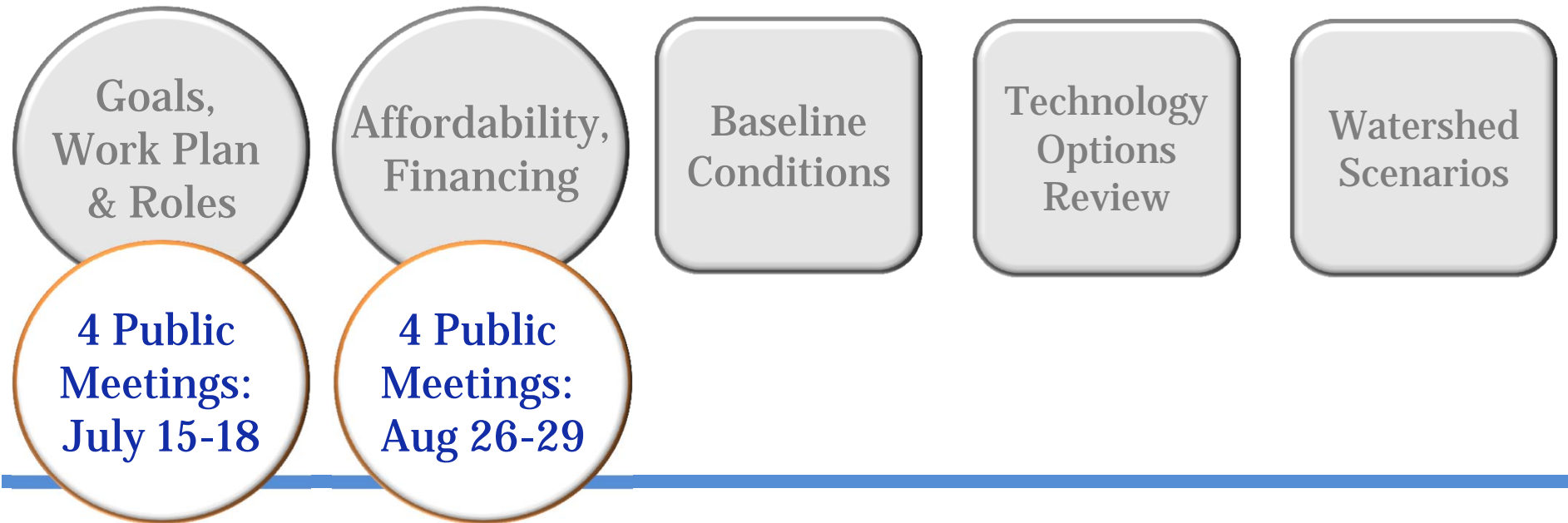
208 Planning Process



 Regulatory, Legal & Institutional Work Group

 Technical Advisory Committee of Cape Cod
Water Protection Collaborative

208 Planning Process



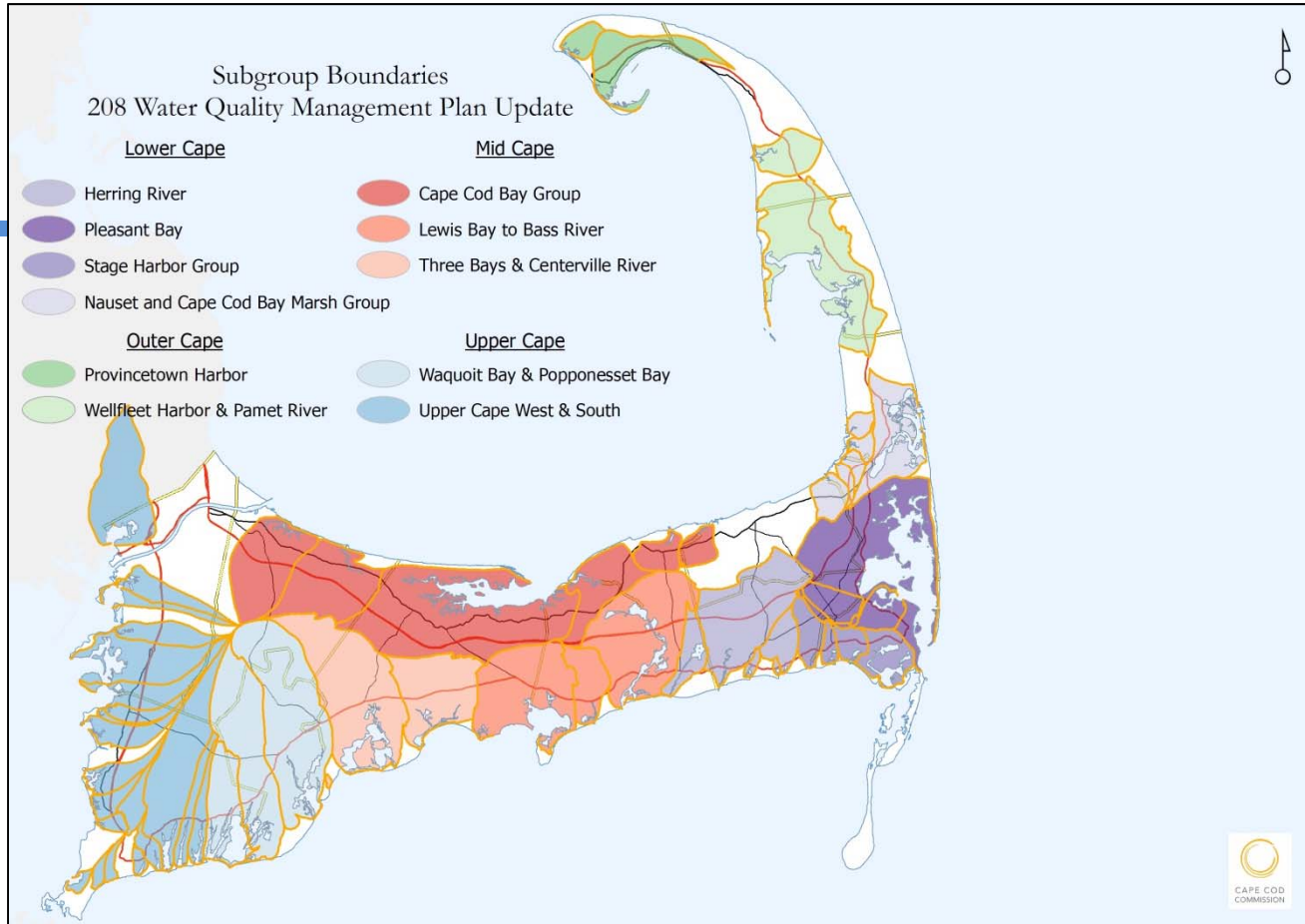
208 Planning Process

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

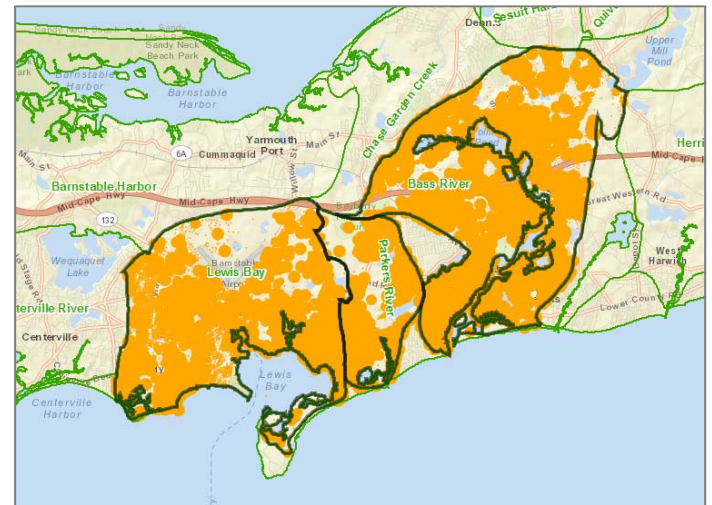
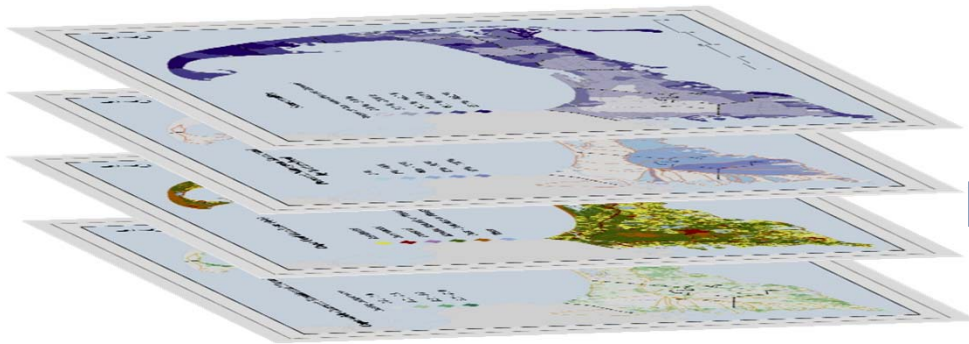
11 Working
Group Meetings:
Sept 18-27

Technology
Options
Review

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Oct 21-Nov 5

Watershed
Scenarios

11 Working
Group Meetings:
Dec 2-11



208 Planning Process

Baseline
Conditions

11 Working
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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



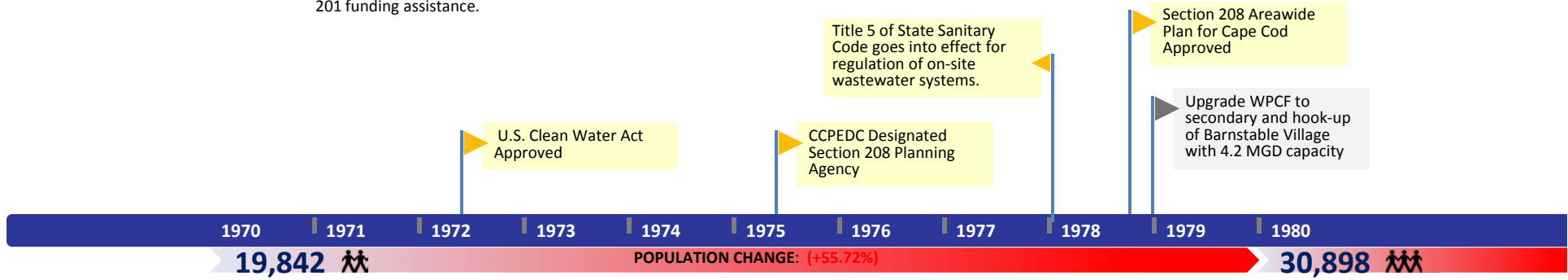
Bass River
Lewis Bay
Parkers River

Barnstable: 1970-2013

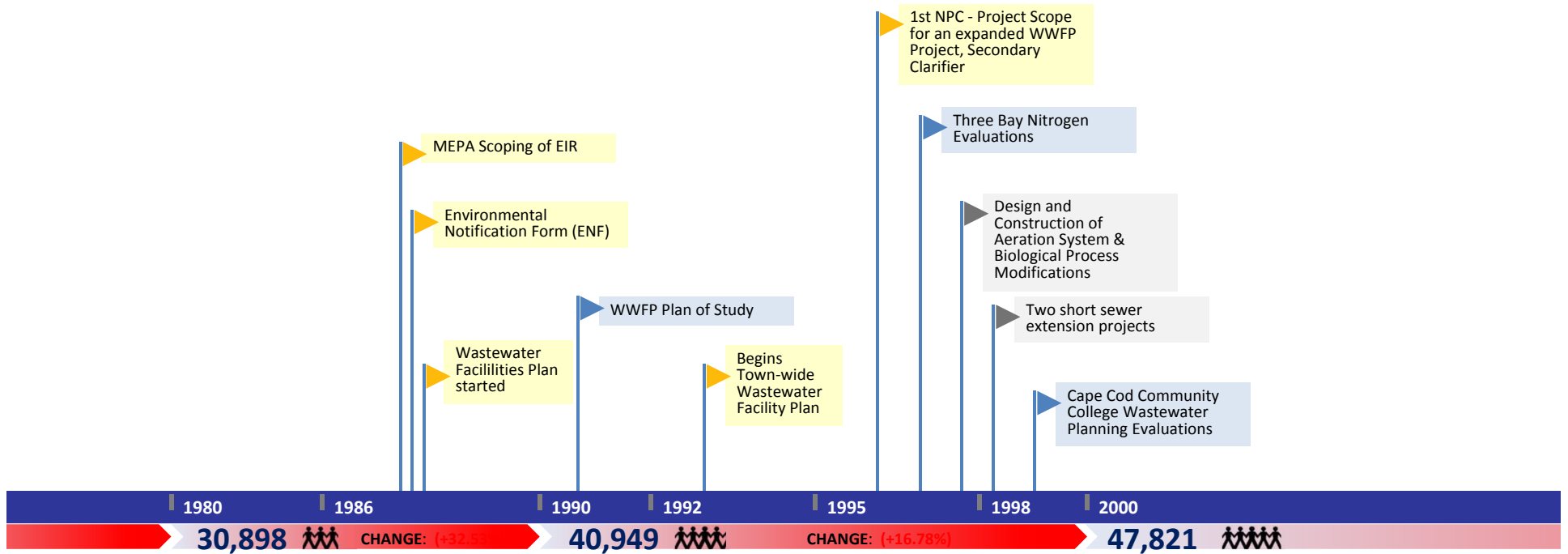
From 1978 Section 208 Plan

- ▶ 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.

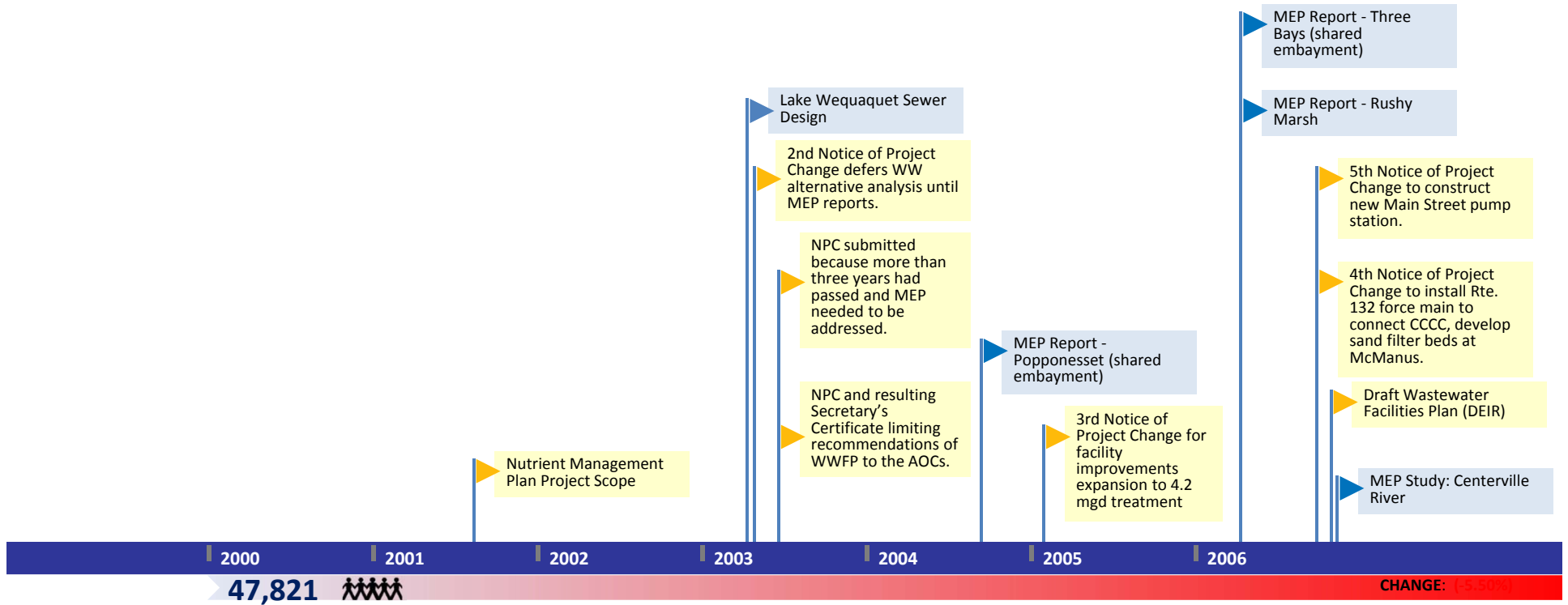
- ▶ The present Hyannis treatment plant has the necessary capacity to handle all sewer service area needs in Hyannis. Should the town want to expand the collection system beyond these sewer service areas, 201 funds will not be available for these expansions or for an additional treatment plant.
- ▶ The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



