

This is a black and white aerial photograph showing a coastal region. On the left side, a large, dark body of water, possibly a bay or a large lake, dominates the frame. The shoreline is irregular, with several small inlets and peninsulas. To the right of the water, the land is divided into various sections. There are areas that appear to be agricultural fields, some with distinct rectangular patterns. Other areas are more densely packed with structures, likely residential or industrial buildings, interspersed with trees. A network of roads or paths is visible, connecting different parts of the land. The overall scene depicts a developed coastal area with a mix of natural and man-made features.

June 1943

Managing Bacteria and Nutrient Pollution: Things you can do

Joe Costa

Buzzards Bay NEP Executive Director, *Retired*

Pocasset Water Quality Coalition Annual Meeting

Saturday August 15, 2026

Take Home Messages

- 1) A well-organized local environmental non-profit can accomplish many things in a MA town (*power at town meeting, citizen petition articles, social networking*).
- 2) Your choices and actions as individuals can do much to protect the environment. Take the time to educate yourself on environmental issues and look for opportunities.
- 3) Bacteria and nitrogen pollution have different causes and effects, but there are many common sources and common solutions. There are many positive things happening already from past action.
- 4) Achieving limits and water quality goals in a “Total Maximum Daily Load” pollution permit is a complex process and can take many years to implement a strategy, but there are many actions you can take for more immediate benefits.

About Me

- New Bedford Sea Lab Oceanography School; *Why no eelgrass?*
- BUMP PhD 1988 Thesis: Distribution, Production, and Historical Changes in Eelgrass Distribution in Buzzards Bay. *Impact of nitrogen pollution, Buttermilk Bay.*
- Post Doc: Watershed nitrogen loading impacts to Cape Cod embayments
- Director of Buzzards Bay NEP: Managing NPS pollution with special focus on stormwater and nitrogen management and state adoption of TMDLs, added to 1992 Buzzards Bay CCMP.
- DEP TMDL grant to the town.



Bacteria vs Nitrogen Pollution in Coastal Waters

Pollution Type:	Bacteria Pollution	Nitrogen Pollution
Primary Source/Pathway:	stormwater discharges (a conveyance of animal wastes)	wastewater discharges (septic systems or wastewater facilities)
Secondary sources:	wastewater treatment failures, pet, wildlife and waterfowl feces, agricultural runoff	fertilizer (lawns and ag), stormwater discharges, agriculture
First order impacts:	shellfish resource areas and swimming beaches closed because of health risks	loss of eelgrass habitat, loss of fish and shellfish habitat
Management Approaches:	source reduction, reducing flows from impervious to surfacewaters (infiltration)	advanced wastewater treatment, stormwater management, source reduction



