Brewster Ponds Coalition

Annual Meeting

August 12, 2023

Our Mission:

To protect and improve the health of Brewster's ponds through science, education and advocacy.

Brewster Ponds Coalition

Agenda

- Introduction of the Board
- 2023 Highlights
- Financial Summary
- Acceptance of ‘22 Minutes
- Board Elections
- Splash Award
- Keynote Speaker: John Keith

Board of Directors




Brewster Ponds Coalition






Susan Bridges - President
John Keith - VP
Rob Condon - Treasurer
Nancy Ortiz - Secretary
Marty Burke
Ron Essig
Cameron Ferguson
Kevin Kearns
Marcia Kielb
Mary Mauterstock

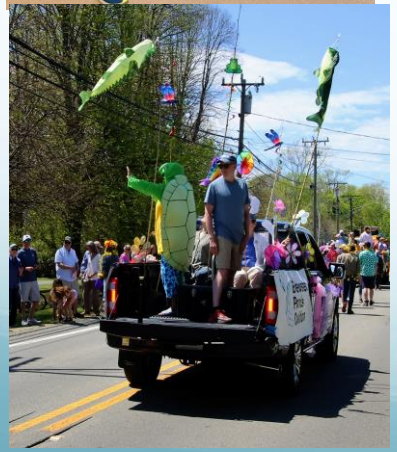
Brewster Ponds Coalition

Administrative Consultant

Jane Savio

Brewster Ponds Coalition

2023 Highlights: Town Wide Events



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2023 Highlights: Adult Programs

Brewster Ponds Coalition

2023 Highlights: Outdoor Activities

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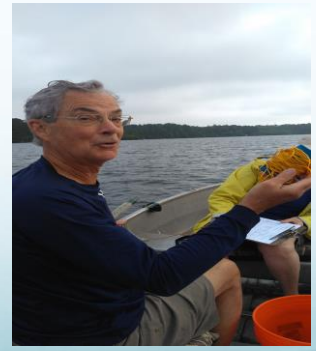
2023 Pond Summit

Co-hosted with the Town of Brewster

Brewster Ponds Coalition

2023 Highlights: Citizen Science



- Cyanobacteria water quality monitoring project: 53 BPC Citizen Science volunteers test 19 ponds on a bi-weekly rotation from May through October 2023 and report results to the Town.
- National Oceanic and Atmospheric Administration (NOAA) project: pilot the use of satellite imagery to monitor ponds. Study conducted weekly at five Brewster ponds.
- 2022 Anatoxin-a study: tested a new method to isolate the smallest picocyanobacteria. Year End 2022 Study published in “Journal of Water Resource and Protection” in June 2023!

Brewster Ponds Coalition

2023 Highlights: Pond Education

- Hosted 7 Pond Education field trips for 2nd and 5th grade students from Stony Brook Elementary School and the Eddy School. Attendees included 113 students, 16 staff, and 15 volunteers.
- Awarded $1,000 scholarships to two Nauset Regional High School students, Benton “Ben” Caldwell and Sara Cornell.

Brewster Ponds Coalition

2023 Highlights: Pond Outreach

The BPC is assisting several neighborhood groups with remediation projects:

- Canoe Pond - installation of a new aeration system. The BPC is helping the neighborhood association navigate the necessary permitting process and will contribute ⅓ of the funds needed, approximately $10K.
- Beechwood Drive at Seymour Pond - updating the catch basins in the association's parking lot to more effectively capture stormwater runoff. BPC is helping to secure specifications and possibly bids from some of our corporate partners.
- Myricks Pond - exploring the possibly an aeration system.
- Pond Protection Pledge Program taking off at Seymour, Upper Mill and Canoe ponds.

2023 Highlights: Pond Outreach (continued)

Enhanced septic system and pond study

The Brewster Ponds Coalition, in partnership with the Town of Brewster, has launched a scientific study to determine the impact of septic systems on Brewster's ponds. The BPC is interested in learning how nutrients move from septic systems towards ponds. The Board has committed $75,000 to fund this study over 3 years.

Brewster Ponds Coalition

2023 Strategic Plan Update

Updated our mission statement from “Protecting the health, beauty, and enjoyment of Brewster’s Ponds” to “***To protect and improve the health of Brewster's ponds through science, education and advocacy.”***

We also identified how we will measure success toward achieving this mission, including:

- A town program to annually monitor and report on pond health
- Adoption and implementation of a comprehensive town wide water protection plan that addresses nutrient pollution from septic systems
- A community educated about the importance of protecting our water resources and willing to fund the projects needed to do it

Brewster Ponds Coalition

2023 Strategic Plan Update (continued)

Specific goals for 2023 include:

- Working with the town administrator and select board to sponsor an article on the town warrant to fund a town wide comprehensive water resource study/plan
- Continuation and expansion of water quality testing and scientific research
- Working with neighborhood groups, the DPW, DNR, and Conservation on pond remediation projects
- Educating the community about water quality issues and their critical role in protecting this important resource

Brewster Ponds Coalition

Financial Summary

Income & Expenses

FY - 2022

Total Income: $73,584

Total Expenses: $38,701

- Administration $9,342
- Programs & Projects $10,543
- Education & Outreach $17,750
- Fundraising $1,066

Account Balances (as of December 2022):