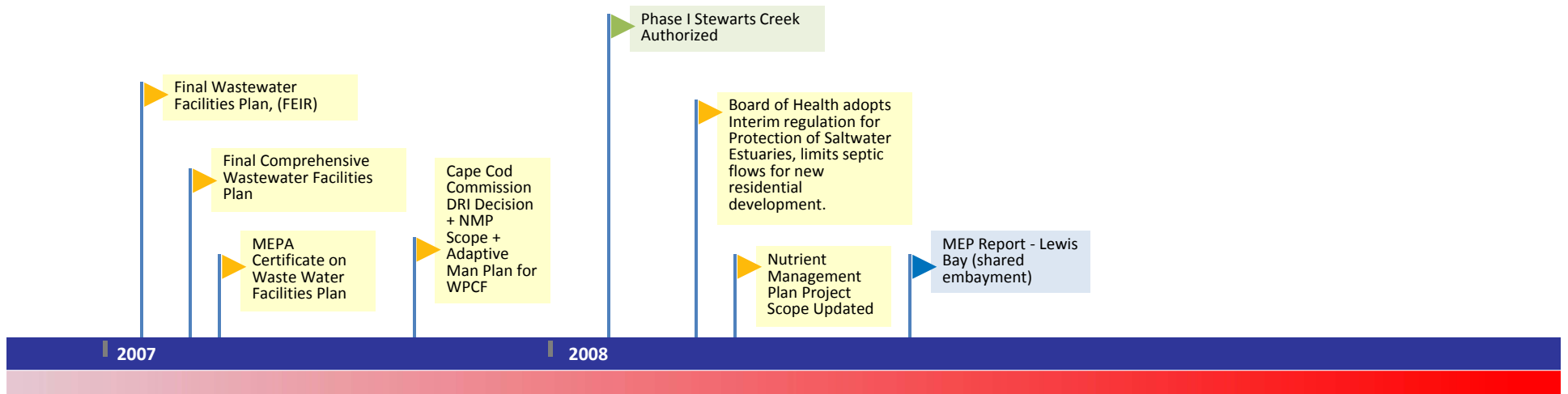
Barnstable: 1970-2013



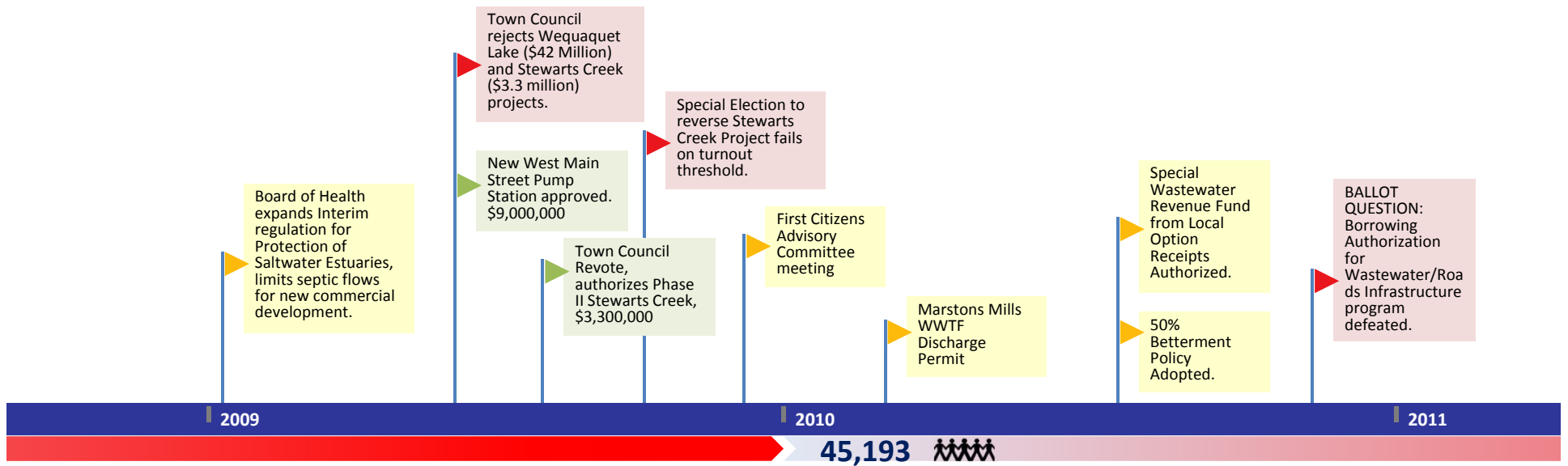
Barnstable: 1970-2013



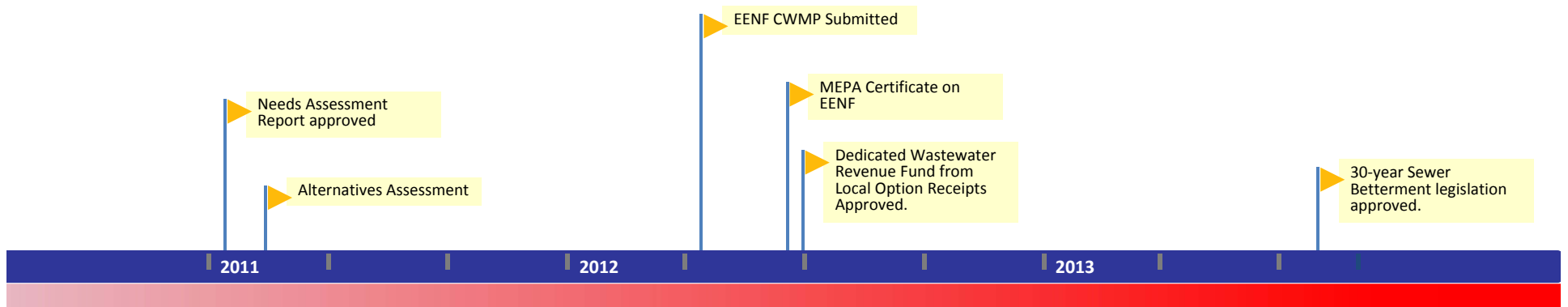
Barnstable: 1970-2013



Barnstable: 1970-2013



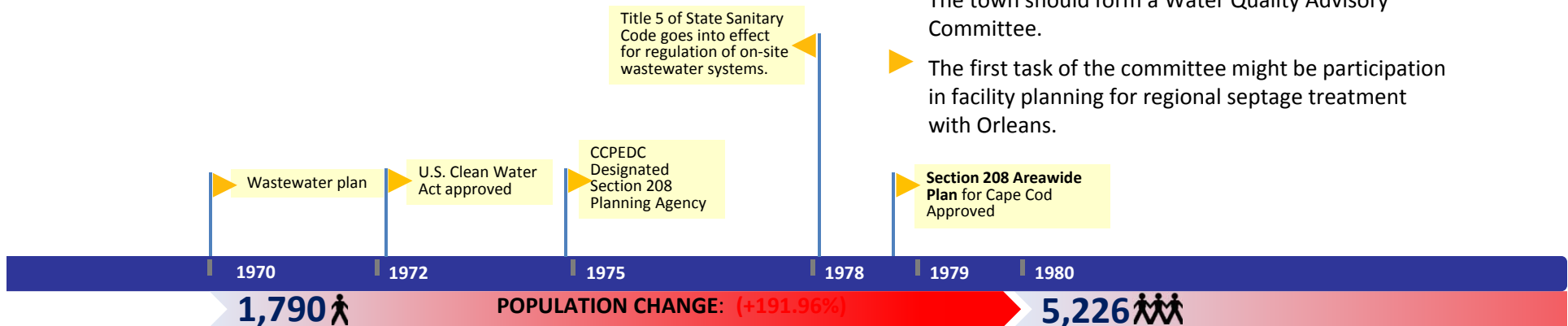
Barnstable: 1970-2013



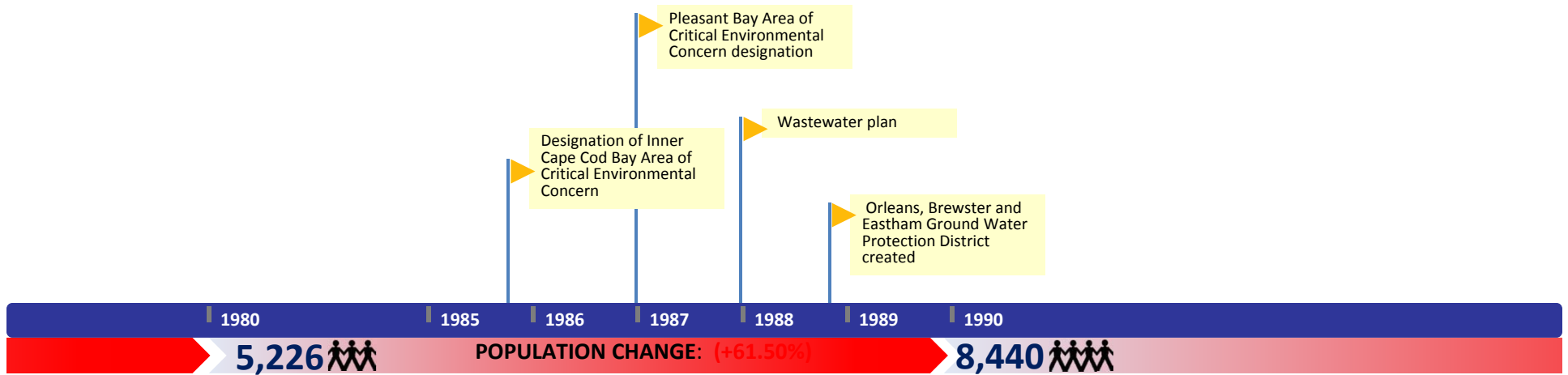
Brewster

From 1978 Section 208 Plan

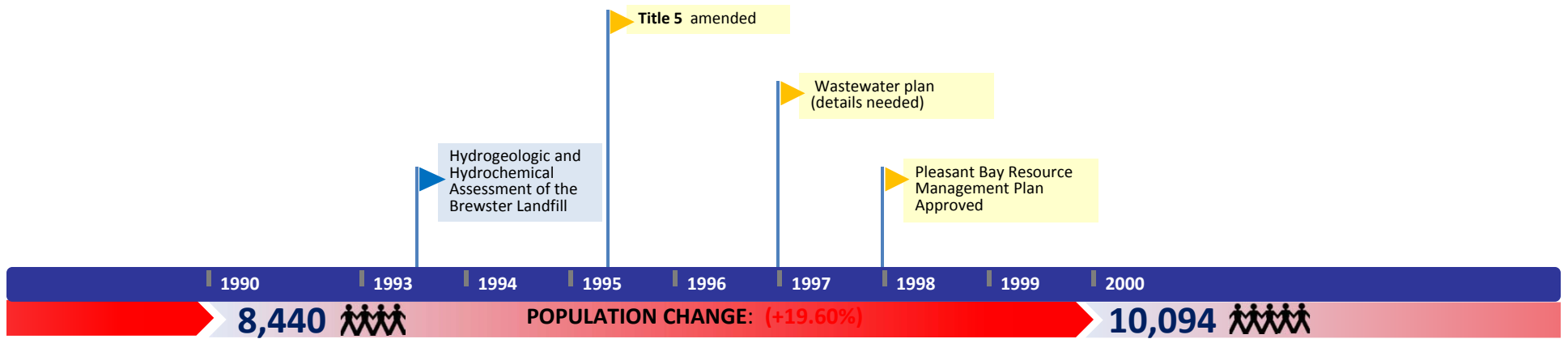
- ▶ Present and future town well sites should be protected from the non-point sources resulting from New development by creating Watershed Protection Districts.
- ▶ The town should cooperate in regional water supply planning to determine future water supply needs of neighboring towns and whether it can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



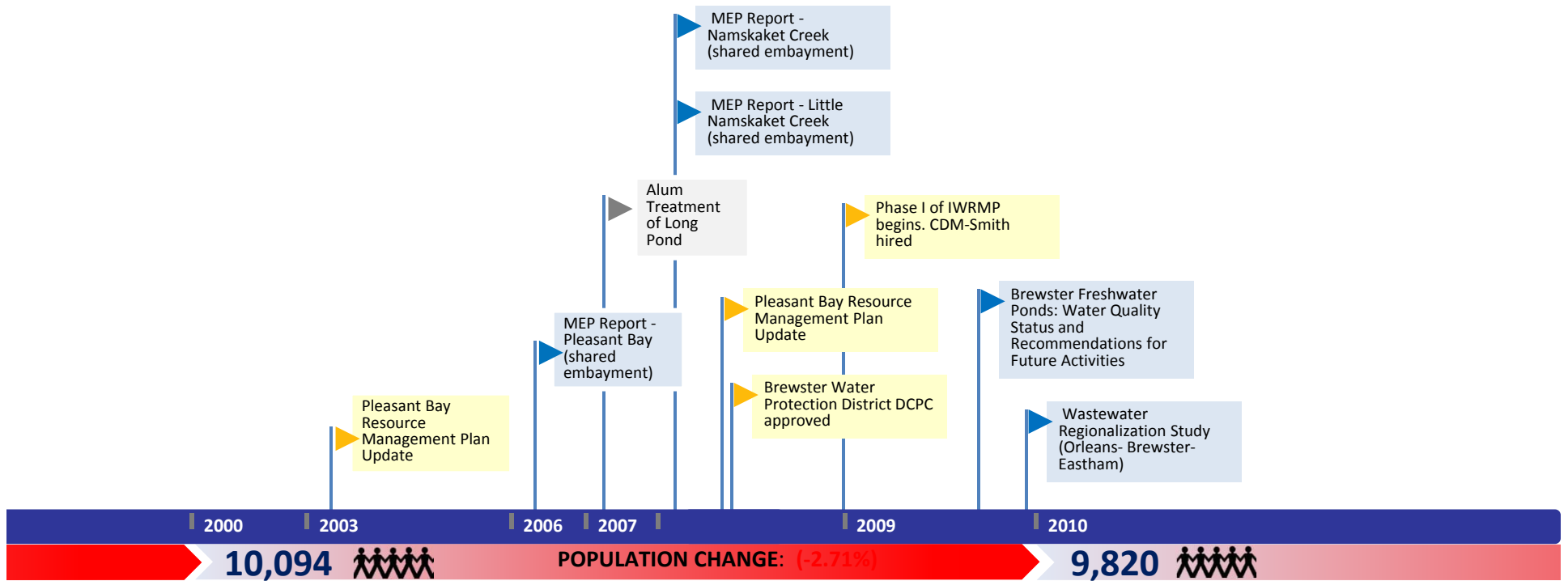
Brewster: 1970-2013



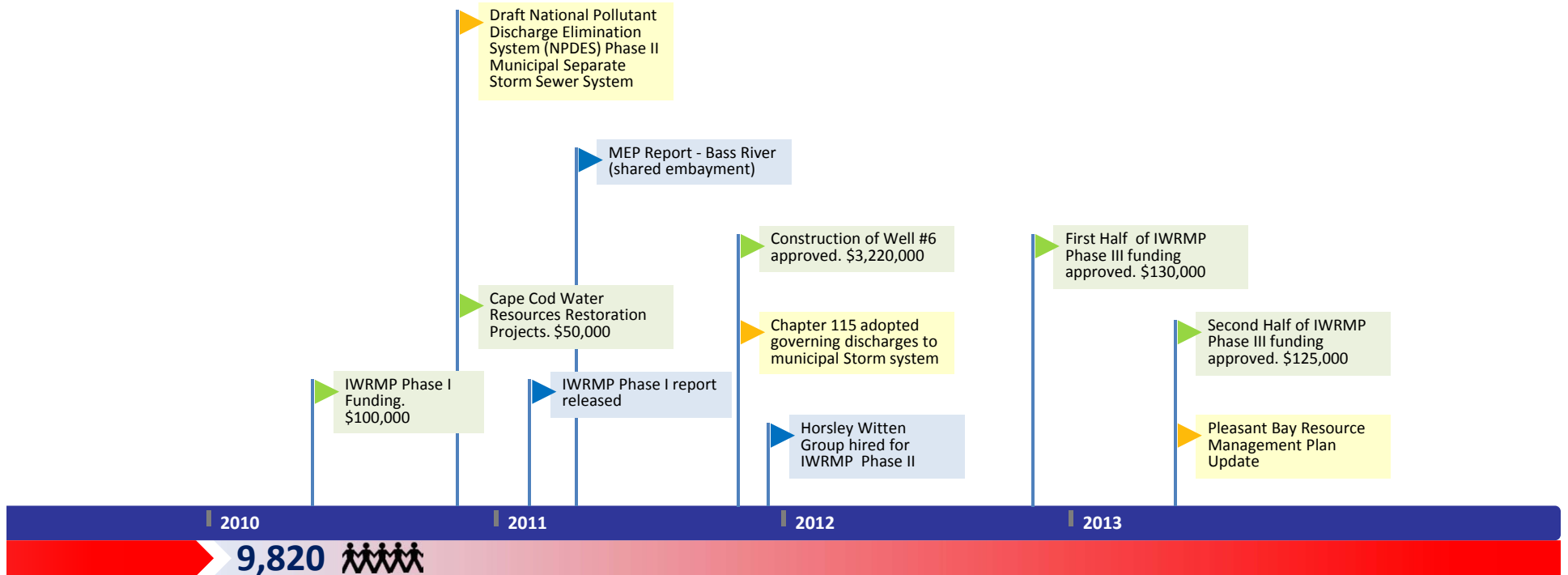
Brewster: 1970-2013



Brewster: 1970-2013



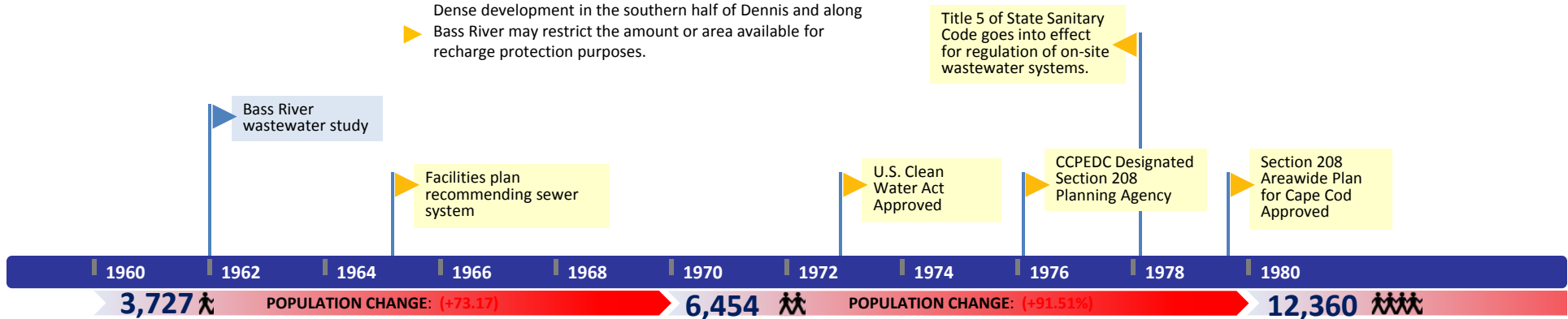
Brewster: 1970-2013



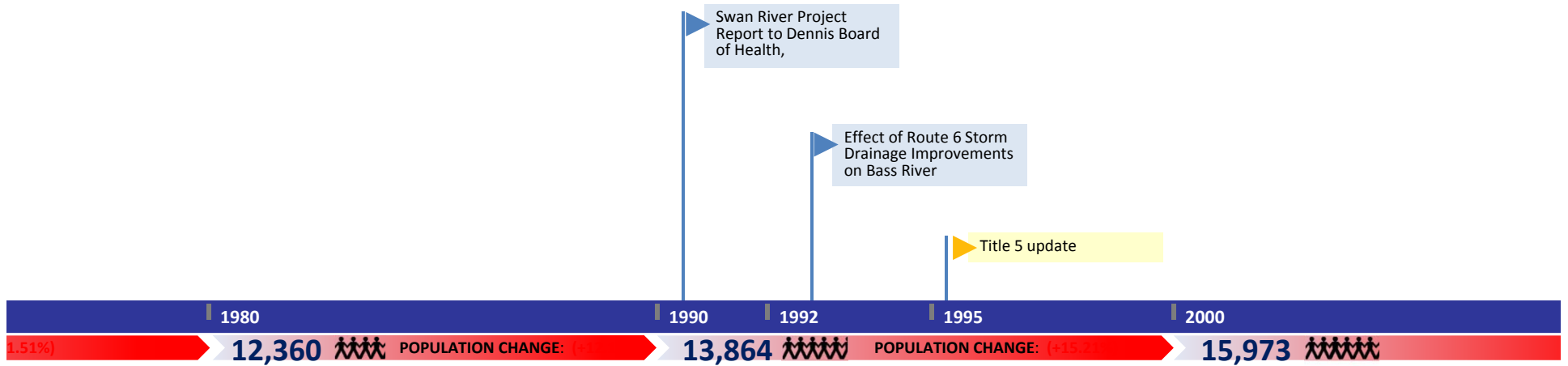
Dennis

From 1978 Section 208 Plan

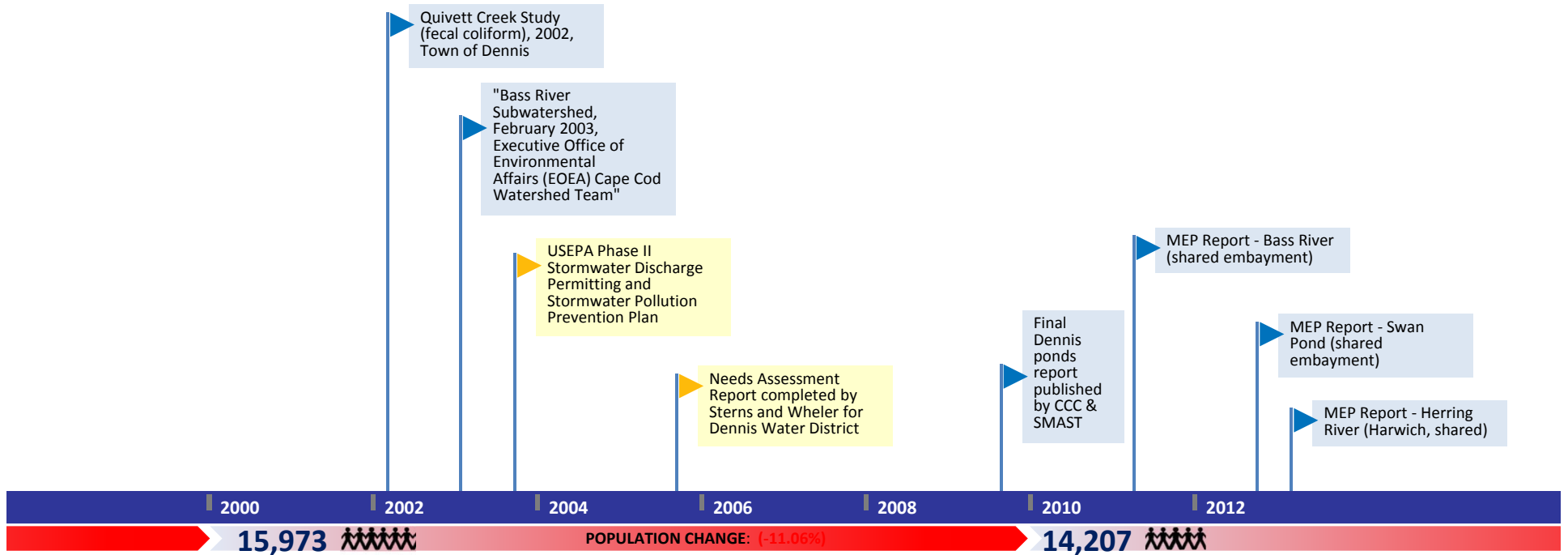
- ▶ Dennis has a professional health agent and the town's health regulations already implement many of the 208 plan recommendations.
It is recommended that the town consider creating a "Seasonal Residential District" in the area south of Lower County Road and carefully control the conversion of seasonal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

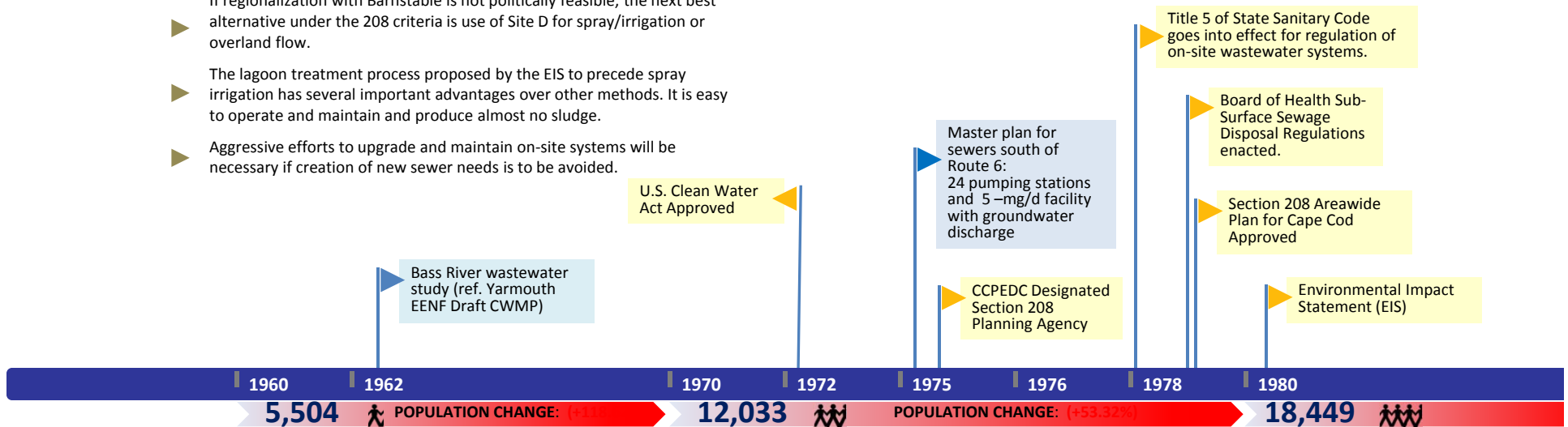


Yarmouth: 1960-2013

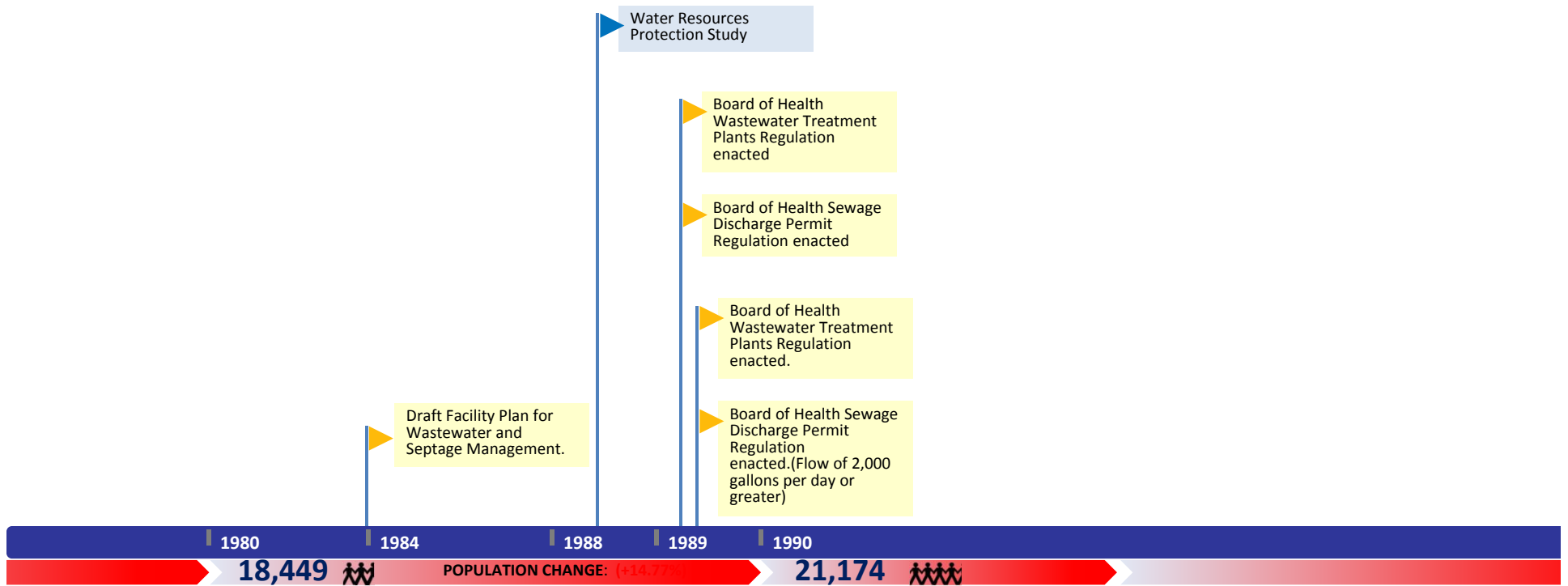
From 1978 Section 208 Plan

- ▶ 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.