Manage Pollution at the Watershed Level

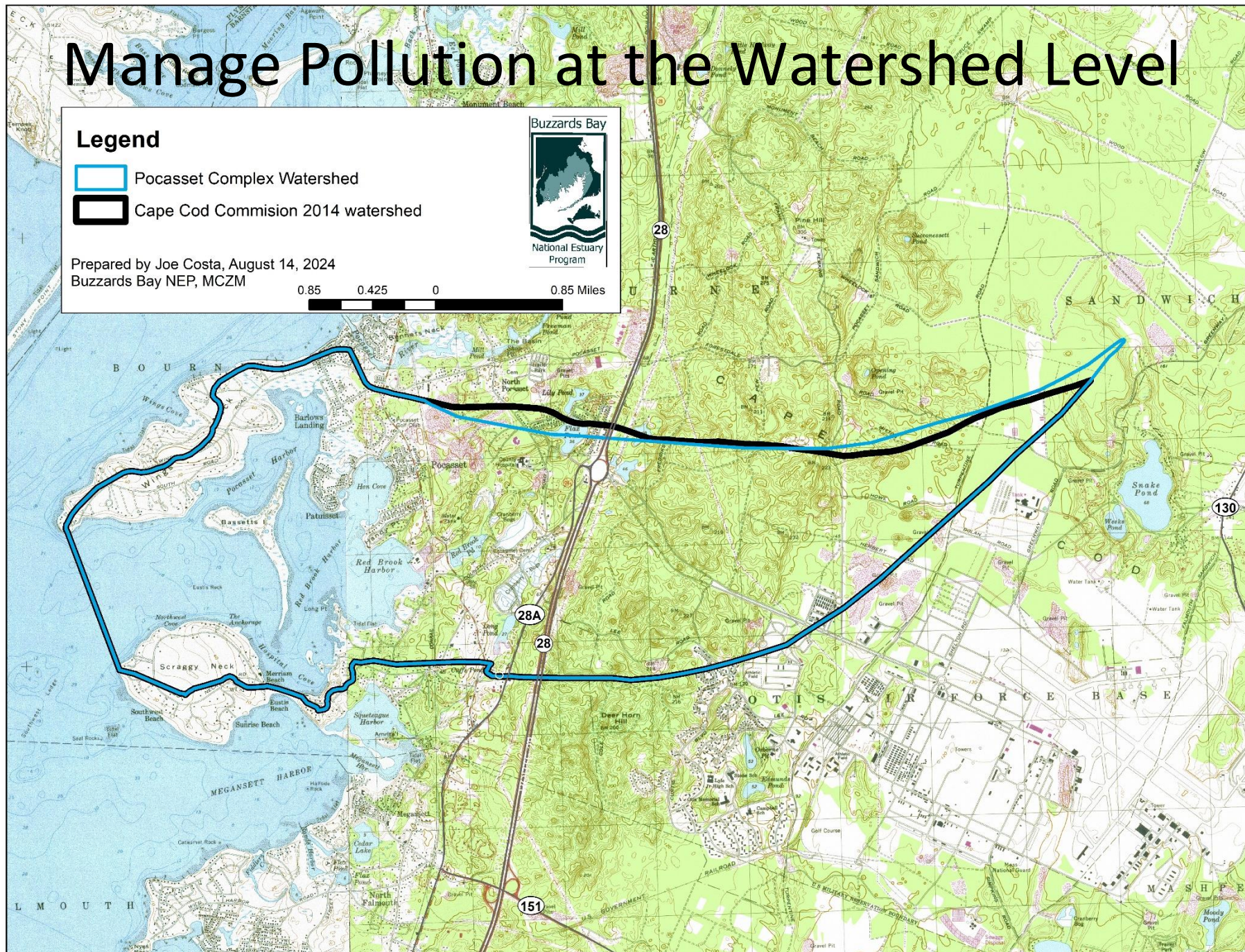
Legend

-  Pocasset Complex Watershed
-  Cape Cod Commision 2014 watershed



Prepared by Joe Costa, August 14, 2024
Buzzards Bay NEP, MCZM

0.85 0.425 0 0.85 Miles

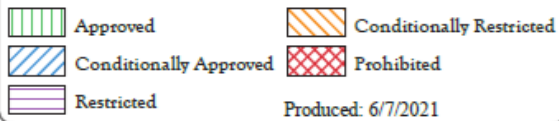


Shellfish bed closures

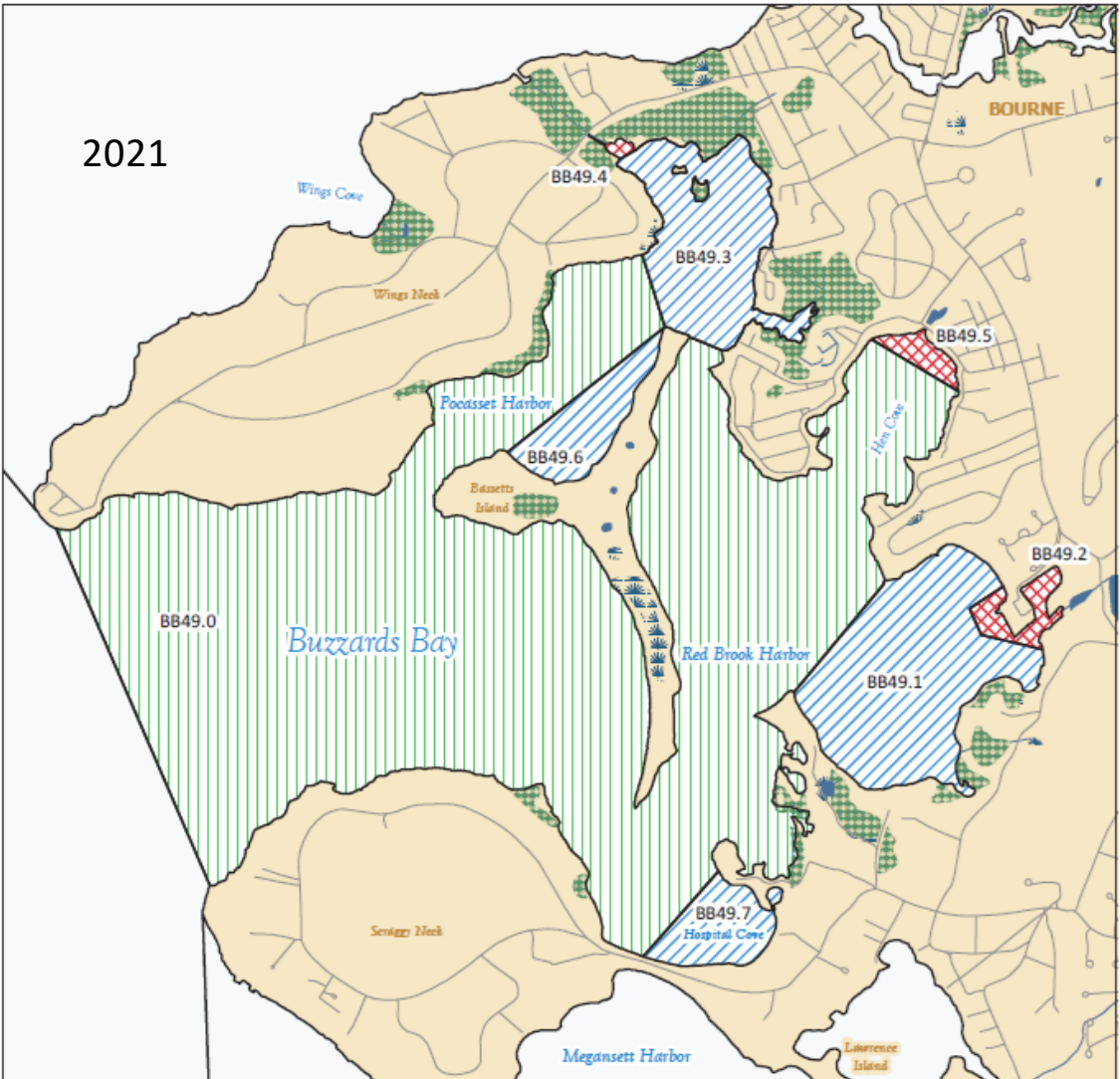


Division of Marine Fisheries
SHELLFISH SANITATION AND MANAGEMENT

Growing Area Code: BB49
Area Name: POCASSET AND RED BROOK HARBORS
Area Town(s): Bourne

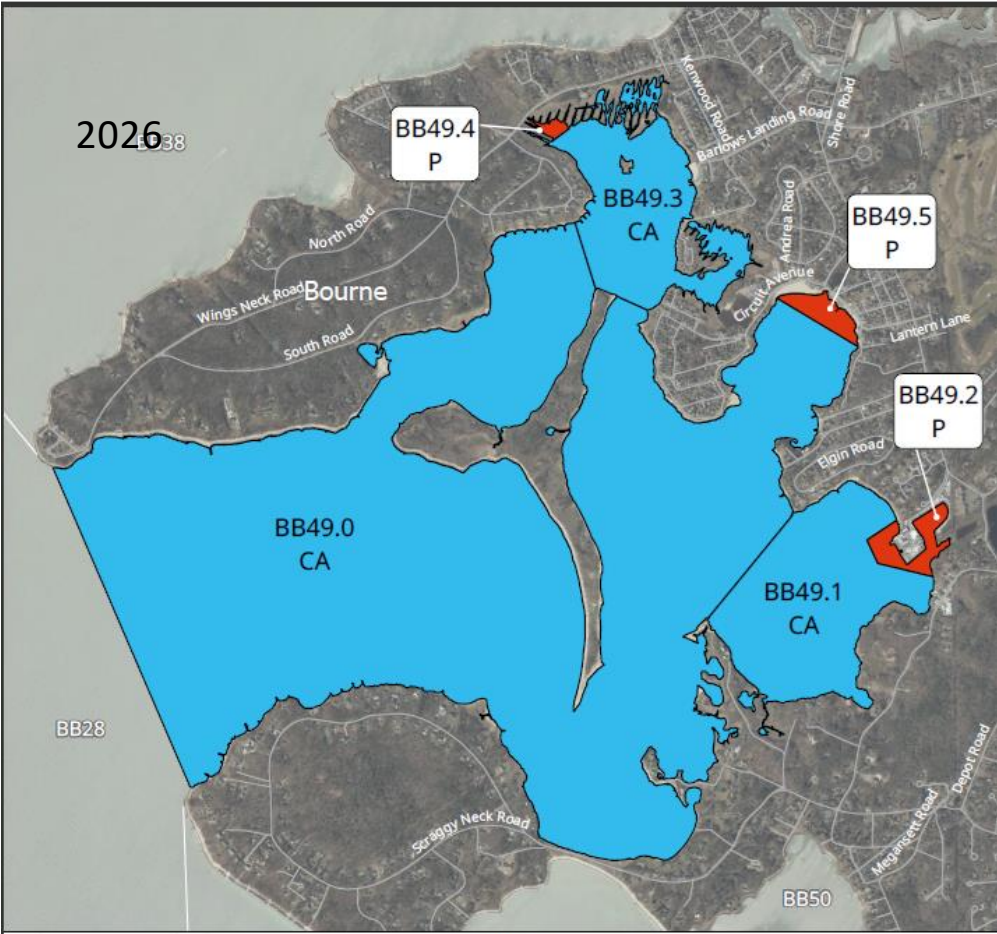


2021



Shellfish Growing Area BB49
Pocasset and Red Brook Harbors
Within the municipality of Bourne.

Massachusetts
Division of Marine Fisheries
Shellfish Sanitation and Management



2015 Buttermilk Way Success



Figure 2. Location of stormwater outfall pipe to Fisherman's Cove in Bourne, Massachusetts.



Figure 3. This stormwater outfall pipe no longer discharges to Fisherman's Cove after construction of stormwater BMPs.

Infiltrating stormwater through rain gardens, and even sandy soils, removes both bacteria and nutrients

stormwater.buzzardsbay.org



Outfall Pipes

- Complete, Revisit 2030
- Excluded, Update as Needed
- MORE IDDE
- Consider Treatment Options
- None Required
- Other

