MINUTES
BOARD OF SELECTMEN
Work Session: Wednesday, June 21, 2017, 2:30PM
Location: Earle Mountain Room

Present: William O'Shea, Chair; Wallace Adams, Vice Chair; Martin McDonald, Aimée Eckman; Jacqui Beebe, Town Administrator
Remote Participation: John Knight, Clerk

William O'Shea, Chair, called the meeting to order at 2:30PM

WORK SESSION
Wastewater Update – Jessica Janney and Jeff Gregg, GHD Consulting and Jane Crowley, Health Agent
Jessica Janney and Jeff Gregg provided an update to the Board regarding Wastewater Management in Eastham. A copy of the presentation is attached to these minutes.

Jane Crowley provided an update to the Board regarding Water Quality issues in Eastham. A copy of the presentation is attached to these minutes.

Both presentations can be viewed and heard as a part of this meeting on the Town of Eastham Website at www.eastham-ma.gov in the Video on Demand section of the site.

Board Goals for FY18
The Board reviewed the draft of the goals originally outlined and identified edits to be made. During this review, they discussed the goals in more detail and agreed that the Strategic Plan will actually include the goals and will be the tool used to track progress of the goals. The Strategic Plan will be posted on the Town website and updated so that residents can follow the Board's progress.

John Knight made a motion to accept the goals as edited
Aimée Eckman seconded the motion
Roll Call VOTE: Aimée Eckman, Yes, Martin McDonald, Yes, John Knight, Yes; Wallace Adams, Yes; William O'Shea, Yes

William O'Shea advised that a Strategic Plan Committee should be set up to develop the strategic plan. Jacqui Beebe will develop a charge for the committee which will have 7 members. The committee would remain active during the development of the plan only and then disband. This will be an item on a future agenda to discuss the details more specifically.

OTHER BUSINESS
Wallace Adams advised that he has received a letter from Armand Normandy and family concerning a memorial bench at the Library in memory of his wife. The Normandy family is raising a couple of concerns and therefore, Wallace Adams would like this issue added to a future agenda for discussion by the Board. A copy of the letter will be sent to each member of the Board.

MINUTES
June 5, 2017 Regular Meeting
Aimée Eckman made a motion to approve the minutes with an edit
Wallace Adams seconded the motion
Roll Call VOTE: Aimée Eckman, Yes, Martin McDonald, Yes, John Knight, Yes; Wallace Adams, Yes; William O'Shea, Yes

June 7, 2017 Work Meeting
Wallace Adams made a motion to approve the minutes with an edit
Martin McDonald seconded the motion
Roll Call VOTE: Aimée Eckman, Yes, Martin McDonald, Yes, John Knight, Yes; Wallace Adams, Yes; William O'Shea, Yes

ADJOURNMENT

Wallace Adams made a motion at 4:35PM to adjourn to executive session to discuss strategy with respect to the appeal of SCG Development Partners filed with Housing Appeals Committee AND with respect to negotiations for non-union personnel when an open meeting may have a detrimental effect on the litigating and negotiating position of the public body and the chair is so declaring.
Aimée Eckman seconded the motion
Roll Call Vote: John Knight, Yes; William O'Shea, Yes; Aimée Eckman, Yes; Martin McDonald, Yes; Wallace Adams, Yes

Respectfully submitted,

Laurie Gillespie-Lee

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Laurie Gillespie-Lee

Town of Eastham, MA

Wastewater Management in Eastham Update

June 2017

Jessica Janney | GHD
Jane Crowley | Town of Eastham

Presentation outline

- Wastewater Planning – History and Current
- Wastewater Nitrogen Removal Need
- Hybrid Scenarios and Integrated Targeted Watershed Approach
  - Tech Memo No. 3 – Salt Pond
  - Tech Memo No. 4 – Town Cove
- Planning – Current and Future
- PRB Update
- Budget Funding – Current and Future

Planning effort history

2009 Planning Efforts

Interim Needs Assessment Report and Alternatives Screening Analysis Report (March 2009)

Wastewater Management Planning Project Plan Evaluation Report (June 2009)

Human health needs

Environmental health needs

Current Planning Efforts

Public water supply

Nauset-Town Cove Estuary - advanced treatment

Rock Harbor Estuary re-classification and/or advanced treatment

Freshwater ponds treatment

Hybrid Evaluations Integrated Targeted Watershed Approach

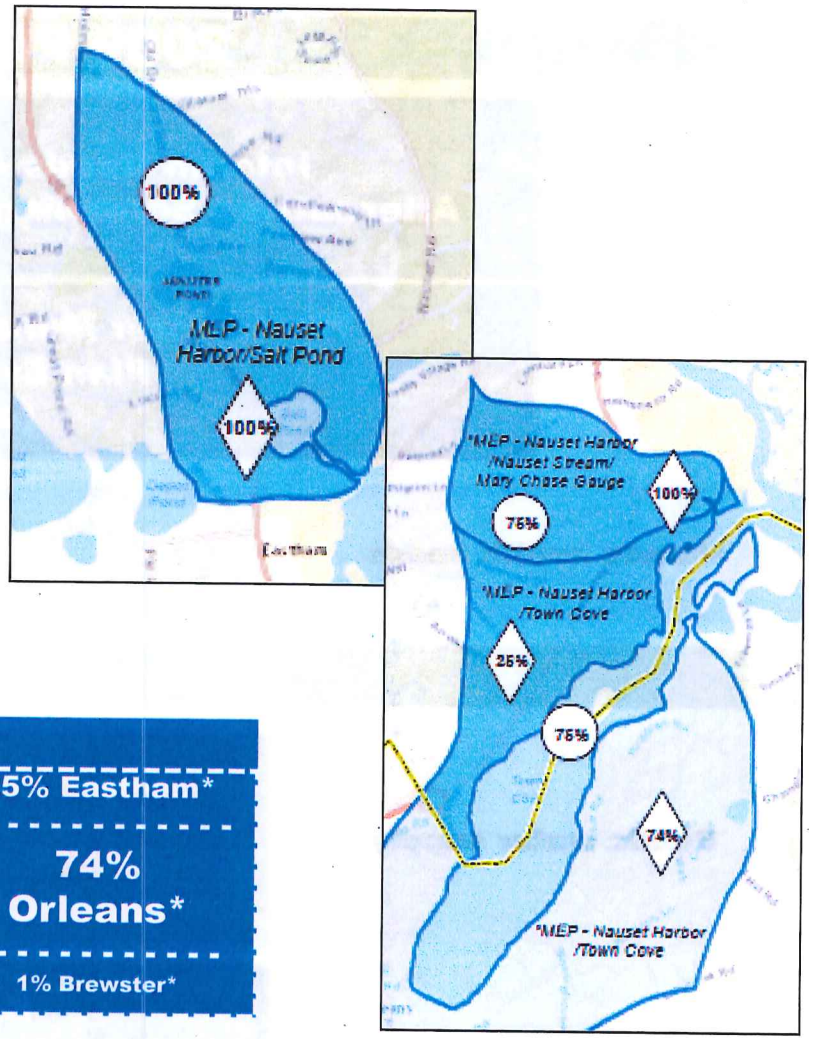
Nauset Harbor Embayment

Salt Pond:

- 100% WW Removal
- Eastham is 100% responsible for load

Nauset Stream / Mary Chase Gauge:

- 75% WW Removal
- Eastham is 100% responsible for load



Town Cove:

** per the Cape Cod Commission*

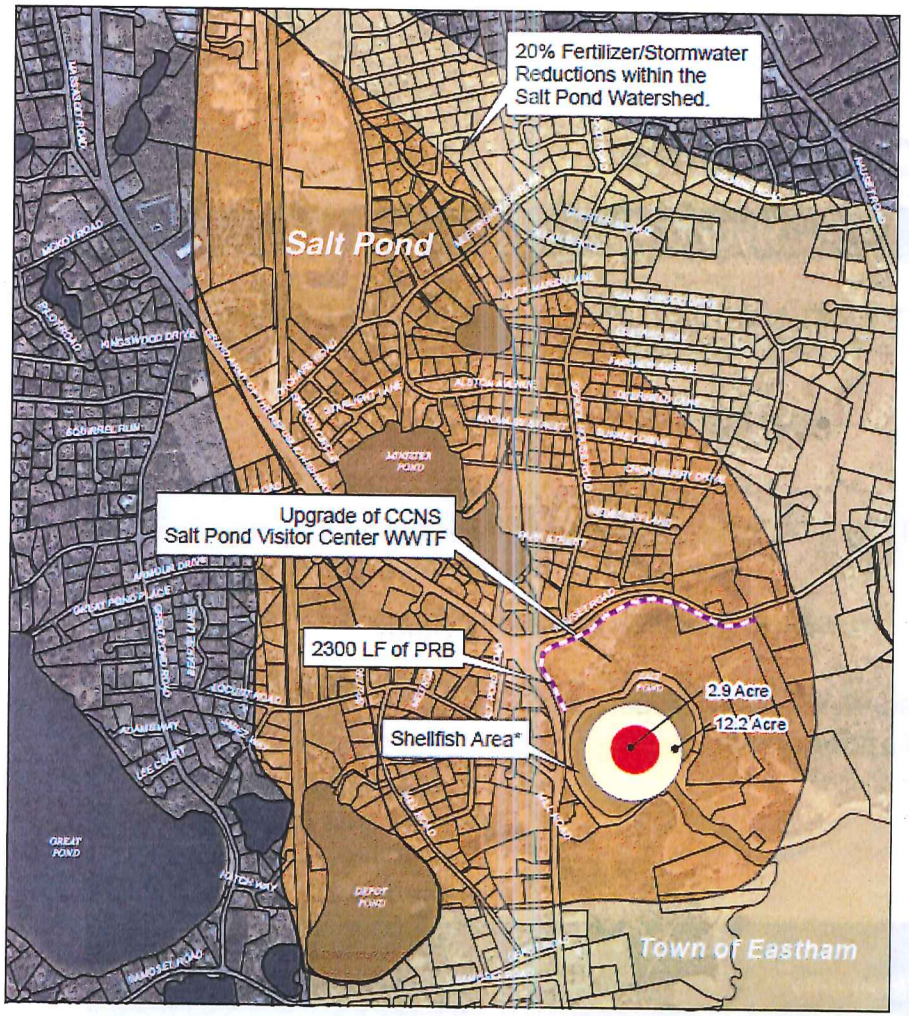
Tech Memo No. 3 – Salt Pond

Summary of Hybrid Scenarios – Key Components:

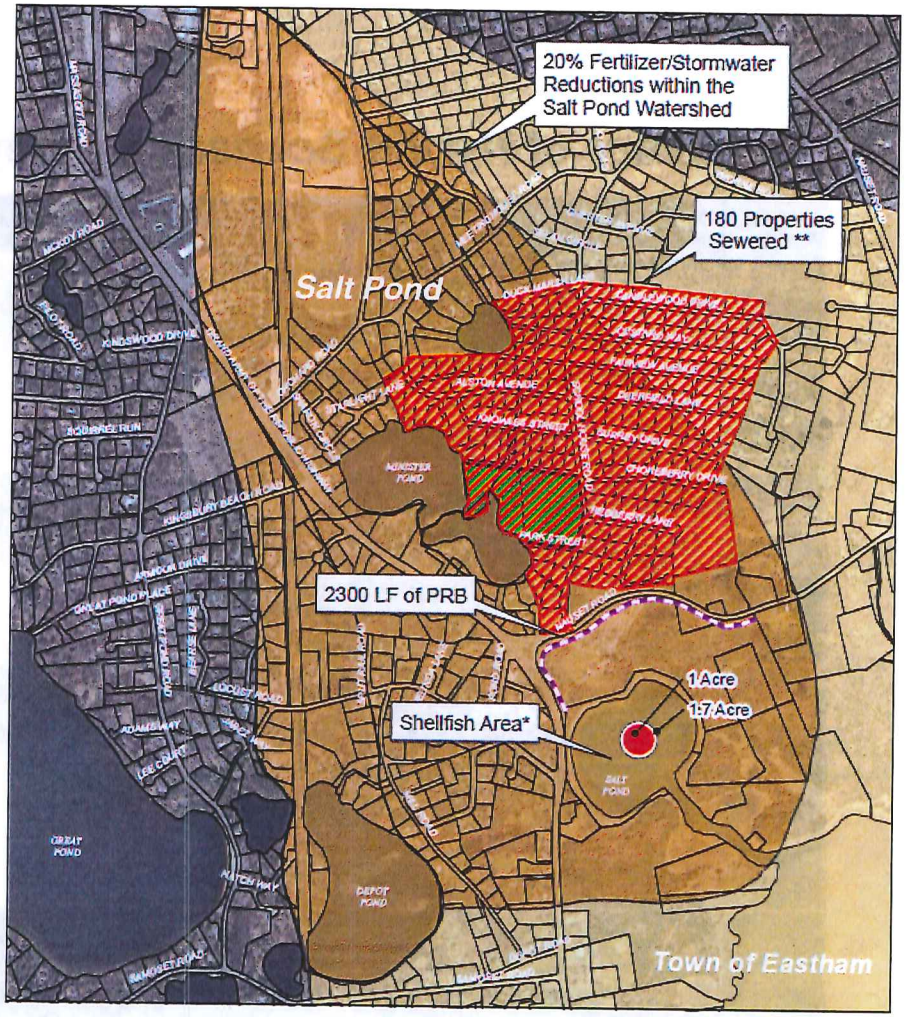
Technology	Hybrid Scenarios	
	Hybrid 1 Evaluation	**Hybrid 2 Evaluation**
Fertilizer and Stormwater Reductions	Town Fertilizer Bylaw - 20%(1)	
Permeable Reactive Barrier	Current - Well Data Collection and Analysis / Detailed Investigation	
Shellfish/Aquaculture	Planned - Shellfish Feasibility Study	
Enhanced I/A Systems	CCNS in process to address nitrogen removal performance.	--
Wastewater Collection and Treatment	--	Implementation if improvements above are not effective – adaptive management approach

Note: (1) Represents a 20% credit of the total Stormwater / Fertilizer load only.

