



Welcome

Pond and Neighborhood Associations Summit

July 30, 2016

Our Mission

The Brewster Ponds Coalition is dedicated to preserving and nurturing the natural beauty, healthy habitats and recreational opportunities of Brewster's ponds, and to safeguard them for current and future generations.



Sheep Pond – Fisherman's Landing Beach

Our Agenda



- Introductions
- Pond Impairment and Ecology
- Case Study of Neighborhood Involvement:
Blueberry Pond
- Discussion: What are your interests and concerns?
- Working together: How the Brewster Ponds
Coalition can help neighborhoods.

About the Brewster Ponds Coalition



- Began as a group of interested citizens working with the Town of Brewster
- Officially incorporated in October 2014
- We are an independent 501 (c)3 tax-exempt organization



Founding Meeting – October 2014



Skating on Sheep Pond

2016 Board of Directors:

- Tom Vautin (President)
- John Keith (Vice President)
- Gwen Pelletier (Secretary)
- Patricia Monahan (Treasurer)
- Karen Malkus-Benjamin
- Konrad Schultz
- Dawn Walnut

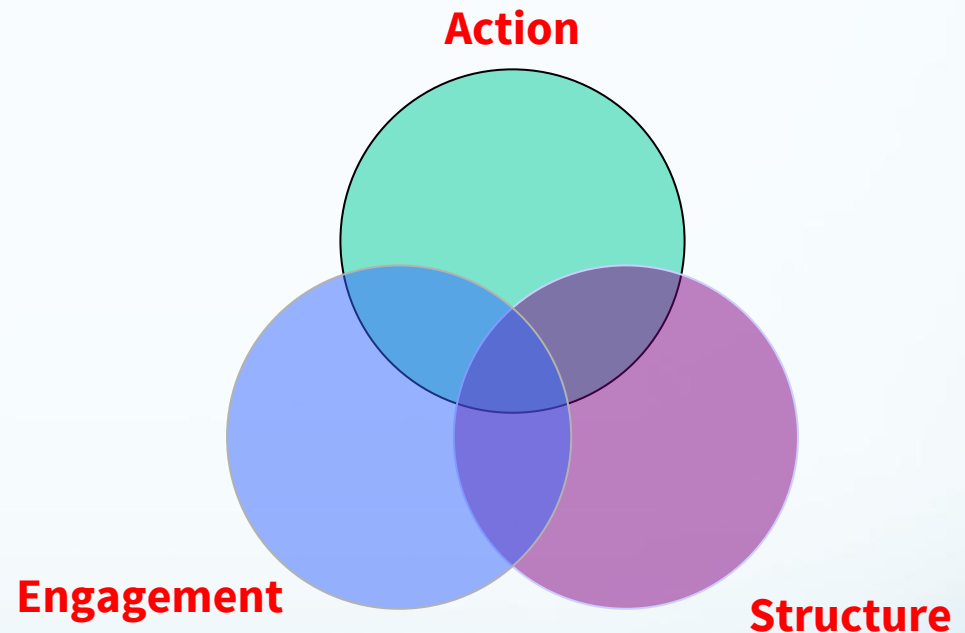
About Our Members

- Over 300 people and families have contributed to the Brewster Ponds Coalition for 2016!
- Only about 50% have Brewster mailing addresses.
- More than 70% are from Massachusetts.
- Members come from 13 states.
- All are committed to protecting Brewster's environment!



A Framework for Planning: Three Interconnected Themes

- **Action**
 - Projects
 - Educational programs
 - Advocacy
- **Engagement**
 - Member events
 - Volunteer opportunities
 - Extending networks & outreach
- **Structure**
 - Building organizational capacity
 - Developing financial resources
 - Establishing roles and policies

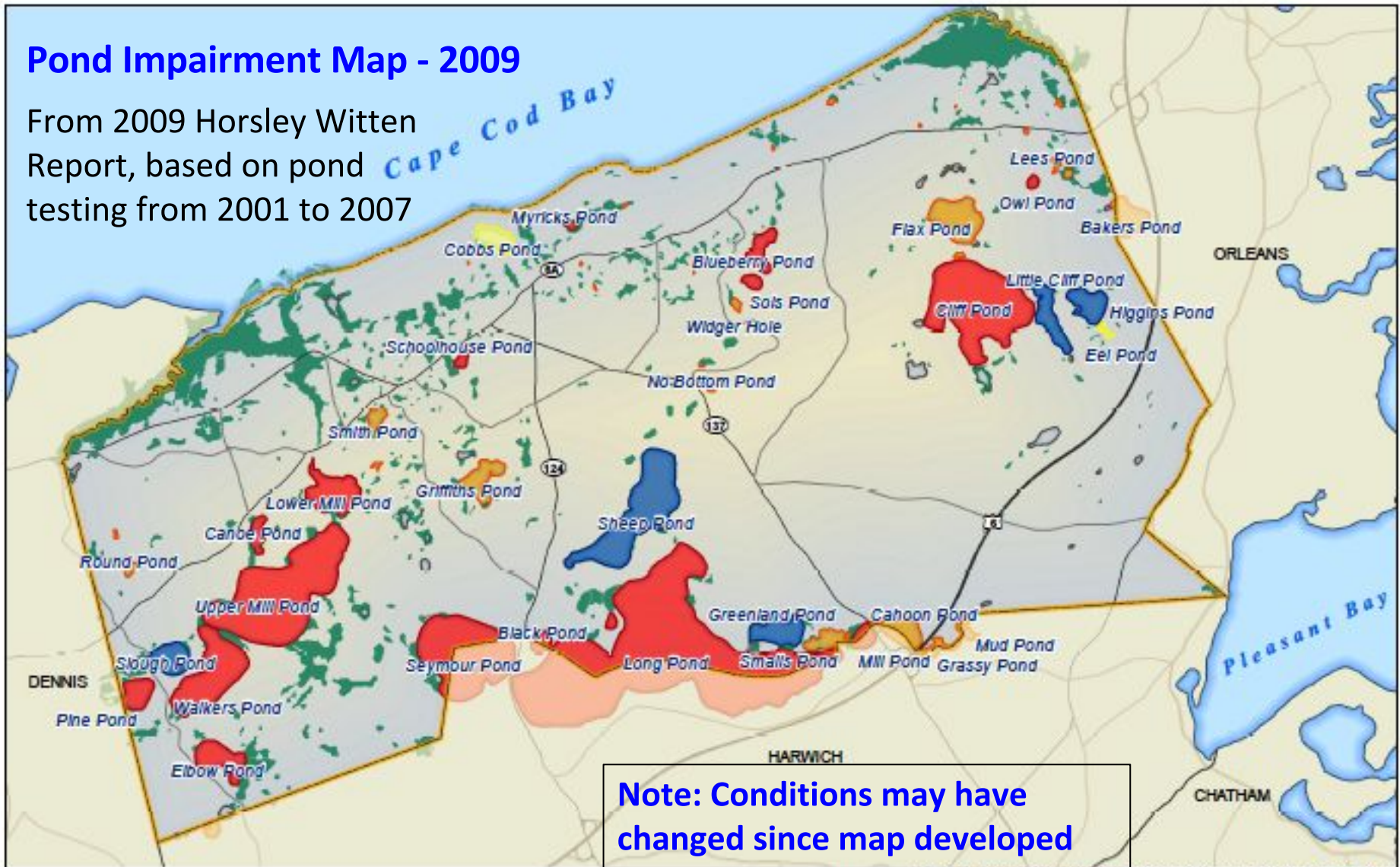


Is Your Pond Impaired?