InletPoints

- Catchbasin
- Pipe Inlet
- Roof Drain
- Overflow Inlet

Stormwater Treatment Points



MS4 Interconnections



Manholes



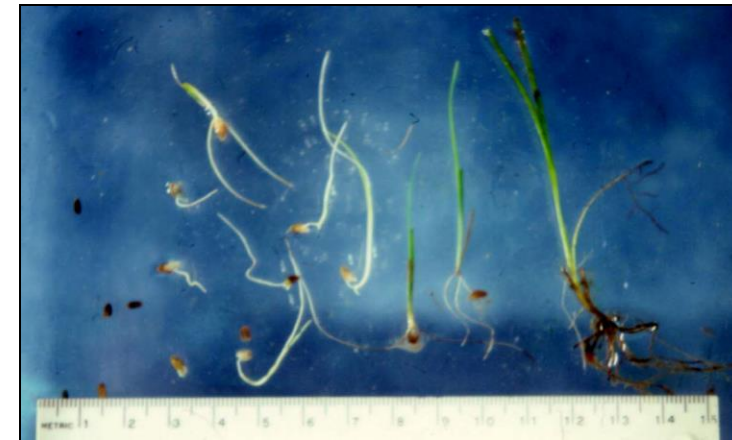
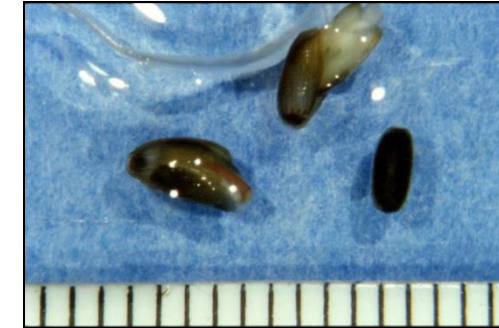
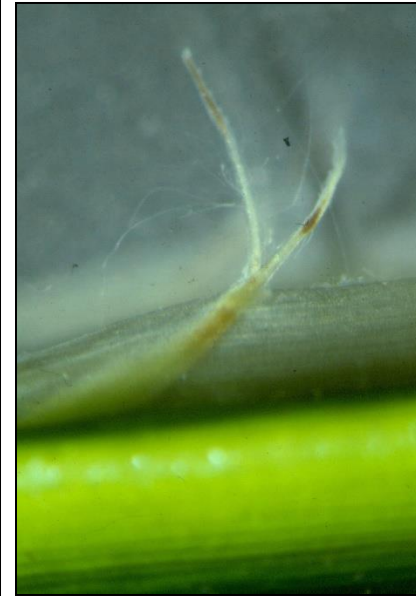
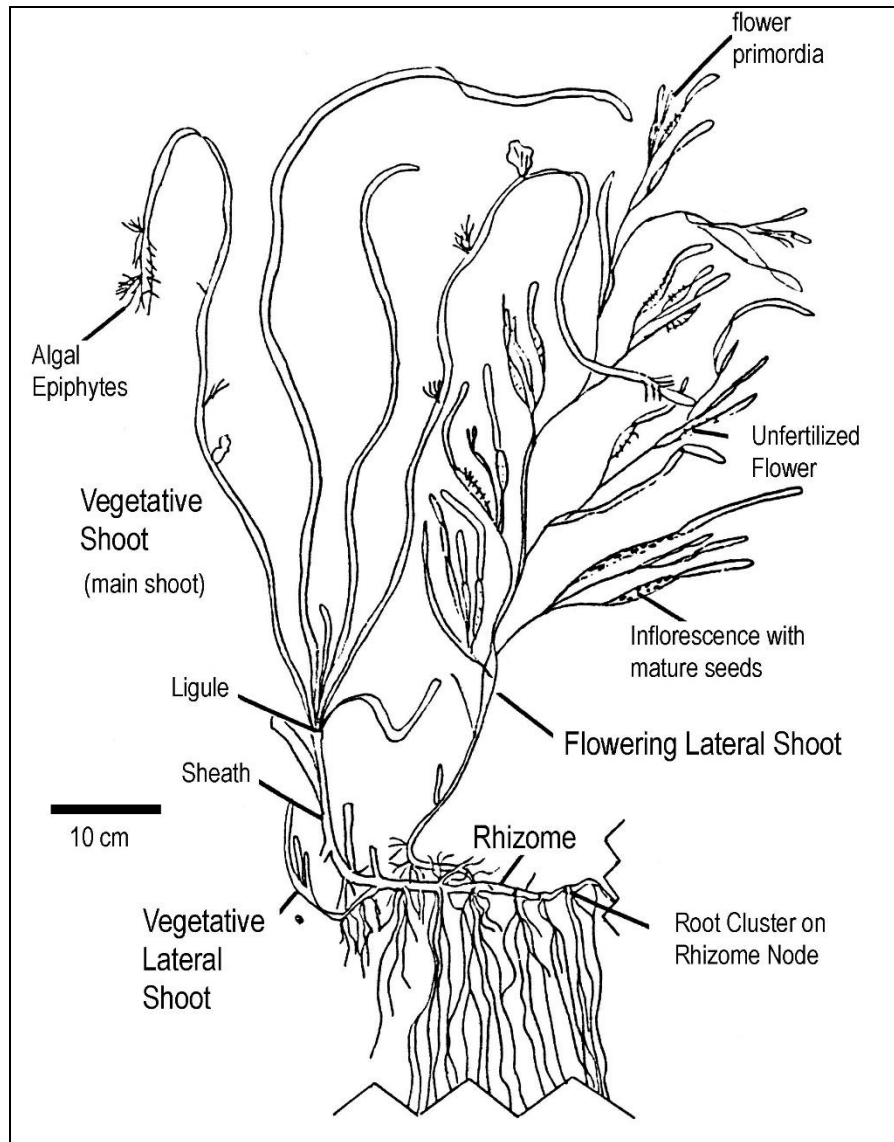
WaterPathways



Spruce Drive Enterococcus = 25,000!

Eelgrass Biology:

It is a flowering plant with pollen and seeds



It is a perennial or functional annual.

Eelgrass grows in embayments and the outer coast

Grows below MLLW down to 15 feet or more on the outer coast if water transparency is excellent.
Water transparency and water quality are fundamental drivers



Shallow bed



Deep Bed

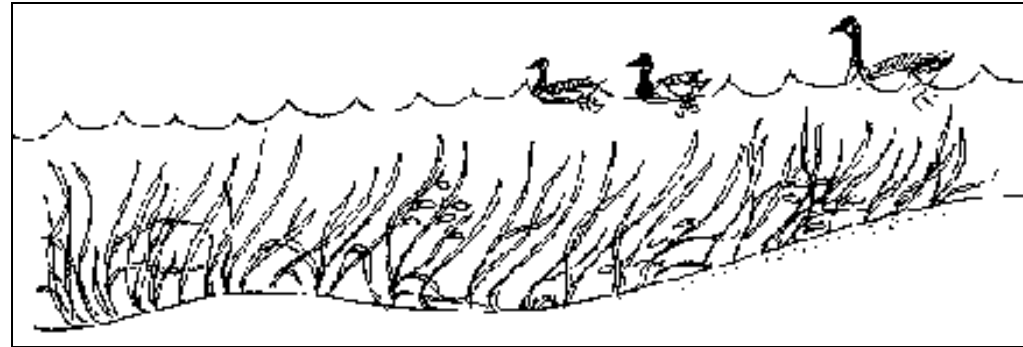
Benefits of Eelgrass

Eelgrass beds are a refuge, feeding ground, or habitat to many animals.

Examples: settlement of scallop spat, protection of molting blue crabs

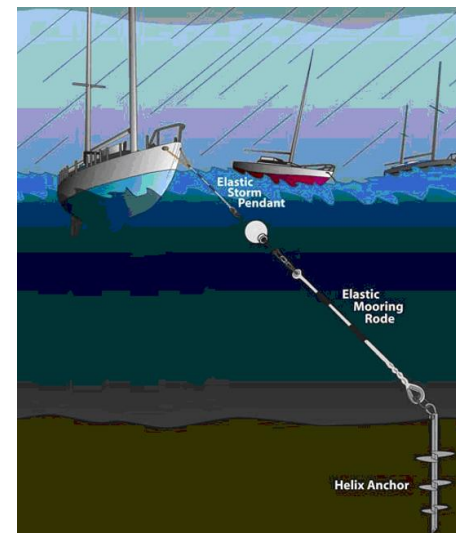
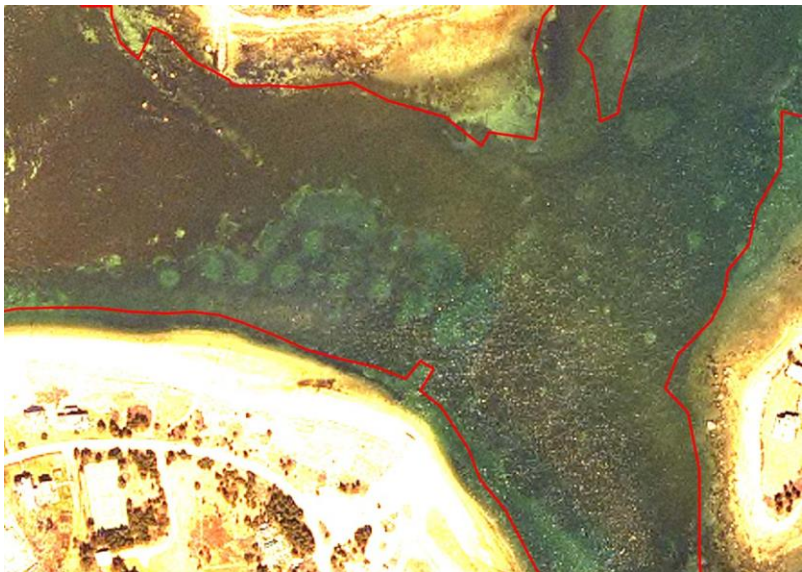


Eelgrass Beds help stabilize the bottom; may slow erosion



Causes of Eelgrass Loss

Dock construction, mooring chains (physical and water quality), shellfishing (especially jet clamming)