Salt Pond – Hybrid 1 & 2



HYBRID 1



HYBRID 2

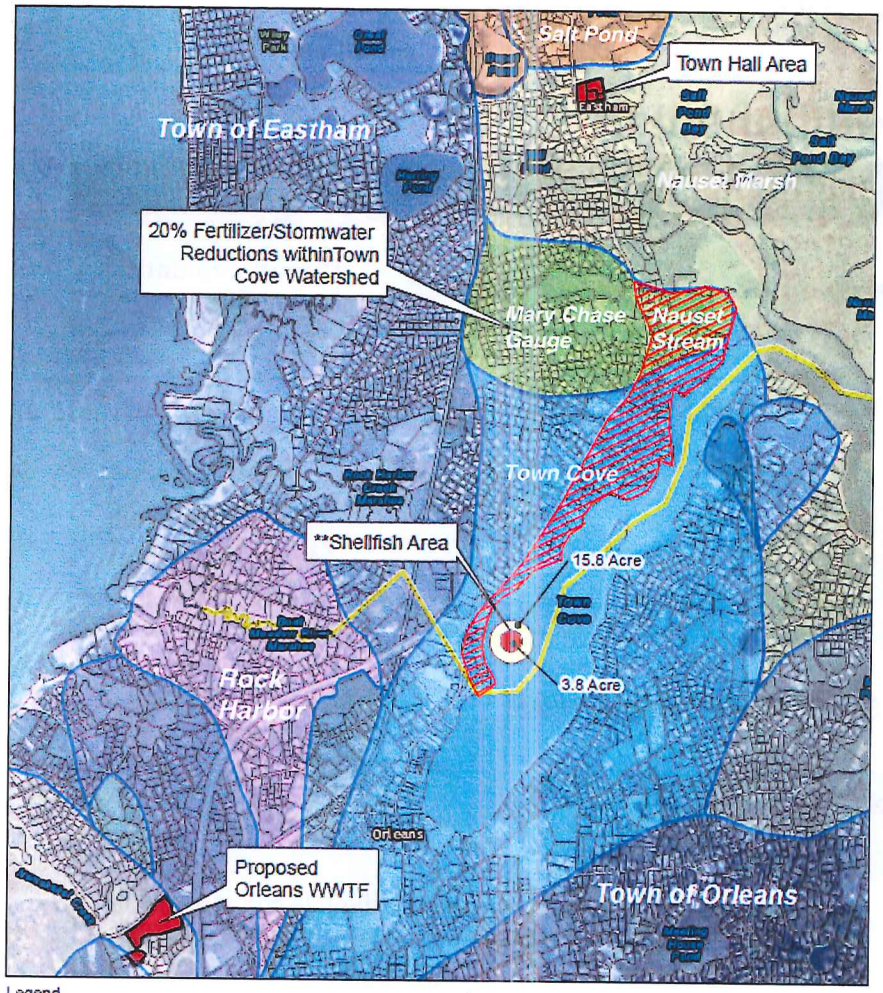
Tech Memo No. 4 – Town Cove

Summary of Hybrid Scenarios – Key Components:

Technology	Hybrid Scenarios[1]			
	Hybrid Evaluation 1A	Hybrid Evaluation 1B	Hybrid Evaluation 2A	Hybrid Evaluation 2B[1]
Fertilizer and Stormwater Reductions	Town Fertilizer Bylaw - 20%			
Permeable Reactive Barrier	--	--	--	As part of Nauset Marsh Watershed Approach
Shellfish/Aquaculture	Apply what is learned from Salt Pond and Orleans' efforts			
I/A Systems	County Health Dept – Grant Request "Layer Cake" Pilot		--	--
Wastewater Collection and Treatment	Needed as part of an adaptive management approach and/or Nauset Marsh Watershed Approach			

Notes: (1) Where TC = Town Cove, NS = Nauset Stream, MCG = Mary Chase Gauge, NM = Nauset Marsh and SP = Salt Pond

Town Cove - Hybrid 2 (A & B)



