

Shubael Pond Diagnostic Nutrient Assessment and Management Plan

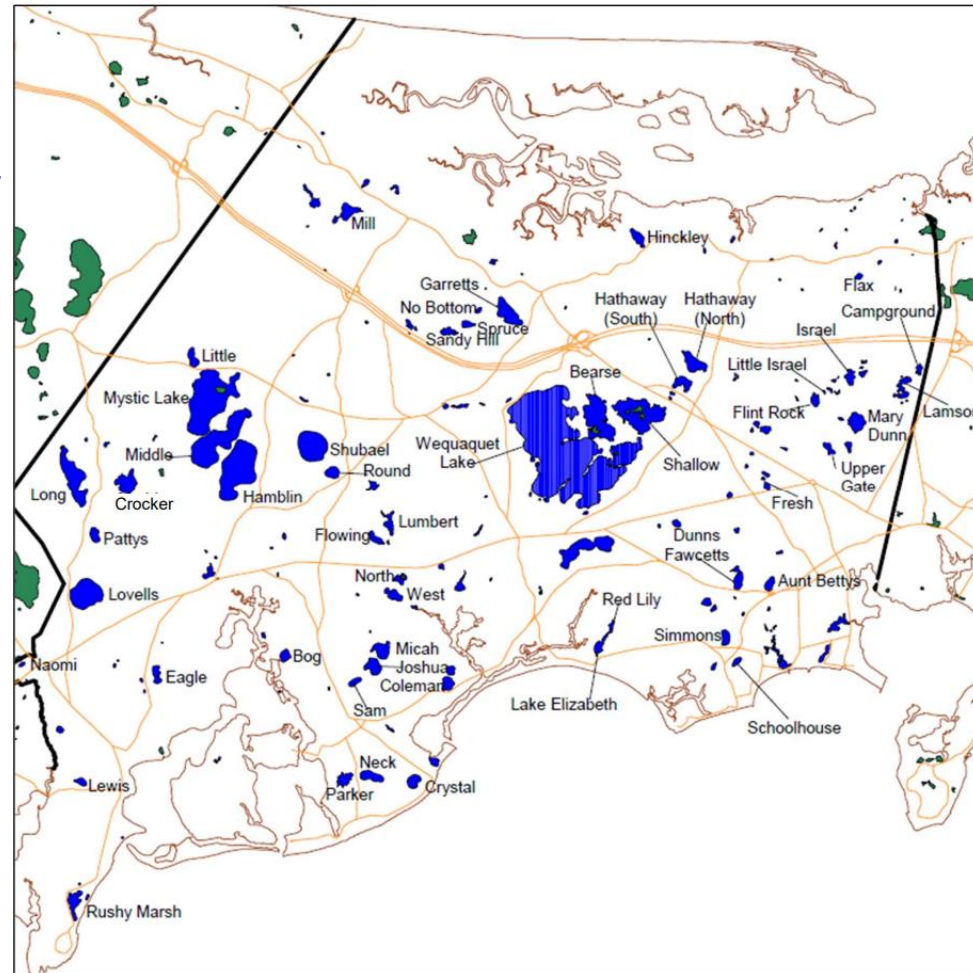
Department of Public Works
August 24, 2022



Barnstable Ponds and Lakes

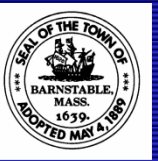
Overview

- ~180 ponds in Barnstable
- 25 ponds are designated as Great Ponds
 - Most of these are impaired to some degree
- Pond and Lake Management Plan Program was initiated in 2020
- Ponds were prioritized based on available data
 - Shubael Pond was at the top of that list.