Types of Impairment	Indicators	Causes
Low Dissolved Oxygen	<ul style="list-style-type: none"> - Low Dissolved Oxygen, especially at bottom - Fish kills 	<ul style="list-style-type: none"> - High nutrient levels - Poor mixing due to thermal stratification and/or low wind
High Nutrient Levels	<ul style="list-style-type: none"> - Algae blooms - Cyanobacteria (blue-green algae) - High <i>chlorophyll a</i> (indicating algae in water column) 	<ul style="list-style-type: none"> - Excessive phosphorus - Excessive nitrogen
Turbidity/clarity	<ul style="list-style-type: none"> - Cloudy or “murky” water - Floating particles in water 	<ul style="list-style-type: none"> - Storm runoff with lots of silt - Algae blooms
Invasive Species	<ul style="list-style-type: none"> - Presence of invasive water plants - Presence of invasive mussels, fish and other fauna 	<ul style="list-style-type: none"> - Introduction of invasive species by boats, people using lake, wind, or birds
Nuisance Plants	<ul style="list-style-type: none"> - Excessive growth and spread of water plants (i.e. “weeds”) 	<ul style="list-style-type: none"> - High nutrient levels, esp. phosphorus, promoting plant growth beyond natural levels
Shoreline damage (impacting pond ecology)	<ul style="list-style-type: none"> - Extensive human-created beaches or rock walls - Lawns to water edge 	<ul style="list-style-type: none"> - Shoreline alterations done by homeowners, governments, and/or businesses

Pond Impairment Map - 2009

From 2009 Horsley Witten Report, based on pond testing from 2001 to 2007



Note: Conditions may have changed since map developed

<p>Legend</p> <ul style="list-style-type: none"> Town of Brewster Ponds Wetlands 	<p>Ponds Health Assessment</p> <p>Water Quality Category</p> <ul style="list-style-type: none"> 1 - High Quality 2 - Meets Most Uses 	<ul style="list-style-type: none"> 3 - Some Impairment 4 - Impaired No Data 	<p>North Arrow</p> <p>Miles 0 0.5 1</p>		<p>Horsley Witten Group Sustainable Environmental Solutions 20000 N. State St. - Suite 201 - 01915 508.884.0000 Fax 508.884.0001 www.horsleywitten.com</p> <p>Figure G-2. Status of Brewster's Ponds</p> <p>Date: 12/20/2012 - eym</p>
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Brewster Ponds Impairment – Small Ponds

Based on Horsley Witten report, PALs data and recent observation by J. Keith and others

Note: Old, limited or no data on many ponds, so evaluation is incomplete

SMALL PONDS	IMPAIRMENTS	SMALL PONDS	IMPAIRMENTS
Balog's Bog		Littlefields	
Bound Brk (Quivett)		Myricks	Nutrients, DO, Plants, Turbidity, Chlorophyll
Calf Field		Mud	Plants?
Dark Bottom		No Bottom	
Ed Snow		Owl	Nutrients, DO, Chlorophyll
Freeman		Rafe	
Girl Scout	Nutrients, Plants	Round	
Grassy		Ruth	
Grassy Nook		Tucker's	
Island (Buggy Whip)		Vesper	
Keeler	Turbidity	Widgeon Hole	Nutrients
Lee's	Nutrients, Plants		

Brown – Incidents of algae blooms noted in the past, Green – No impairment

Brewster Ponds Impairment – Large Ponds

LARGER PONDS	IMPAIRMENTS
Bakers	
Black	Nutrients
Blueberry	Nutrients, DO, Plants
Cahoon	Plants?
Canoe	Nutrients, Plants
Cliff	DO
Cobbs	Nutrients, Plants, Chlorophyll
Elbow	Nutrients, DO, Plants
Flax	DO
Greenland	Plants?
Griffiths	Nutrients, Plants
Higgins	
Little Cliff	

LARGER PONDS	IMPAIRMENTS
Long	DO, Chlorophyll
Lower Mill	Nutrients, Chlorophyll
Mill	Turbidity
Pine	
Schoolhouse	Turbidity, Chlorophyll
Seymour	Nutrients, Chlorophyll
Sheep	
Slough	
Small's	Turbidity, Chlorophyll, Plants
Smith	Nutrients, Turbidity, Chlorophyll
Sol's	Nutrients, DO, Plants
Upper Mill	Turbidity, Chlorophyll
Walker	Nutrients, Plants, Turbidity, Chlorophyll

Brewster Pond Ecology - The Eutrophication Process



Eutrophication

Classification of Lakes

Oligotrophic

Cold, Deep, Low Nutrients



Mesotrophic

Increasing in Nutrient Load



Eutrophic

Shallow, Warm, High Nutrient Load

Pond Trophic Status from SMAST Data 2001-2007

Need to take these evaluations with caution because the data age. Some conclusions do not match current visual observations.