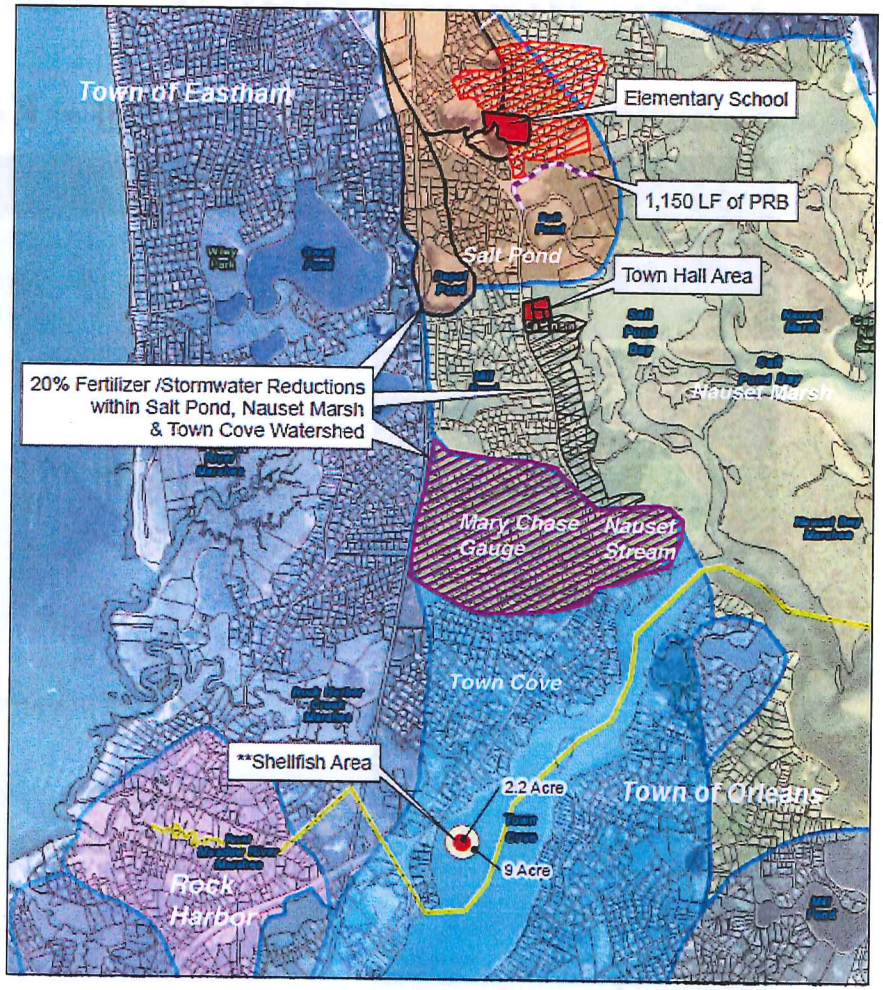
Legend

200 Properties Sewered – Estimated

Potential Recharge Site

Town Line

HYBRID 2A



180 Properties Sewered - Estimated

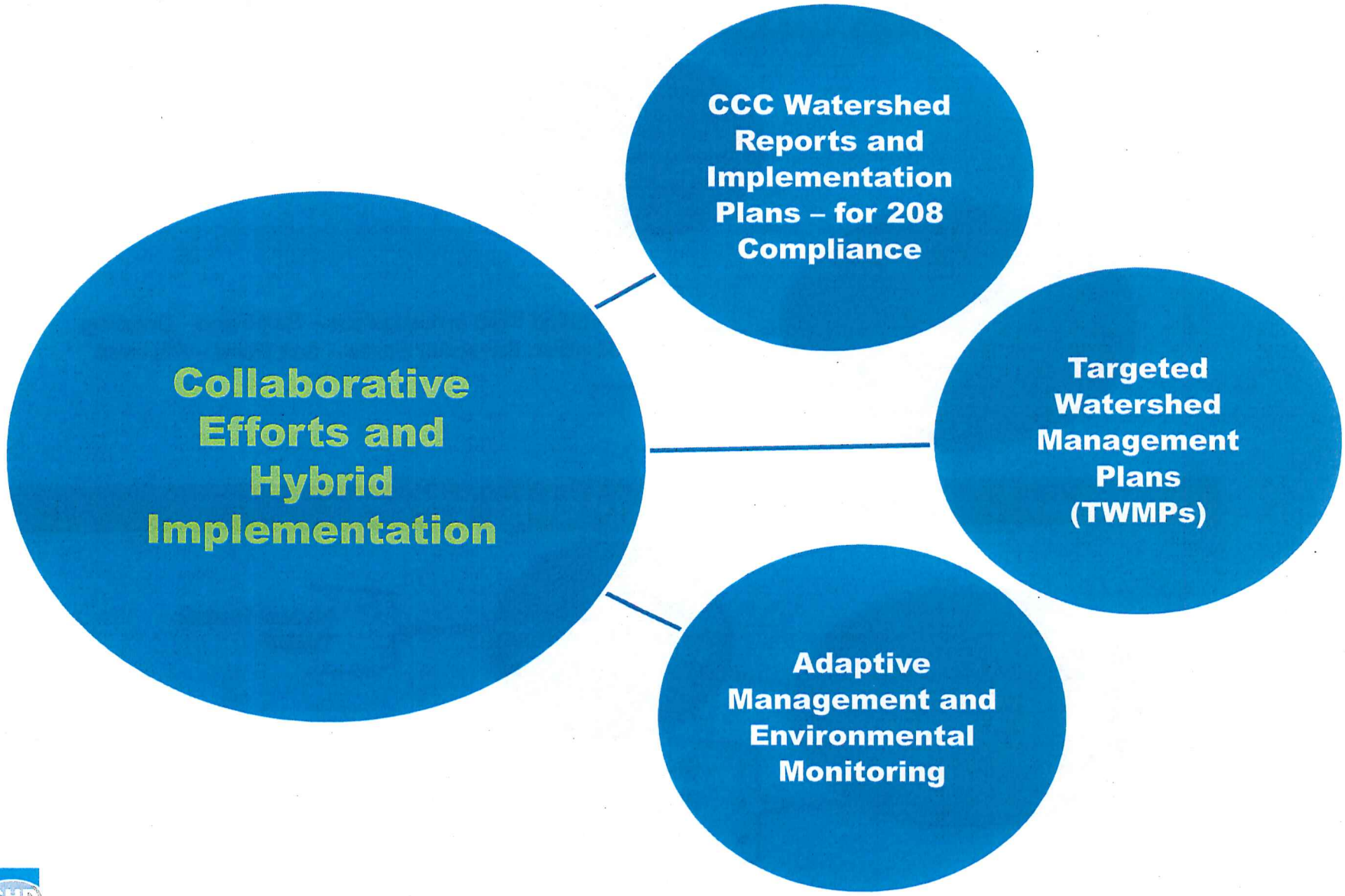
30 Properties Sewered - Estimated

Potential Recharge Site

280 Properties Sewered - Estimated

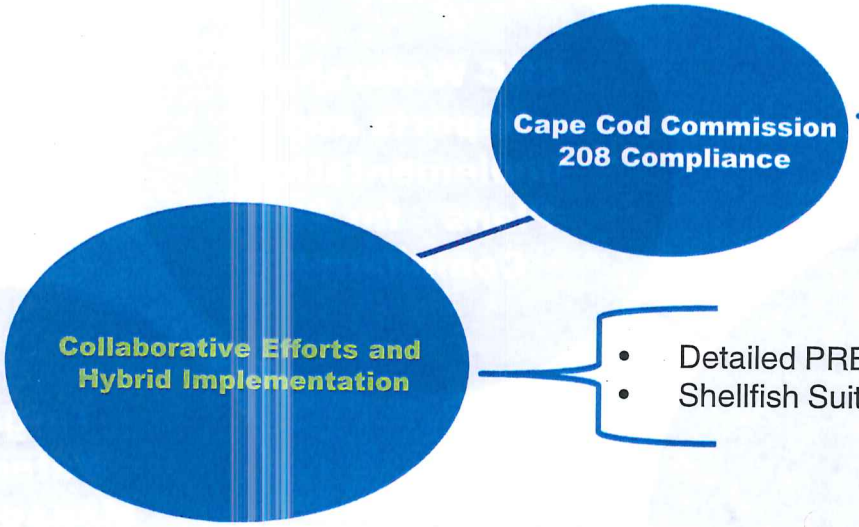
HYBRID 2B

Planning Components



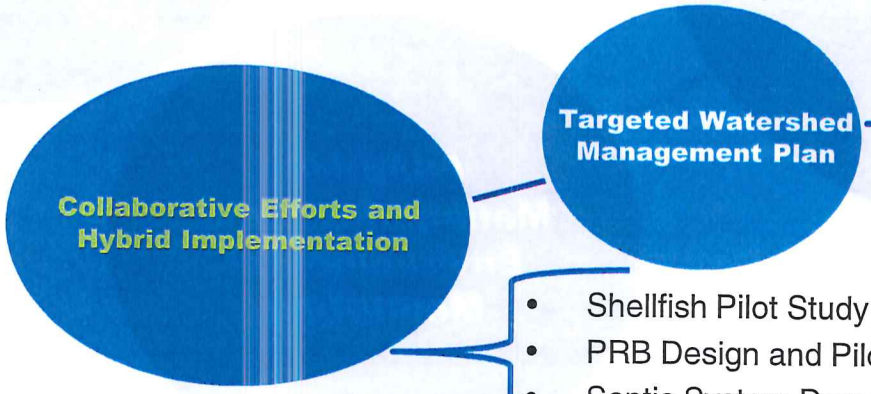
Planning – Current and Future

Current Planning Efforts



- Implementation Plan Update Submitted April 2017
- Detailed PRB Investigation – Salt Pond - Ongoing
- Shellfish Suitability Study – Salt Pond – Planned

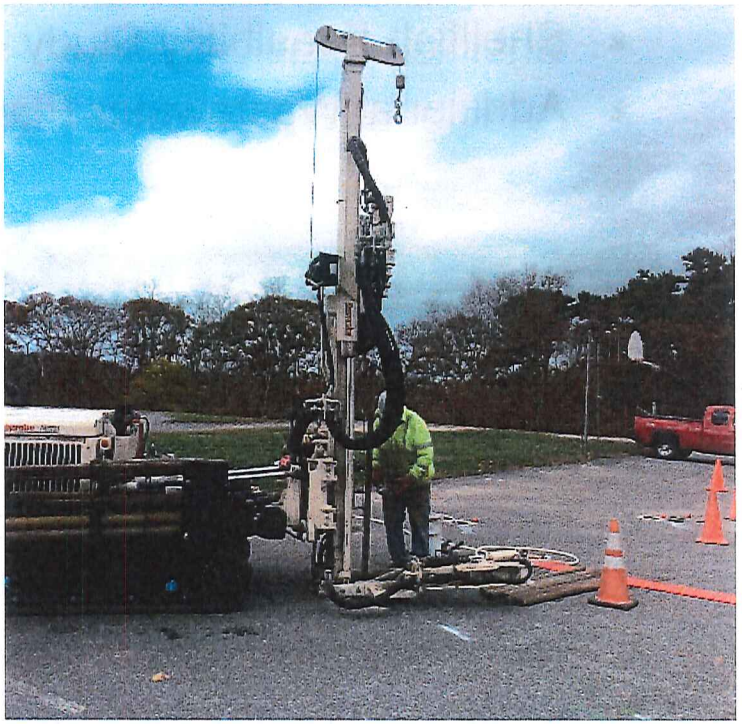
Future Planning Efforts



- Nauset Harbor TWMP
- Shellfish Pilot Study – Salt Pond
- PRB Design and Pilot– Salt Pond
- Septic System Demonstration Project / County "Layer Cake" – Town Cove

PRB Update – Salt Pond

- Completed data review for nitrates in wells
  - Data showing trends of elevated nitrate levels west of Rt. 6
- Working on developing flux of nitrate entering Salt Pond
  - Flux = flow rate + nitrate concentration
- Scheduled to sample stormwater outfalls to Salt Pond and Schoolhouse/Minister's Pond
- Analyze data and develop recommendations for next steps