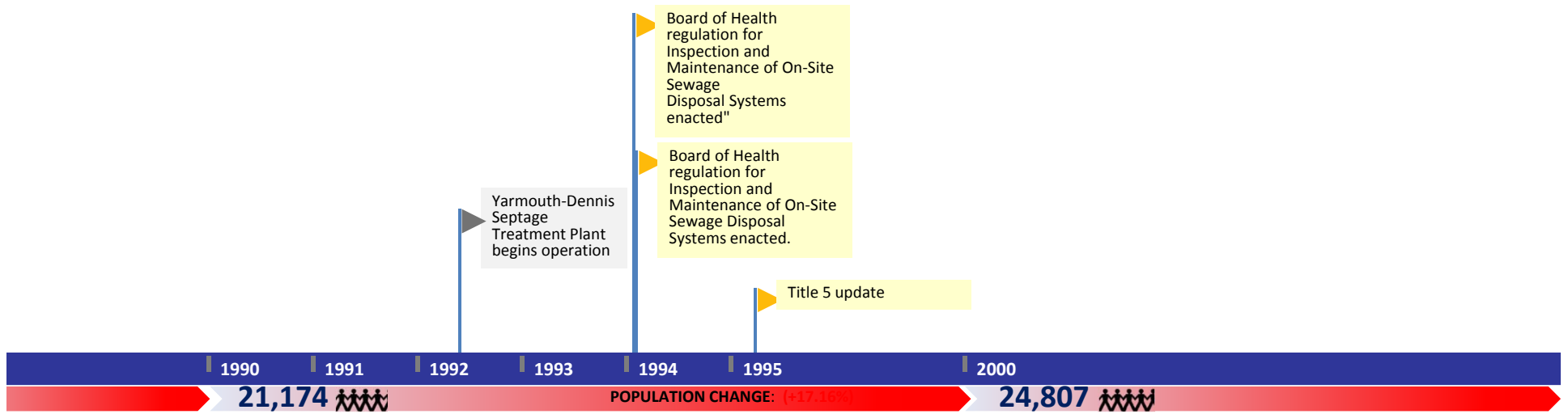
- ▶ As soon as construction of the sewage/septage facilities is underway, the town should begin setting up a mandatory on-site system pumping program.
- ▶ Non-structural controls, including control of multi-family dwellings and possibly larger lot zoning, could help to prevent the development of serious 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.



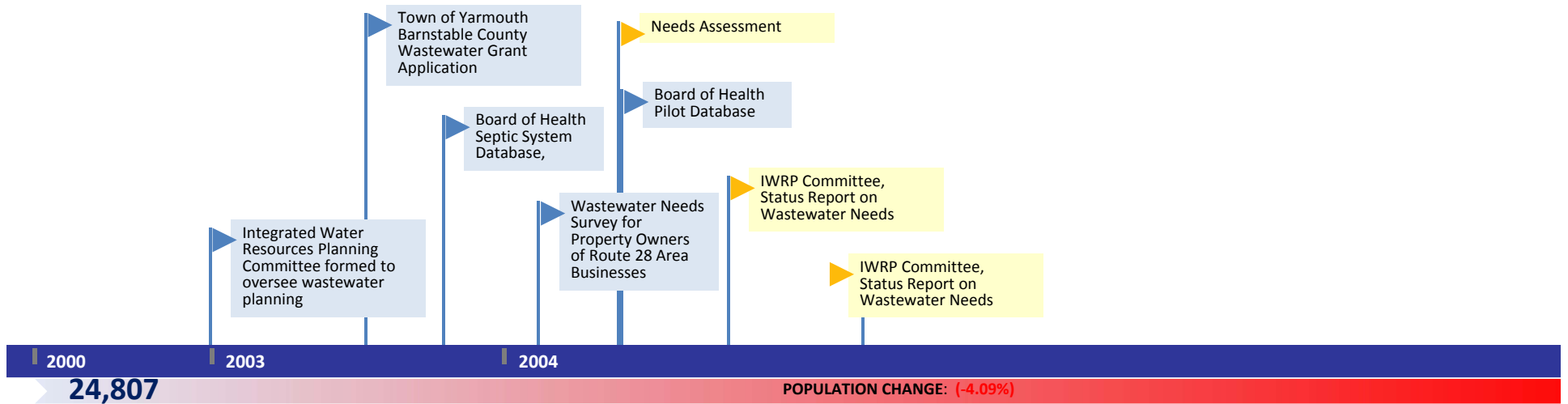
Yarmouth: 1960-2013



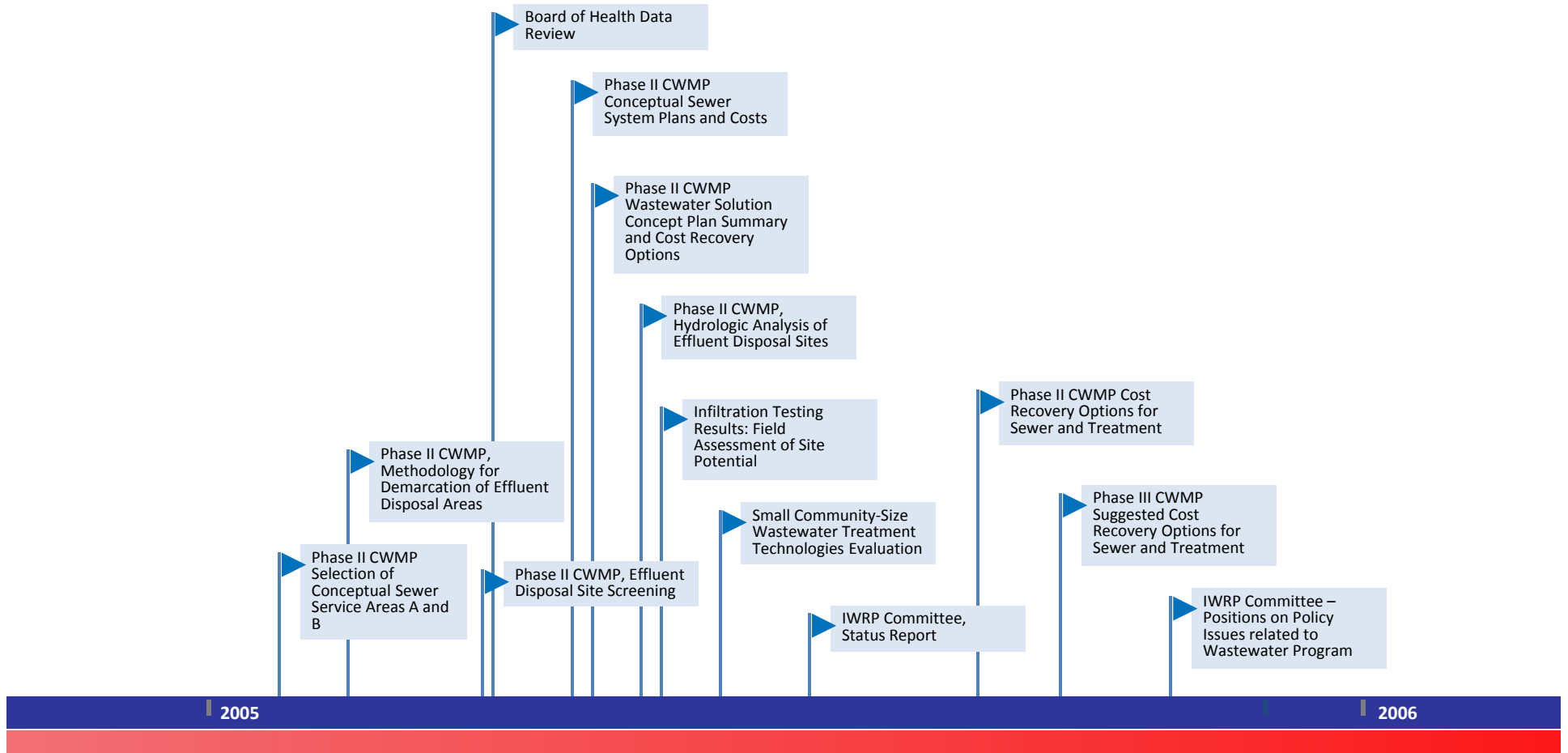
Yarmouth: 1960-2013



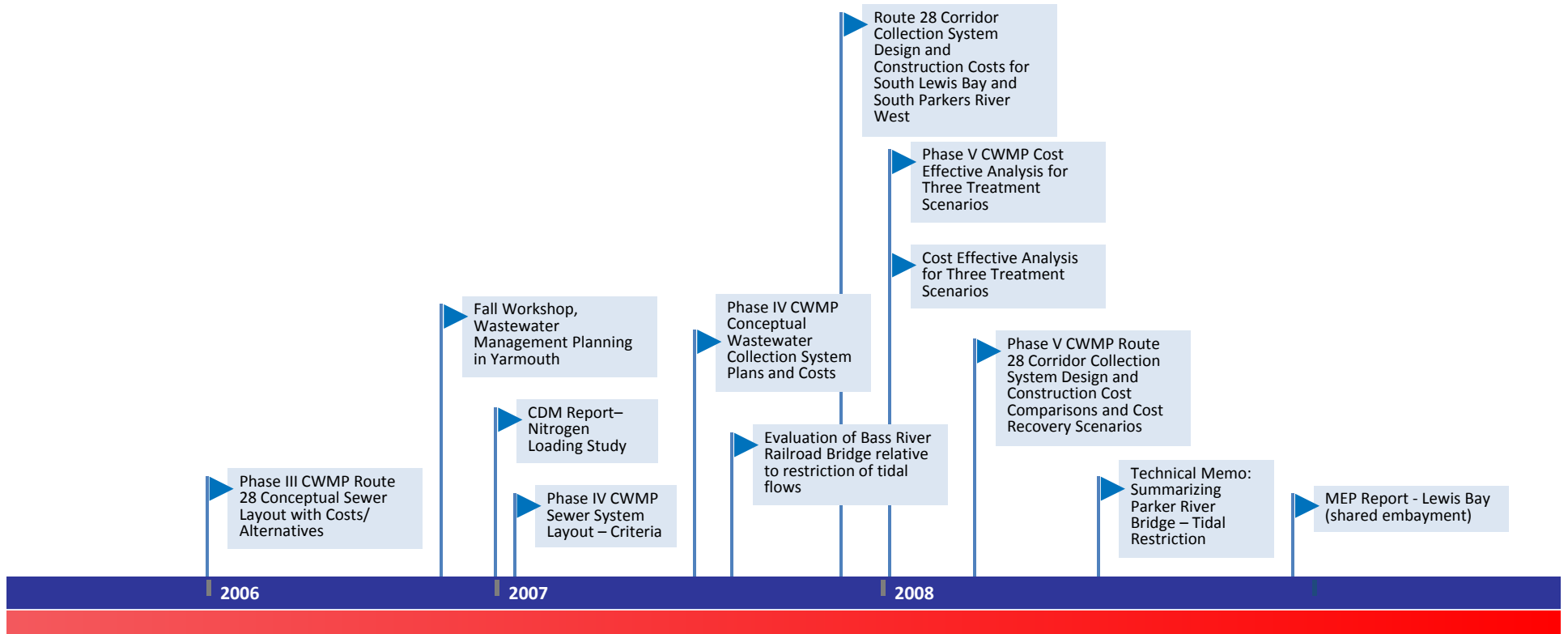
Yarmouth: 1960-2013



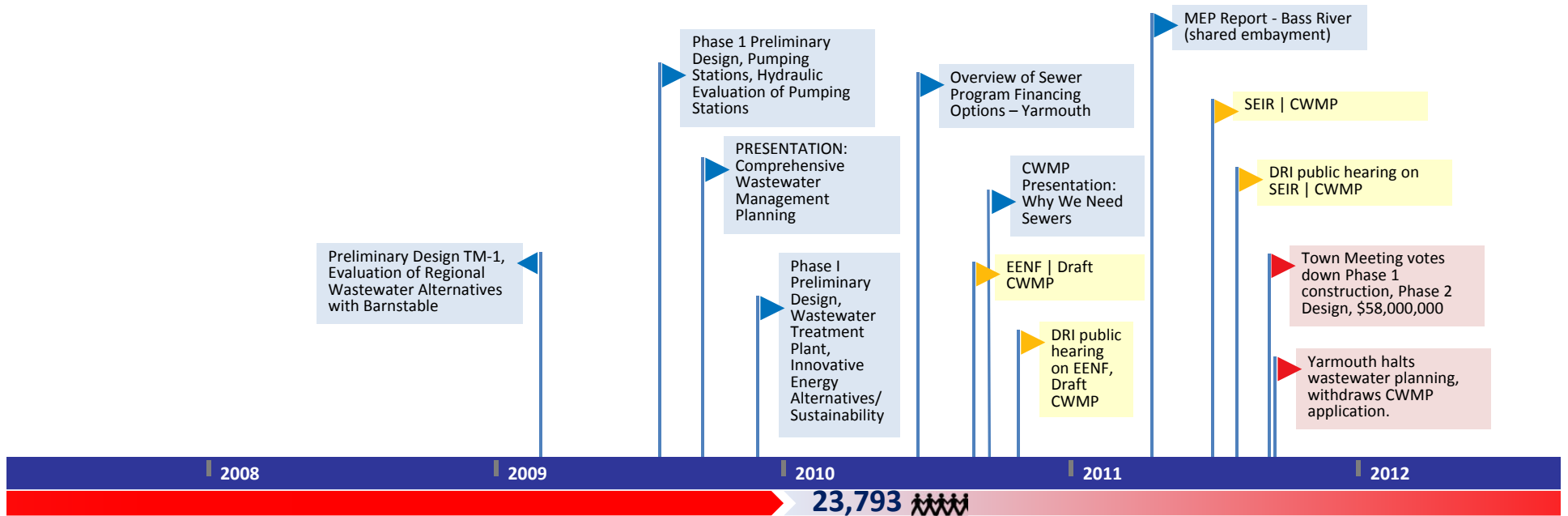
Yarmouth: 1960-2013



Yarmouth: 1960-2013



Yarmouth: 1960-2013



POPULATION: 23,793
(-4.09%)

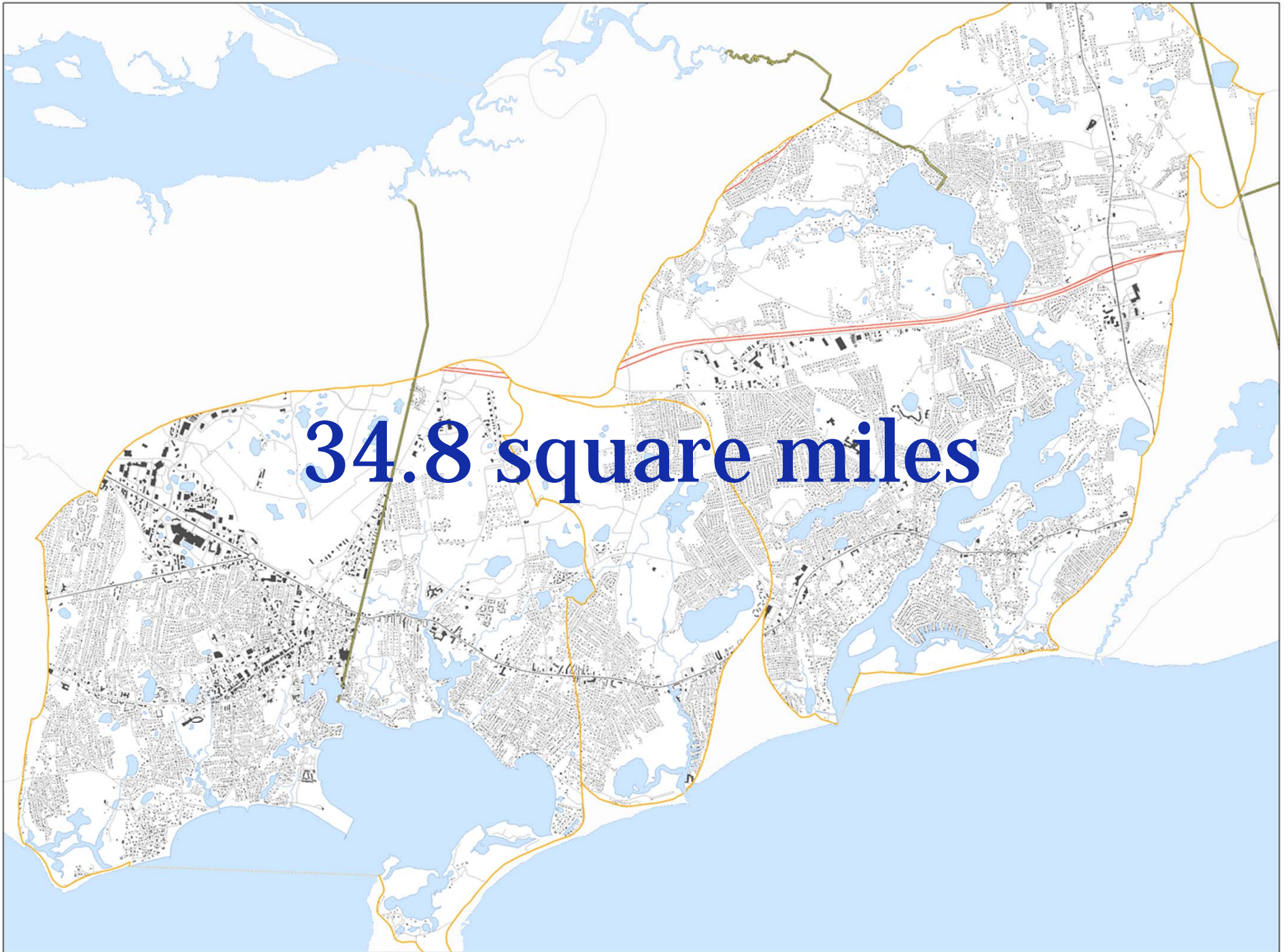
Did we miss anything?