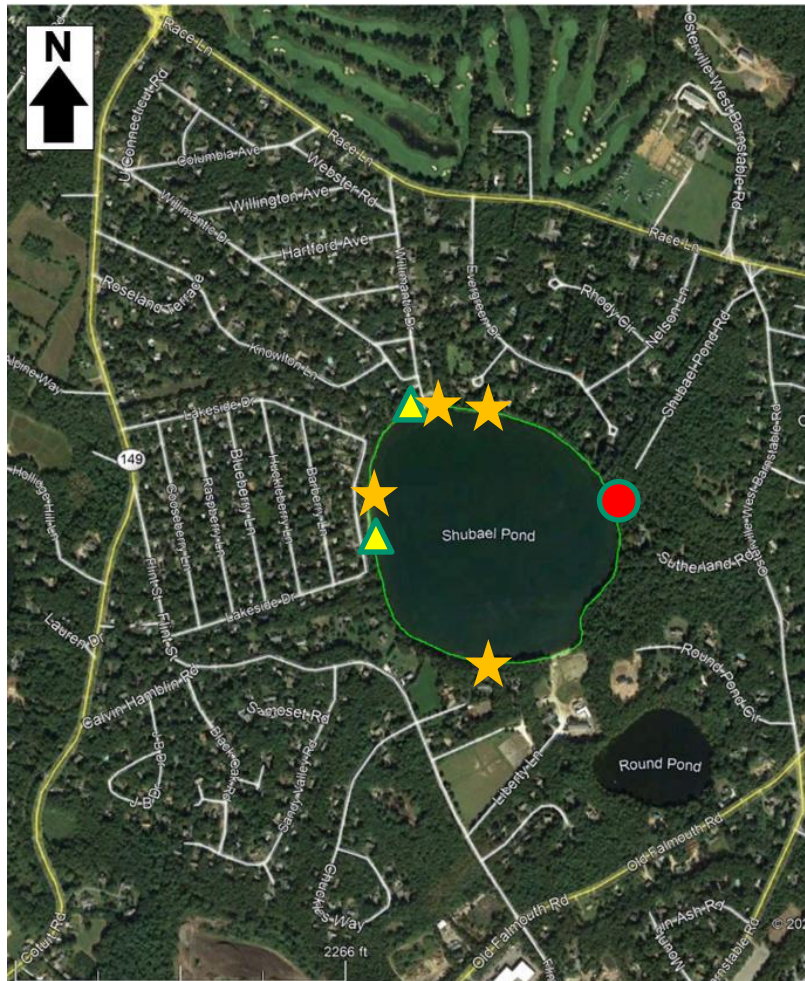




Shubael Pond Overview



- *General*



- **Size:** ~55-acres (Great Pond)
- **Depth:** Max depth of ~13-meters
- **Trout Stocked:** spring and fall
- **Boat Ramps:** 
 - Willimantic Drive
 - Lakeside Drive
- **Beaches:** 
 - Willimantic Beach
 - Sand Shores Beach
 - Fair Acres Beach
 - Evergreen Homeowners Association
- **Town Way to Water:** 
 - Shubael Pond Road



Cyanobacteria in Shubael Pond



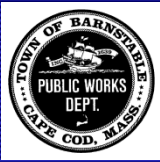
- ***Cyanobacteria Monitoring conducted by the Town Health Division revealed no blooms prior to 2018***
- ***Cyanobacteria Warnings were issued in:***
 - 2018
 - 2019
 - 2020



October 3, 2018



July 19, 2020



DPW Approach

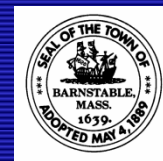


- *Systematic and science based approach to target effective management*
- *Initiated a study in 2020:*
 - *Year 1 - Nutrient Diagnostic Assessment*
 - *DO and Temperature*
 - *Nitrogen, phosphorus, chlorophyll-a pigments, pH, alkalinity*
 - *Phytoplankton composition (including cyanobacteria)*
 - *Nutrient regeneration from the internal sediments*
 - *Septic System assessment*
 - *Stormwater monitoring*
 - *Runoff from surrounding watershed*
 - *Year 2 - Develop a Management Plan*
 - *Set nutrient reduction targets*
 - *Evaluate management options to meet those targets*