Orleans PRB Pilot, Source: Cape Cod Times

Budget Funding – Current and Future

Current Planning Efforts – FY18 Budget

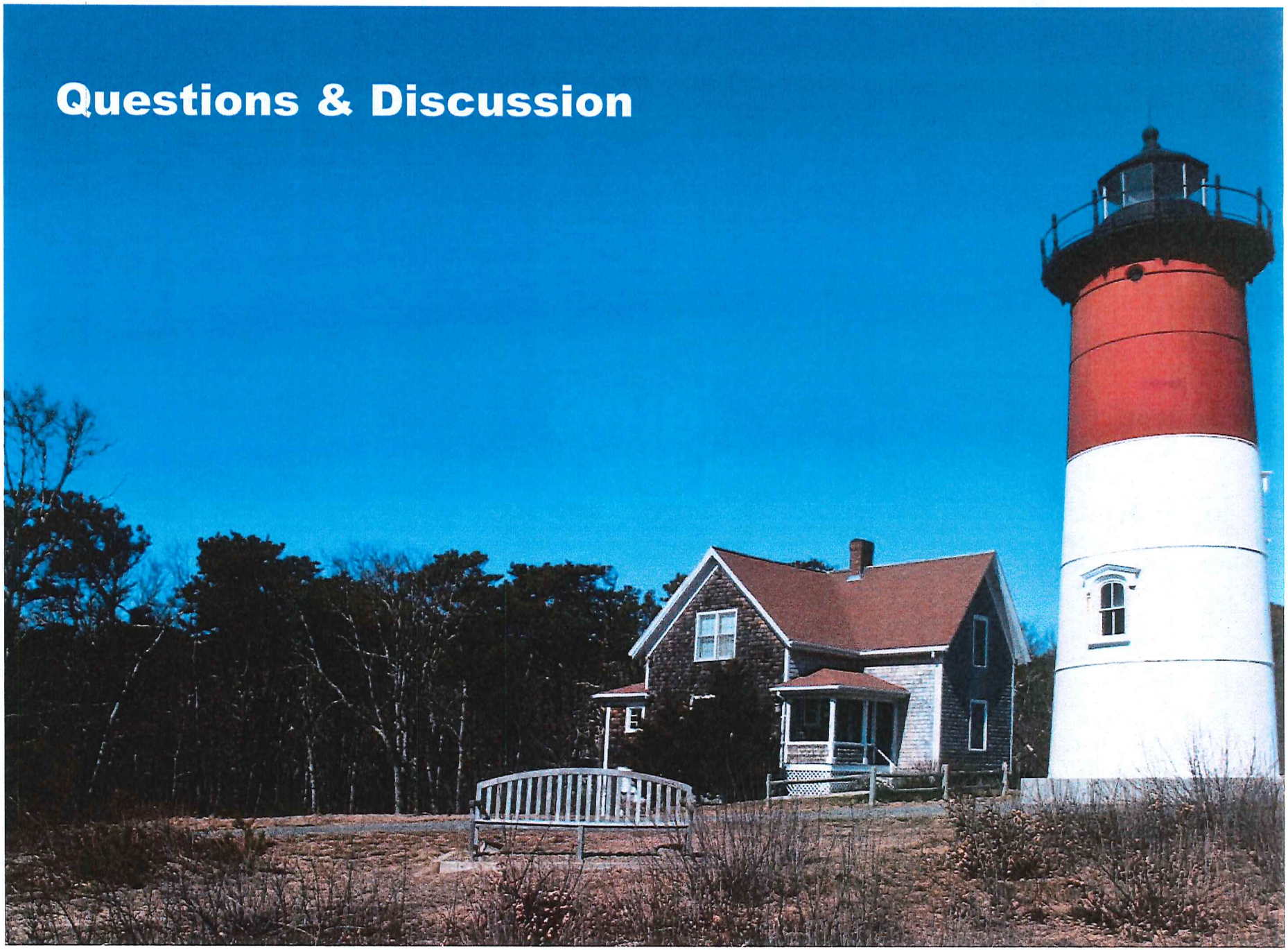
- PRB Detailed Investigation – Salt Pond - Ongoing
- Shellfish Feasibility Study – Salt Pond
- Additional Wastewater Planning Support and Services

$145,000

Future Planning Efforts – 5 Year Capital Plan

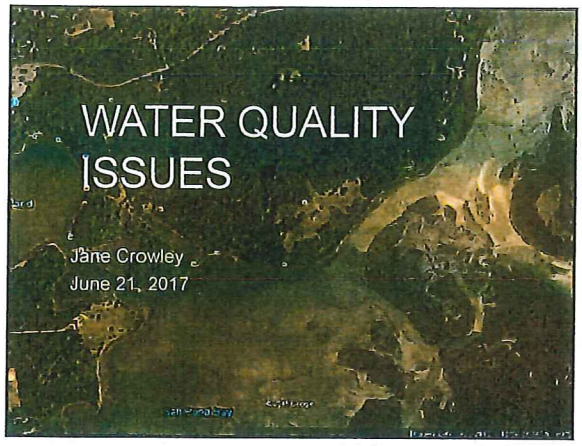
- Shellfish Pilot Project – Salt Pond
- PRB Pilot Design and Installation – Salt Pond
- Targeted Watershed Management Plan (TWMP) for Nauset Harbor Embayment – Eastham side
- Septic System / "Layer Cake" Pilot – Town Cove
- Additional Wastewater Planning Support and Services

Questions & Discussion



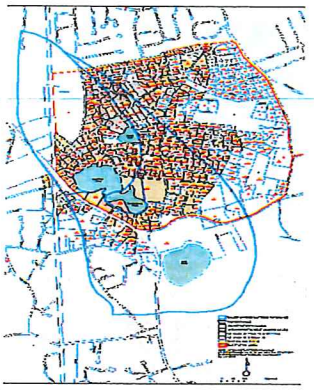
www.ghd.com

GHD

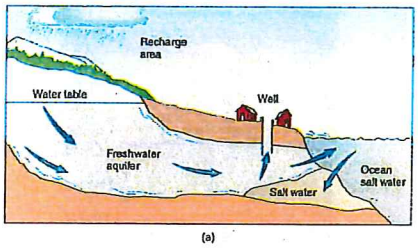


Overview

- Background on wastewater planning and the 208 Plan
- Setting Nitrogen Targets
- Implications for Eastham
- Path Forward Targeted Watershed Planning...Multifaceted Approach for Salt Pond Watershed
  - Monitoring Nauset Estuary and Schoolhouse /MinisterPonds
  - Septic system performance upgrade at Salt Pond Visitor Center
  - PRB Investigation
  - Storm water Improvements
  - Adaptive Management



Where did it come from?



(a)

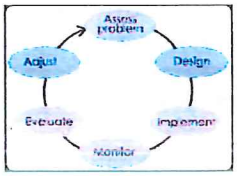
Setting Nitrogen Limits

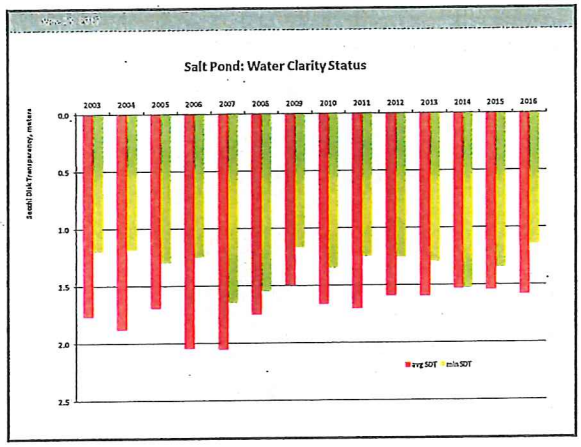
- Restoration goal: eelgrass bed expansion
- Eelgrass present when Total N less than 0.45 mg/L Sentinel Stations, including Salt Pond
- Model calculates estimates of current N load, target N load to meet concentration, and reductions (TMDL)

Complex Hydrodynamic Circulation

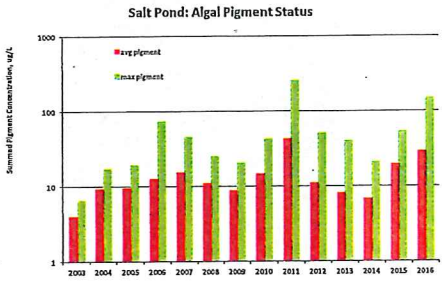
Adaptive Management

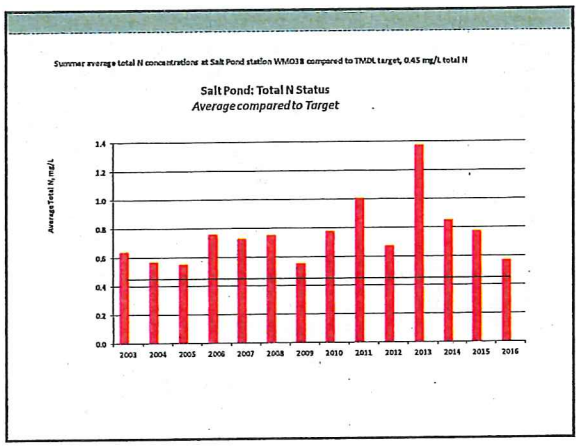
- Develop an approach to comply with the Clean Water Act where non-traditional approaches are used uncertainty is High





Average and maximum concentrations of algal pigments, Salt Pond station WMO38
(note bloom threshold is considered 30 µg/L.