- Unrestricted cash: $179,003
- Restricted funds: $37,219

July YTD - 2023

Total Income: $53,666

Total Expenses: $27,932

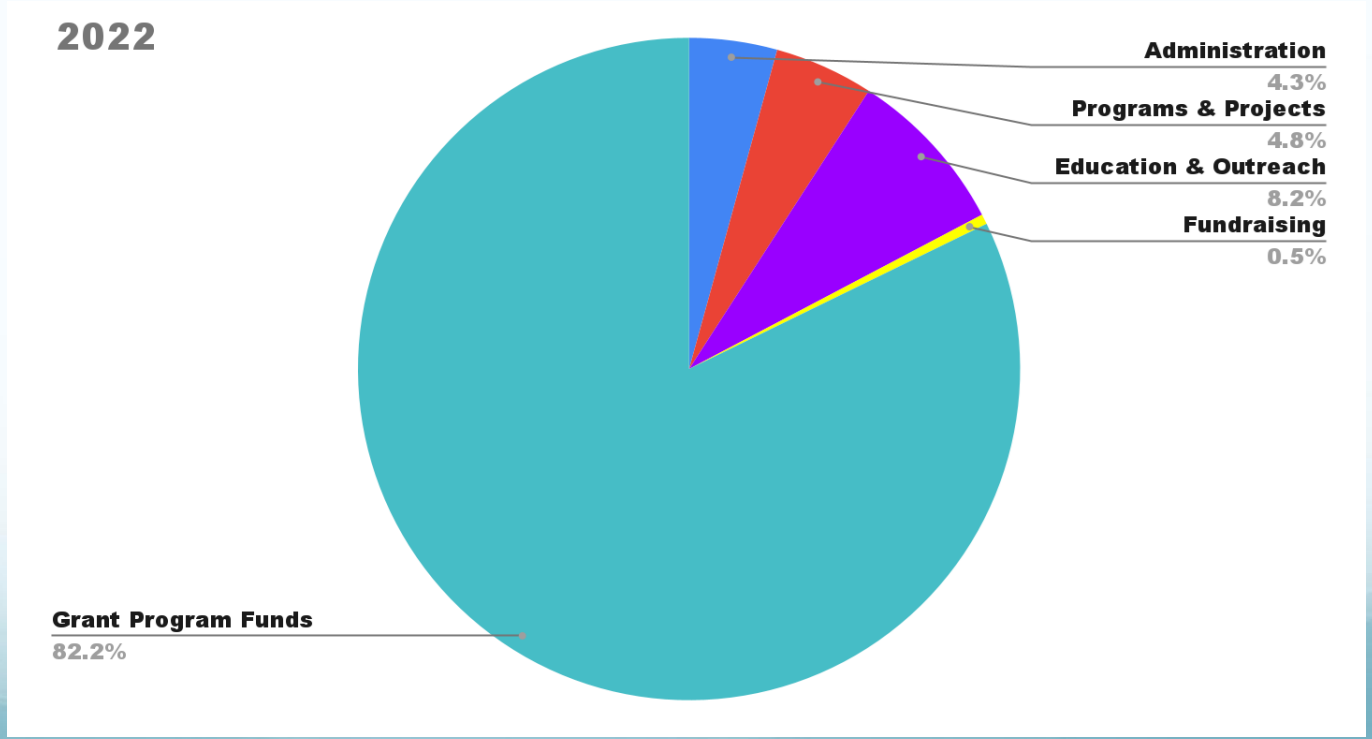
- Administration $14,920
- Programs & Projects $6,179
- Education & Outreach $5,471
- Fundraising $1,361

Account Balances (as of July 2022):

- Unrestricted cash: $210,358
- Restricted funds: $37,221

Brewster Ponds Coalition

How We Spend Your Donations



Annual Elections

Background

In accordance with the Bylaws of the Brewster Ponds Coalition, election of Directors takes place at the Annual Meeting of the Corporation.

The BPC Board of Directors has staggered three-year terms to ensure continuity of leadership. Current “classes” are:

2023 - Cameron Ferguson, Mary Mauterstock
2024 - Marty Burke, Ron Essig, John Keith, Marcia Kielb, Nancy Ortiz
2025 - Susan Bridges, Rob Condon, Kevin Kearns

Term limits: Board members may serve up to two consecutive regular (full) terms. Officers are nominated and elected by the Board of Directors at the first Board meeting following the Annual Meeting.

Brewster Ponds Coalition

Proposed Slate of Nominees

The Nominating Committee proposes the following slate for election to the Brewster Ponds Coalition Board:

- **Re-elect:** Mary Mauterstock to a three-year term ending in 2026

Brewster Ponds Coalition

2023 Splash Award

Awarded annually to the BPC volunteer who has made a ***splash*** through his or her contributions to improve the water quality, beauty, or natural habitats of Brewster's Ponds.

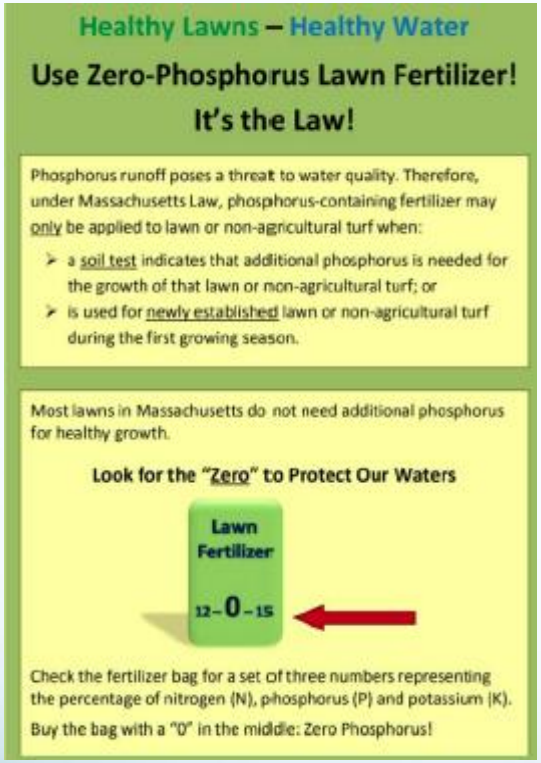
Town of Brewster Lawn Fertilizer Information for Residents

IF YOUR LAWN REQUIRES FERTILIZER, YOU CAN STILL HELP REDUCE WATER POLLUTION:

- Use phosphorus-free and slow-release fertilizers
- Do not over apply – follow instructions on the bag
- Remember to sweep up the driveway and sidewalk to insure none enters the storm drain
- Don’t apply pesticides or fertilizer if rain is forecasted
- Never store or dump yard waste in or around waterways, wetlands, or storm drains
- By state law, fertilizer may not generally be used within 20 feet of wetlands or waterbodies, or 100 feet of surface water sources for public drinking water supply.