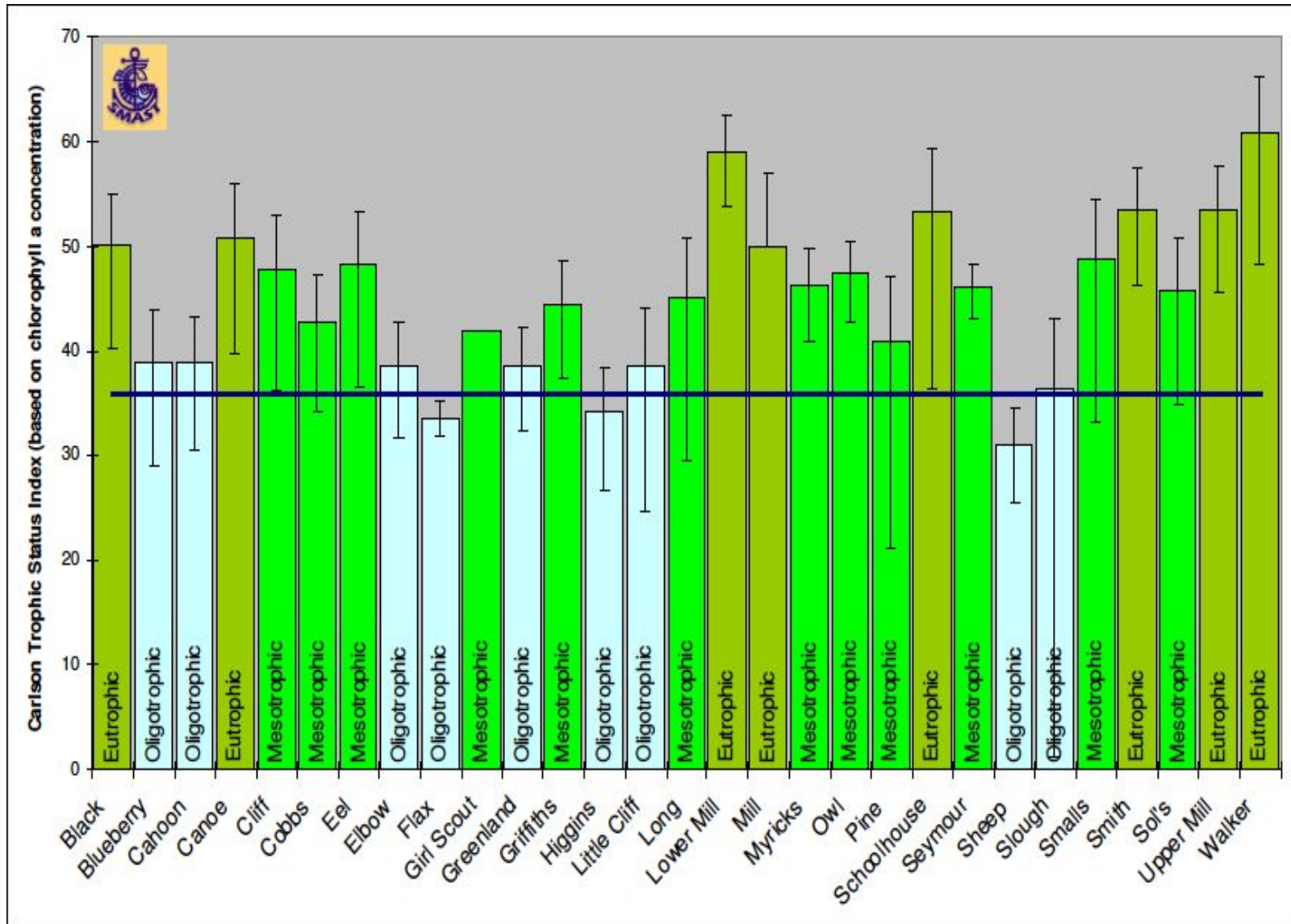


Figure IV-1. Trophic Status Index (TSI) in Brewster Ponds 2001-2007

Phosphorus - The Key Limiting Nutrient

(though nitrogen also impacts type and quantity of plants and algae)

Source	Phosphorus Contributors	Seasonality	Control?
Storm runoff	Lawn fertilizer, road salts, animal waste, vegetation	Occurs all year	Significant control
Groundwater	Septic systems, lawn fertilizers	Highest in summer when population is high	Significant but difficult
Surface streams	Inlet streams in any, cranberry bog drainage (may include fertilizers)	Highest in rainy years, high GW table; bog drainage early spring	Depends on upstream situation
Birds	Bird droppings	Low in winter	Low control
Vegetation deposition	Leaves, twigs, pollen falling in water	High in autumn	No control
Rain & snow deposition	Particulates washed by rain (from road dust, power plants, etc.)	Varies some year to year	No control

Note: Cape soil is very low in phosphorus so generally does not leach much phosphorus to rain or ground water

Pond Phosphorus Mass Balance

Understanding the balance is critical to determine what to do



Bird waste

Rain deposition

Deposition of vegetation (leaves, etc.)

Storm runoff in

Surface flow in

Groundwater flow in

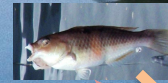
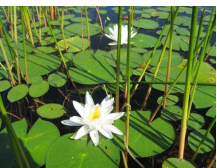
Uptake and release by water plants and algae

Deposition to and uptake from sediments

Uptake and release by fish and other fauna

Surface flow out

Groundwater flow out



Phosphorus Accumulation in Ponds Over Time

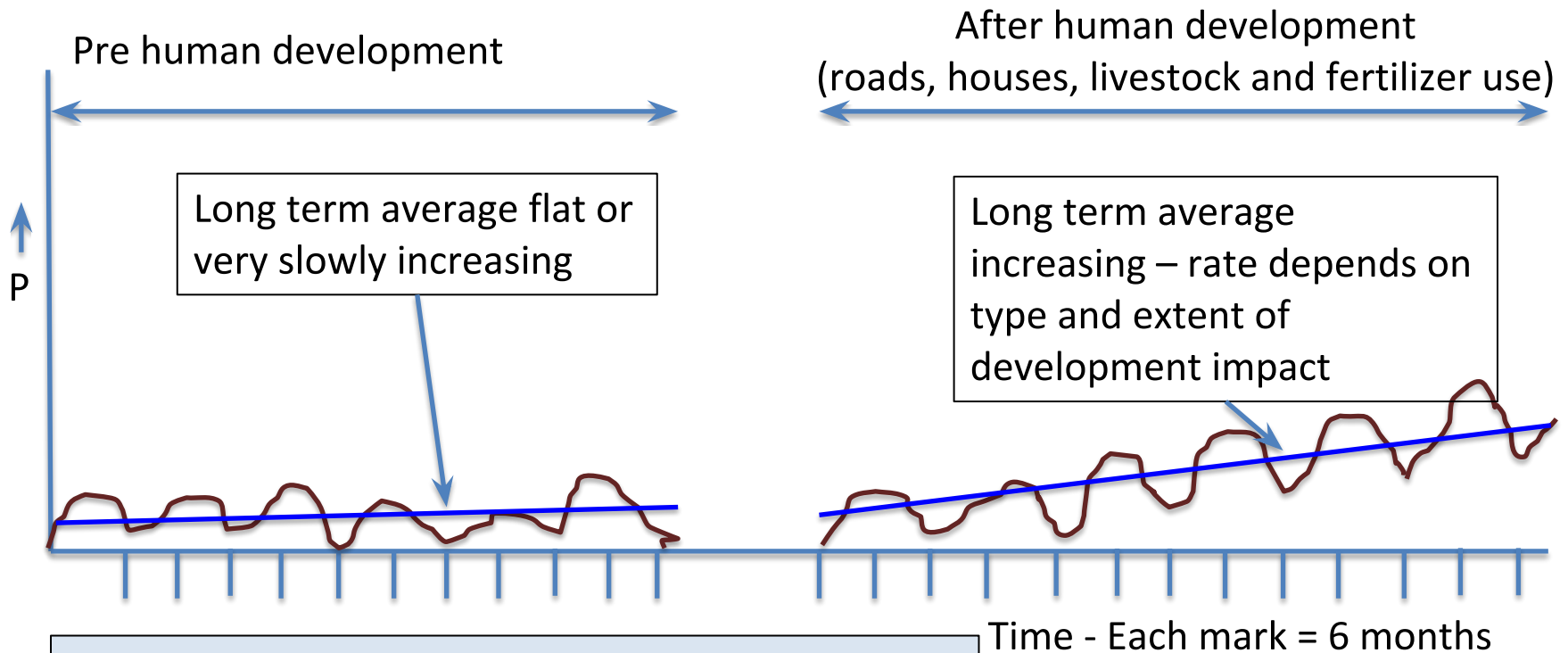
Natural Phosphorus Sources:

- **Leaves, needles, vegetation detritus**
- Birds
- Groundwater inflow
- Volcanic ash deposition

Human Phosphorus Sources:

- **Road runoff**
- **Septic tanks**
- **Livestock**
- **Fertilizer**
- Acid rain
- Pets

(Blue – common major sources of phosphorus)



Bottom sediments store P from season to season, resulting increased water concentrations in warm seasons when P is released from sediments

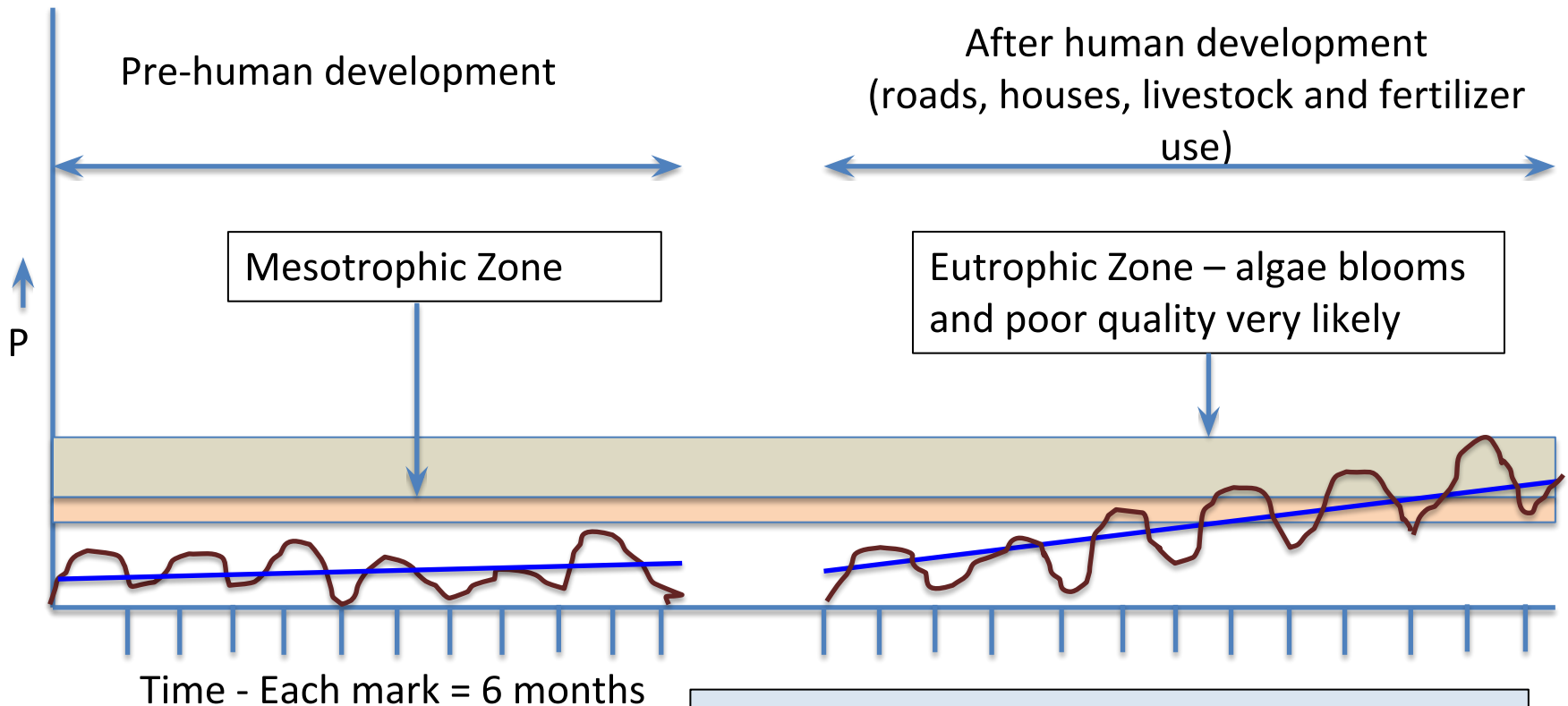
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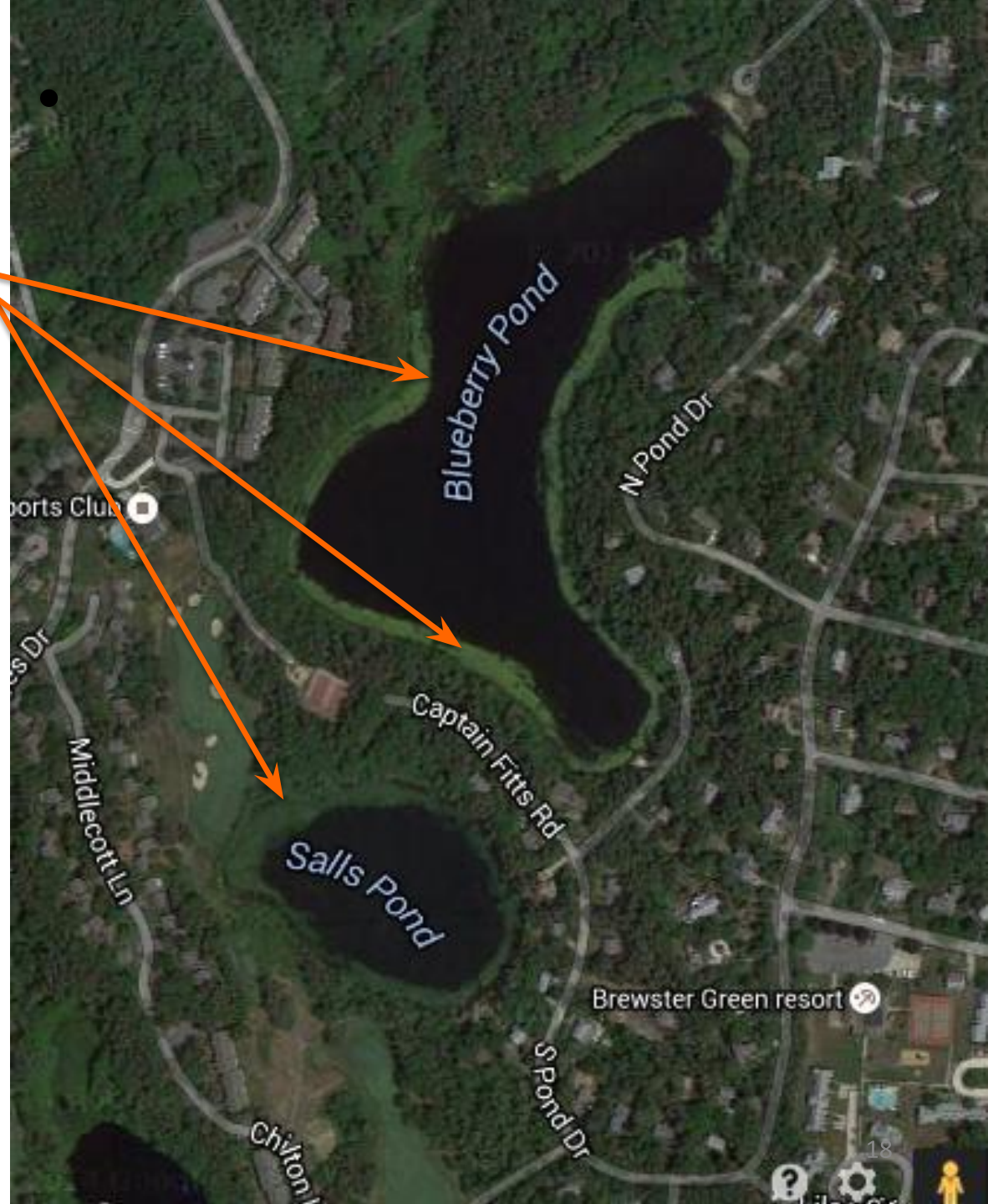