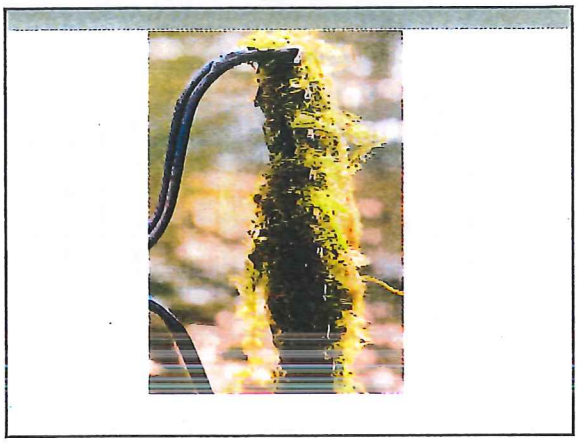


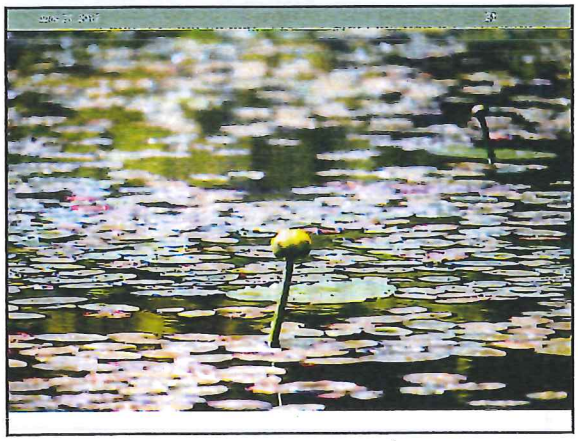


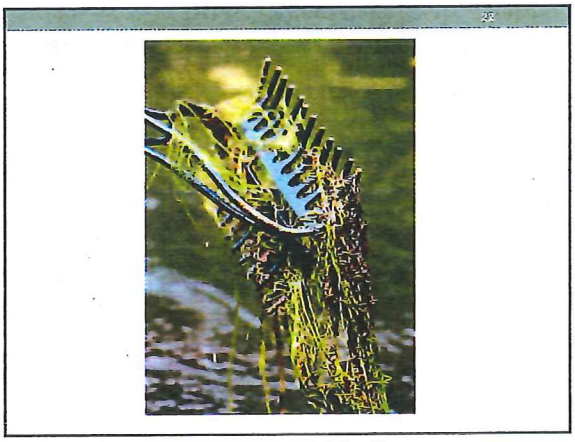
What about our ponds?

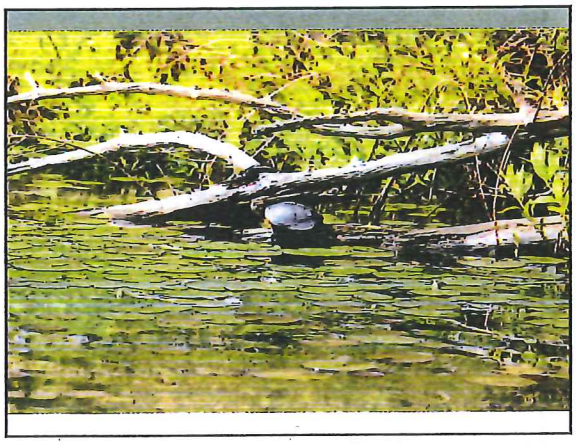
- Samples taken by volunteers 2 times year April and September:
- Bridge Pond
- Depot Pond
- Great Pond
- Herring Pond
- Jemima Pond
- Minister Pond
- Widow Harding Pond
- Little Depot Pond
- Schoolhouse Pond
- Muddy Pond
- Molls Pond

Currently working on plan to evaluate Schoolhouse /Minister Pond….includes conducting an Aquatic Vegetation and Water Quality Survey









Technical Memorandum

TO: Jane Crowley, Town of Eastham
FROM: Liz Moran, EcoLogic LLC
RE: Updated estuarine data
DATE: April 3, 2017

At your request, we have reviewed 2015 and 2016 water quality data collected within the Eastham portion of the Nauset Harbor Embayment System and updated metadata files and the plots displaying Sand Pond water quality conditions over time. The Towns of Eastham and Orleans are following the recommended adaptive management approach to wastewater management planning; namely, to continue monitoring and data analysis to improve our collective understanding of factors affecting the health of the watersheds and estuaries.

Regulatory Context

The nitrogen management goal for the Nauset Harbor estuary system is to expand eelgrass habitat by approximately 80 acres. Resource managers concluded that reducing nitrogen loading to a level that will enable an expansion of eelgrass will also improve the habitat for benthic organisms; animals including shellfish are more tolerant than eelgrass to elevated nitrogen and the associated algal abundance. The target nitrogen level was set at 0.45 mg/L considering the Nauset data along with work on other MEP systems. The target nitrogen concentration of 0.45 mg/L is adopted as a threshold for Salt Pond restoration as well.

Current Conditions and Trends

Multiple monitoring stations are established within the Nauset Harbor Embayment System, as show in Figure 1. The sampling program varied over the years; stations were removed from the program following the intensive surveys in 2003 and 2004. Monitoring was expanded in 2016 to include additional sites **(Table 1)**. Three embayments: Salt Pond (site WMO38), Town Cove (site WMO27) and Mill Pond (site WM034) have consistently been part of the monitoring program.

Table 1. Summary of metadata, water quality monitoring within the Nauset Harbor estuary system, 2003-2016

Year	Stations	Events	Frequency and Schedule	Parameters
2003	25 - 41 (41 is ocean)	6	Biweekly, June 4-Aug18	Secchi, salinity, DO, PO4, N series, POC, algal pigments, fecal coliform
2004	25-40 except 28,31,37	5	Biweekly, June22-Aug20	as 2003, dropped fecal coliform
2005	25,27,34,38	7	Biweekly, June13-Aug24	as 2004
2006	27,34,38	6	Biweekly, June29-Sept12	as 2004 (+total pigment, calculated)
2007	27 (4 events), 34,38	5	Biweekly, July5-Sept17	as 2006
2008	27,34,38	5	Biweekly, July7-Sept4	as 2006
2009	27,34,38	5	Biweekly, July13-Sept9	as 2006
2010	27, 34, 38	5	Biweekly, July15-Sept13	as 2006
2011	27,34,38	4	Biweekly July, once Aug & Sept (7/6 - 9/19)	as 2006
2012	27,34,38	5	Biweekly, 7/9-9/6	as 2006
2013	27,34,38	5	Biweekly, 7/11-9/10- no 34 last date	as 2006
2014	27,34,38	5	Biweekly, 7/16-9/11	as 2006
2015	27,34,38	5	Biweekly, 7/7-9/3	
2016	28,29,36,37,38,39	5	Biweekly, 7/7-9/7	As 2006

Figure 1. Water quality monitoring stations in Nauset Harbor estuary system

Monitoring station WMO38 is located in Eastham's Salt Pond. Data from annual monitoring efforts were compiled to review status and trends of key metrics related to eutrophication: total N concentrations, water clarity (Secchi disk transparency), concentration of algal pigments, and dissolved oxygen status of the deep waters.