HELP KEEP OUR WATER CLEAN

- When it rains, fertilizer and other pollutants from our lawns wash into our storm drains from where it flows directly – and untreated – into nearby ponds, and streams.
- Phosphorus, commonly found in fertilizers, is among the causes of toxic algae blooms, which can make it unsafe to swim as well as harming fish and other aquatic life.
- Many people follow the same lawn care routine without really understanding what their lawn needs to be healthy. For example, your soil may already have plenty of nutrients in it for making the grass green and doesn't require additional fertilizer. Unless you or your landscaper is testing the soil, you really don't know what your lawn needs, and you could be using chemicals unnecessarily - and wasting your money.



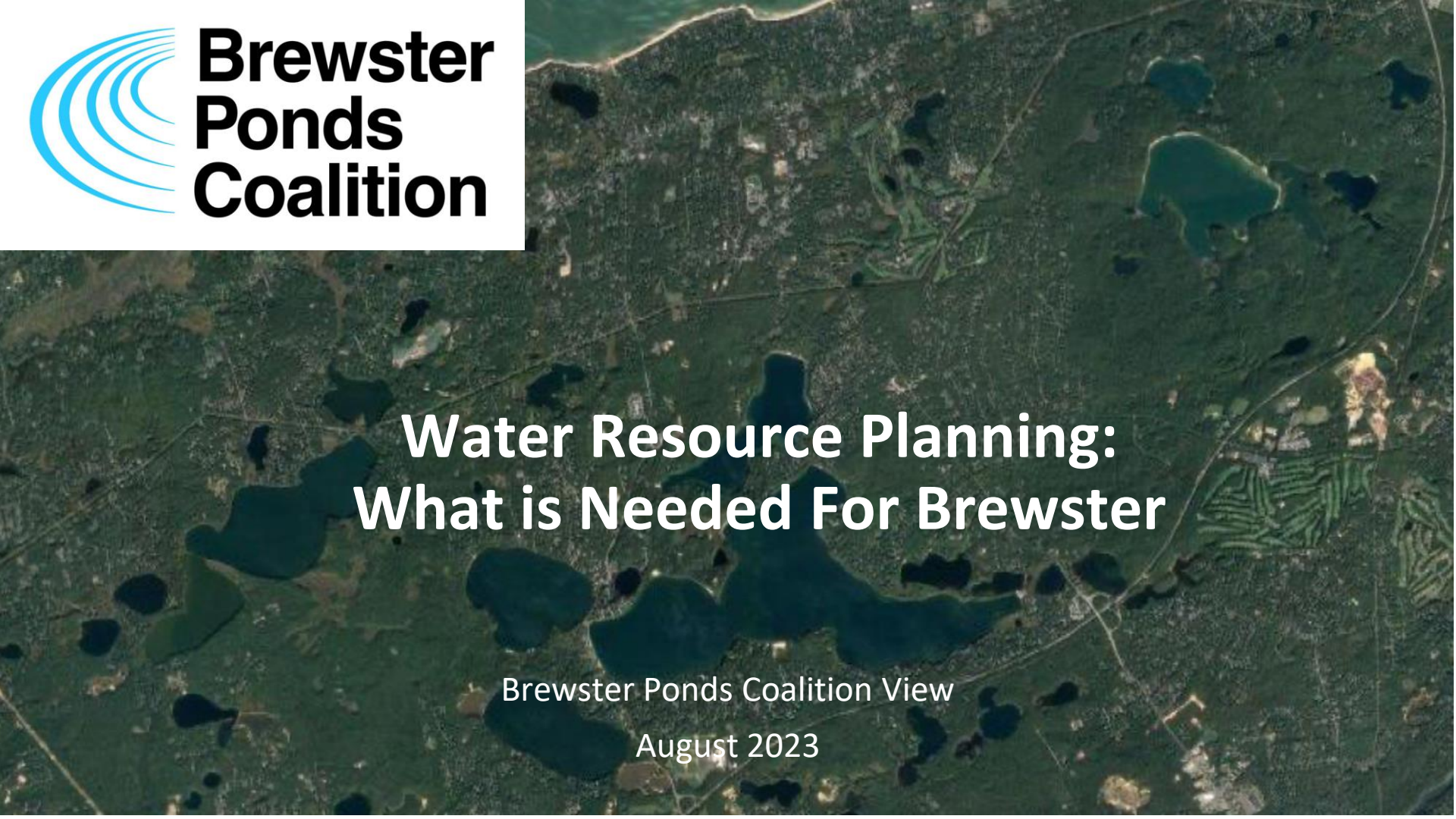
HOW TO TEST YOUR SOIL

Inexpensive soil tests are available through UMass Amherst's Soil Testing Lab. Detailed test results include customized fertilizer recommendations, tailored
to the nutrient levelsin your specific soil. Soil samples can be mailed or hand delivered.

Additional soil testing information is available at:
www.ag.umass.edu/services/soil-plant-nutrient-testing- laboratory

TOWN OF BREWSTER FERTILIZER BYLAW

Any applications of lawn fertilizer must comply with the Town of Brewster Fertilizer Nutrient Control Bylaw.



Water Resource Planning: What is Needed For Brewster

Brewster Ponds Coalition View

August 2023

What Does the Ponds Coalition Want?