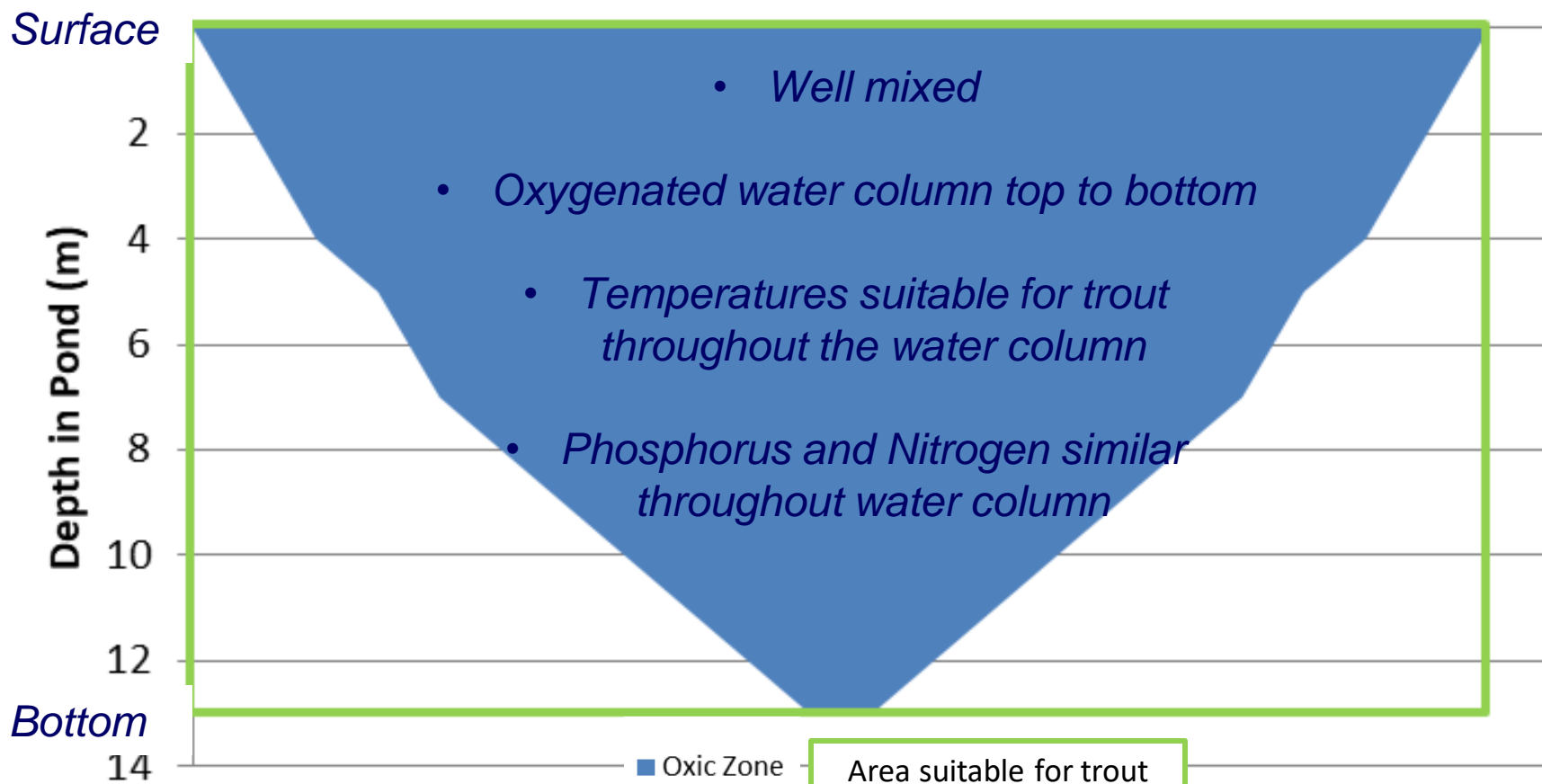




Shubael Pond Dissolved Oxygen and Temperature Conditions



Shubael Pond Early May

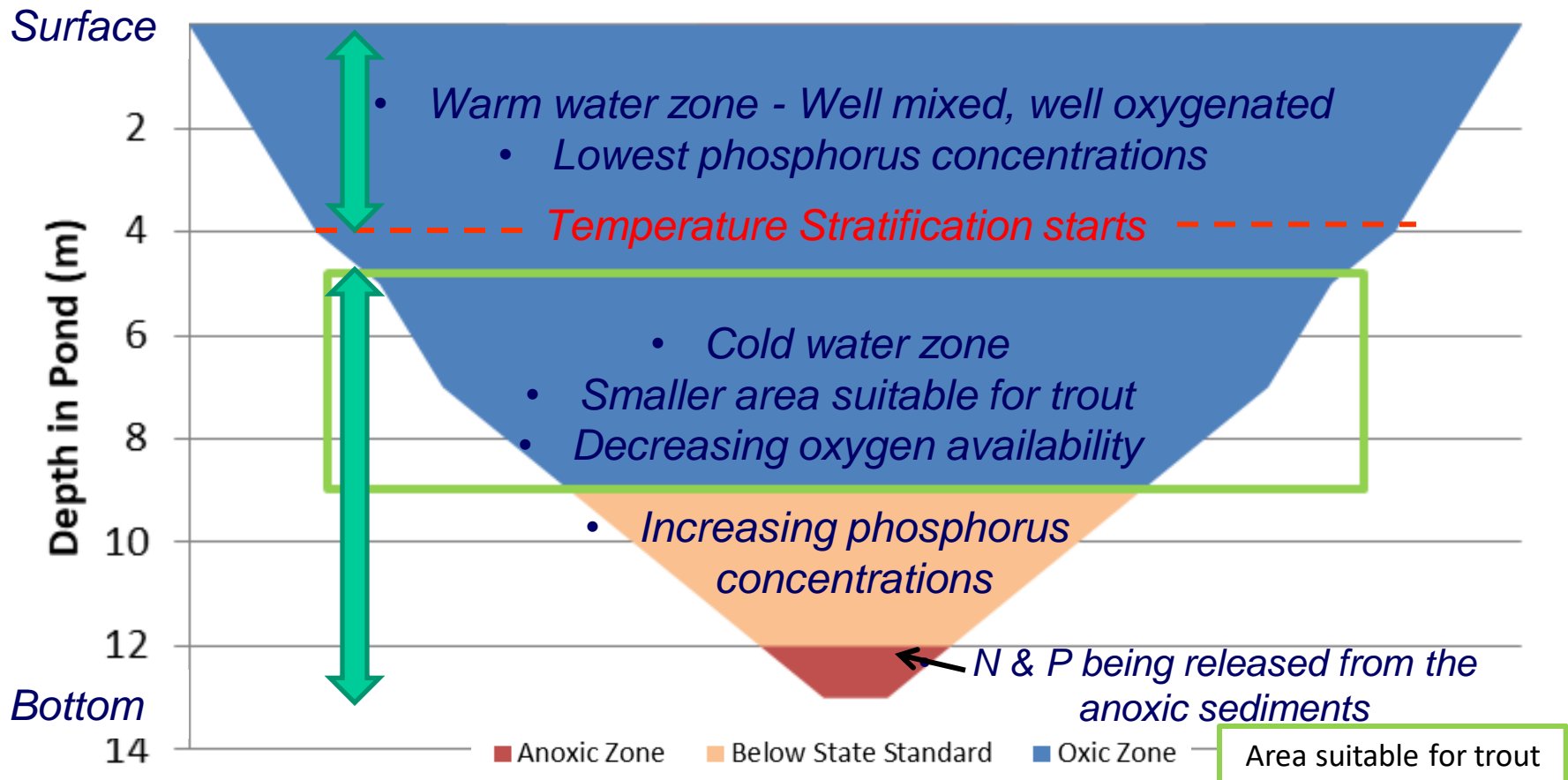


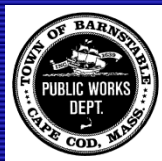


Shubael Pond Dissolved Oxygen and Temperature Conditions