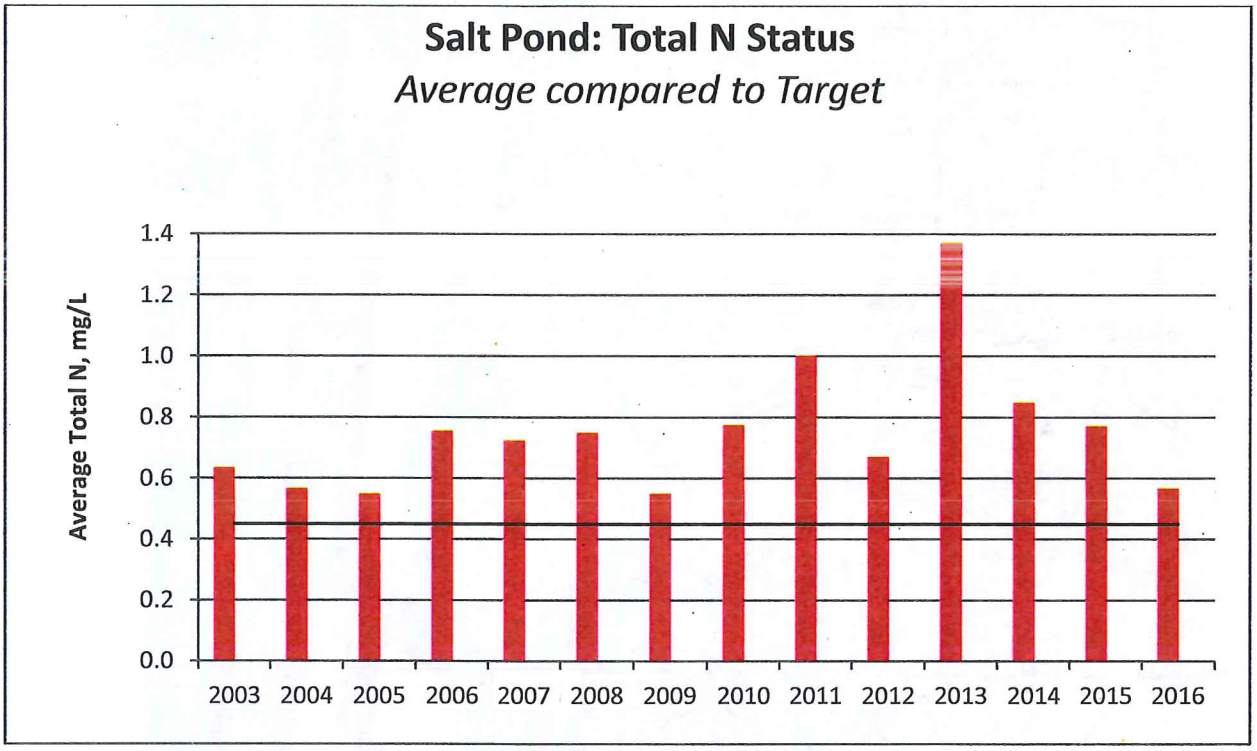


Figure 2. Summer average total N concentrations at Salt Pond station WMO38 compared to TMDL target, 0.45 mg/L total N

Note that the average total N (which includes organic and inorganic, dissolved and particulate fractions) is highly variable from year-to-year (**Figure 2**). The data plotted are the water column average values, which include samples from the surface and bottom waters as well as mid-depth samples in most years. Note also that all years of record exceed the threshold of 0.45 mg/L corresponding to a healthy ecosystem.

Nitrogen is the limiting nutrient for phytoplankton growth in this estuarine ecosystem, meaning that the abundance of phytoplankton is regulated by the supply of nitrogen. The elevated N concentrations in Salt Pond support abundant plankton growth. As shown in **Figure 3**, algal pigments (a measure of phytoplankton abundance) are also highly variable from year-to-year. Note the logarithmic scale of the graph; this is to accommodate the high concentrations measured during bloom conditions, defined as algal pigment concentrations greater than 30 µg/L. Blooms of harmful algae (e.g., red tide) have become common in regions of the Nauset Estuary, including Salt Pond.

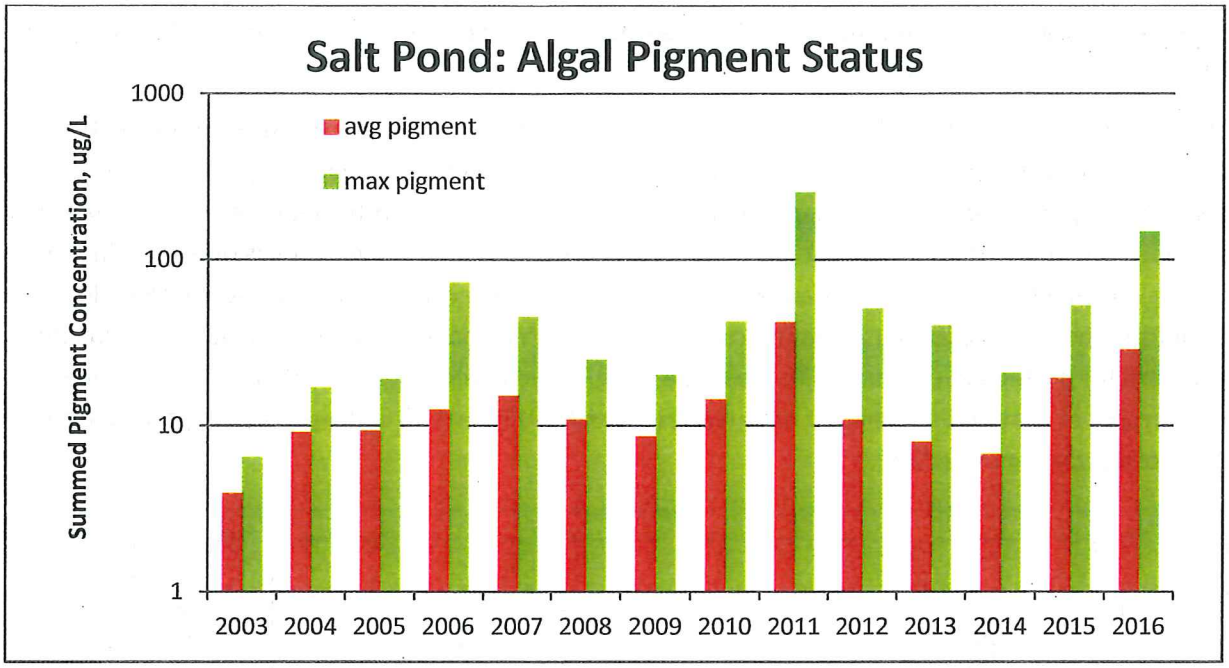


Figure 3. Average and maximum concentrations of algal pigments, Salt Pond station WMO38 (note bloom threshold is considered 30 µg/L.

Elevated algal pigment concentrations lead to diminished water clarity, affecting the aesthetic quality of the resource as well as limiting light penetration needed to support eelgrass. The average and minimum Secchi disk transparency of Salt Pond is displayed in **Figure 4**. Note that the pond depth is approximately 9.4 m (+/- 30 ft). A Secchi disk reading of 2 m or more is generally indicative of low phytoplankton abundance and clear water.