Brewster Ponds Coalition

- For the Town to continue its ongoing work to protect the waters of Brewster
- For an article to be on the Town warrant this fall to fund the additional work needed to develop and implement a comprehensive action plan/road map to protect all waters of Brewster
  - Substantial amount
  - Notably to include funding for pond protection planning
  - Continued funding needed for several (3+) years
- For the protection and improvement of our ponds and water to continue to be a top priority for the Town

Water Resource Action Plan Objectives

- Consider all pollution sources
  - Septic systems
  - Surface runoff from streets, lawns, bogs, etc.
  - Natural sources – deposition, animals
  - Historic impacts, notably sediments at bottom of ponds
  - Emergent pollutants such as PFAs and other toxic chemical pollution
- Consider all waters
  - Protect drinking water – public and private wells
  - Protect ponds – keep them usable for recreation and fishing; protects pond health
  - Meet Pleasant Bay permit requirements
  - Protect Bay from degradation due to nutrients and bacteria
  - Satisfy any nitrogen reduction needs to the Herring & Bass Rivers under State regs
- Satisfy State and/or Cape & Islands Fund requirements to get funding

Water Resource Road Map/Action Plan

- Build on previous plan developed in 2016 and other work
- Coordinated planning that considers all waters
  - Format & name less important than a coordinated plan
- Incorporate and build on extensive work already done
  - Purchase of town wellhead protection land
  - Mill Ponds study, work done on Long Pond
  - Stormwater discharge point correction work
  - Fertilizer regulation
  - State Title V and Town septic system regulations
  - Pleasant Bay water permit nutrient reduction measures
  - Evaluation of PALs and other data – in progress
- Takes a long range view – consider future build-out

Developing the Plan Will Require Study & Funding

- Town Water Planning Task Force is coordinating effort
- Actions must consider cost and effectiveness
- Much is known about threats to Town water but need to know more
  - Impact of septic systems known to be significant, but exactly where??
  - Measures to address pond impairments must be pond specific
  - Many options, especially regarding septic systems, sewering and addressing pond impairments
- Substantial funding required
- Full coordinated plan development will take several years
  - Need more knowledge and study of risks, alternatives

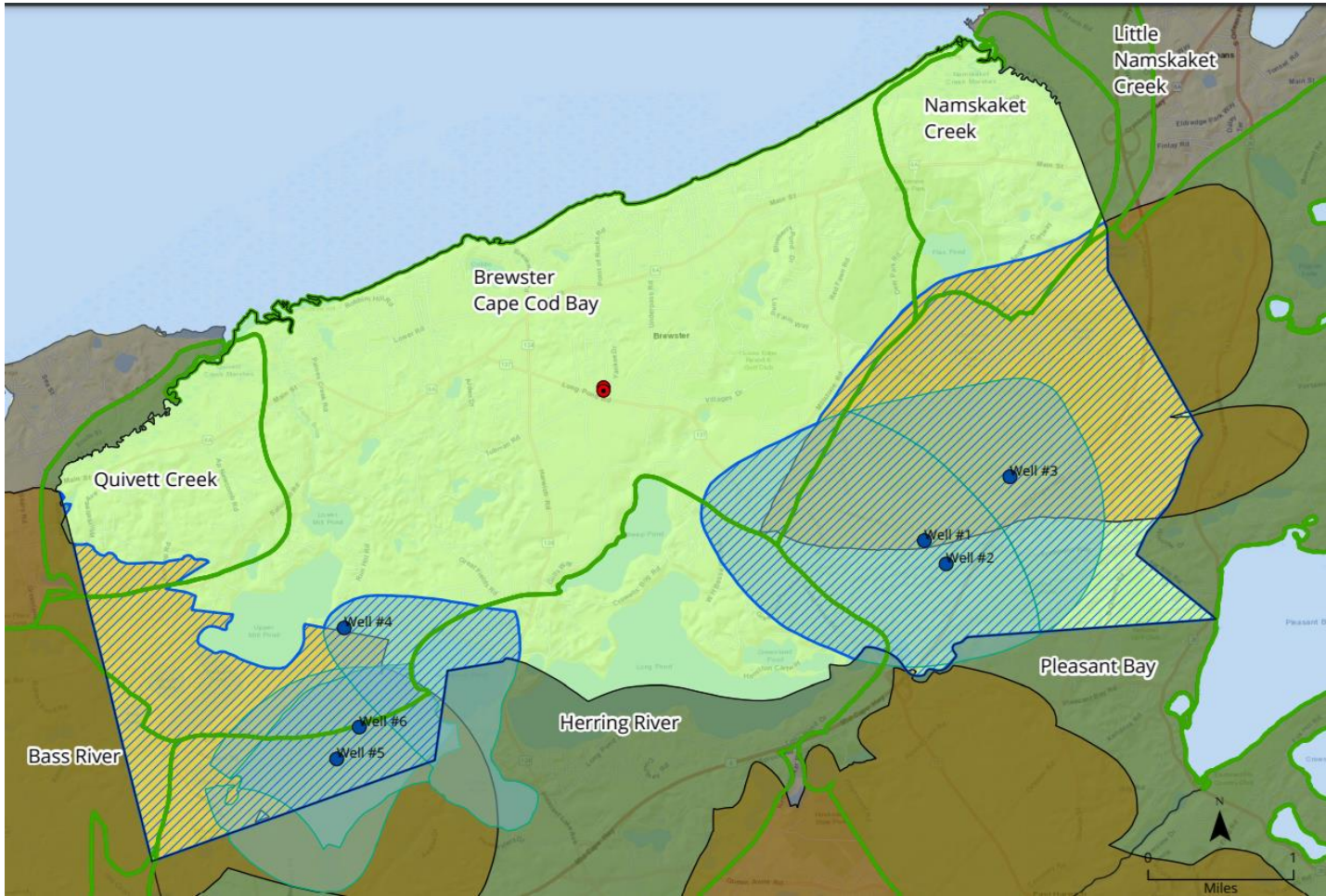
Wells/Drinking Water

Groundwater flow is well understood

Six drainage basins:
To South:
- Pleasant Bay
- Herring River
- Bass River

To North:
- Cape Cod Bay
- Quivett Creek
- Namskaket Creek

Six Town wells –
(Area hatched in blue)