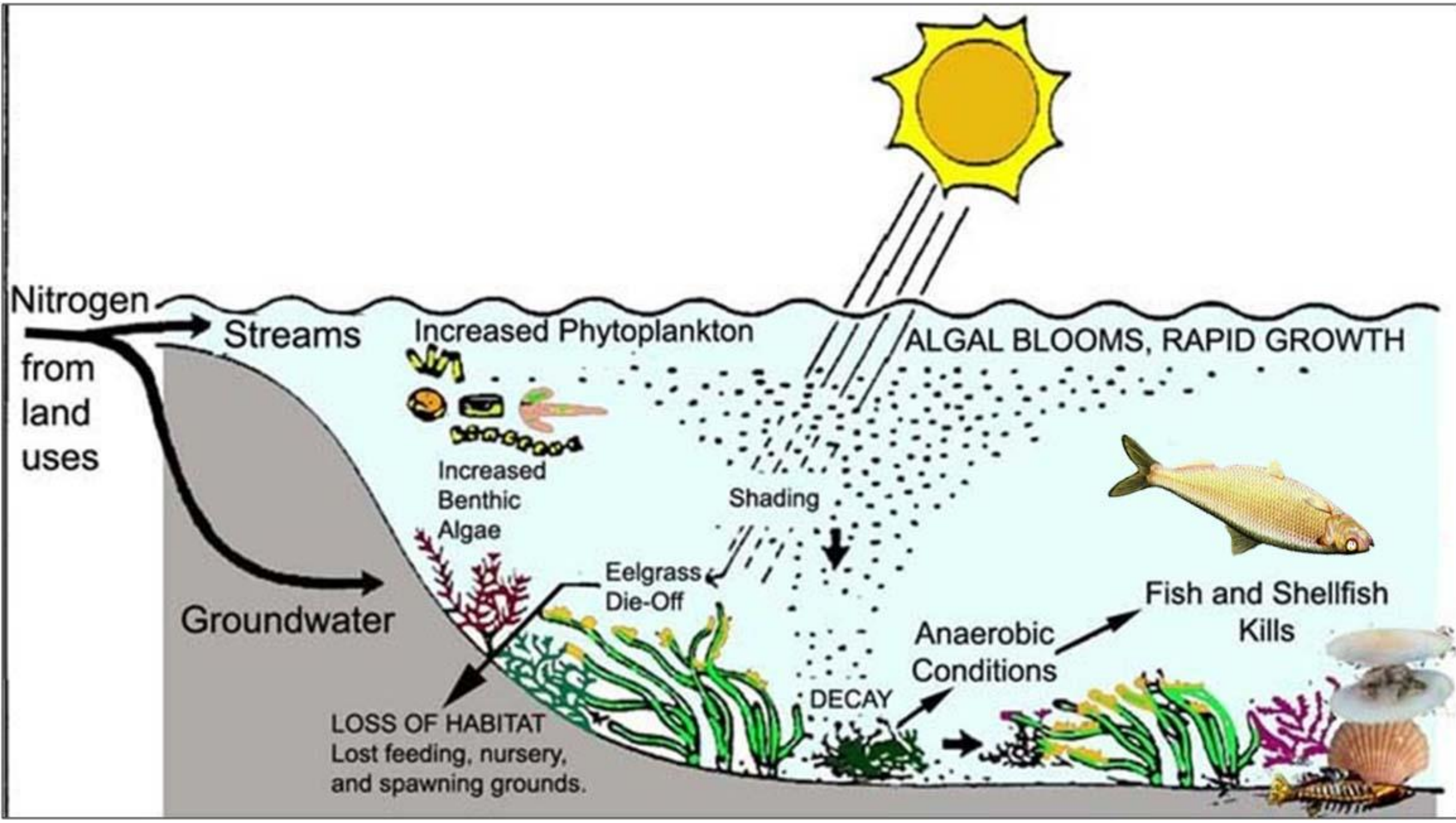


**We promoted
Conservation Moorings:**
elastic rodes
and
helical anchors

The Biggest Problem: Nitrogen Pollution: It destroys eelgrass and shellfish beds



Eelgrass bed in area with good water quality (top left) compared to eutrophic sites.



Fish Kills in summer during the right conditions

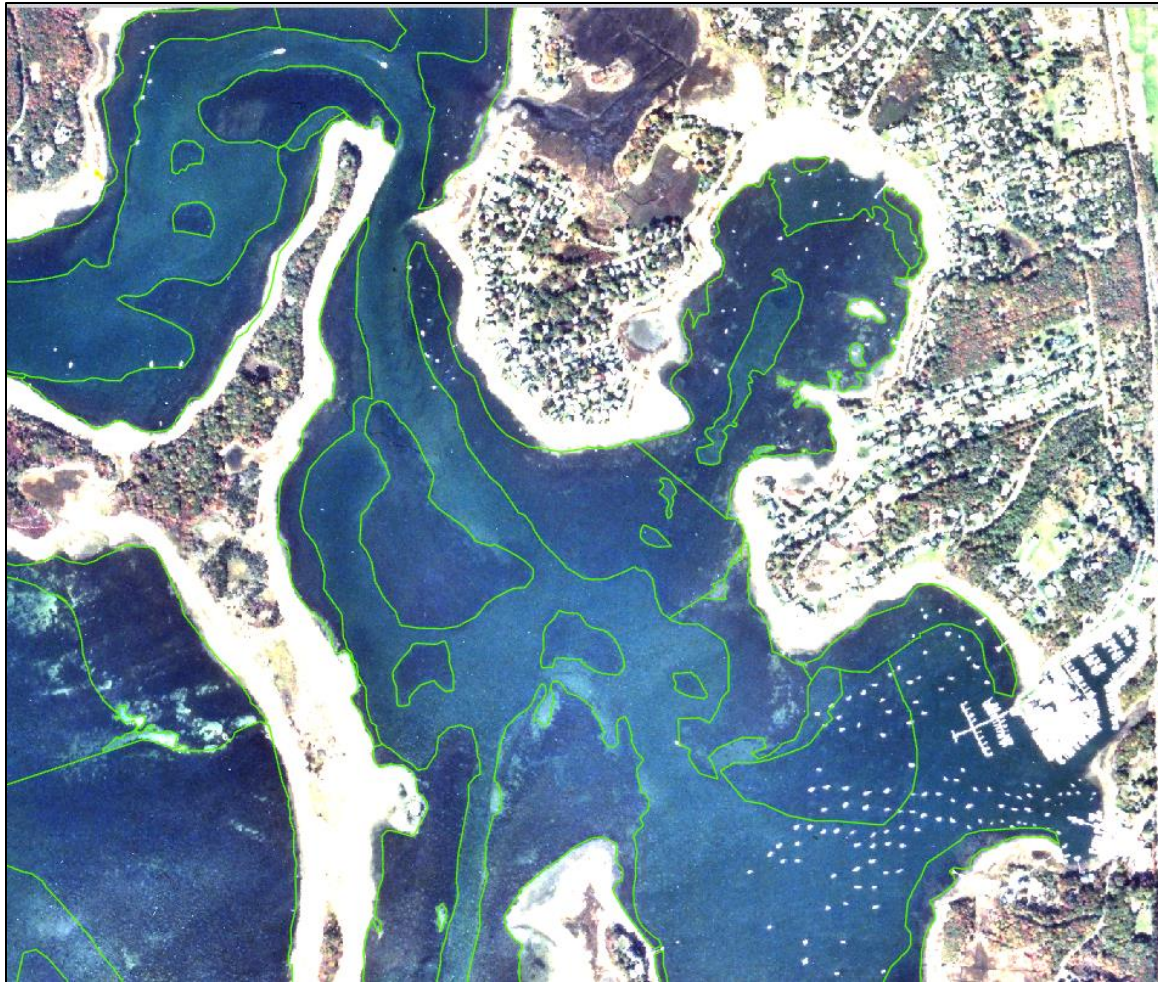


The immense Codium wrack accumulation on Little Harbor beach Wareham disappeared after upgrades to the Wareham WWTF in the 2000s



Dramatic loss of eelgrass in Pocasset during the 1990s

BBNEP1981



DEP 2020

(temporary reappearance of eelgrass in Red Brook Harbor)