Problems develop when P rises to Eutrophic Zone – even if just in summer

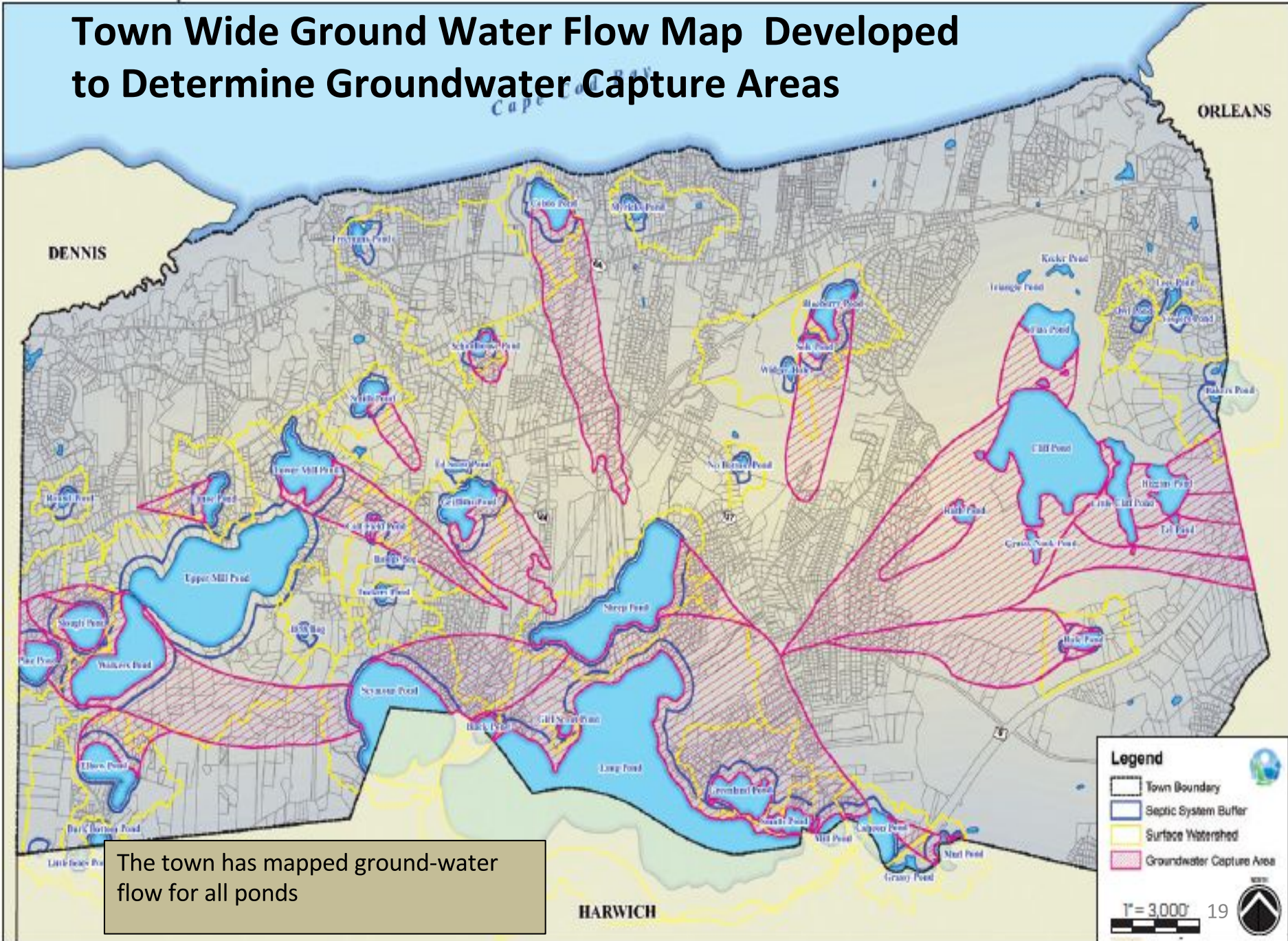
Macrophytes (water plants)

Note ring of green around ponds

- Some patches are normal, a complete dense ring is not
- May also float beneath surface (e.g. milfoil)
- Classified as a nuisance plants if in excess
- Cause: excess nutrients, just like algae
- Macrophytes compete with algae for nutrients
- Removal before phosphorus is addressed may exacerbate algae risks



Town Wide Ground Water Flow Map Developed to Determine Groundwater Capture Areas



The town has mapped ground-water flow for all ponds

Legend

- Town Boundary
- Septic System Buffer
- Surface Watershed
- Groundwater Capture Area

Scale: 1" = 3,000'