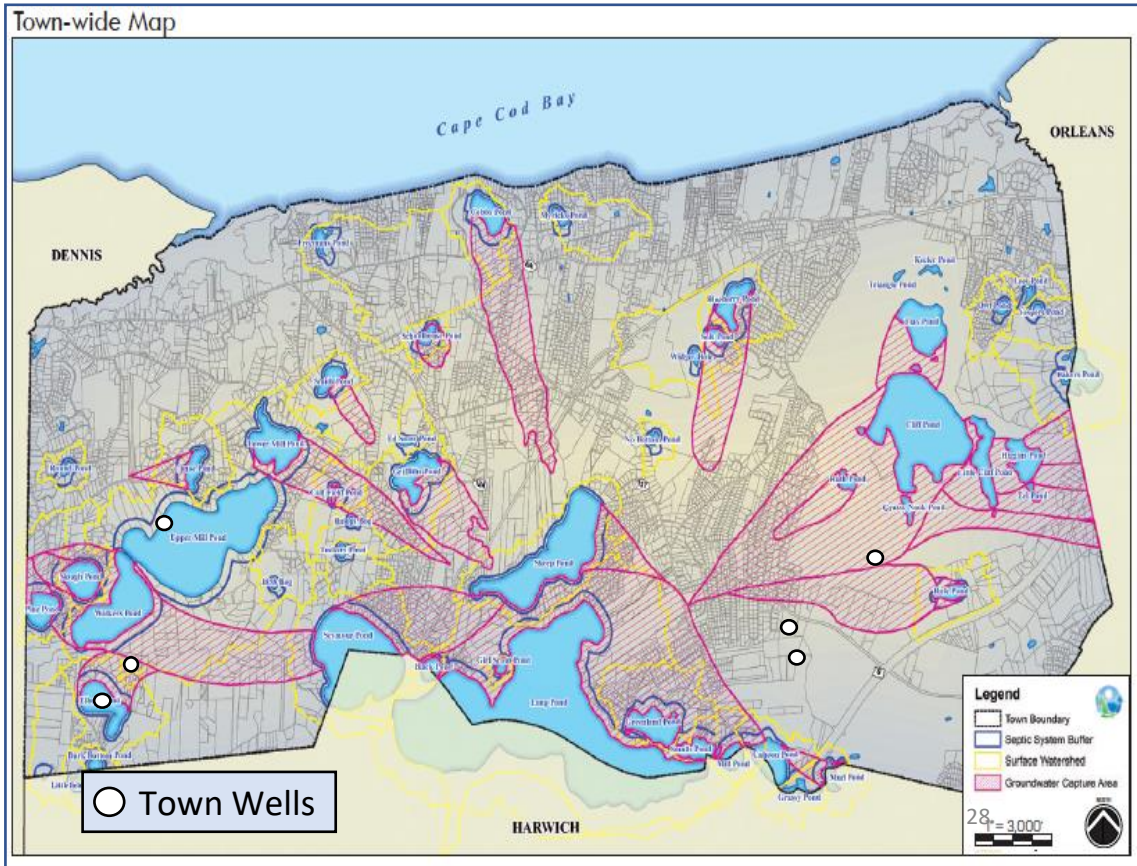
BPC View About Public Water Wells Planning Needs

- Water quality extensively monitored
- Excellent quality, no PFAs
- Public wells protected by well-head protection lands purchase by Town
- Major source of toxics is likely septic systems – evaluation needed

Key needs (much of which is ongoing work by Water Department):

- Volume of water needs in future – need for another well?
- Understand impact of pumping on groundwater flow directions
- Continue to assess risks from PFAs or other toxics – public and private wells
- Continuing public education about keeping toxics out of septic systems

Groundwater Flow Showing Pond Groundwater Capture Areas



What Do We Know About Pond Impairment?

Sources of Pollution of Ponds

- 7 categories of sources (arrows below)
- Importance varies by pond and surrounding area

- Roads, driveways
- Lawns, gardens

- Bogs
- Very few others in Brewster

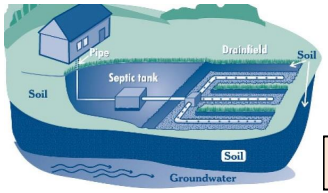
Atmosphere (Rain)

Watershed Runoff

Deposition of vegetation (leaves, etc.)

Discharges

Wildlife



- Septic Systems

Groundwater

Internal Recycling

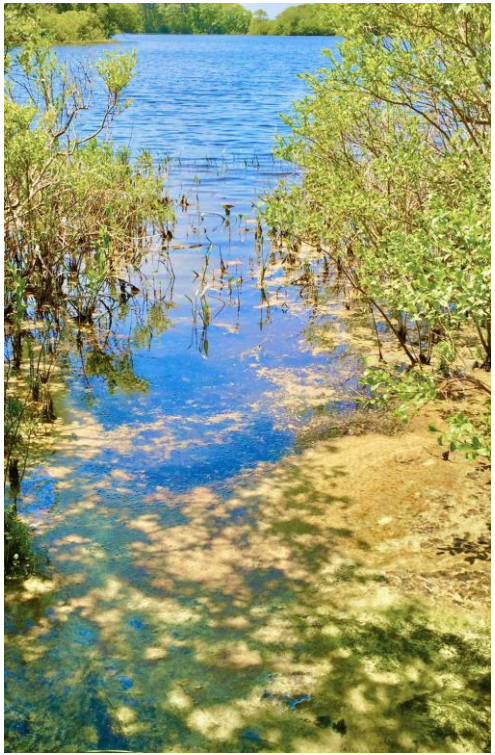
Internal release from sediments facilitated by low oxygen levels (anoxia) at pond bottoms

Contributions from atmosphere, deposition, wildlife and internal recycling largely not controllable.