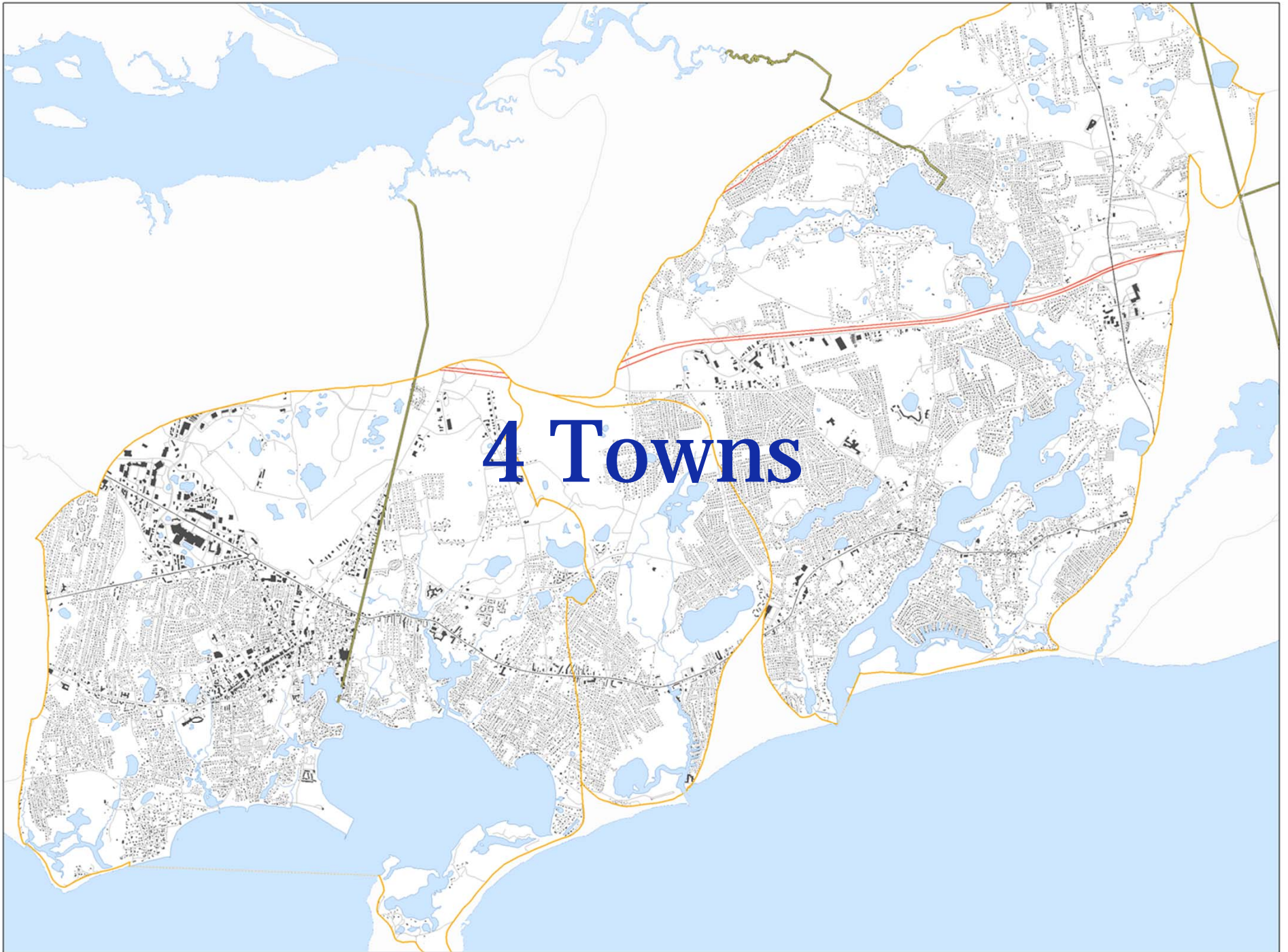
Your Watersheds



Bass River
Lewis Bay
Parkers River









Natural Features


Base Map

 Town Lines


 Rivers


Embayment Boundary


 On Land


 On Sea


Major Roads

 US Highway


 State Highway


 Roads


 Structures

 Ponds


Natural Areas


 Natural Heritage & Endangered Species Program (NHESP) Certified Vernal Pools

 Water Table Contours

 Cranberry Bogs


 Wetlands

 Sea, Lake, & Overland Surges from Hurricanes (SLOSH) Update 2013

 Preliminary FEMA Flood Insurance Rate Map (FIRM) Zones 2013


Managed Surfaces


Base Map

 Town Lines


 Rivers


Embayment Boundary


 On Land


 On Sea

Major Roads

 US Highway


 State Highway


 Roads


 Structures


 Ponds

Managed Surfaces

 Approximate Managed Ground Surfaces


 Approximate Residential Managed Lawns

 Approximate Golf Course Managed Lawns

 Approximate Municipal Managed Lawns


Regulatory


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway


 State Highway


 Roads


 Structures

 Ponds


Regulatory

 Areas of Critical Environmental Concern

 DEP Approved Wellhead Protection Areas (Zone IIs)