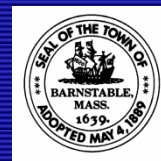


Shubael Pond Mid-June

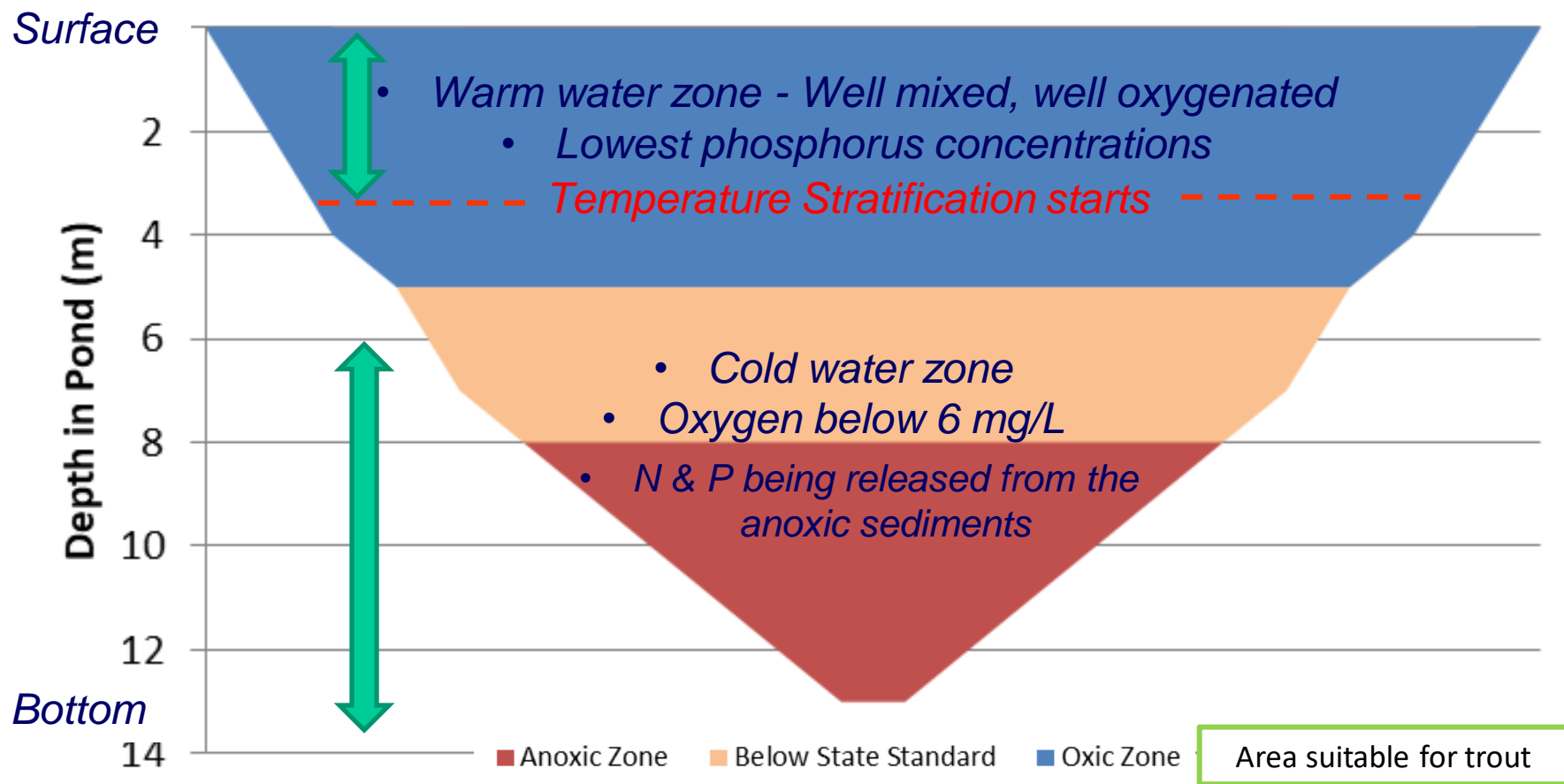


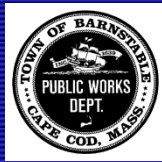


Shubael Pond Dissolved Oxygen and Temperature Conditions

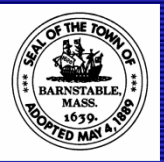


Shubael Pond mid-August

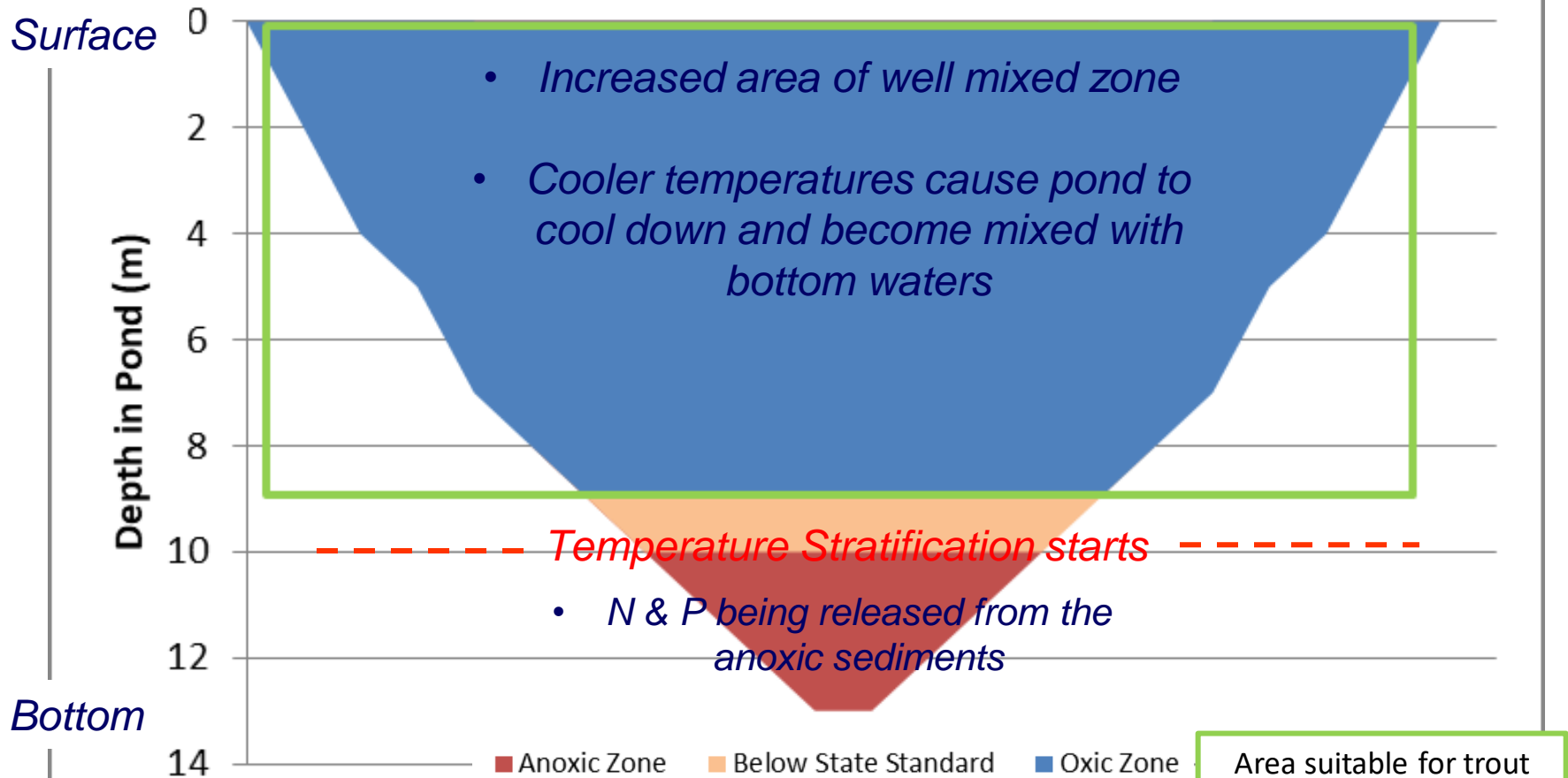