WRS

Types of Pond Impairment

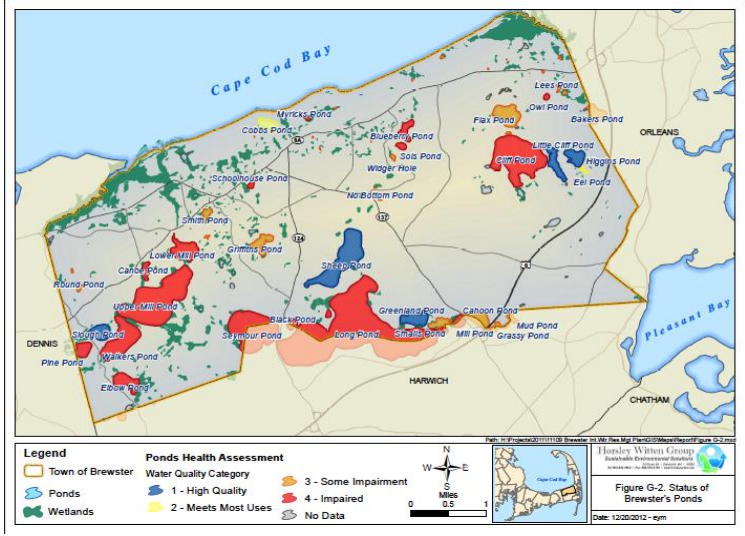
Type of Impairment	Sources
Low Dissolved Oxygen	High nutrients and resulting algae growth; stratification
Clarity – unclear water	Silt, suspended solids, algae
High Nutrients – Phosphorus, Nitrogen	Septic systems, fertilizer runoff, animal waste, plant detritus
Harmful Bacteria	Septic systems, animal waste
Chemicals – PFAs, pesticides, drugs, oil, etc.	Septic systems, pesticide spraying, road runoff
Invasive Species	Human introduction
Nuisance Level of Plants	Invasive species, high nutrients



Planning should consider all sources and impairment types

What Don't We Know About Pond Impairment?

- The current status of impairment
  - Previous "impairment" map from 2009 outdated
  - PALs data now being reviewed by Town
  - Some ponds worse, some the same
- The causes of impairment
  - Mill Ponds studies showed the issue is complex
  - High phosphorus cause varies by pond – no generic answer
  - Septic systems impact unclear and varies depending on houses nearby
  - Often high internal loading from sediments
- Ponds need to be considered individually – no "one size fits all answer"
- In some cases, reduction of input nutrient sources will not protect ponds due to internal loading from sediments



Pond Impairment Map - 2009

From 2009 Horsely Witten Report

Relative Importance of Phosphorus Sources in Cape Ponds

- Precipitation relatively even over year – significant P Source
- Ground water relatively constant – varies greatly by pond, related to septic systems near by, can be major P source
- Storm runoff – more runoff in spring, generally even over year – varies, generally minor P source
- Cranberry discharges focused in autumn – significance unclear
- Wildlife inputs skewed to summer – minor
- P Load from sediments often dominates in growing season due to pond stratification and anoxia at bottom, which facilitates P release – often major P source

% of Total P Load to Lake					
Source	Spring	Summer	Fall	Winter	Total
Precipitation	6.25	6.25	6.25	6.25	25
Ground water	12.5	12.5	12.5	12.5	50
Internal load	0	20	5	0	25
Total	18.75	38.75	23.75	18.75	100

Typical data for a pond, from Ken Wagner report

WRS

Source vs. In-Pond Controls

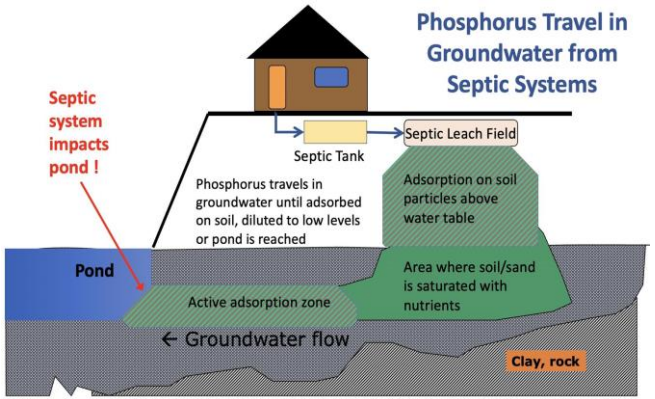
- Source control protects pond, but rarely remediates pond once impaired
- Source control rarely counters all effects of development and agriculture
- P load analysis typically indicates that >25% of P load is from internal sources
- In-pond actions are almost always necessary to rehabilitate a damaged pond
- Alternatives - basically aeration, alum, macrophyte harvesting (if many plants) or, in some cases, bio-manipulation

From Ken Wagner presentation

The leaky boat analogy – Fixing the leaks won't help if the boat is already full of water!

What We Know About Septic System Impacts on Ponds

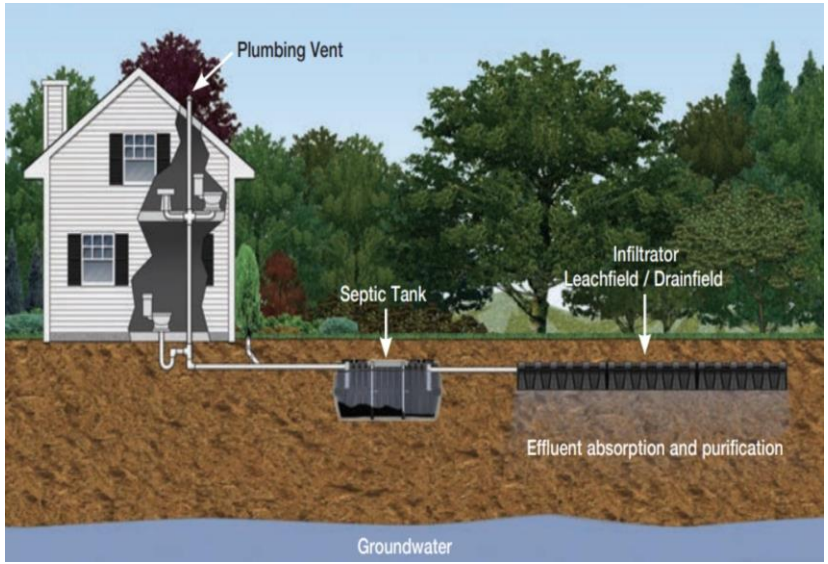
- Nutrient discharges (P & N) impact ponds when:
  - Systems are close to and upgradient of ponds
  - Systems are closer to groundwater level
  - Systems are old or poorly managed