 Growth Incentive Zone


OpenSpace: Level of Protection


 In Perpetuity

 Limited

 None


Landuse Vision Map


 Economic Center

 Industrial and Service Trade Area

 Village

 Resource Protection Area

 Other

 Undesignated


Land Use Change


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway


 State Highway


 Roads


 Structures


 Ponds


LandUse Change

 Residential

 Commercial

 Industrial

 Wooded, Natural, or Wetlands

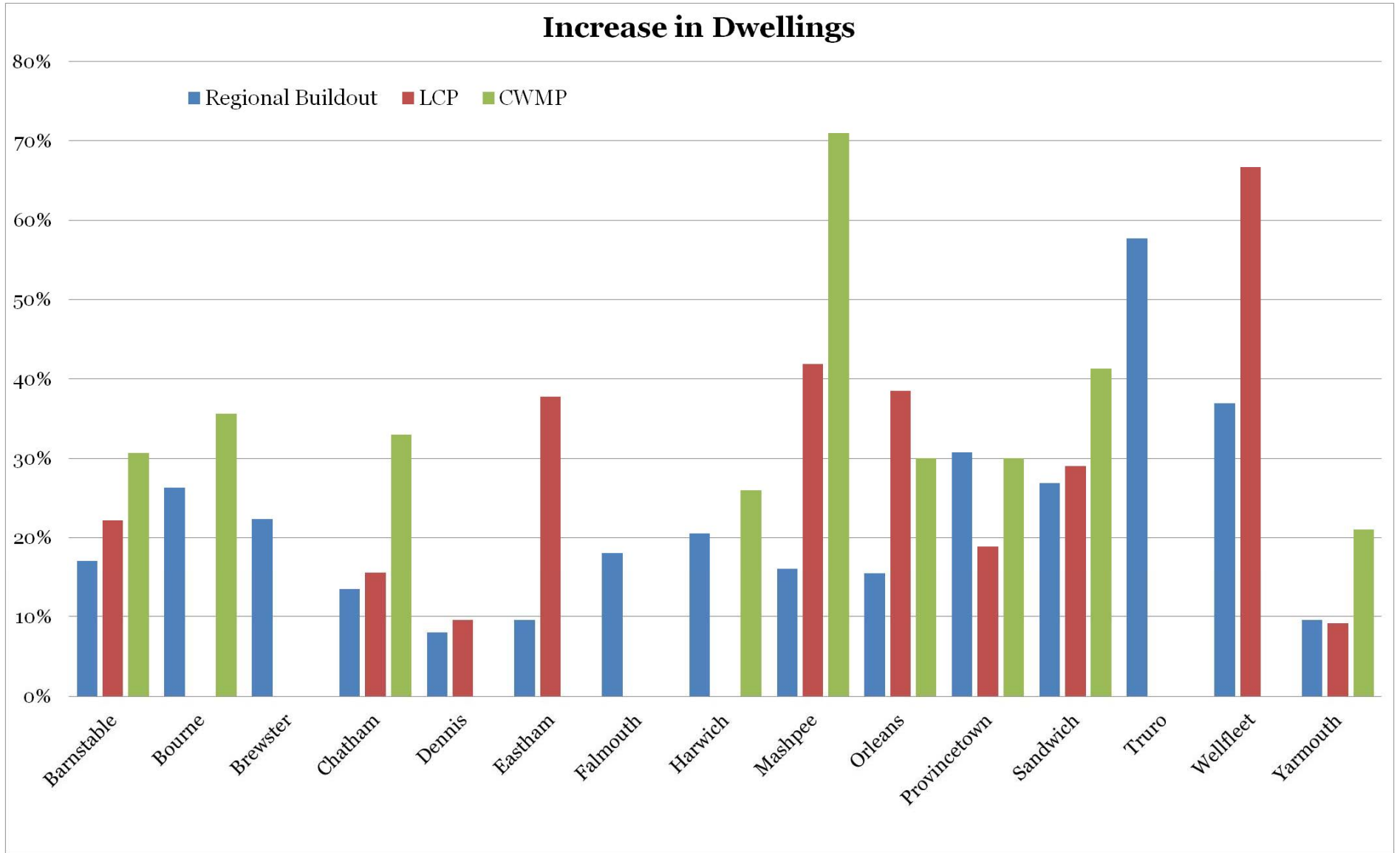
 Open - Disturbed or Managed

 Water

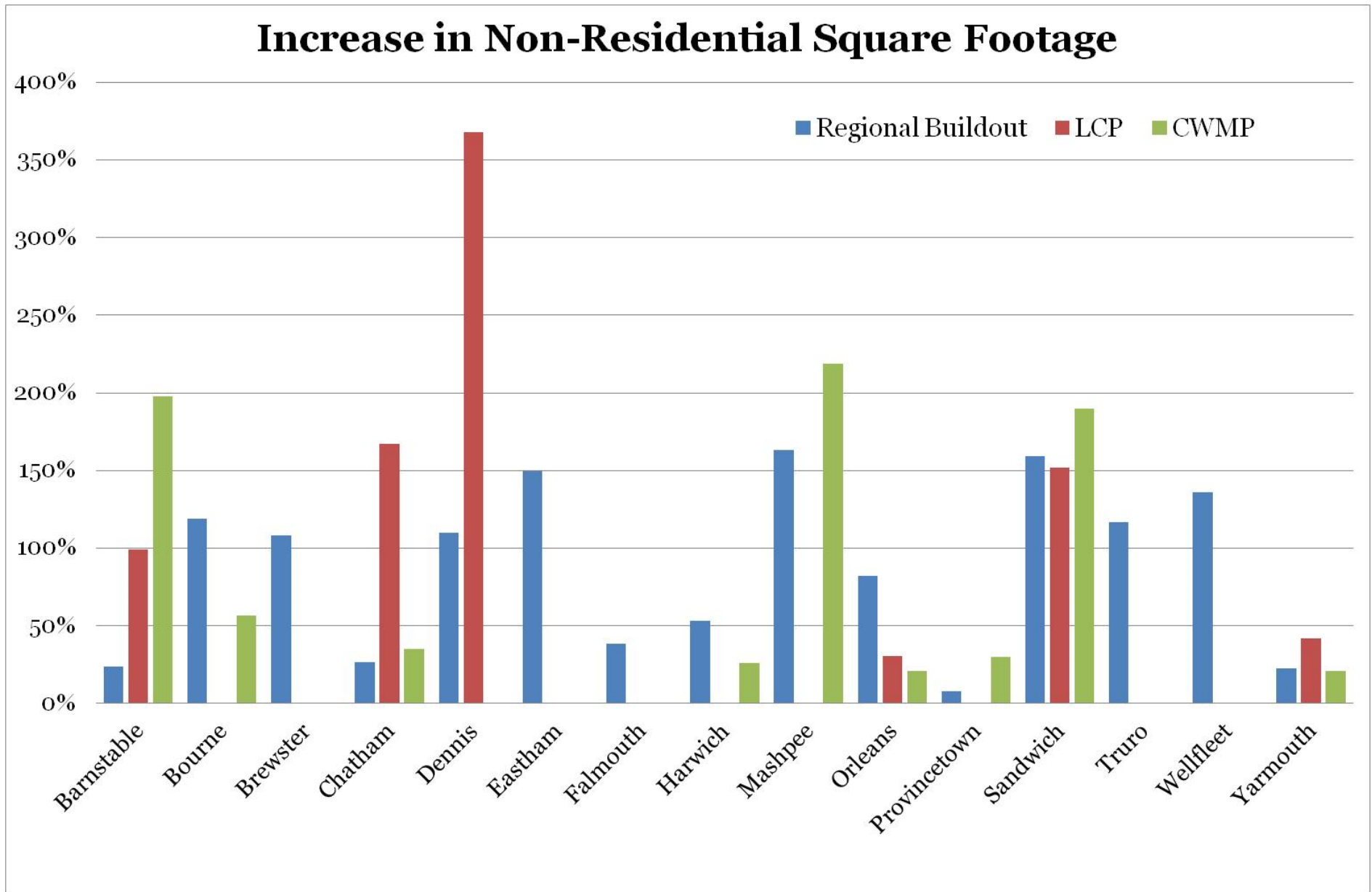
Density

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

Buildout



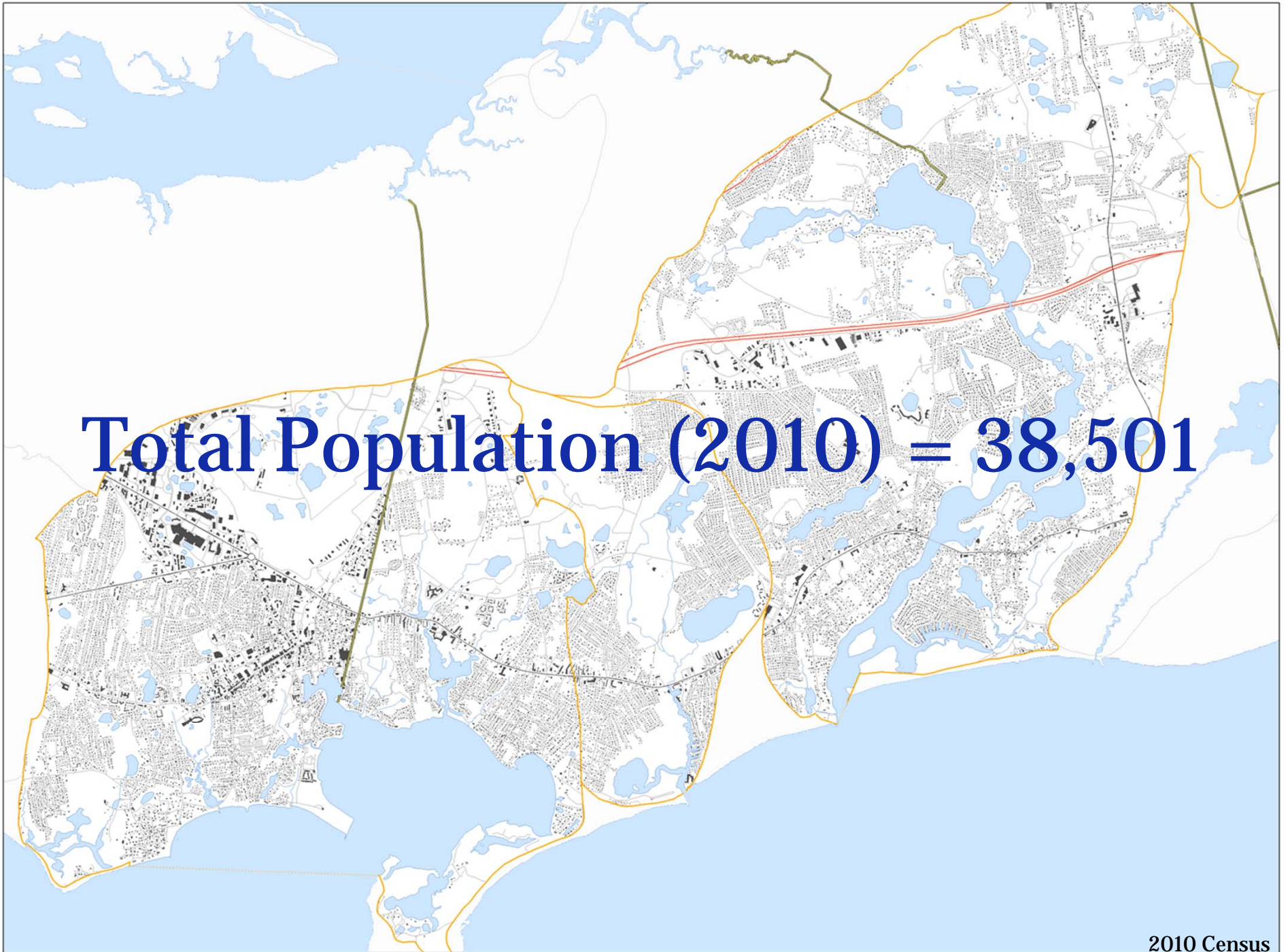
Buildout



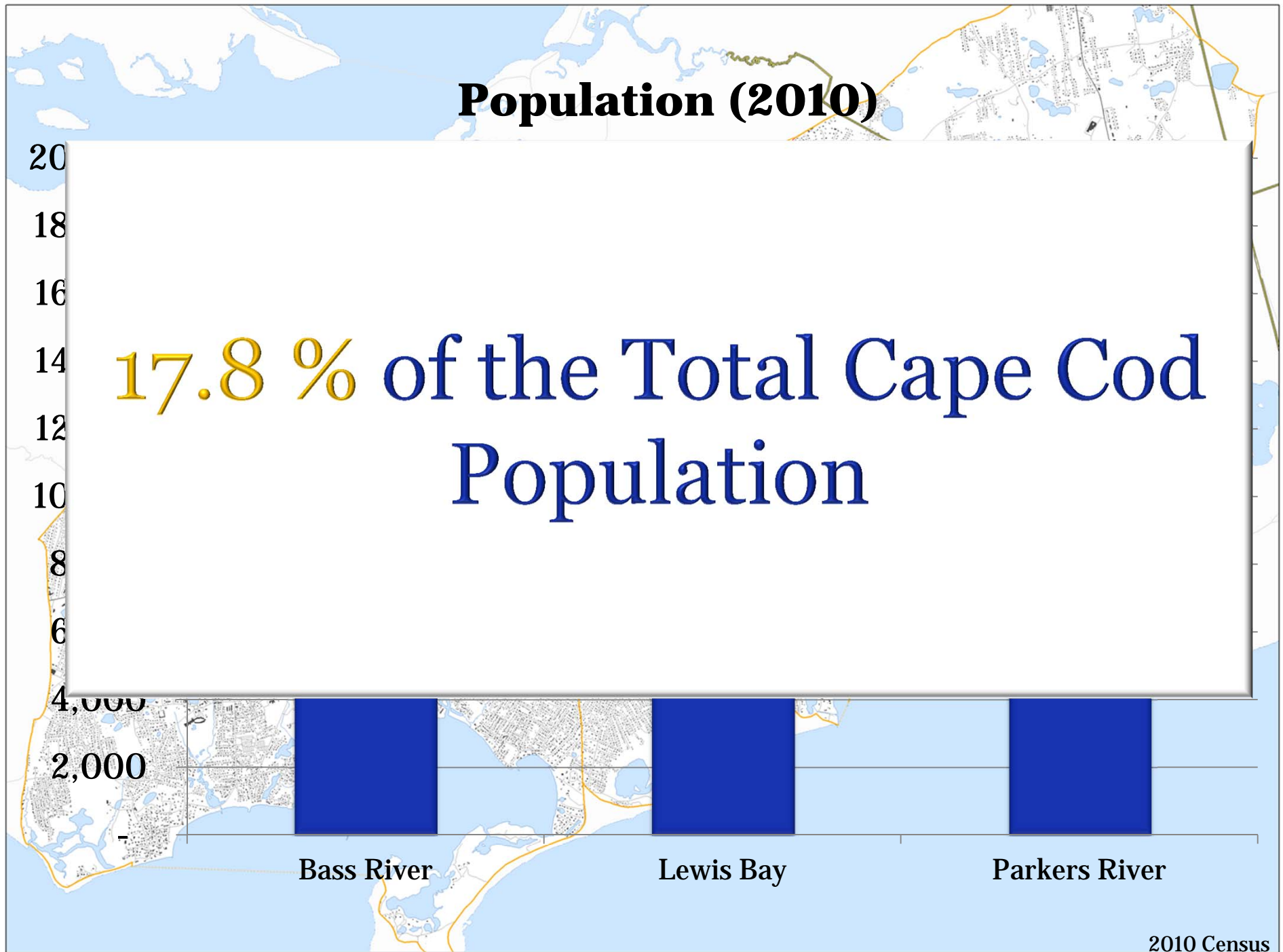
The People



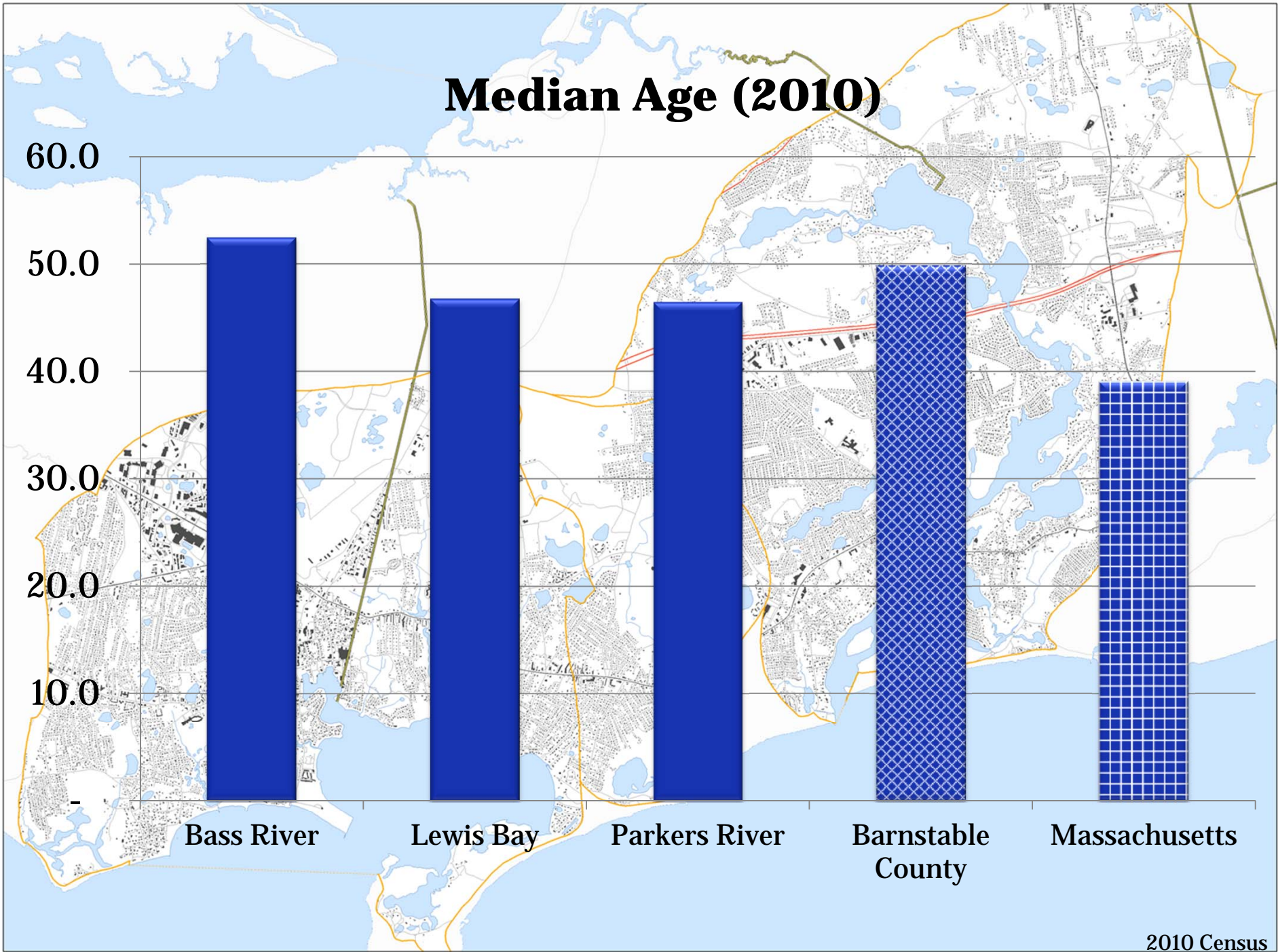
Bass River
Lewis Bay
Parkers River



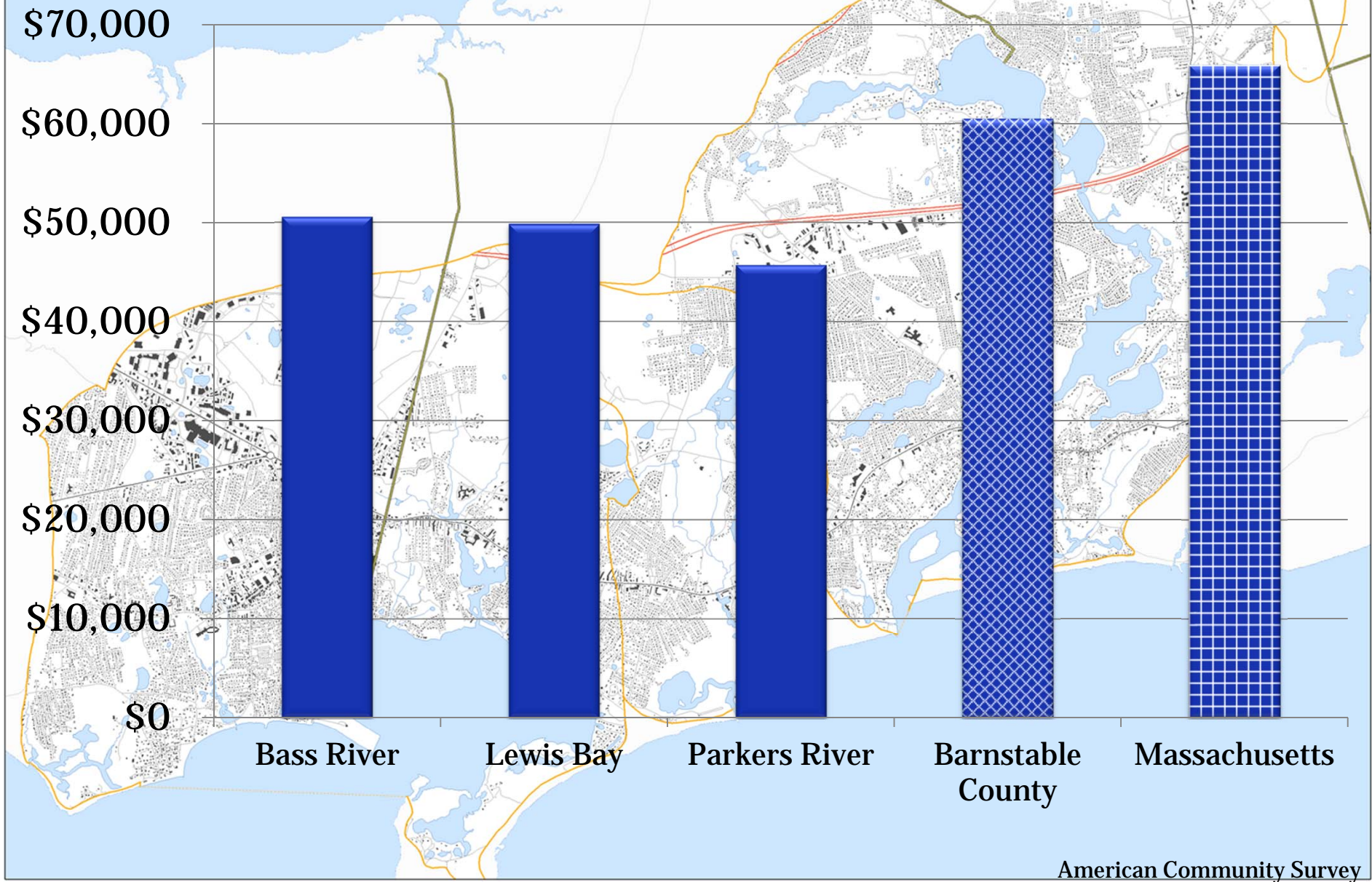
Total Population (2010) = 38,501

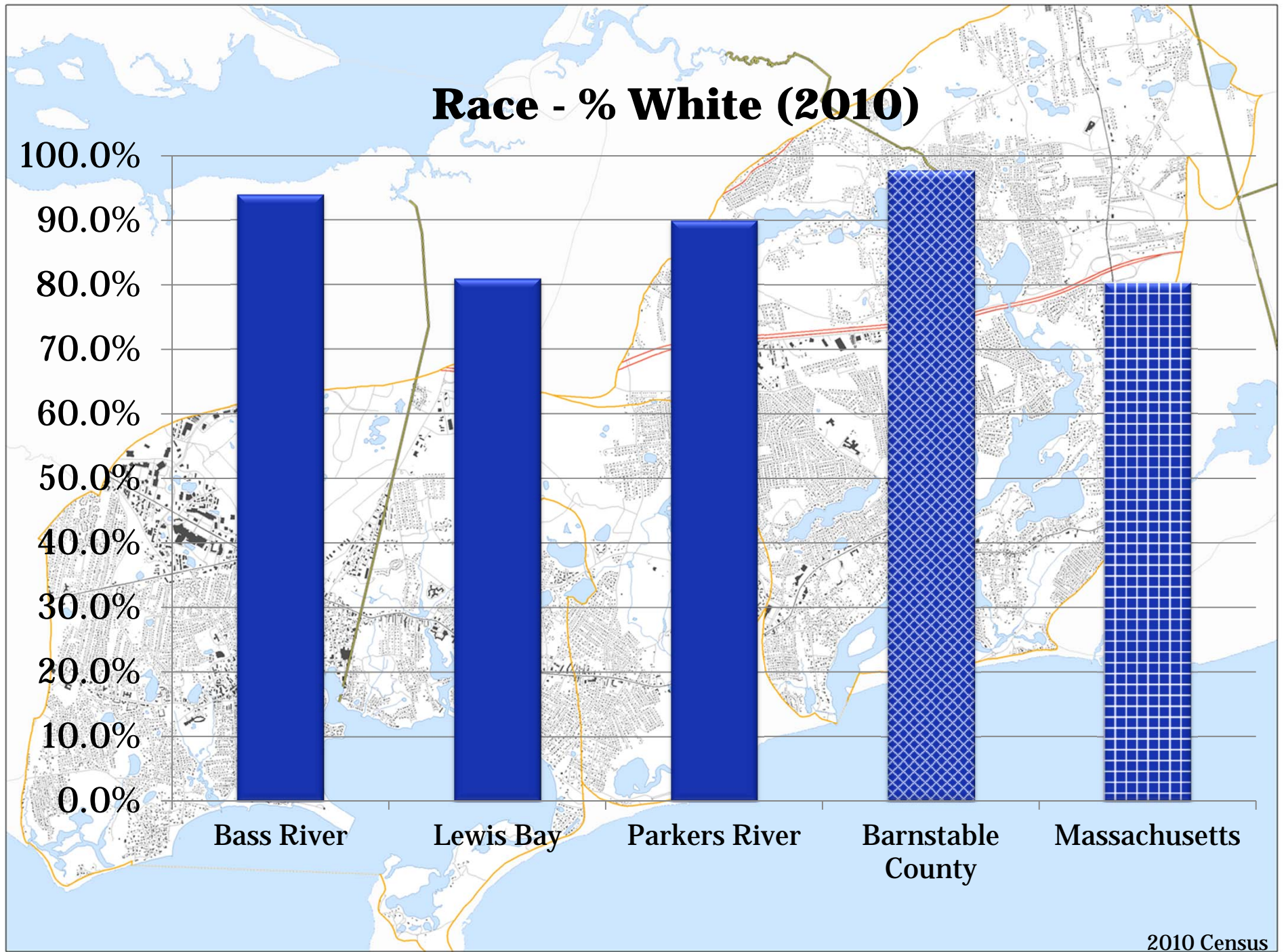


Median Age (2010)

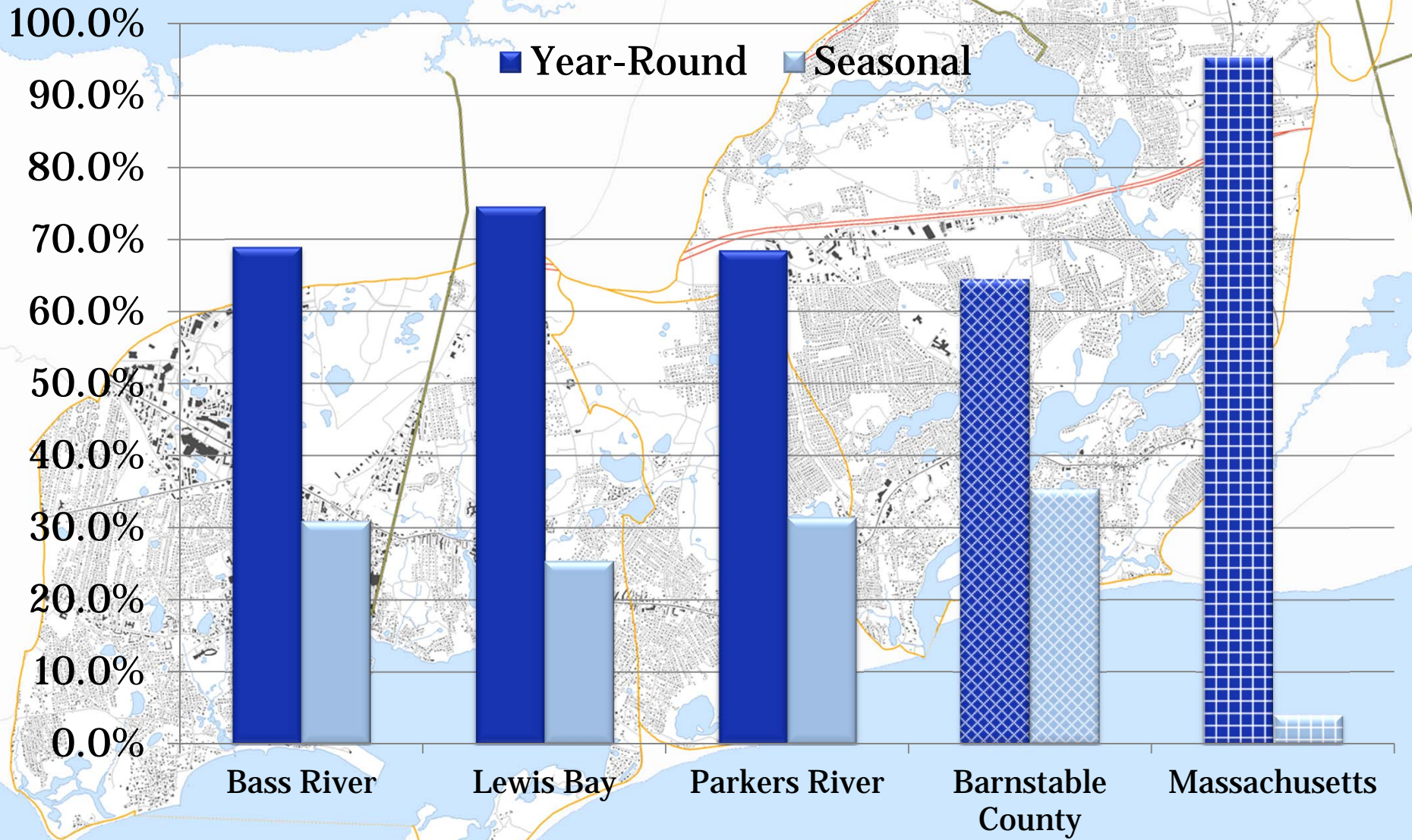


Median Income (2010)





Seasonal vs. Year Round Housing (2010)



Average Assessed Home Value (2010)