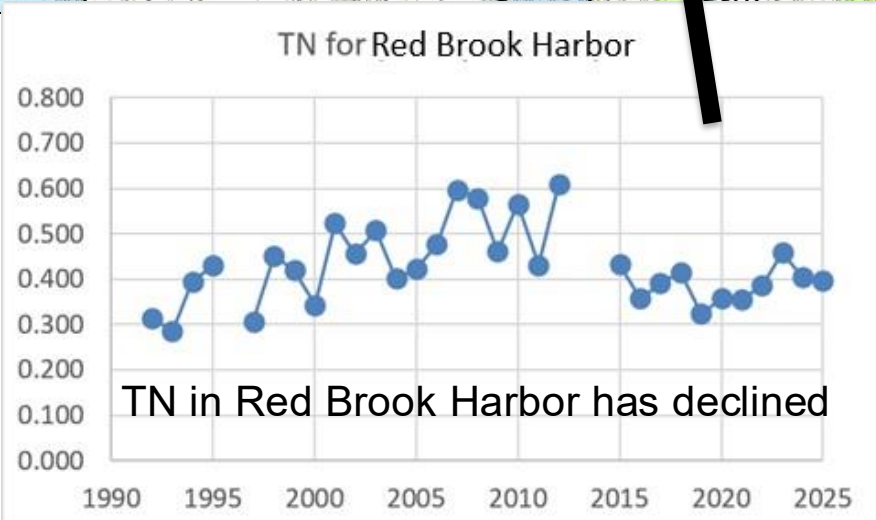
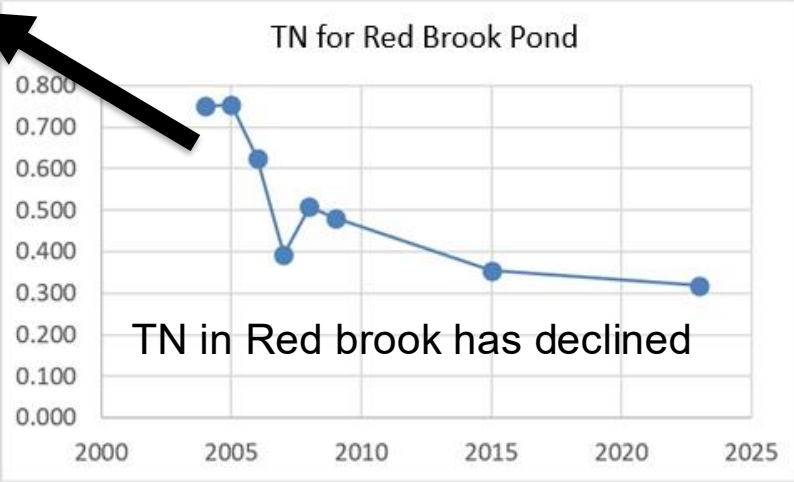
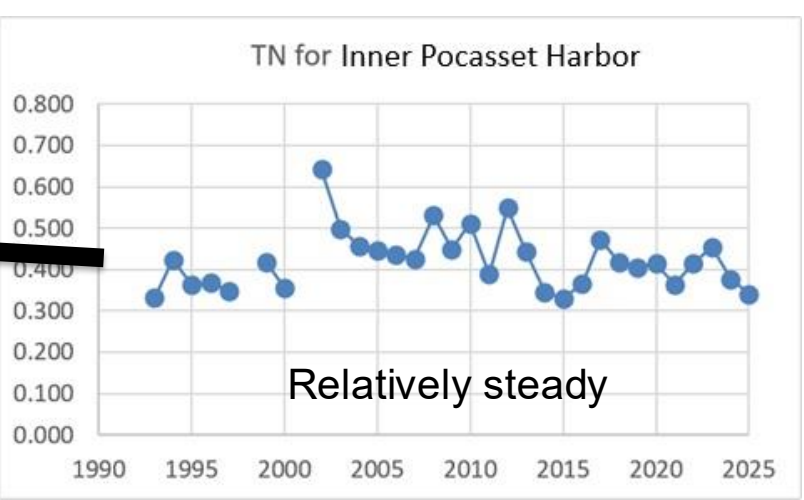
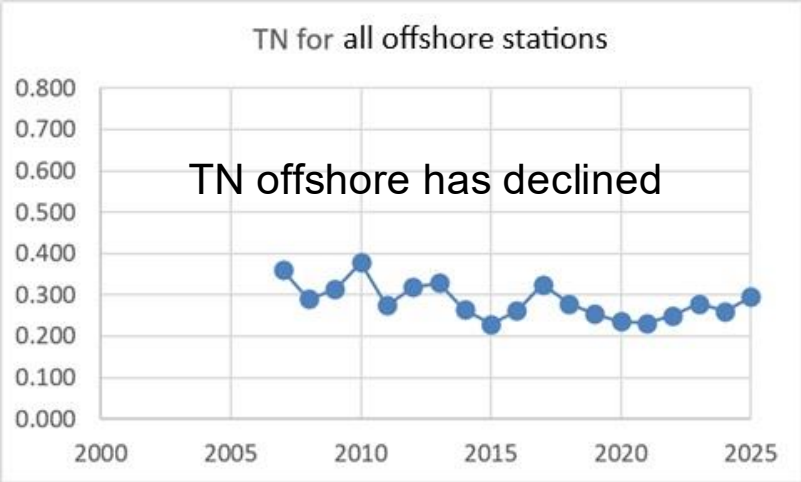
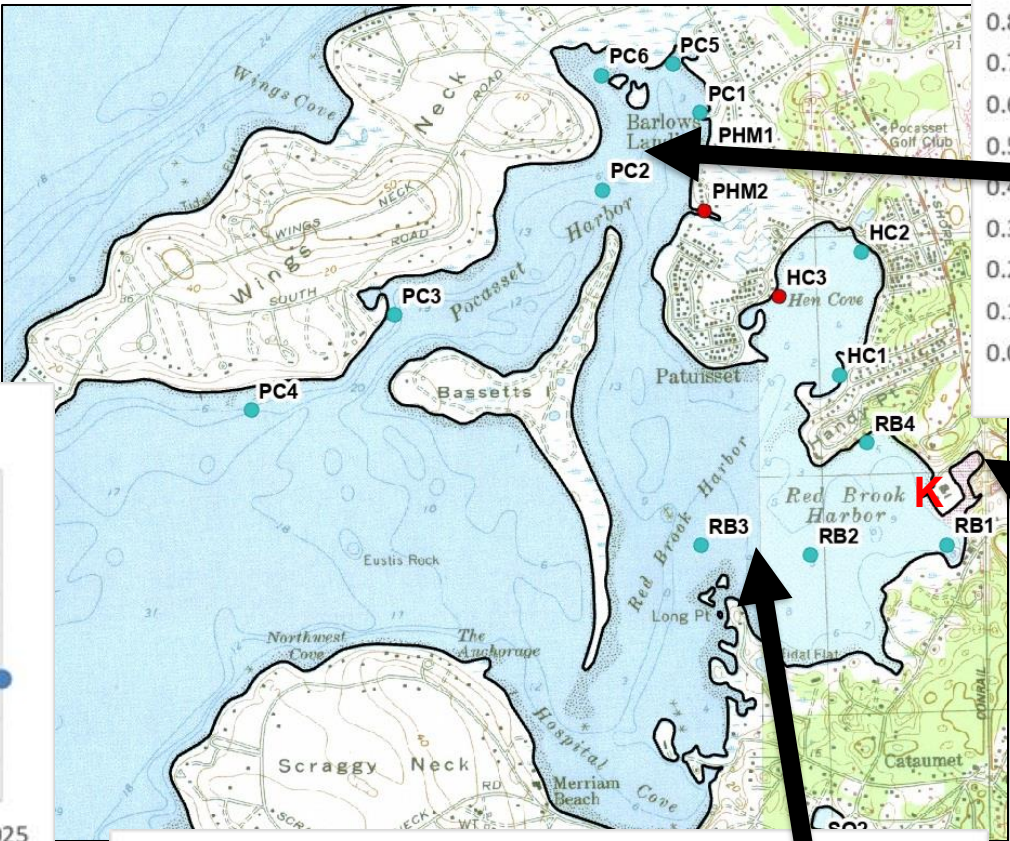
2020 eelgrass reappearance: signs for hope

Water quality has improved recently in Red Brook Harbor. Potential contributing causes include:

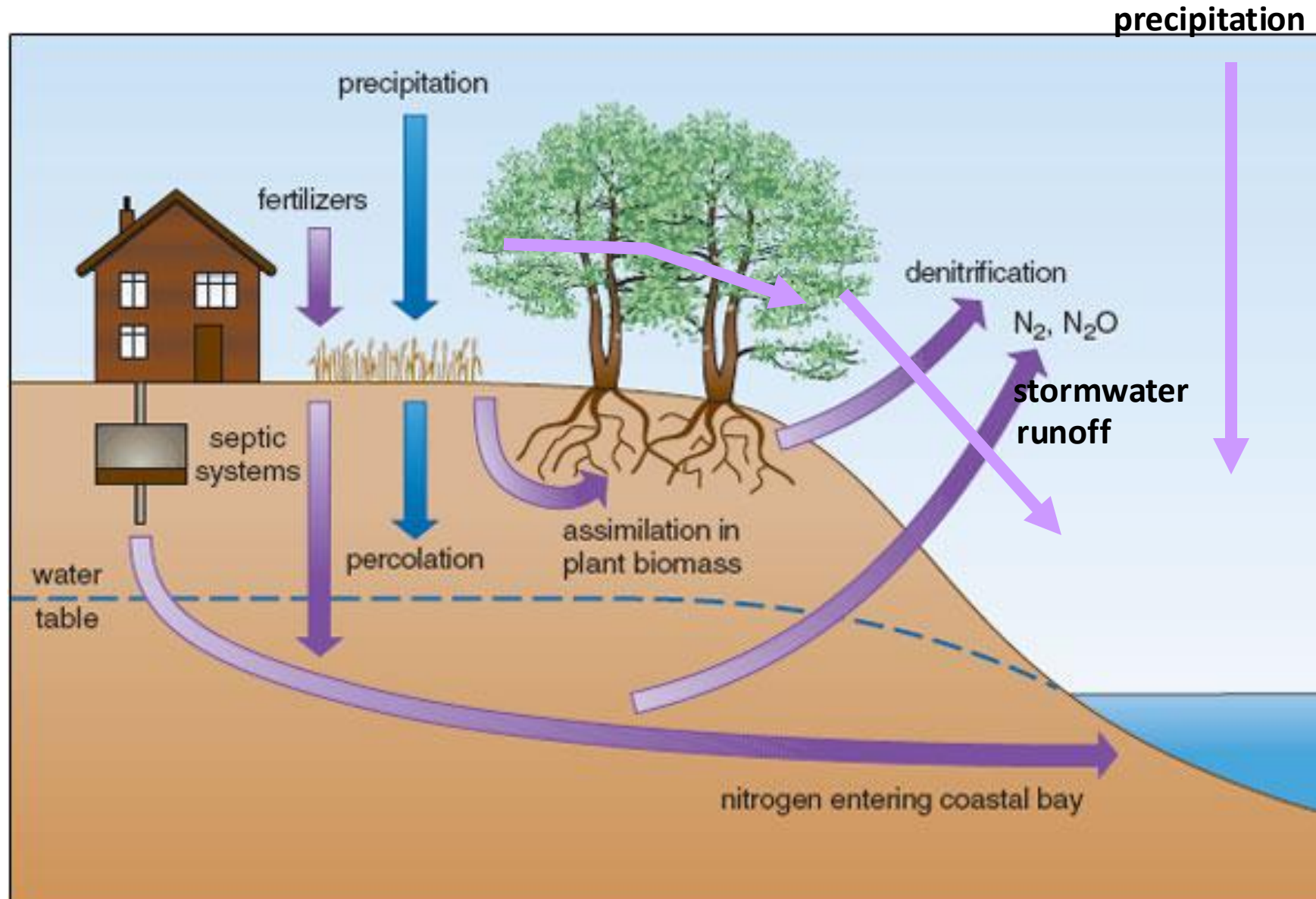
- Drought summers have better water quality, 2020 was a notable drought summers
- Clean Air Act has been reducing N for past few decades (atmospheric deposition to land and water)
- TN in central Buzzards Bay has been declining because of WWTF upgrades and reductions in atmospheric loading. These concentrations define the boundary concentration in the model. Reductions in offshore TN making it easier to achieve water quality improvements in embayments.
- The Kingman WWTF N-reducing facility upgrade went online in the Fall of 2016, reducing N to RBH
- Changes in Bog Production area or practices (separation of streams in “flow through” bogs?) have reduced loadings to Red Brook.



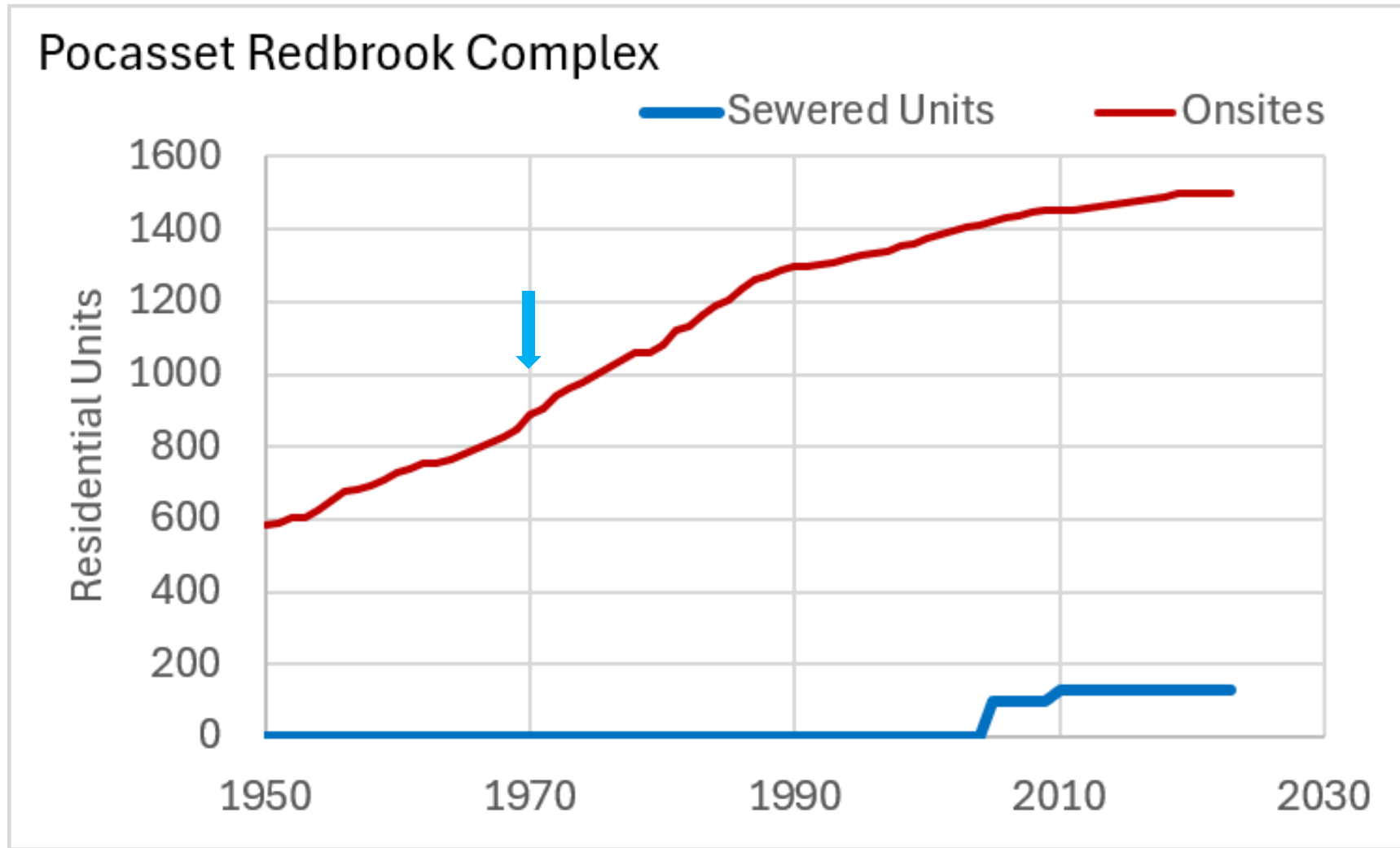
Water quality trends have been favorable