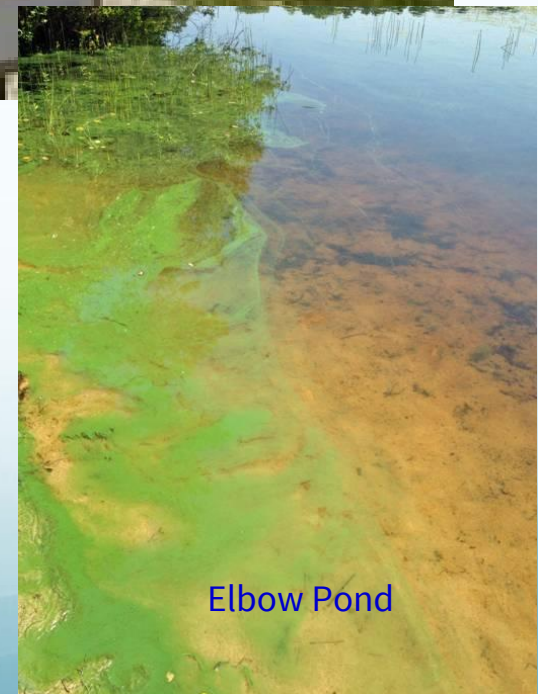
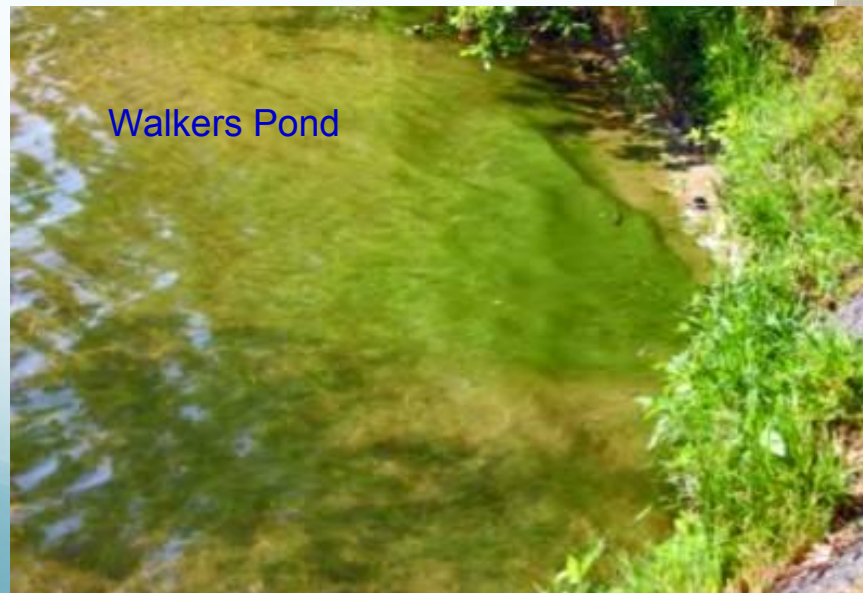
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Only Four Ways to Address Phosphorus in our Ponds

- 1) **Reduce** inputs to below outflow levels (i.e. prevention)
 - **Essential to achieve long term success**
 - Focus on controllable sources: septic systems, fertilizer use, storm runoff, pets/livestock
- 2) **Remove** phosphorus stored in sediments
 - Macrophyte harvesting
 - Dredging of sediments and vegetation at bottom
- 3) **Aeration**
 - Prevents anoxic zones at bottom, decreasing P release from sediments
 - Improves DO throughout pond, improving overall water quality
- 2) **Inactivation**
 - Most commonly by use of alum
 - Precipitates P into biologically unavailable solid that settles to bottom
 - Quick and effective in short term, but with limited longevity

A Growing Concern: Harmful Algae Blooms (HABS)

- Increasing incidents of cyanobacteria (blue/green algae) blooms
- Some HABS produce harmful toxins
- Mostly in late summer and fall – warm water conditions.



Other Threats to our Ponds

- Excess nutrients are not the only problem:
 - Mercury in native fish
 - Invasive species
 - Surface runoff
 - “Compounds of emerging concern”
 - Other human behaviors
- What goes into the ground and the air ends up in the water.



Sheep Pond Ice Fishing Detritus



Blueberry/ Sol's Pond Water Quality Improvement Planning

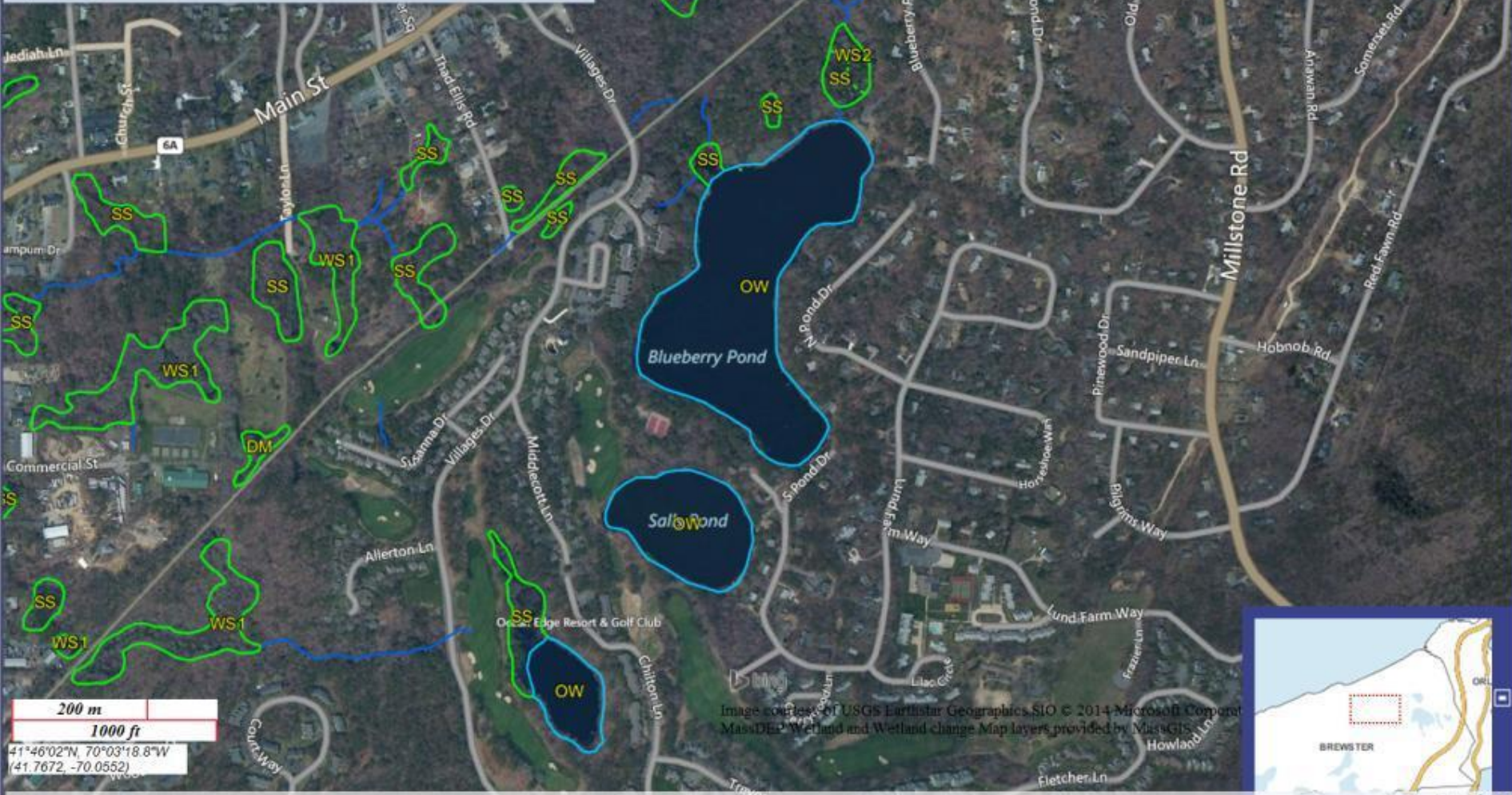
Summary Presentation: July 2016

Marty Lucenti, MVA
Jan McGann, BHPOA
Mike Medirous, OE

Blueberry Hills Property Owner's Assoc.
Millstone Village Assoc.
Ocean Edge Resort Inc.
Save Blueberry & Sols Pond
Organization