\$700,000

\$6

\$5

\$4

\$3

\$2

\$1

Total Assessed Value of Residential Homes=
\$6,898,348,120

\$0

Bass River

Lewis Bay

Parkers River

Barnstable
County

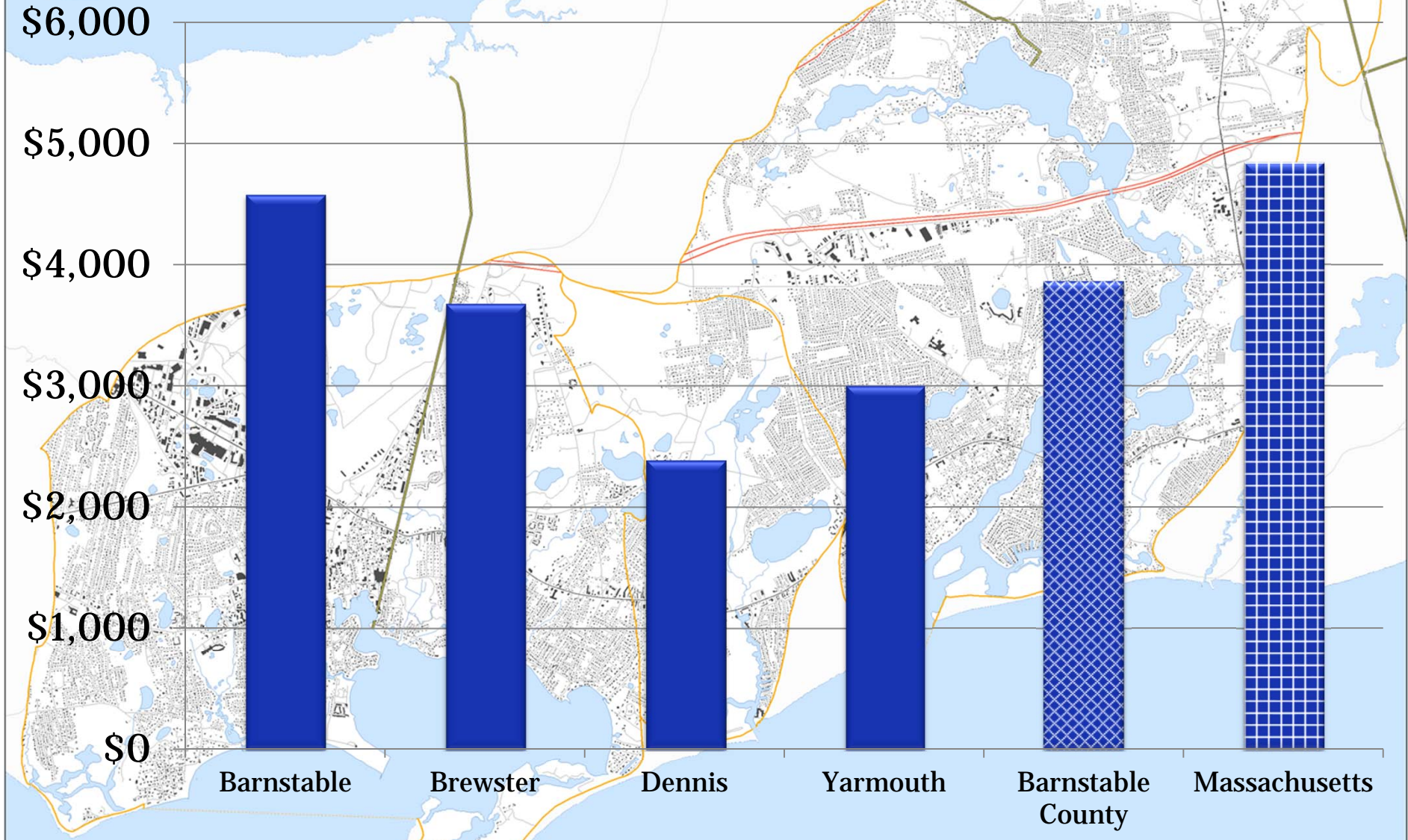
Massachusetts

Your Government & Taxes

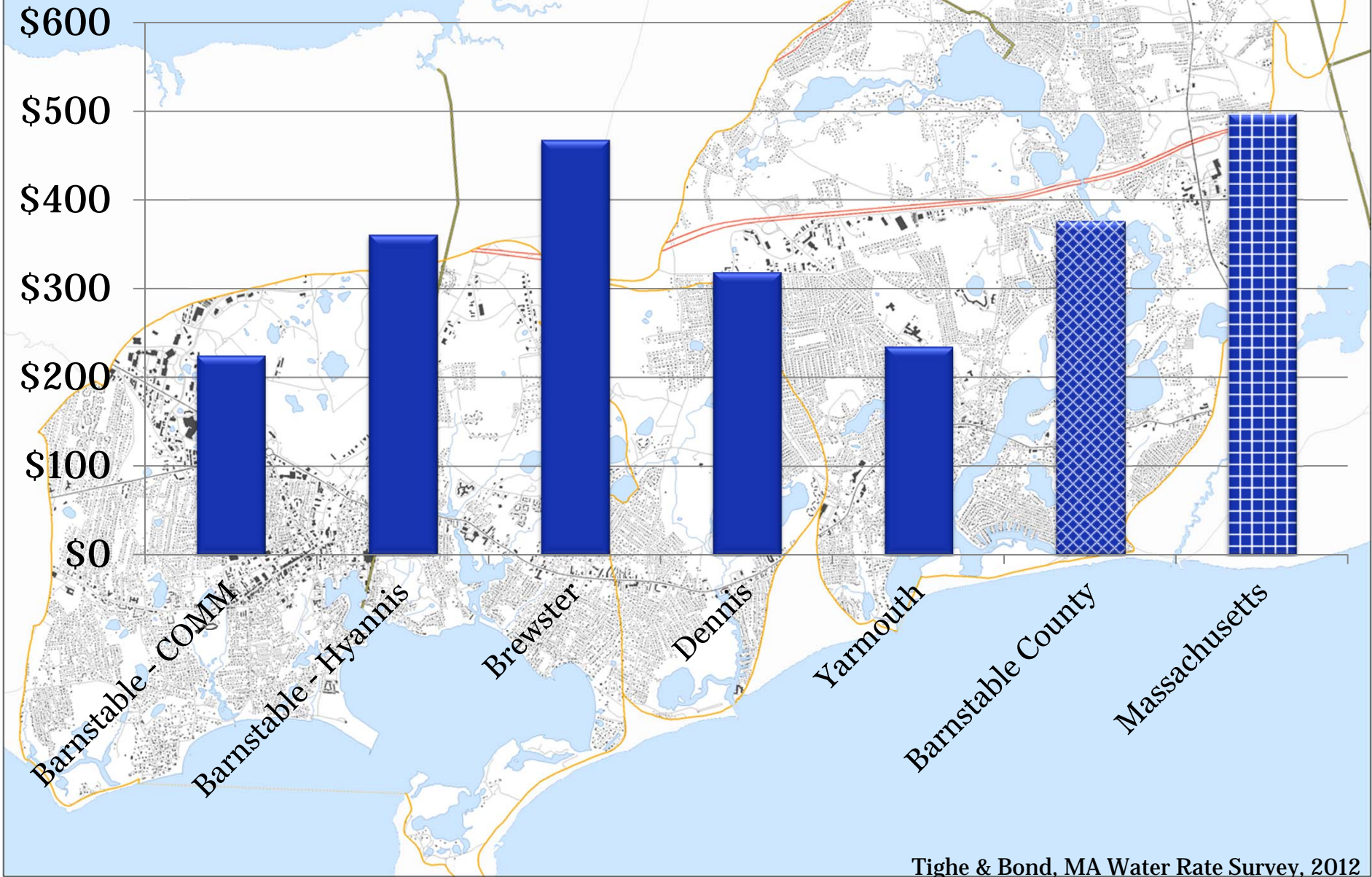


**Bass River
Lewis Bay
Parkers River**

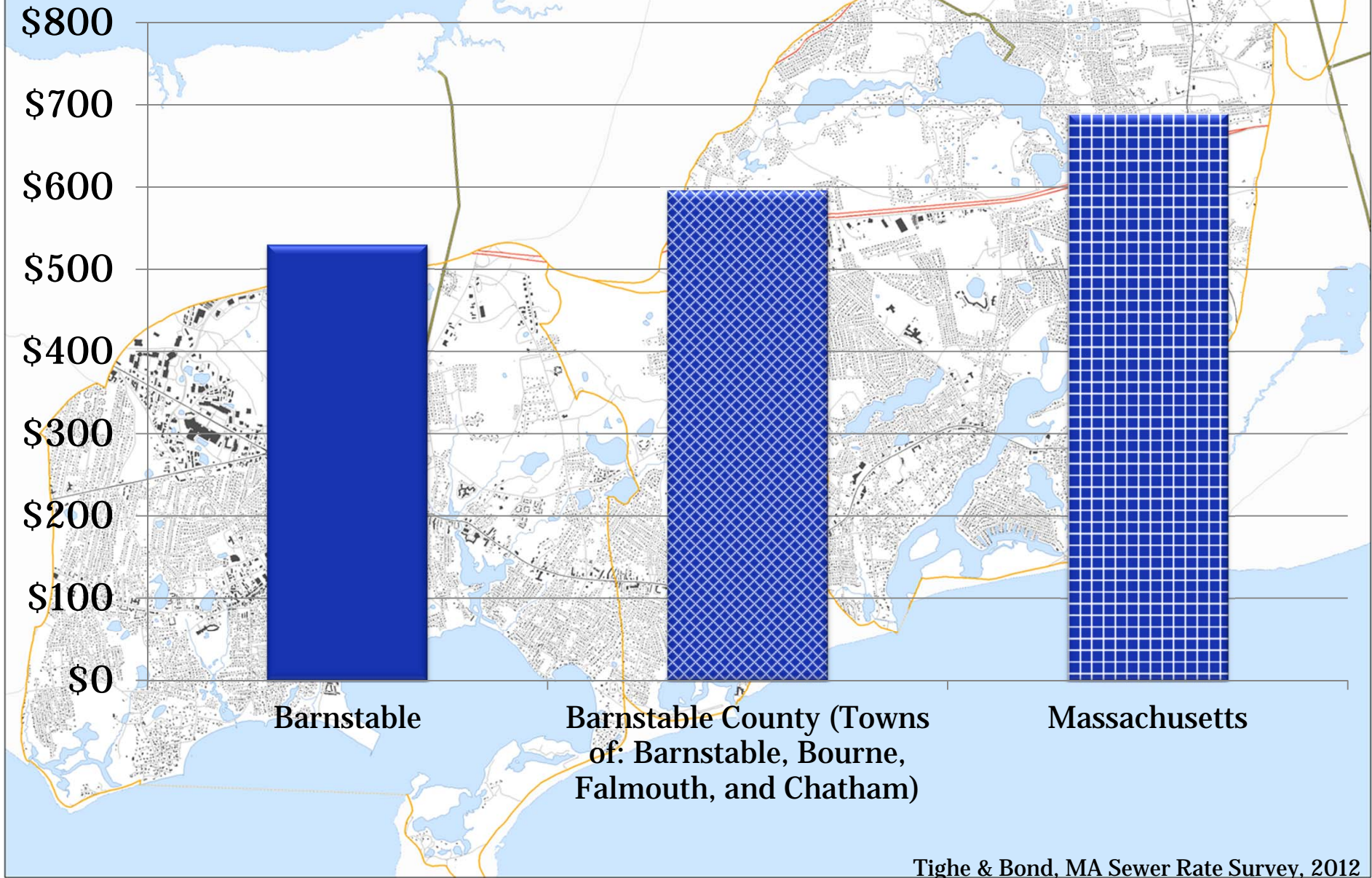
Average Single Family Property Tax Bill (2013)



Average Annual Water Bill (2012)



Average Annual Sewer Bill (2012)



The Problem



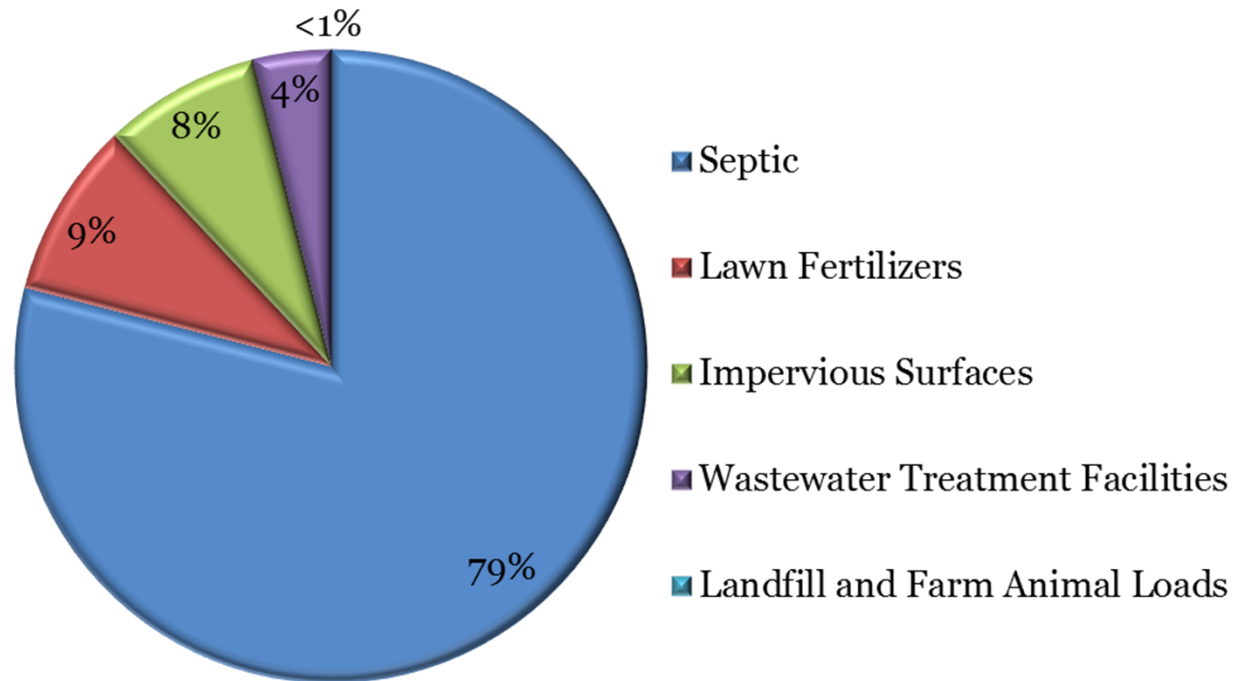
Bass River
Lewis Bay
Parkers River



Massachusetts Estuaries Project

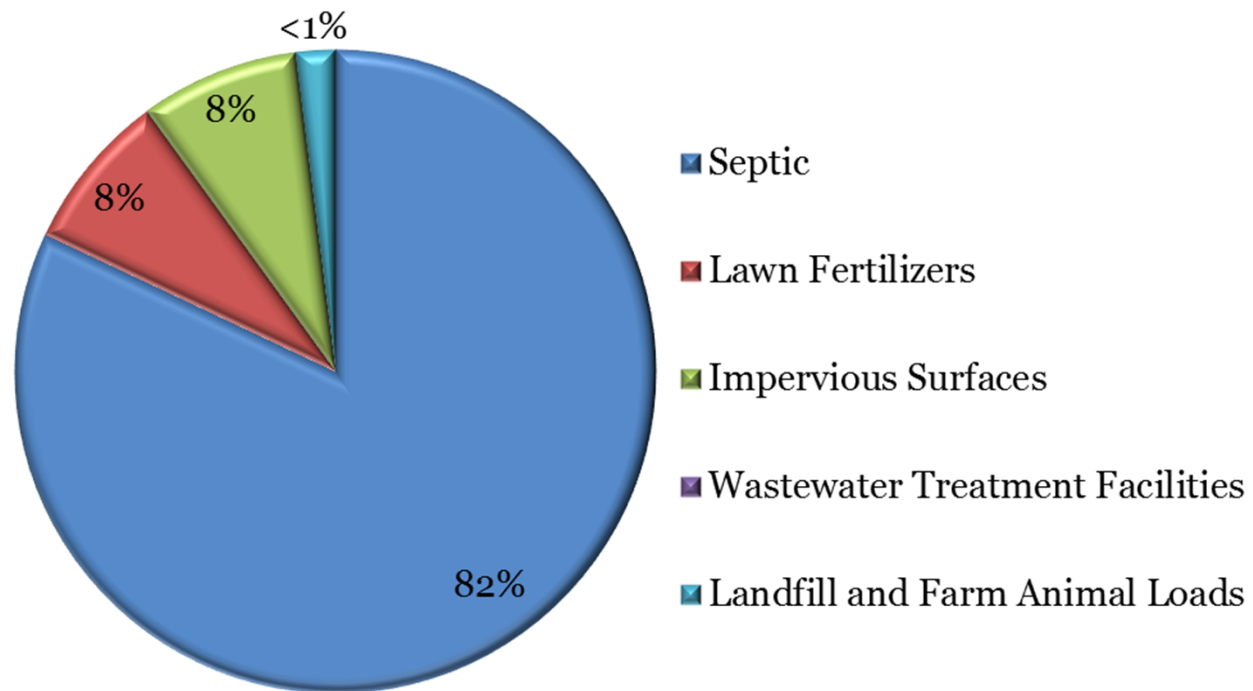
- Opportunity for towns to obtain independent analysis of nitrogen loading and its impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to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

Cape-Wide Controllable Nitrogen Loads



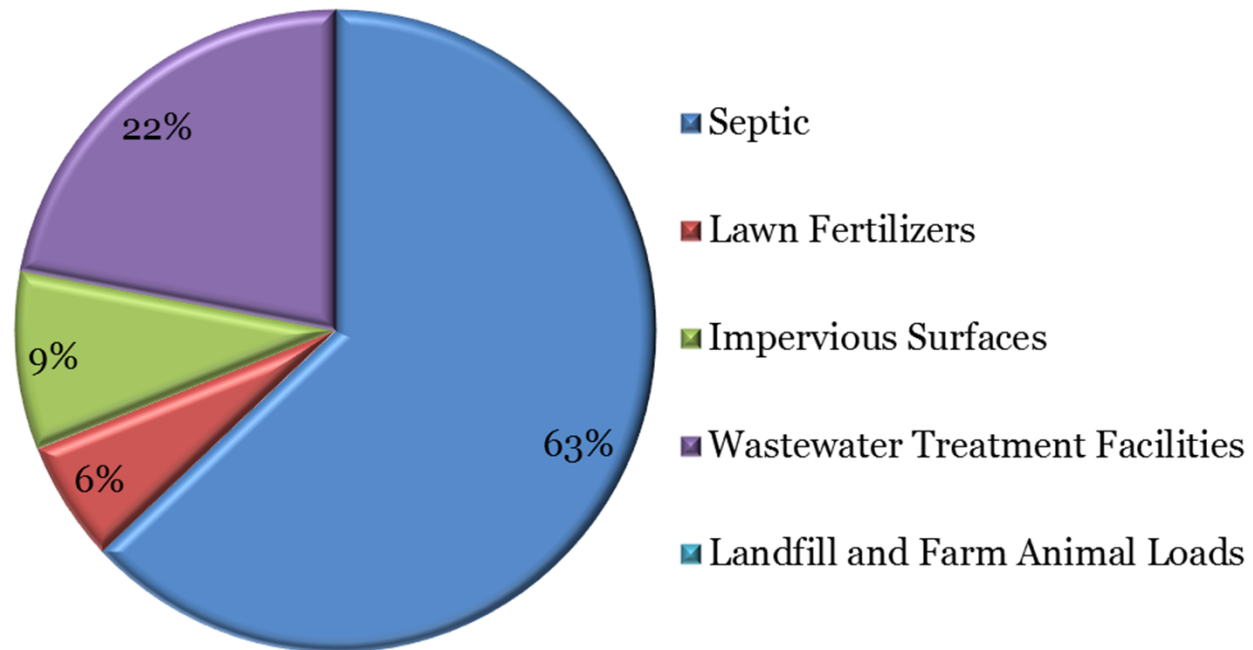
Note: Data averaged from existing Massachusetts Estuaries Reports

Bass River Controllable Nitrogen Loads



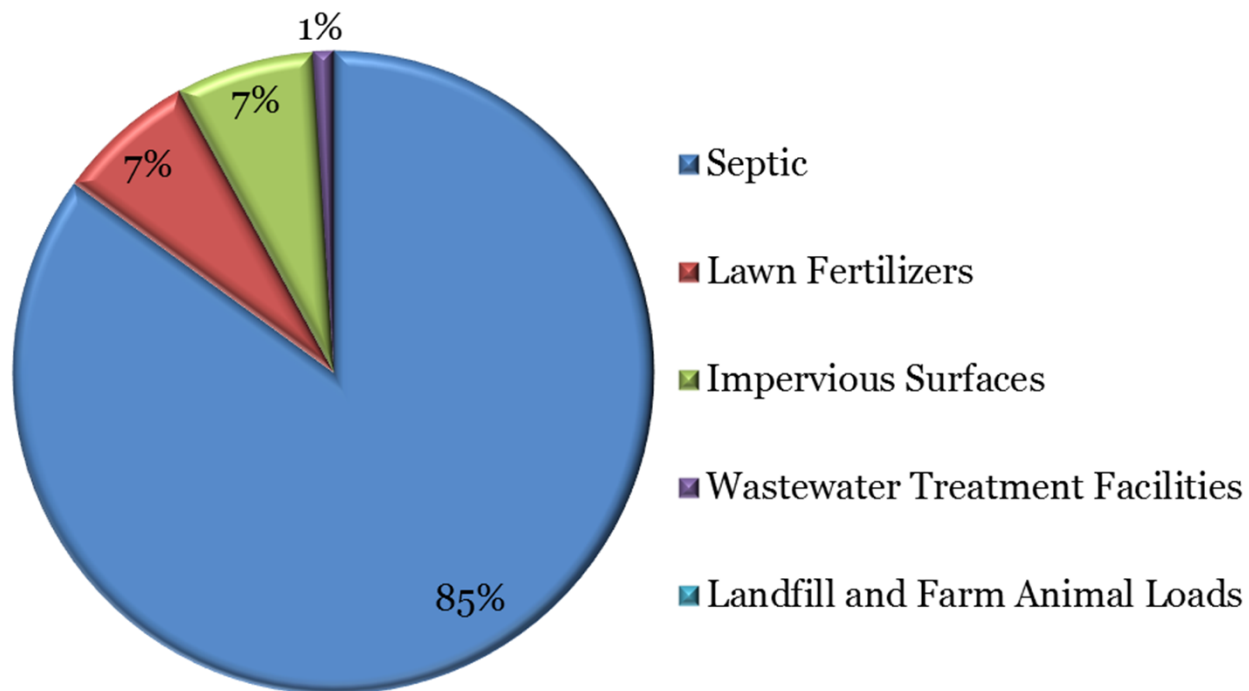
Massachusetts Estuaries Project, 2011

Lewis Bay Controllable Nitrogen Loads



Massachusetts Estuaries Project, 2010


Parkers River Controllable Nitrogen Loads



Massachusetts Estuaries Project, 2010


Nitrogen Problem


Base Map

 Town Lines


 Rivers


Embayment Boundary


 On Land


 On Sea

Major Roads

 US Highway

 State Highway


 Roads

 Structures




 Ponds

Nitrogen

Water Quality Stations






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

Yearly Nitrate Concentration Averages

-  0 - 0.5 mg/l **in Public Water Supply Wells**
-  0.5 - 1 mg/l
-  1 - 2.5 mg/l
-  2.5 - 5 mg/l




Embayments with Removal Target

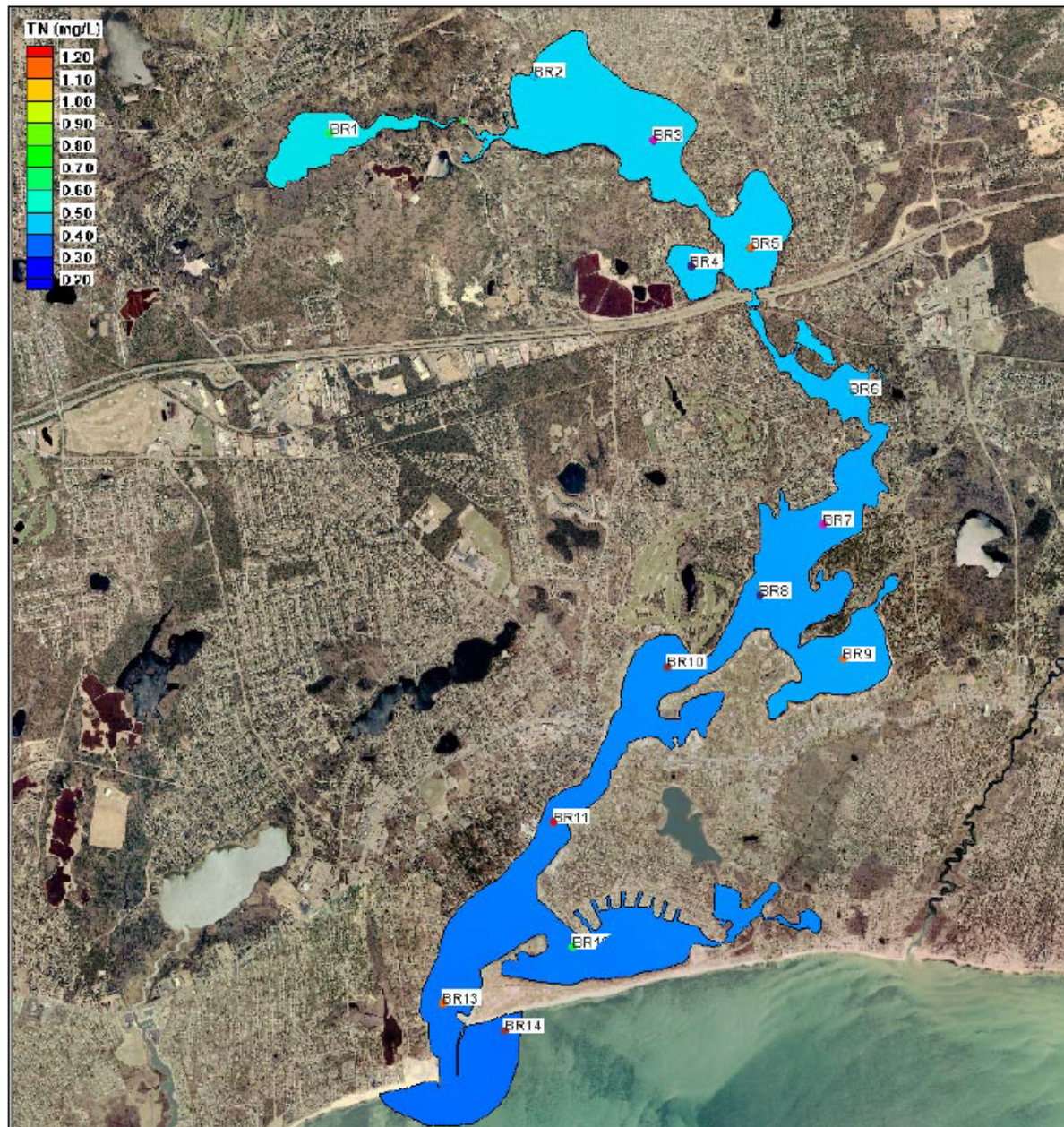
Total NLoad Percent Removal

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

Subwatersheds with Removal Target

Total NLoad Percent Removal

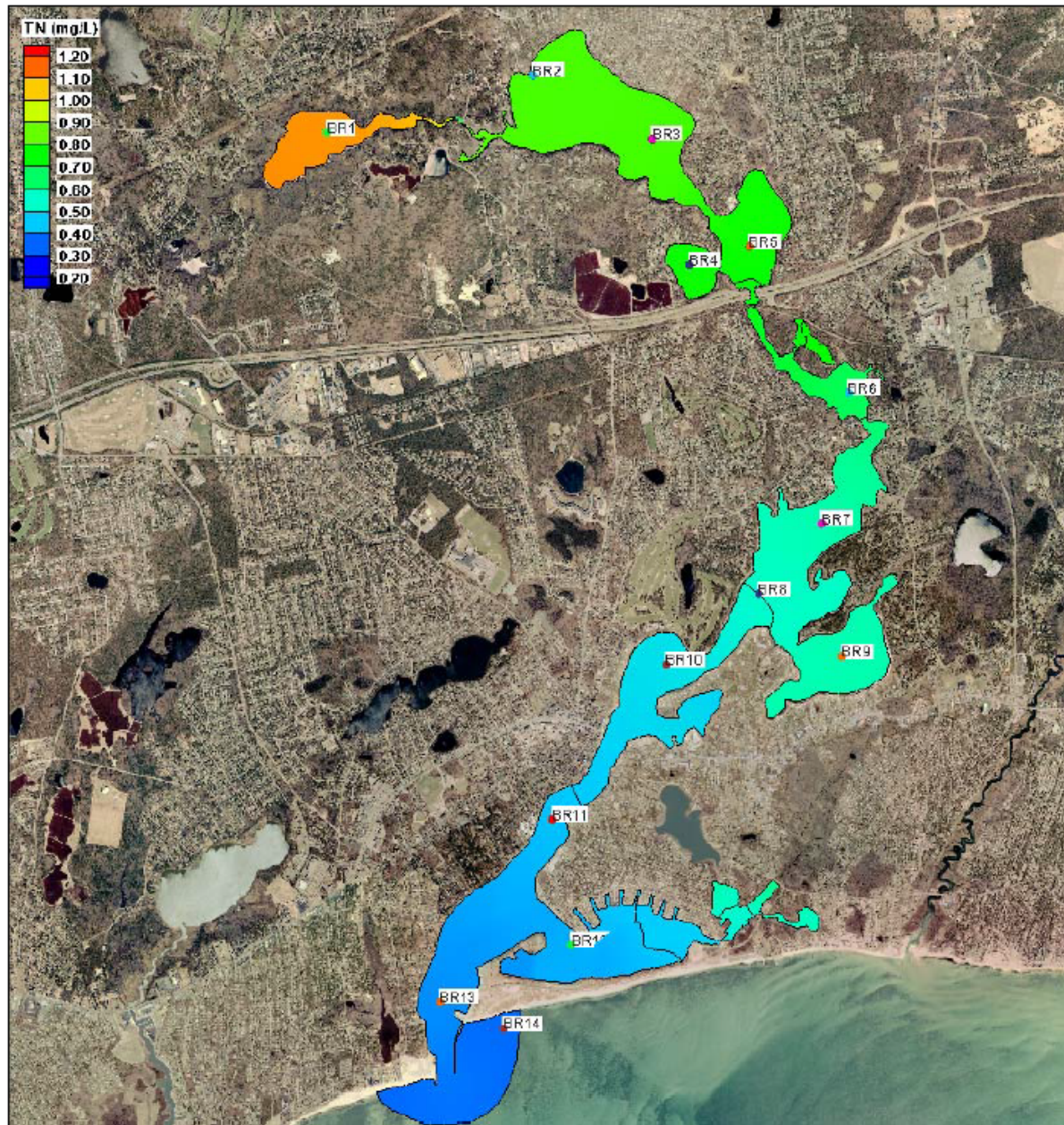
-  0.1 % - 9%
-  9.1 % - 38 %
-  38.1 % - 62 %
-  62.1 % - 86 %
-  86.1 % - 100%