- Phosphorus is adsorbed in soil, so does not move very far or fast
- Nitrogen is not well adsorbed so travels readily in groundwater
  - Greatest impact is on salt water estuaries where N is the key limiting nutrient
- Septic systems are probably the major source of PFAs and other toxics
  - Risk to drinking water – public and private wells

What We Don't Know About Septic System Impact

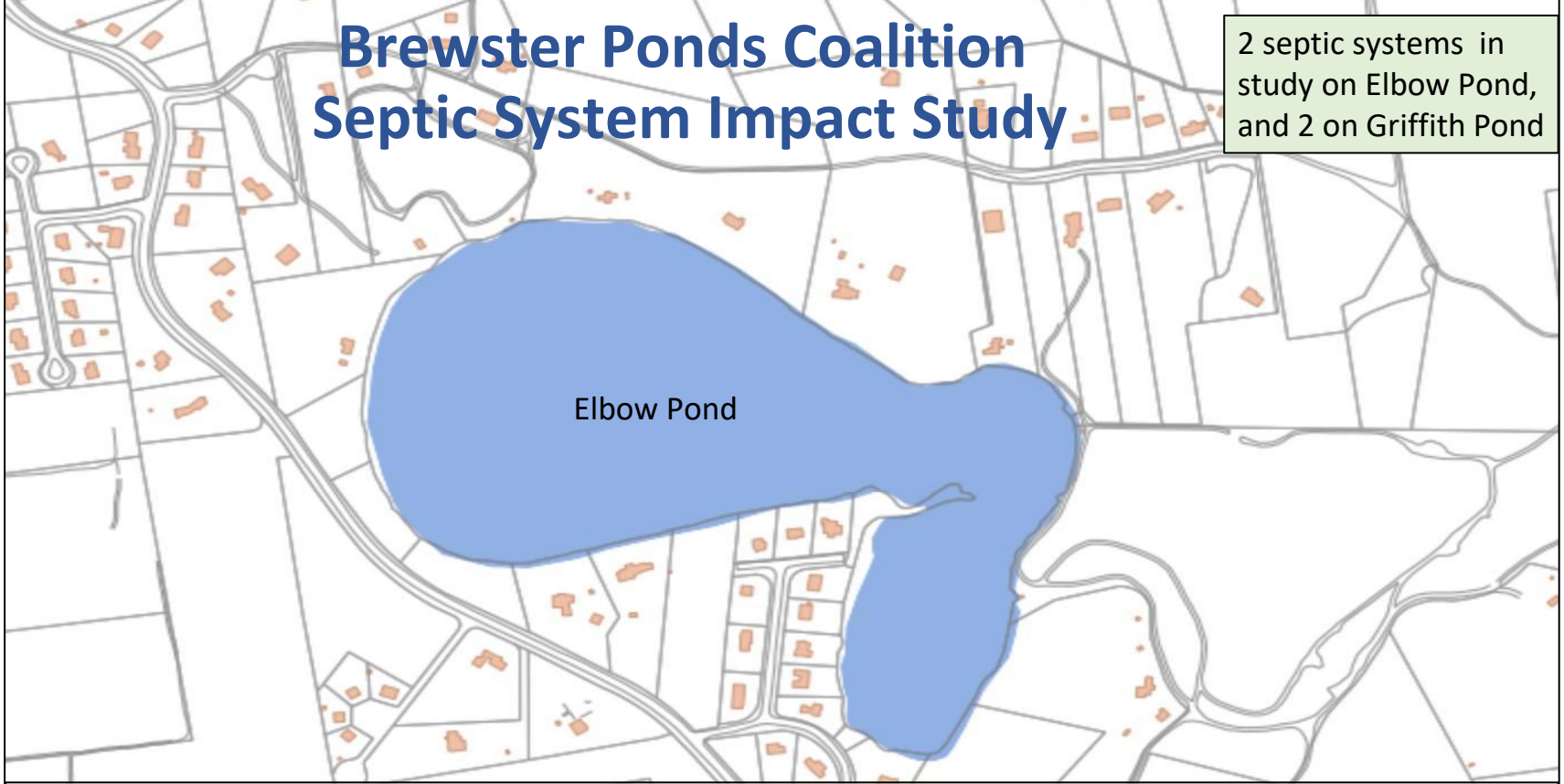
- **How far away from ponds do septic systems need to be to not impact ponds?**
- Rule of thumb: Systems upgradient and <300 ft from ponds might impact ponds
  - But studies not done on Cape Cod
- Many variables influence this:
  - Age of house
  - Distance to pond
  - Elevation of leach field above pond
  - Number of residents
  - Year round use or summer only
  - Iron and manganese levels in soil
  - How many septic systems nearby
- Actual distance for Cape ponds likely varies



- **Toxics discharges from septic systems also not well known**
  - Depends greatly on homeowner practices

Brewster Ponds Coalition
Septic System Impact Study

2 septic systems in study on Elbow Pond, and 2 on Griffith Pond



Project Purpose:

- Improve understanding of phosphorus travel from septic systems towards ponds
- Help assure that improvement measures focus on systems impacting ponds

Possible Future Study

What about impact when there are many septic systems upgradient of a pond?