Shubael Pond Dissolved Oxygen and Temperature Conditions



Shubael Pond Late October

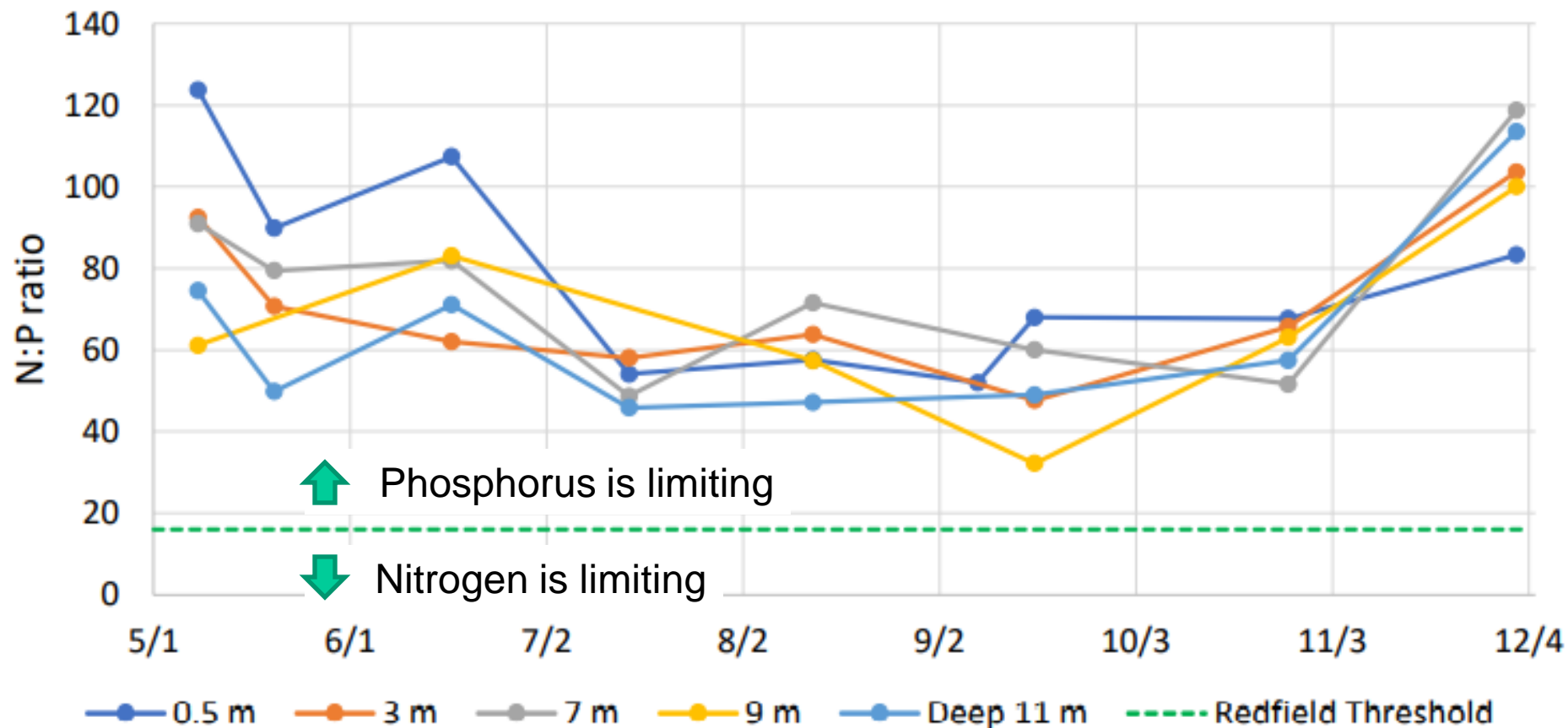




Phosphorus is the key to management

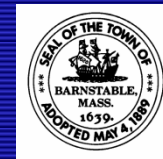


Shubael Pond: 2020 N:P ratios

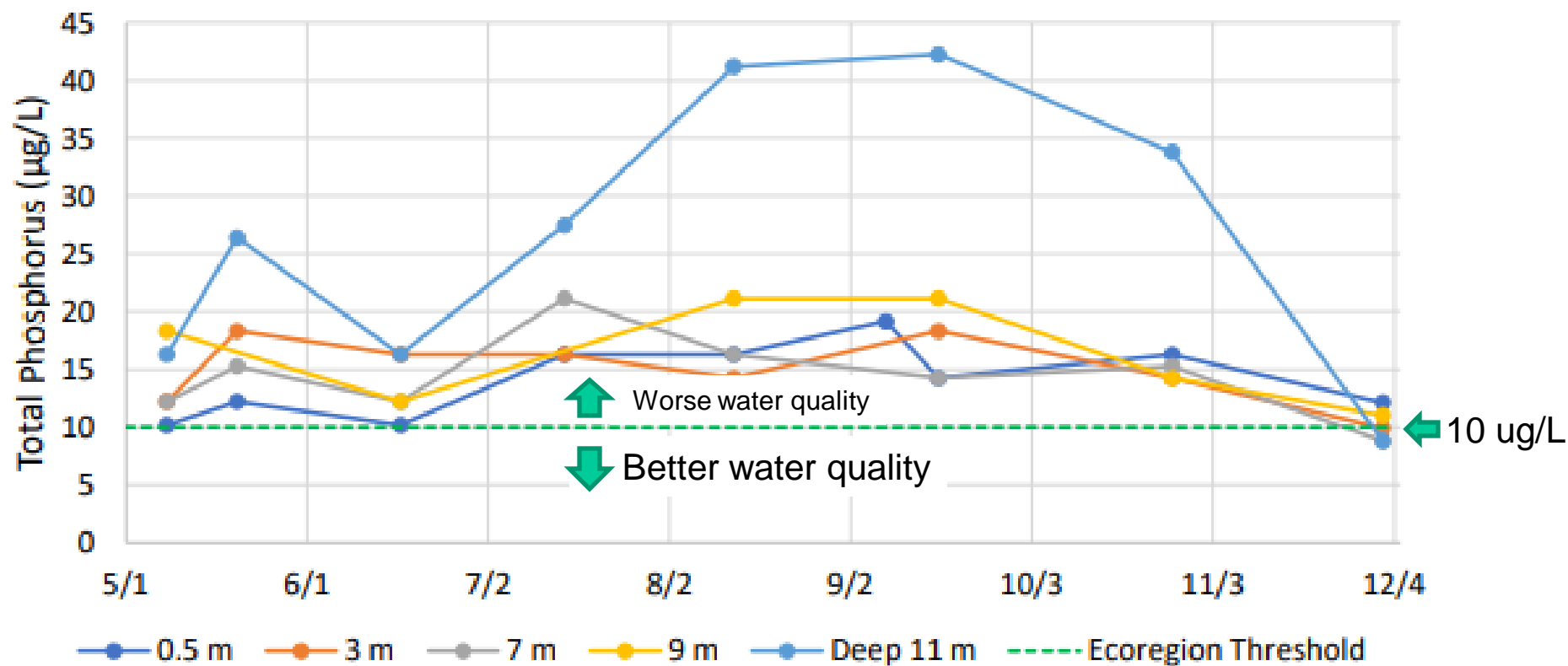