Contour plots of **modeled total nitrogen concentrations (mg/L)** in 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)

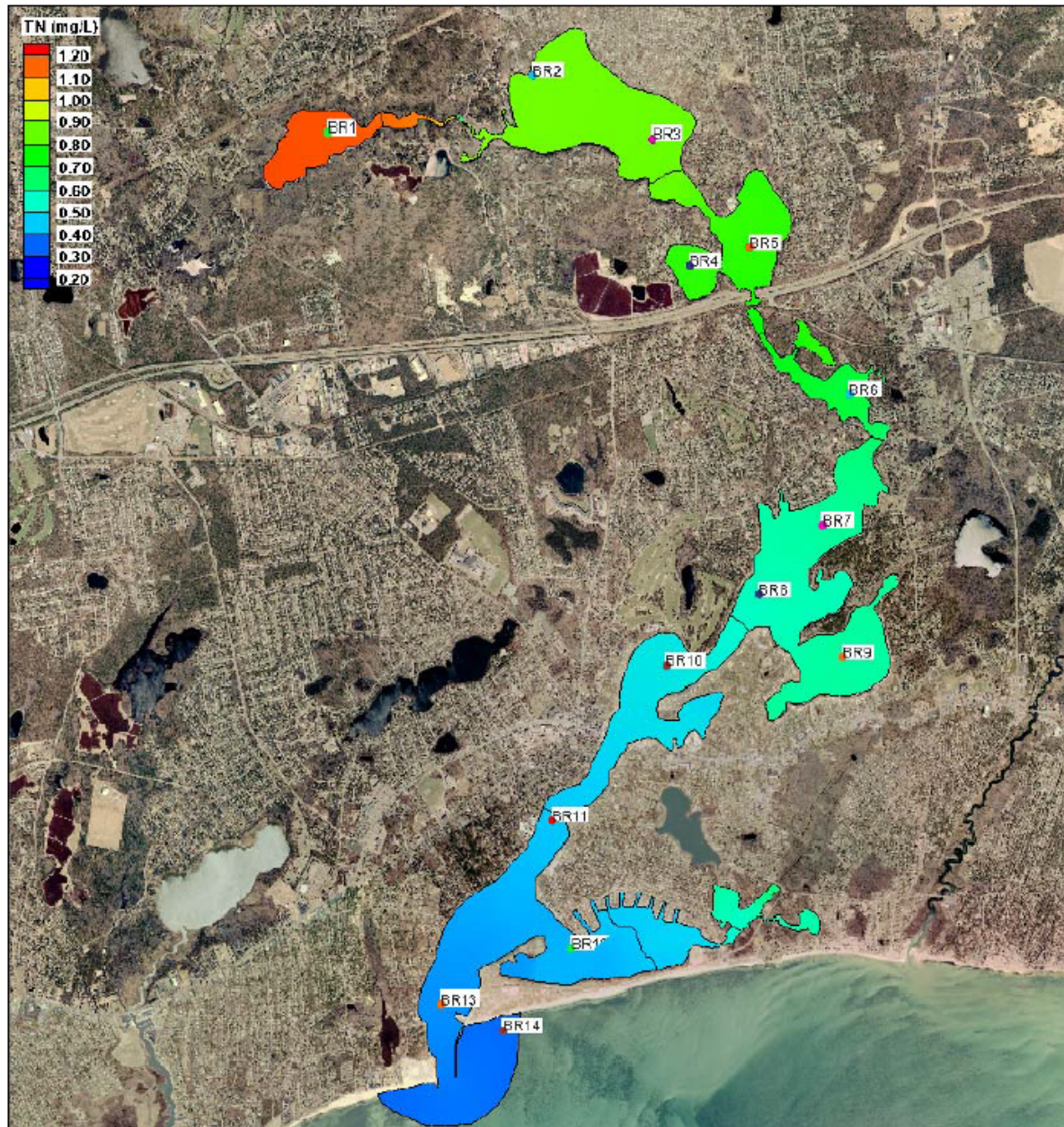
Pre-Colonial Conditions: Bass River



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)

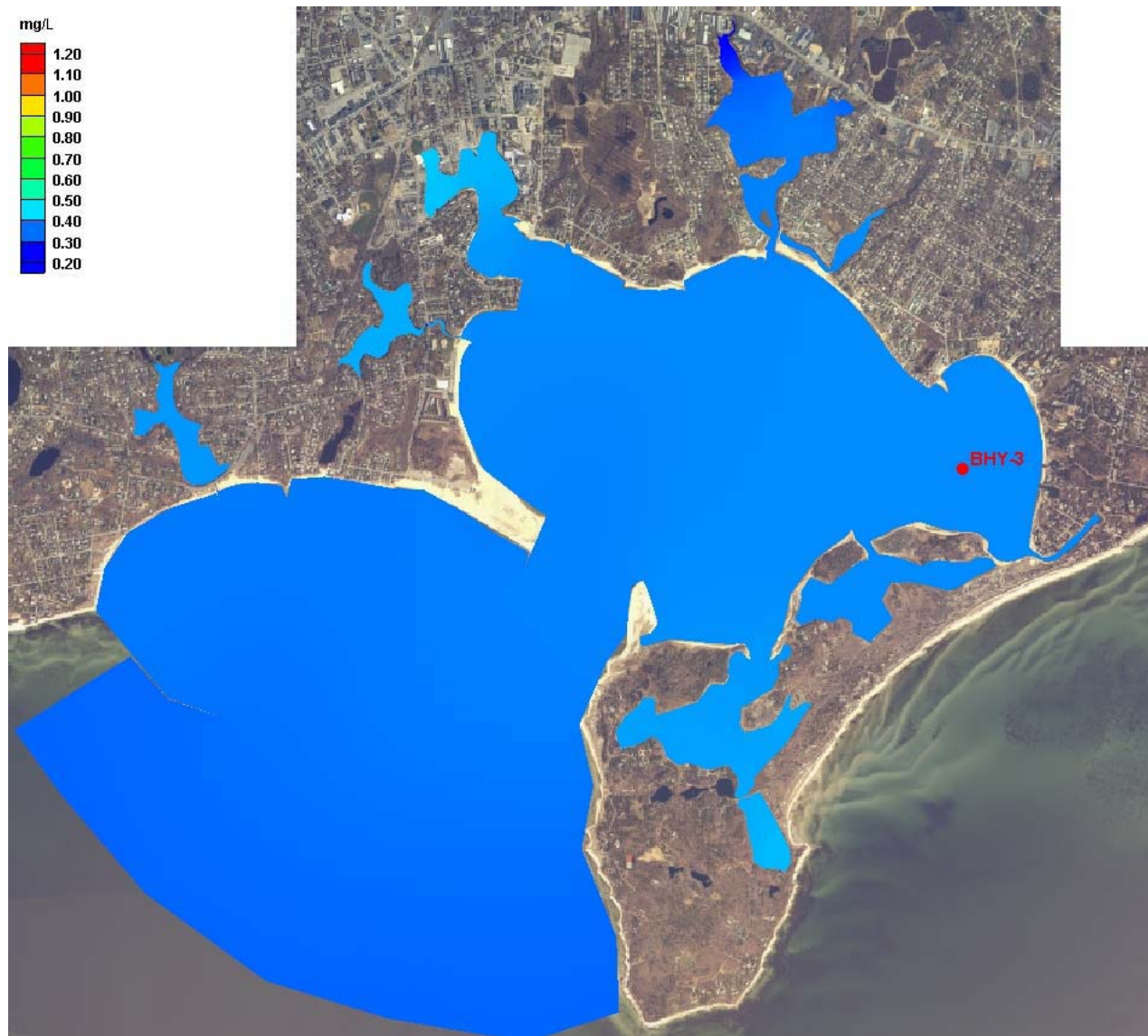
Present Conditions: Bass River



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)

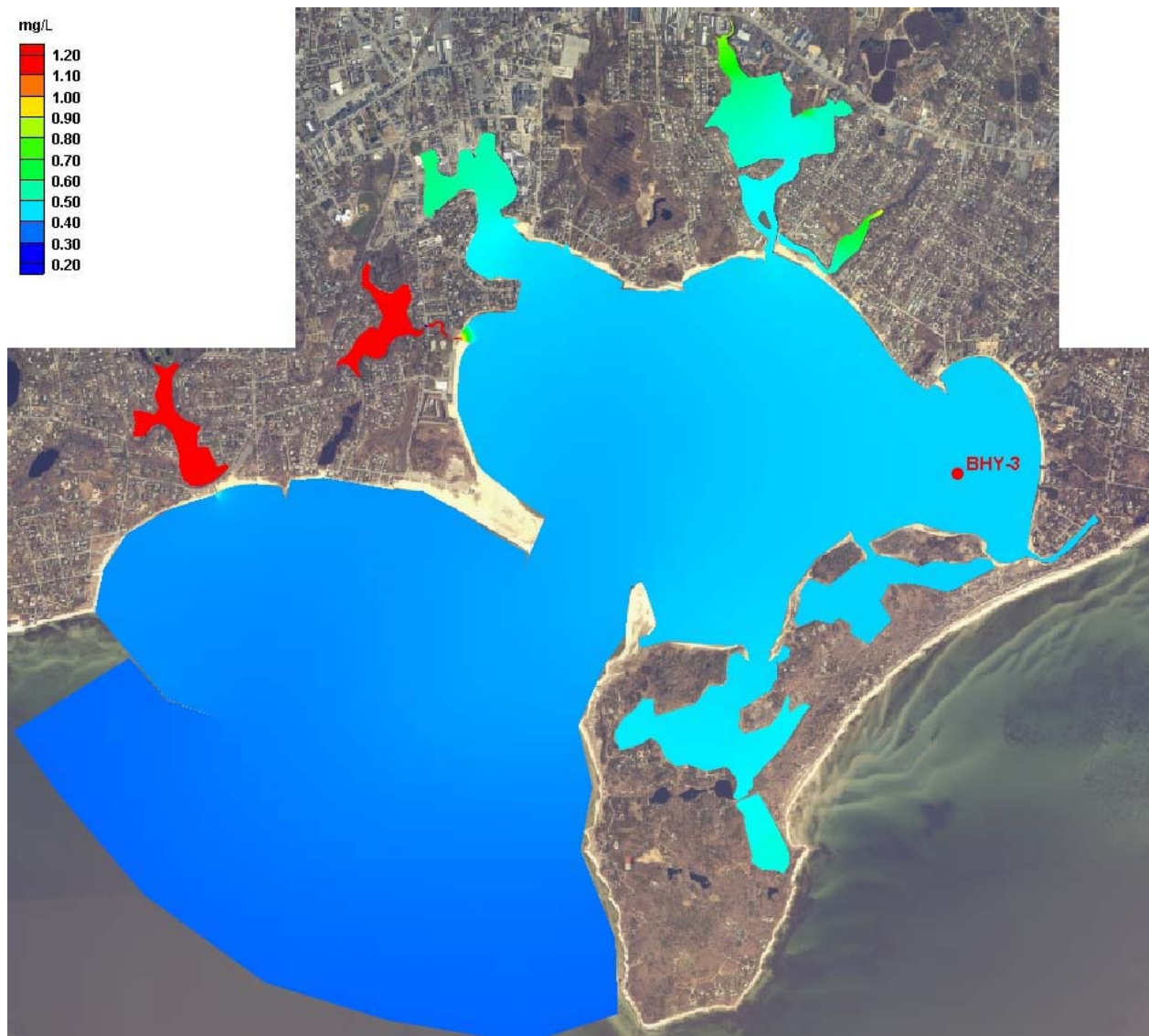
Build-out Conditions: Bass River



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)

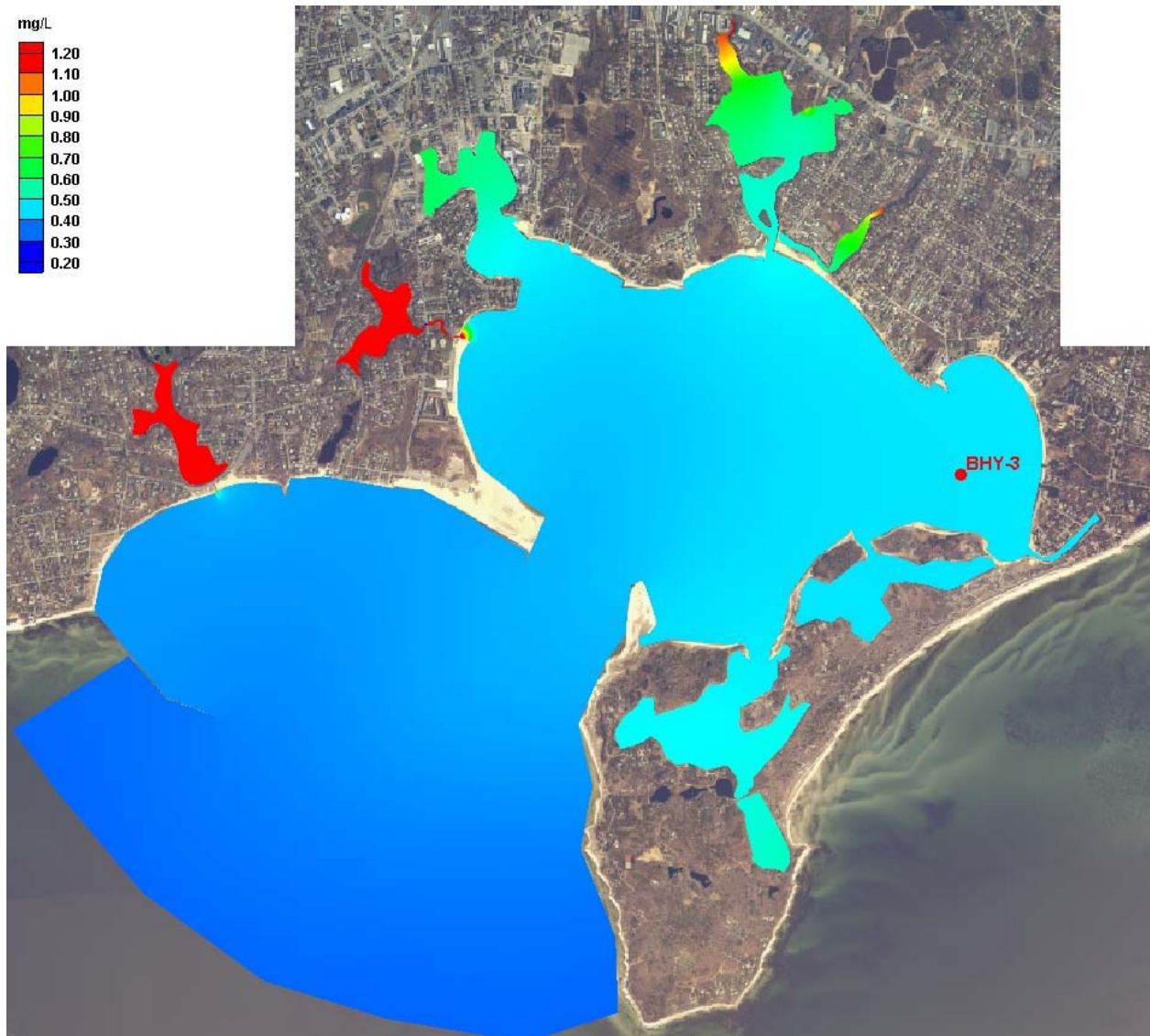
Pre-Colonial Conditions: Lewis Bay



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)

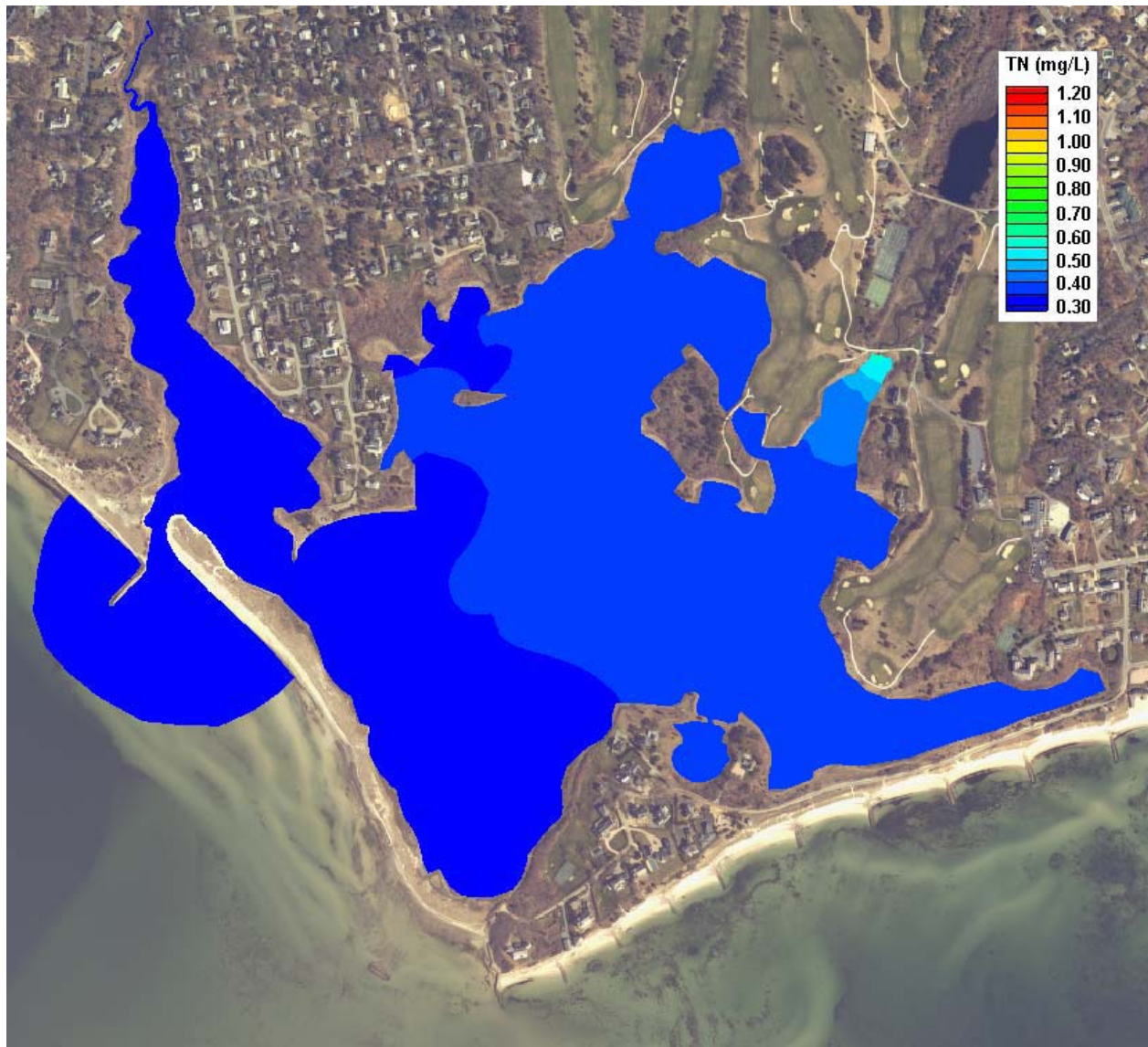
Present Conditions: Lewis Bay



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)