- Example: Cobbs Pond has large groundwater catchment area, including old settled areas
- Phosphorus from septic systems, cesspools & outhouses has had hundreds of years to travel

Steps Needed – Brewster Ponds Coalition View

1) Existing Data Analysis

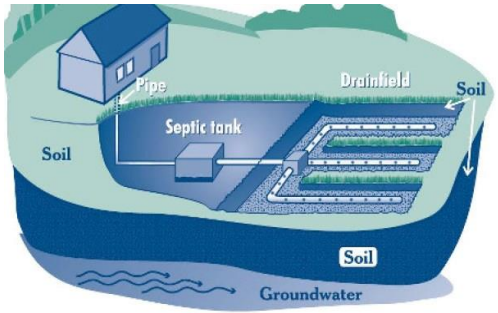
- Complete analysis of PALs data - now in progress
  - Determine gaps, additional data needs
- Conduct pond by pond review to determine impairment status
  - Some already done, such as Mill Ponds
- Herring River estuary review
  - Maybe aggregating data from ponds
  - Historic data review of land, stormwater inflow, count of houses
- Bay review
  - Sampling data review
  - Land use data similar to above (much already done)

2) Continue study and work required by Pleasant Bay permit

3) Work to address State requirements to exempt Bass and Swan River watersheds from new Title V regulation

4) Septic System Impact Evaluation

- Better understand which systems likely to impact ponds
  - Complete Ponds Coalition septic system study, review other studies
  - Develop loading factors to ponds based on real occupancy and distances
  - Consider real time duration of houses & septic system use
  - Consider situation of many upgradient septic systems
- Suggest considering two scenarios – “Reality” and “Regulatory”
  - Reality for planning, Regulatory for new construction



Septic Tank being pumped out

5) Pond Assessments

- Prioritize assessment based on public use, size and access
- Use available data from data assessment, maybe further sampling
- Develop template for nutrient evaluation to simplify, keep costs low
  - Standard factors for lawn runoff, natural deposition
  - Ponds Coalition plans to help develop a good, simple template
- Understand cranberry bog nutrient contribution
  - **Study needed to determine likely P & N from bogs**
- Assessment to include
  - Actual number of houses upgradient close enough to impact ponds
  - Lawn, road, & bog input using surveys, town maps
  - Stream flow in and out , natural deposition
  - Release from sediments from surveys using standard, efficient practices
  - Consider history of area around pond
- Develop overall nutrient budget (P & N, water retention)

5) Pond Assessments (continued)

Possible Pond Analysis Priority: Base priority on pond size, public or semi-public (e.g., homeowner association) access, and usage for swimming, boating, fishing

- Ponds in Nickerson Park excluded – a State issue
- Mill/Walkers Ponds and Baker's Pond – analysis done
- Priority 1 – Great ponds with public access and/or regular usage for swimming
  - Blueberry, Cahoon, Elbow, Greenland, Griffith, Long, Pine, Seymour, Sheep, Slough, Smalls
- Priority 2 – Smaller ponds with public access and/or regular usage for swimming
  - Black, Canoe, Owl, Schoolhouse, Sols
- Priority 3 – Great ponds with very little access and/or use (little or no swimming)
- Priority 4 – Smaller ponds with very little access and/or use (little or no swimming)
- Priority 5 – Very small ponds with limited or no use (and little water quality data)

Start with Priority 1 and 2

6) Strategy and Alternative Evaluation - Ponds

1) Determine if pond is impaired or likely to become impaired

2) Can pond be protected/improved with source control? Yes/No

3) If Yes: evaluate possible source control measures, with effectiveness and cost
   - I/A septic systems for P removal
   - Community I/A system or treatment plant
   - Sewering and sewage treatment plant
   - Consider RMP needs
   - Further storm water management improvements if needed

4) If No: evaluate in-pond remediation measures, with effectiveness and cost
   - Alum, aeration, macrophyte harvesting, etc.
   - Supplemented with source control measures as per 3) above

5) Develop refined cost estimates for best alternatives

7) Herring/Bass River and Bay Assessment

1) Herring & Bass River Estuary Assessment

- Understand Brewster contribution of Nitrogen
- Include estimated N reduction in ponds and rivers before reaching estuary
- Determine need for N reduction and new septic system requirements
- Evaluate alternatives and cost effectiveness– I/A systems, sewering, etc.
- Use for Herring River watershed permit application or Bass River exemption

2) Bay and Bayside Estuaries Assessment

- Evaluate available sampling data (much already done)
- Focus on N loading to Bay from Brewster sources
- Consider bacterial contamination risks (already a major focus)
- Evaluate risk of impairment, reflecting huge tidal flushing
- DEP classification as impaired needed before deciding control needs
- Continue with storm runoff control measures

8) Consider Interactions Between the Various Areas

- Integrate planning and actions for:
  - Wells
  - Ponds
  - Pleasant Bay
  - Herring River, Bass River Estuaries
  - Bay and Bayside Estuaries

- Consider implications for all waters combined – sewering, septic regulations?
- Use as a basis for submissions needed for approvals or funding
- Time – will take some time to put it all together (3 years?)
  - Including filling info gaps on priority ponds, septic system impacts
  - Herring and Bass River sections as needed for Watershed Permit appl.
  - Pleasant Bay sections as required by permit and work on-going

Brewster Ponds Coalition

We hope members of the Brewster Ponds Coalition will support the inclusion of an article in the next Town warrant to fund the continuing work needed to develop an action plan and road map to protect all waters in Brewster.

Questions & Discussion

Brewster Ponds Coalition

Thank you members and volunteers for your active participation, financial support and commitment to our mission!

Brewster Ponds Coalition

Many thanks to
Agway of Cape Cod
for sponsoring this event

AGWAY of Cape Cod

Brewster Ponds Coalition

Thank you to all of our Business Partners!

LEIGHTON TEAM

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