TMDL models add nitrogen loads to water circulation models

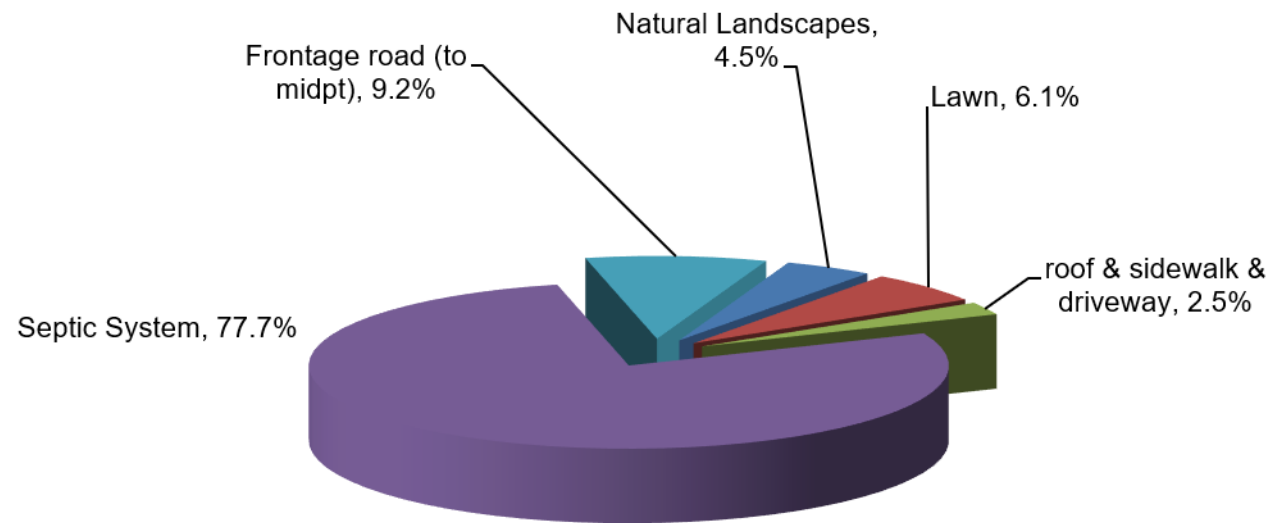


Number of wastewater units over time



Loading from residential parcels

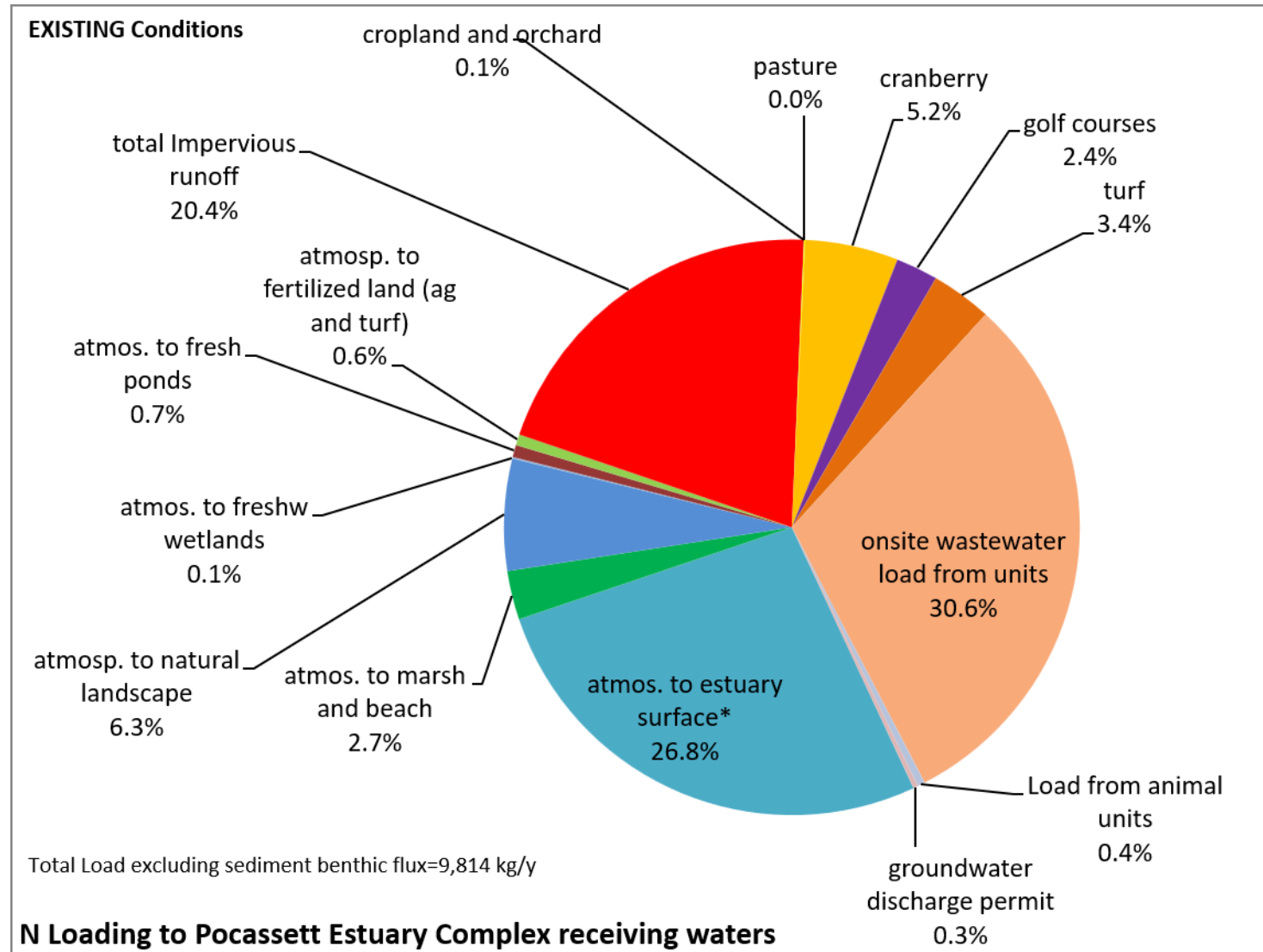
1-acre Residential Lot Near Coast BBC-BBNEP model for Pocasset Estuary Complex



Total annual load = 9.11 lbs/yr

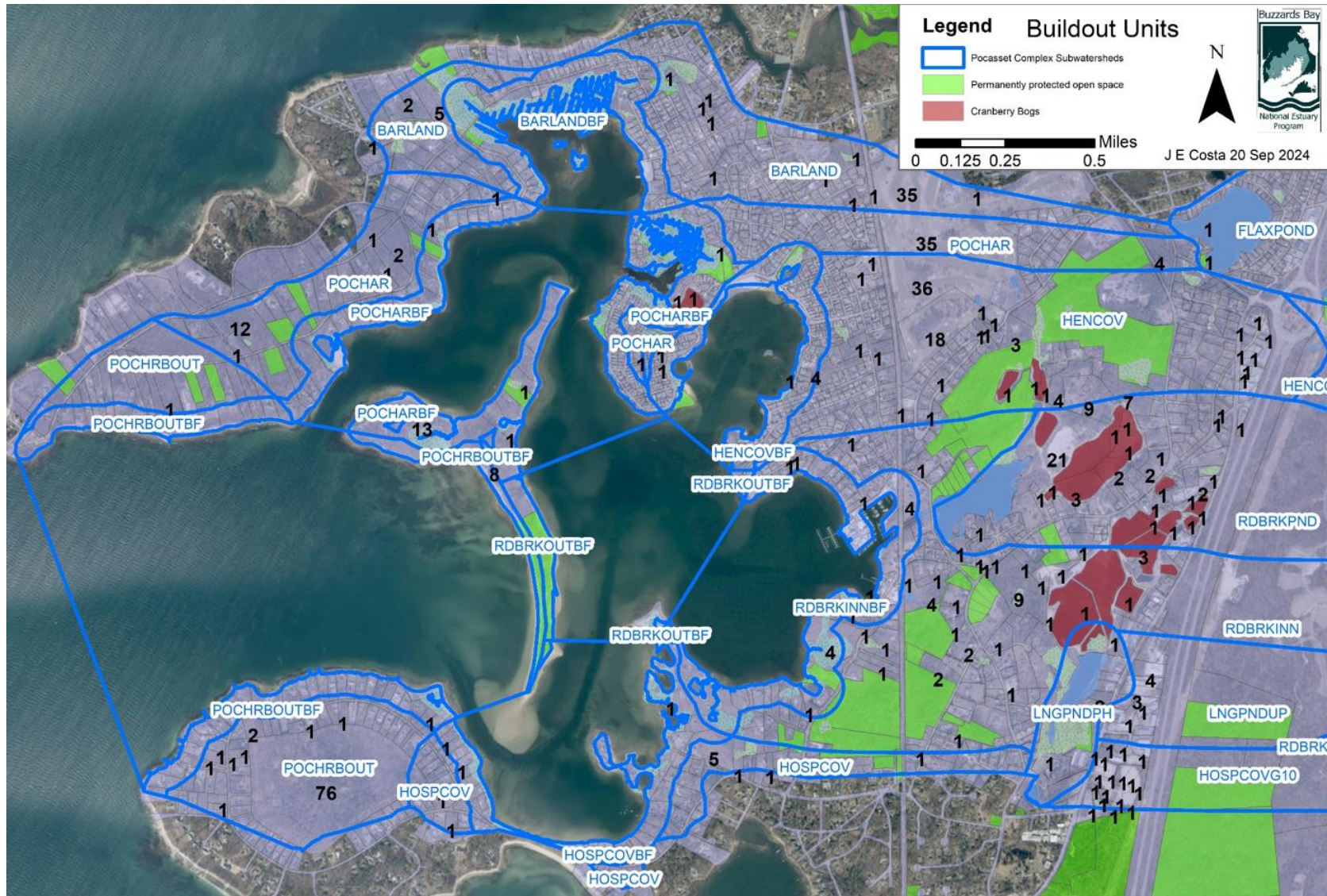
1 acre lot near coast, 1.7 per. occupancy, 5000 sq feet lawn, 1500 sq ft roof and driveway.