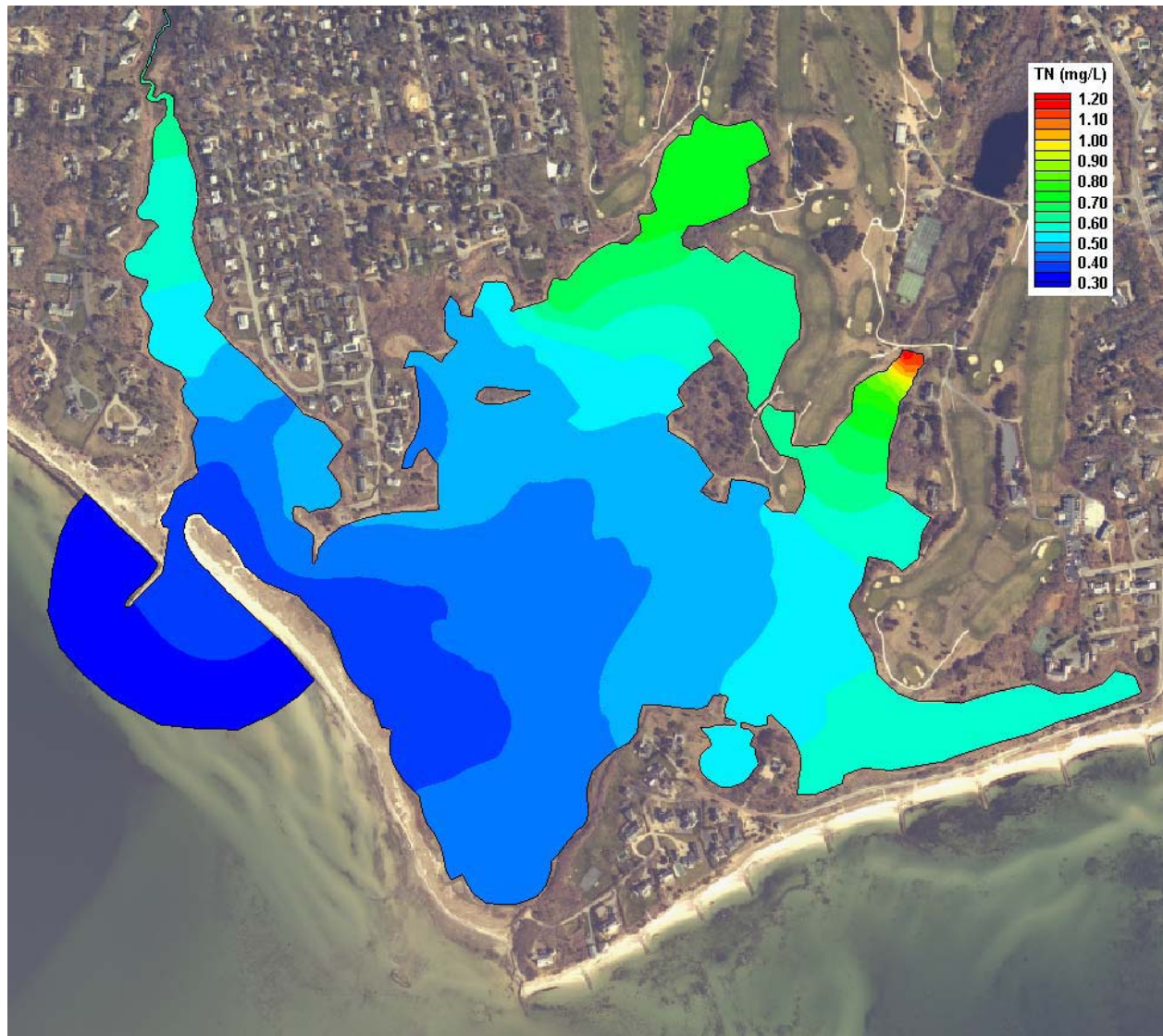
Build-out Conditions: Lewis Bay



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

(Source: MEP 2010)

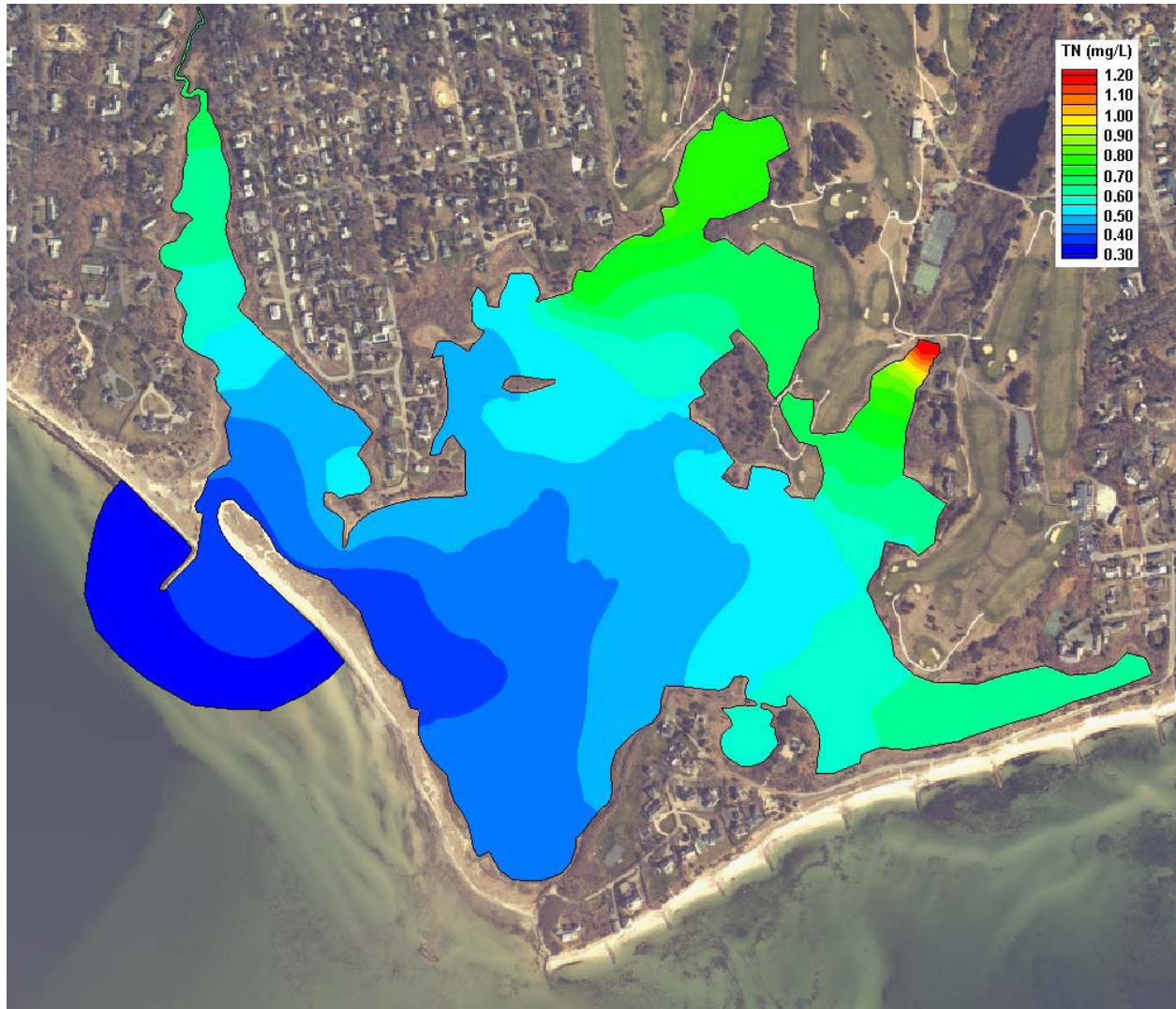
Pre-Colonial Conditions: Halls Creek



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)

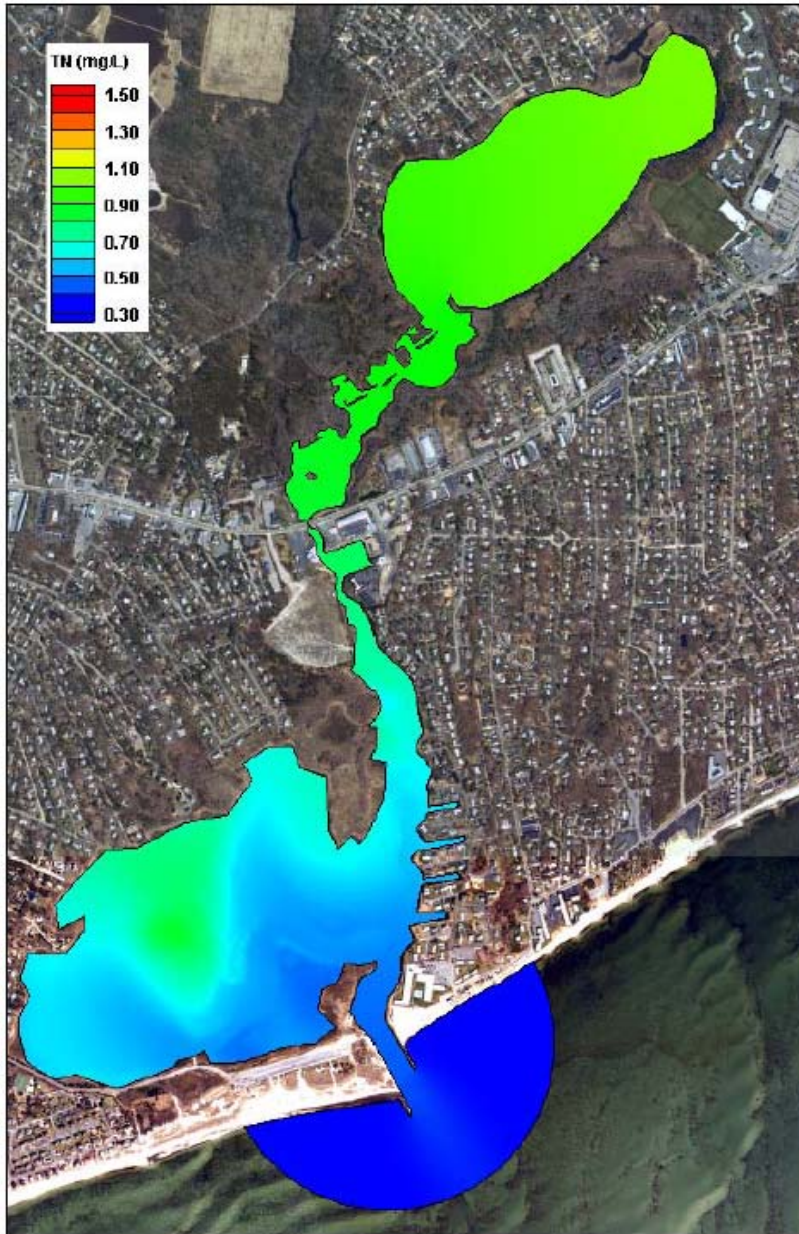
Build-out Conditions: Halls Creek



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

(Source: MEP 2010)

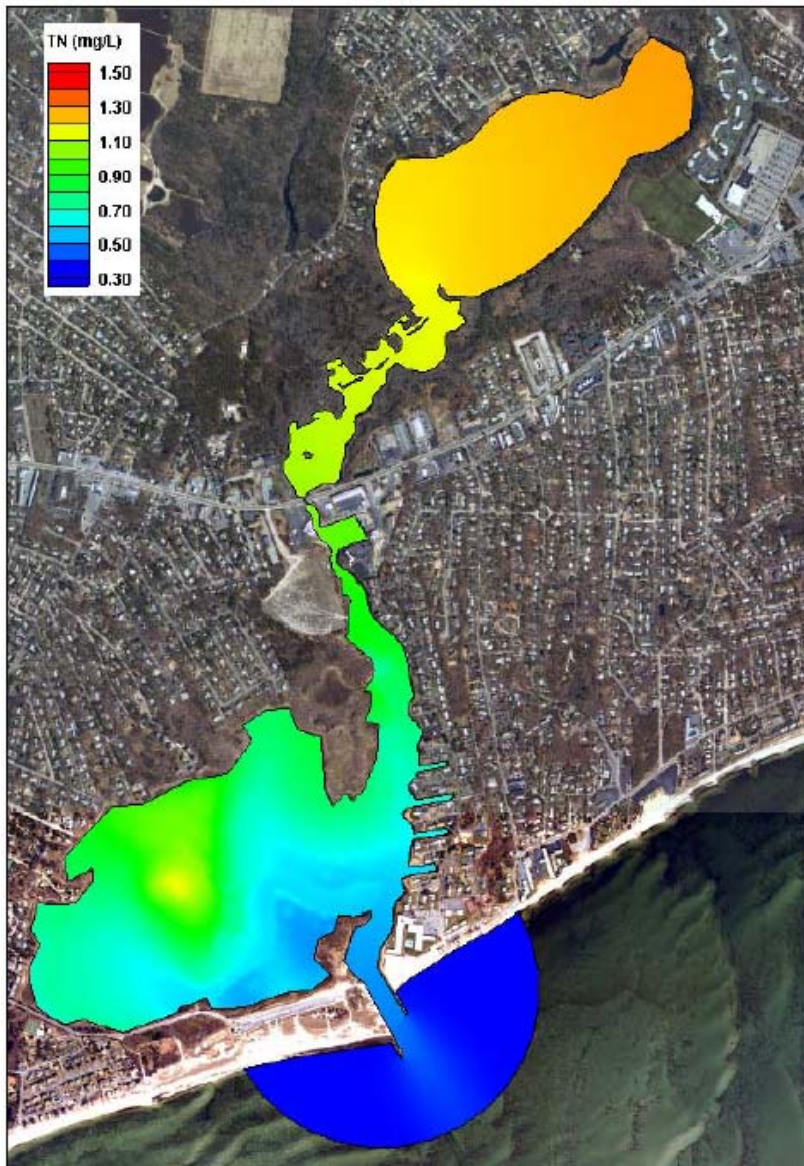
Pre-Colonial Conditions: Parkers River



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


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway

 Roads

 Structures





 Ponds

Nitrogen

Water Quality Stations






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

Yearly Nitrate Concentration Averages

-  0 - 0.5 mg/l **in Public Water Supply Wells**
-  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%


Eelgrass Extent


Base Map

 Town Lines


 Rivers


Embayment Boundary


 On Land


 On Sea

Major Roads

 US Highway


 State Highway

 Roads

 Structures


 Ponds

Eelgrass

 Eelgrass Extent


Phosphorus Problem


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway

 Roads

 Structures


 Ponds


Phosphorus


Priority Ponds

Trophic Status

 Eutrophic *Most Impacted*


 Mesotrophic

 Oligotrophic *Least Impacted*

 Not Interpreted


Title 5 Compliance Issues


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway


 State Highway


 Roads

 Structures


 Ponds


Existing Conditions

 Approx. Locations of Loans Issued for Title 5 Repair

 Potential Title 5 Compliance Issues

 Wastewater Treatment Facility

 Groundwater Discharge Points

 Sewered Parcels

Existing & Proposed Solutions



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


Proposed Infrastructure


Base Map

 Town Lines


 Rivers


Embayment Boundary

 On Land


 On Sea

Major Roads

 US Highway

 State Highway

 Roads


 Structures

 Ponds

Proposed Conditions


Natural Attenuation Sites


 Bridge

 Culvert


 Inlet

 Pipe


 Sewer Alternatives


 Stormwater


CWMP Sewershed Phasing


 No Date Set


Phase Date

 2001 - 2010

 2011 - 2020

 2021 - 2030

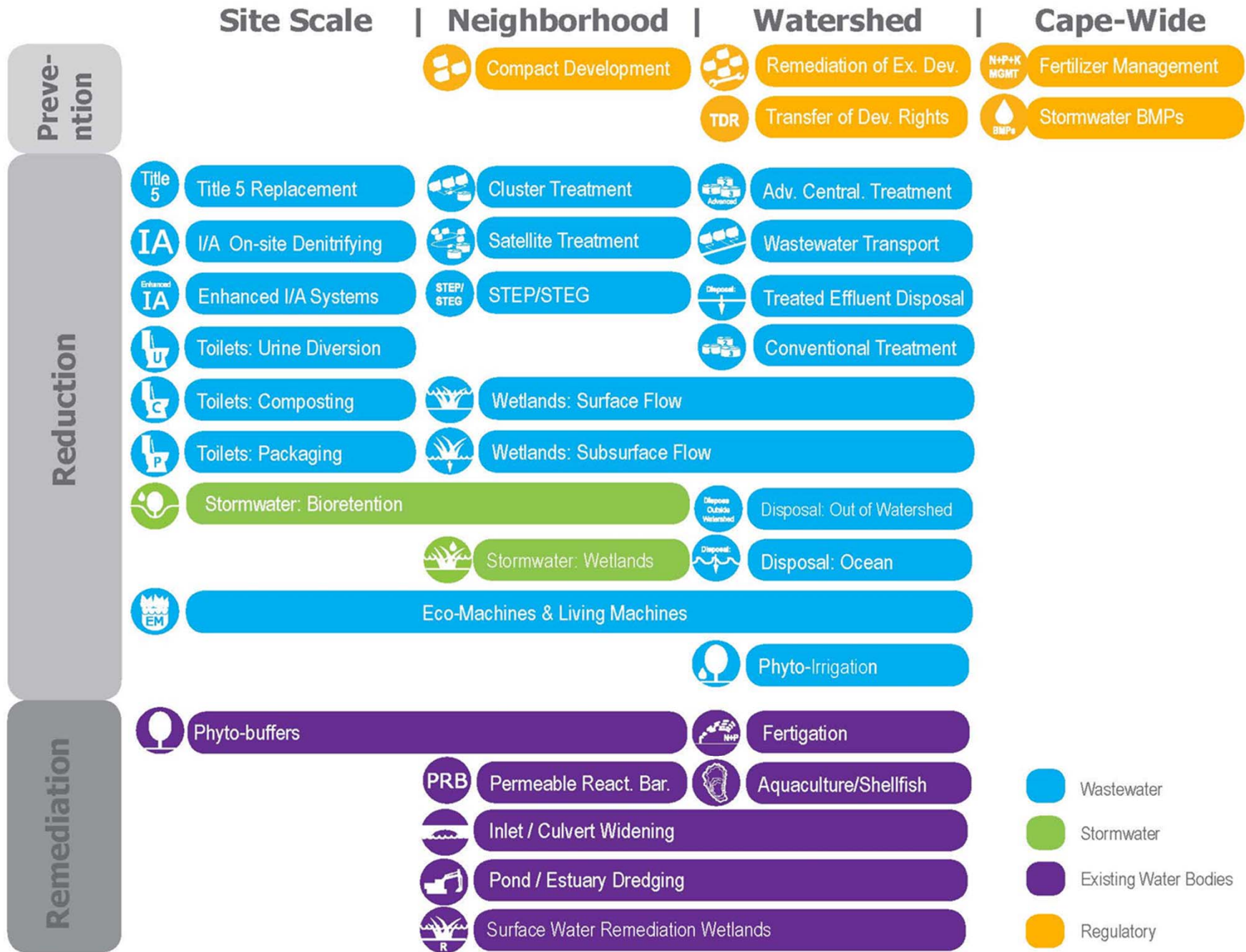
 2031 - 2040

 2041 - 2050



Framework for Addressing Solutions Moving Forward





**Bass River
Lewis Bay
Parkers River**



Alternatives: Screening Method

1
2
3
4
5
6
7

 Wastewater  Existing Water Bodies  Regulatory

<p>Targets/ Goals</p> <p>Present Load: X kg/day Target: Y kg/day Reduction Required: N kg/day</p>	
<p>Composite Target Areas</p> <p>A. High Nitrogen Reduction Areas C. Title 5 Problem Areas B. Pond Recharge Areas</p>	
<p>Low Barrier to Implementation</p> <p>A. Fertilizer Management B. Stormwater Mitigation</p>	<p> </p>
<p>Watershed/Embayment Options</p> <p>A. Permeable Reactive Barriers C. Constructed Wetlands B. Inlet/Culvert Openings D. Dredging</p>	<p>   </p>
<p>Alternative On-Site Options</p> <p>A. Eco-toilets (UD & Compost) C. Enhanced I/A Technologies B. I/A Technologies D. Shared Systems</p>	<p>     </p>
<p>Priority Collection/High-Density Areas</p> <p>A. Greater Than 1 Dwelling Unit/acre C. Economic Centers B. Village Centers D. Growth Incentive Zones</p>	<p>     </p>
<p>Supplemental Sewering</p>	<p> </p>

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 sewerage 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 sewerage.

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
<i>Working Group Members</i>	
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
<i>Observers</i>	
Dan Milz	PhD Candidate, University of Chicago
Fred Chirigotis	Town Councilor, Town of Barnstable
<i>Staff</i>	
Shawn Goulet	GIS Analyst, Cape Cod Commission
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