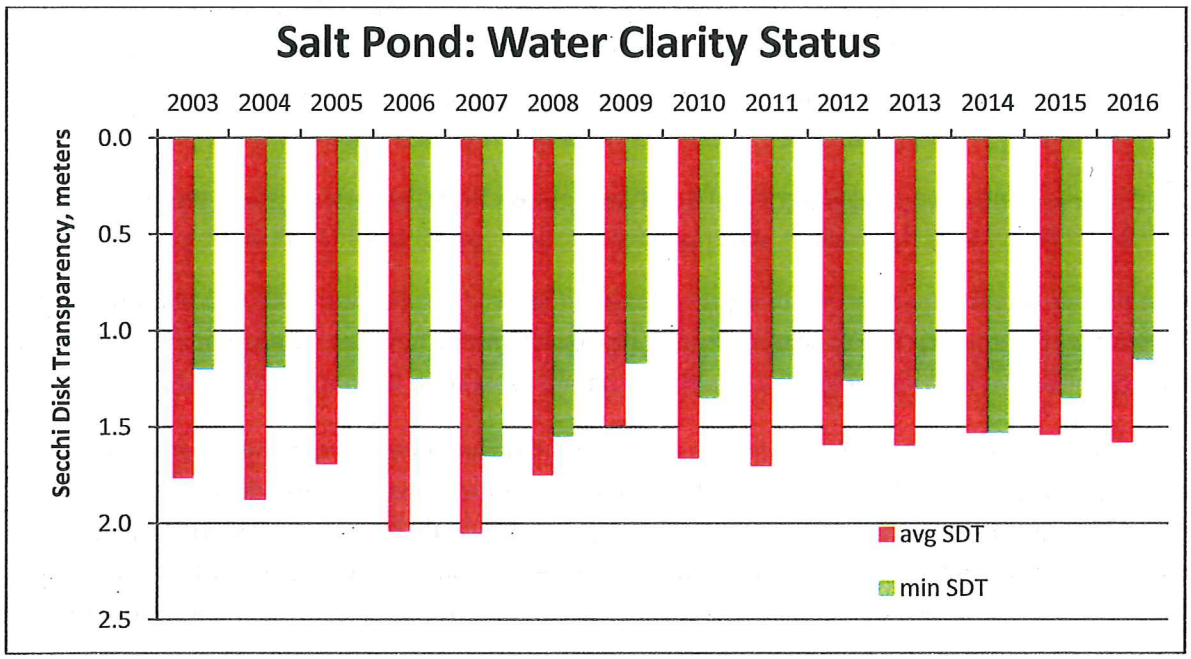


Figure 4. Average and minimum Secchi disk transparency (SDT), Salt Pond station WMO38 compared to a 2 m target water clarity.

The final important metric related to nitrogen enrichment is the dissolved oxygen status of the lower waters. As shown in Figure 5, the deep waters of Salt Pond are subject to hypoxia (low concentrations of dissolved oxygen, DO). This condition is a direct effect of the pond's depth; Salt Pond develops thermal stratification during the summer, isolating the deeper waters from the two sources of oxygen in the water: exchange with the atmosphere and photosynthesis. The average concentration of DO is less significant, however, than the minimum concentration. In Massachusetts, the ambient water quality standard for protection of aquatic life is set at 6.0 mg/L. The percentages included in Figure 5 refer to the percent of observations that do not meet this standard. The trend in deep water oxygen status of Salt Pond is clearly in decline.

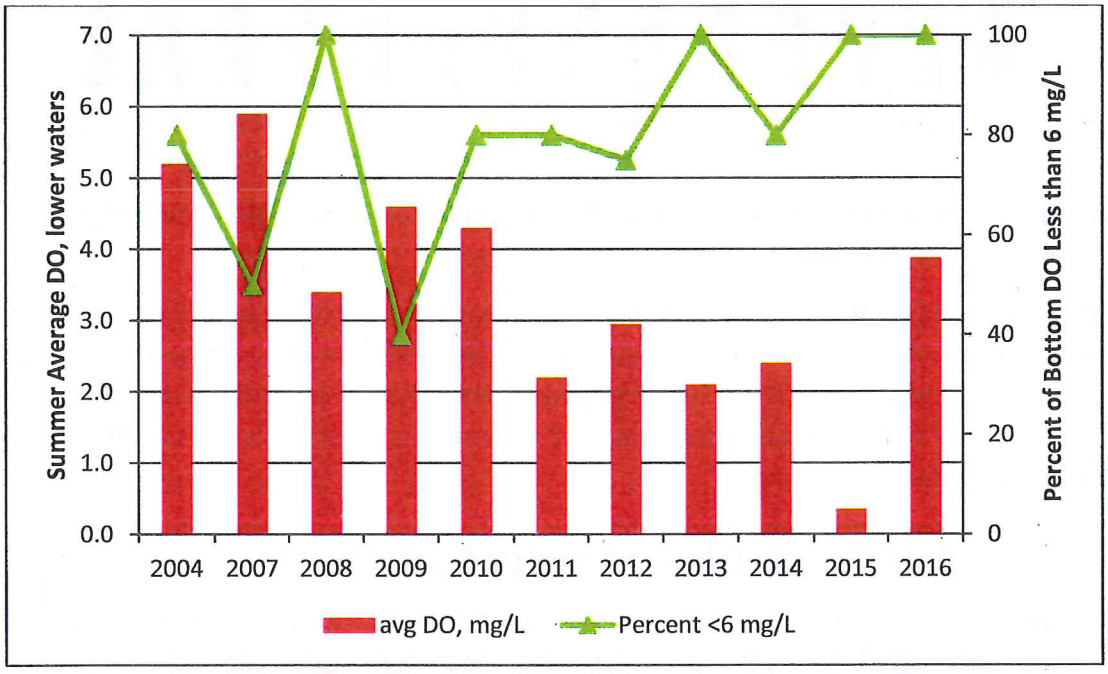


Figure 5. Average dissolved oxygen (DO) of Salt Pond station WMO38 lower waters, plus percent of observations below 6 mg/L, ambient water quality standard for aquatic life protection

Results of annual water quality monitoring of Eastham's Salt Pond indicate that the pond is enriched with nutrients (eutrophic). The concentrations of nitrogen (limiting nutrient for algal production) in Salt Pond are well above the threshold for a healthy estuarine ecosystem (0.45 mg/L total N).

As a consequence of the elevated N concentrations, Salt Pond supports abundant algal growth, with periodic bloom conditions. Blooms of red tide, *Alexandrium fundyense,* the alga linked to paralytic shellfish poisoning (PSP) have become a regular occurrence. According to a 2008 report by biologist Don Anderson of Woods Hole Oceanographic Institute, PSP occurred in Salt Pond in eight of 17 years (48 percent) from 1975 to 1991 and in 16 of the next 17 years (94 percent).[i1] The risk of harm from red tide

[1] http://seagrant.mit.edu/2ifbysea/issues/fall08/blooms.html

may extend beyond Salt Pond if the algal cells are transported to other areas within the Nauset estuary system.

Algal blooms reduce the water clarity of Salt Pond, which in turn reduces habitat available for eelgrass as less light reaches the sediment surface. As algal cells die and settle to the bottom of the pond, decomposition of the organic material depletes the supply of dissolved oxygen which further diminishes habitat quality. Under current conditions, the deep waters of Salt Pond routinely violate the state's ambient water quality standard for dissolved oxygen, in place to protect aquatic life.

The 2003 – 2016 SMAST monitoring data for Salt Pond indicate declining trends in water quality conditions. Nitrogen concentrations are increasing, along with algal pigment levels and bloom intensity. Water clarity has decreased. Deep water dissolved oxygen levels are also in decline. Without effective controls on external nitrogen loading, water quality conditions will not improve and are likely to continue to decline, with an increasing risk of harmful algal blooms.

The long-term water quality data sets have been extremely valuable for assessing current conditions and trends. Continued coordination with the Town of Orleans to ensure that the volunteer monitoring efforts are supported will be part of the overall adaptive management approach to assessing the health of the Nauset Harbor estuary system.