Map Tools



Legend:

- OW= Open water
- SS= Schrub Swamp
- WS1= Wooded Swamp Deciduous
- WS2= Wooded Swamp Coniferous

Lines:

- Blue=Shoreline
- Green=Apparent Wetland Limit
- Dark Blue=Hydrologic Connection



Purpose

Improve the water quality and habitat surrounding Blueberry and Sol's Pond by short term preventive and remedial measures while collecting load details necessary to take longer term corrective action

Plan Objective



Improve Recreational Uses:

- Swimming
- Fishing
- Boating

Reduce Light Pollution

Reduce Noise Pollution

**WHY: Doing nothing means uses
above will deteriorate**



Millstone Village Catch Basins (8/16/2014)

LIVE TRAFFIC

Blueberry Pond

Known Runoff Issue (BCT owned)

Total = 30

End of Capt Fitts

Swale (Oct. 2014)

151 X

137 X

122 X

Cherrystone Near Unit D31 X

4 X

Clubhouse Registration Near Playground

X X X X X X X X

Lynann Ct X

Across From Unit D90/29 X

310 X

Diversey X

148 X

469 X

452 X

110 X

280 X

217 X

X

X

X

X

X

X

X

X

X

X

X

X

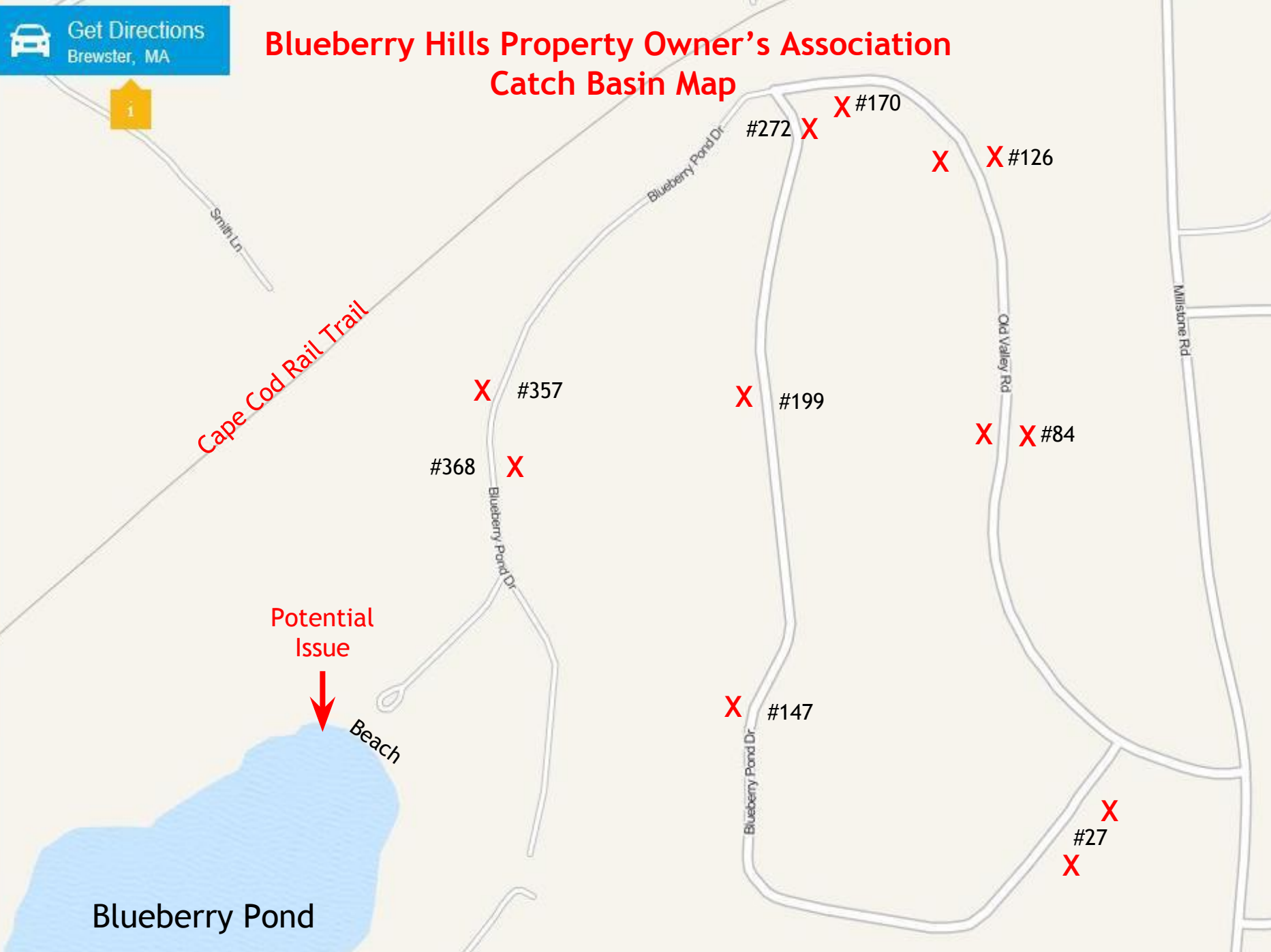


Get Directions
Brewster, MA

Blueberry Hills Property Owner's Association Catch Basin Map

1

Cape Cod Rail Trail



Potential Issue



Beach

Blueberry Pond

X #357

#368 X

X #199

X #147

X #27
X

#272 X X #170

X X #126

X X #84

Smith Ln

Blueberry Pond Dr

Blueberry Pond Dr

Old Valley Rd

Millstone Rd

Leverage/ Partnerships



- BHPOA, MVA, and OE have 2 ponds (Sol's & Blueberry)
 - Ocean Edge borders both ponds
- Both ponds are impaired (phosphorous & dissolved oxygen issues)
- Current pond conditions are a product of existing water quality bylaws/ regulations/ development
- Blueberry & Sols Ponds have no public access (therefore, low public funding priority)
- Ocean Edge is the largest tax payer in town and has influence
 - Associations have 225+ residences - they also have influence
- MVA, BHPOA and Ocean Edge have a common interest - water quality (for recreational purposes)
- Align our local pond efforts with the Brewster Ponds Coalition
- Continue to pursue other water quality initiatives/ funding and leverage our accomplishments with other pond organizations - share best practices.