Watershed & Atmospheric Loading Pocasset Estuary Complex



Buildout Analysis

Subdivision buildout (483 units):



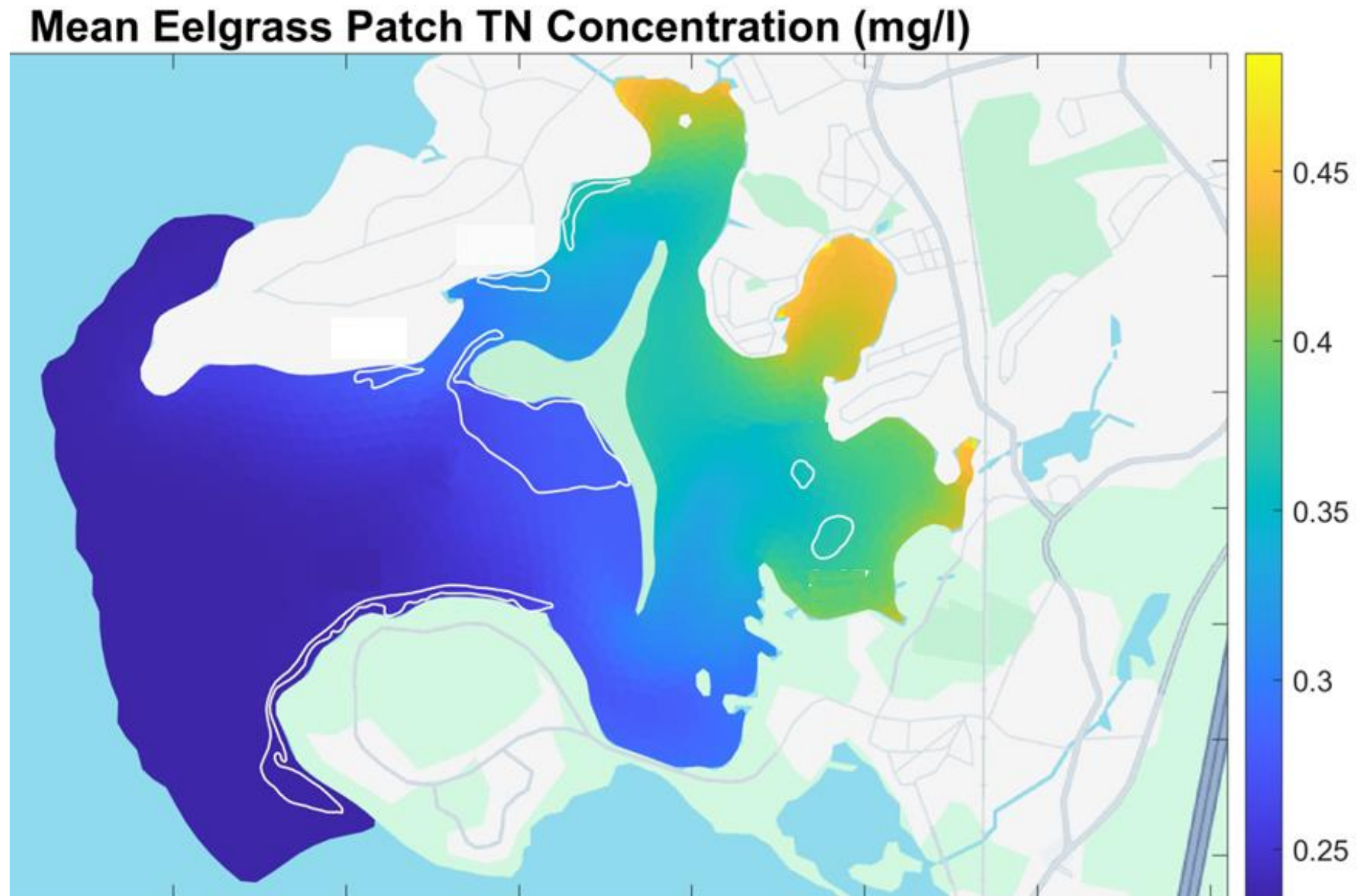
Accessory Dwelling Unit state law went into effect in 2025.

Any landowner can build an ADU
"by right."

**Potential ADUs
(25% in 25yr):
425 units**

Boards of Health can adopt regulations to limit ADUs in nitrogen sensitive areas.

Combining watershed loading with the water quality hydrodynamic model



Keep taking action, both as an organization and individuals.

There are billions of us on the planet. Your cumulative actions and purchase decisions for everything you buy makes a difference.

Little things help.

Stop rainwater from leaving your property. Redirect downspouts to infiltration

You do not need a lush green monoculture lawn. These require lots of water, fertilizer, pesticides, and herbicides. Replace some of your lawn with a pollinator garden.

Increase use of native plants, eliminate the worst of the nuisance invasives

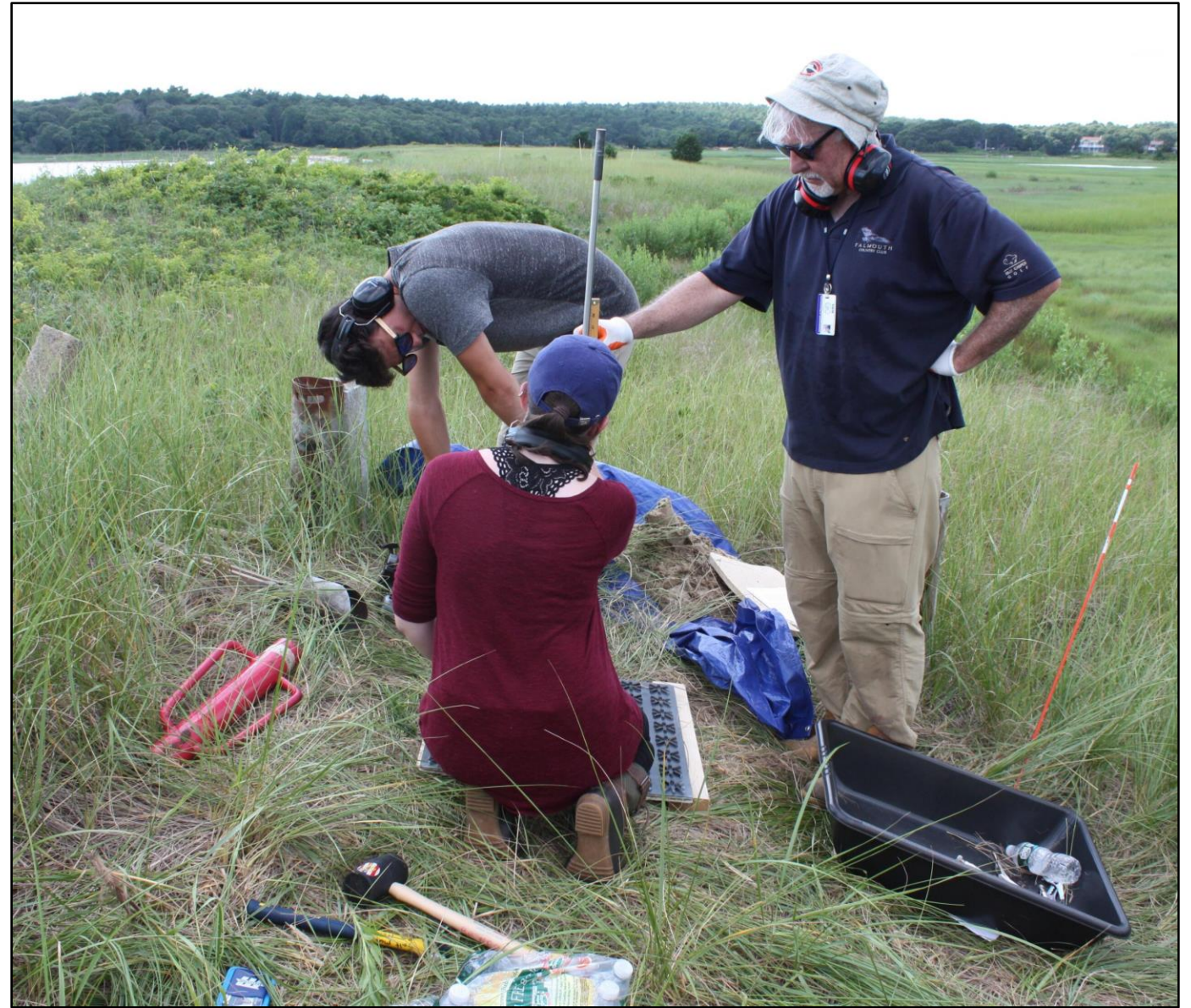
Plant rain gardens, pollinator gardens, water features.

Plug-in solar / balcony solar will soon be legal in Massachusetts

Support local action to better the environment, participate in town government, volunteer for a board



END



Installing an elevation benchmark in Wareham, MA (2019).