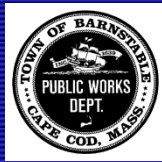


2020 Phosphorus Concentrations



Shubael Pond: 2020 TP Concentrations





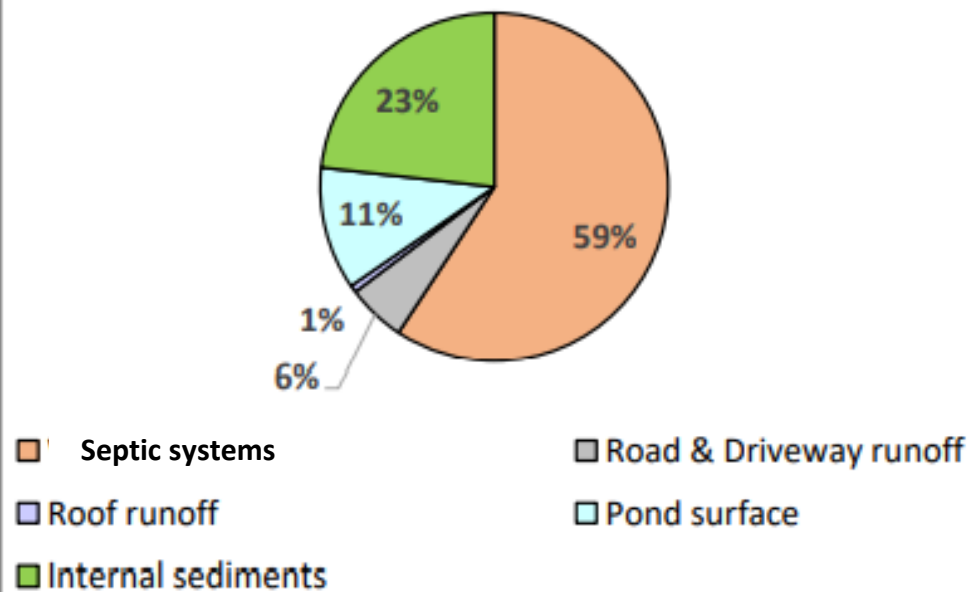
Sources Contributing Phosphorus to Shubael



Contributing sources of phosphorus in and around the pond:

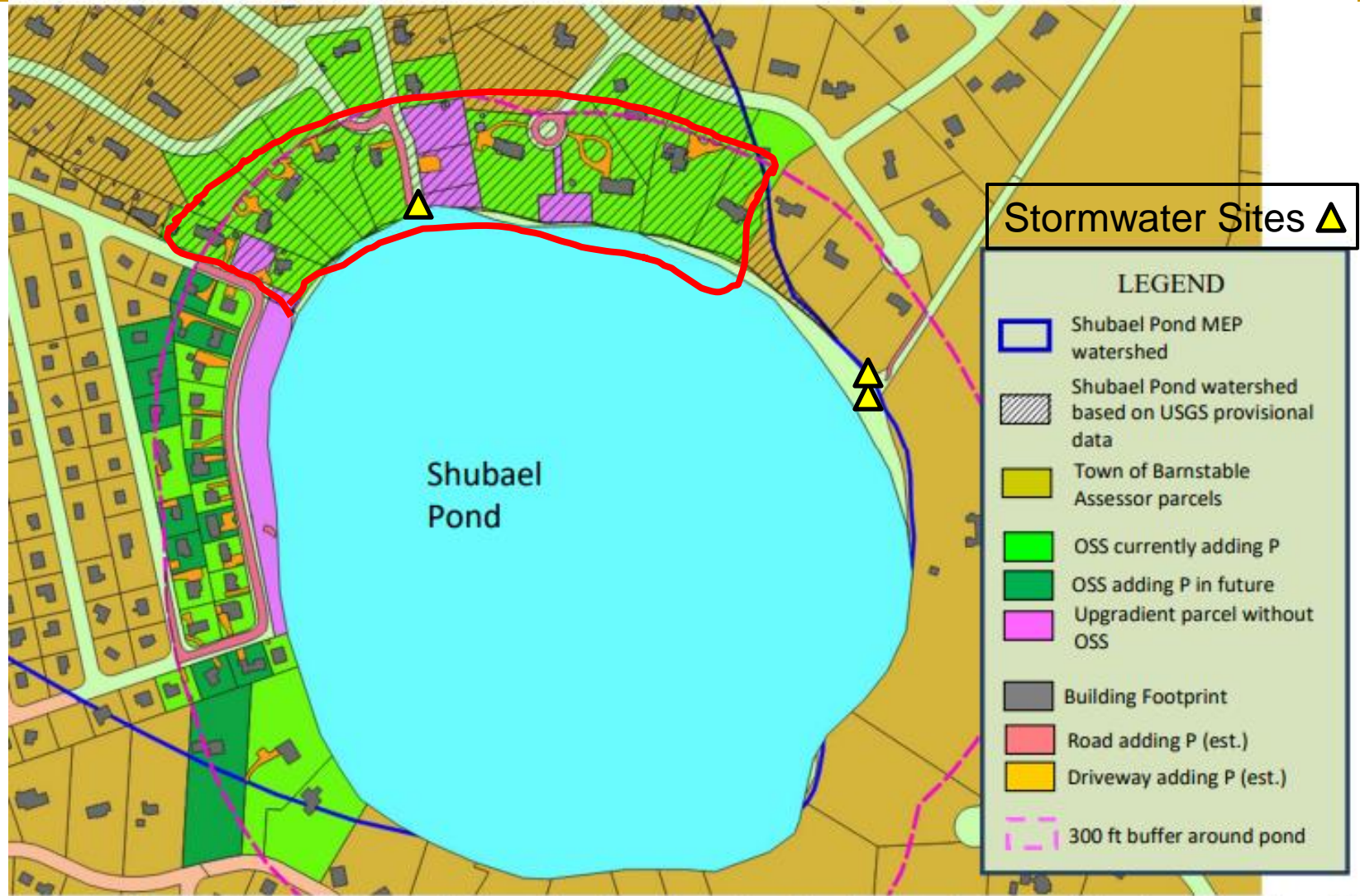
- 1. Septic systems within 300-ft of the pond and in the contributing watershed*
- 2. Phosphorus released from anaerobic sediments*
- 3. Natural atmospheric deposition to the pond surface*
- 4. Stormwater Inputs*
- 5. Overland runoff to the pond*

Summer P Budget: Provisional Watershed





Septic System Inputs

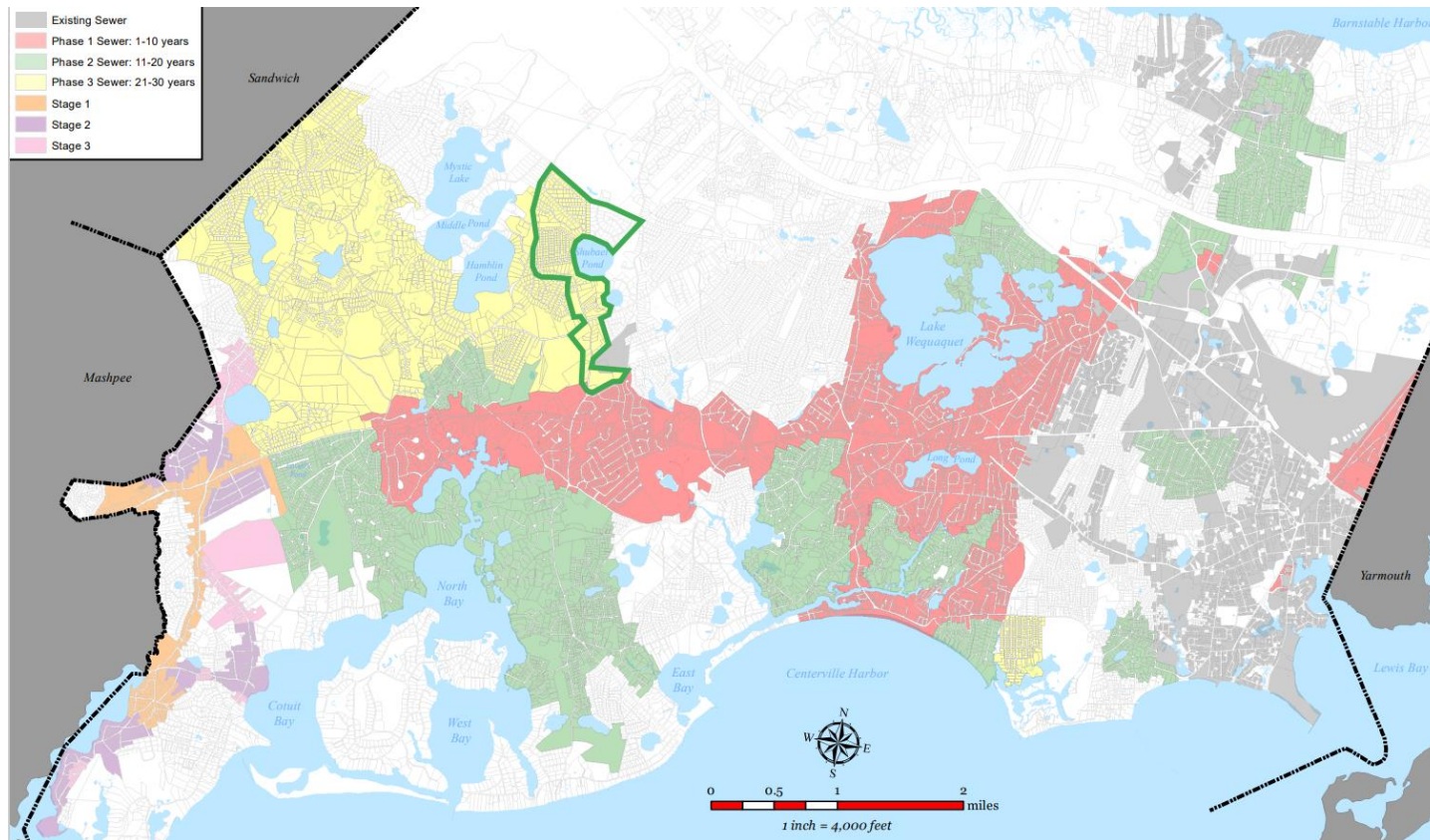




Recommended Solutions



- *Long Term: Sewer the homes contributing phosphorus to Shubael Pond*
 - *The Town will advance the timeline for sewer from Phase 3 to Phase 2.*
 - *Modeling indicates this will reduce the phosphorus load enough to achieve phosphorus concentrations less than 10 ug/L.*



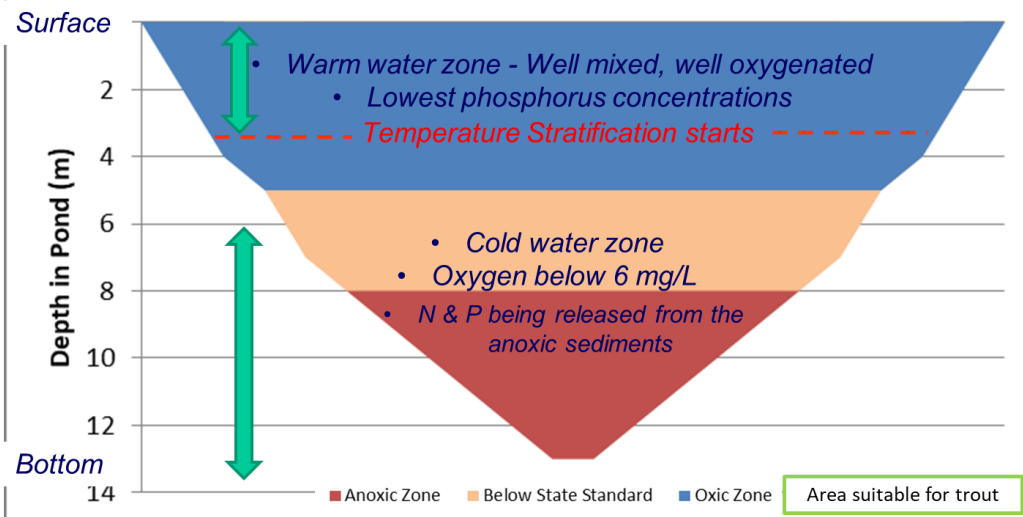


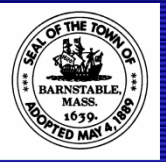
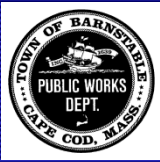
Recommended Solutions



- *Near Term (FY23): Perform an alum treatment*
 - *The Town will use alum to bind to the phosphorus and reduce the amount phosphorus that is released from sediments during periods of anoxia.*
 - *This will reduce phosphorus available for cyanobacteria, but will not reduce to the phosphorus load enough to achieve phosphorus concentrations less than 10 ug/L.*

Shubael Pond mid-August

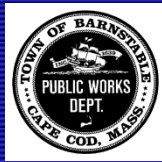




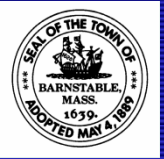
Recommended Solutions

- *Near Term (FY23): Reduce stormwater inputs from Shubael Pond Road*
 - *The Town proposes to install additional stormwater infrastructure along this pipe to reduce inputs to Shuabel.*
 - *This will not reduce to the phosphorus load enough to achieve phosphorus concentrations less than 10 ug/L, but does reduce further nutrient and TSS loading from this pipe.*





Discussion?



Thank You

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