The most interested parties own property on or near the ponds

Activities Matrix/ Agenda



By-Laws

BPC Participation/ Integration
Dock Policy Compliance
Bylaws Update

Funding

Annual Yard Sale
Articles of Incorporation
OE Partnership
501C(3)

Education

Comm Plan/ Data Base
Email Flyers - Tips
List of Recommended Products
Aquatic Study/ Training

Analysis: See Management Plan which follows in this presentation

Water Quality

Identify Issues
Support BPC Initiatives
List of Recomm. Products

Fertilizer reduction (<300')
Individual Property Owners
Maintain Catch Basins
Install Swales/ Rain Gardens

Identify Issues/ Mitigations
Pets - waste removal

Mitigation Measures

Septic

Runoff

Birds

Light Pollution

Spotlight Limitation
Low Voltage Down Lights
Use of motion sensors

Noise Pollution

Signage
Observe sunrise/sunset only activities
Horsepower Limitation

Habitat



The swale/ Rain Garden

Swale Funding: SBP Fund
Rain Garden/s: HOAs



Side view - from beach area

Example of runoff remedial action. Consider also for North Pond runoff issue on Brewster Conservation Trust property



Middle from the street



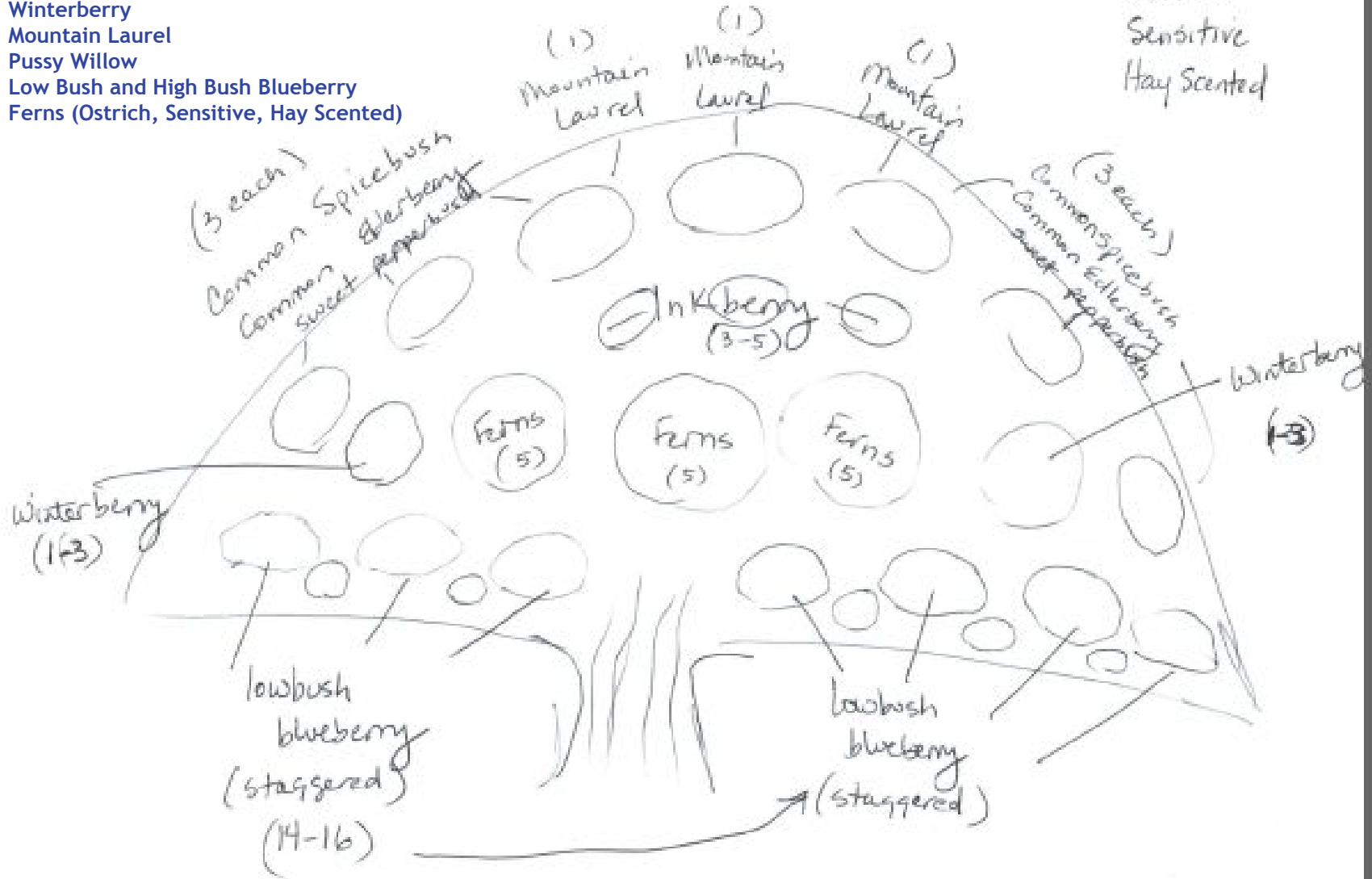
Rain Garden Plants:

- Sweet Pepper Bush
- Oak Leaf Hydrangea
- Inkberry
- Winterberry
- Mountain Laurel
- Pussy Willow
- Low Bush and High Bush Blueberry
- Ferns (Ostrich, Sensitive, Hay Scented)

Coordinator: Nancy Bentivegna
Please coordinate all plant donations

Ferns (15)

- Ostrich
- Sensitive
- Hay Scented





Accomplishments



- Formed joint Millstone/ Blueberry Hills Home Owner's Assoc. Organization
- Completed a settlement agreement with Ocean Edge Resort Inc.
- Partnered with Ocean Edge Inc. to pursue water quality improvements
- (4) new MVA Catch basins installed - Millstone Betterment (\$20K)
- (26 - MVA; 12 BHPOA) Catch basin clearings/ maintenance (annually)
 - 42 Total catch basins
- (1) Swale/ Rain Garden (\$5K)
- (2) Yard sales (fund raising annual events) (raised \$13K)
- Signage posted at Millstone Beach
- Water Quality Improvement Plan - (Initiated - On Going)
 - Objective: Identify and select from technically viable courses of actions (options)
- Initiated stormwater runoff project on North Pond Drive

What can we do together?

- We can speak for the Ponds!
- Raise awareness throughout our community (residents and visitors).
- Collect quality environmental data and monitor trends of pond health.
- Lead and help organize projects to protect and improve ponds.
- Assist with permitting and regulatory processes.
- Enjoy and promote our beautiful natural resources!



Tools and Resources: How the Brewster Ponds Coalition Can Help

- Pond Waterfront Improvement Guide
- Funding for neighborhood projects
- Regulatory engagement:
 - Stormwater
 - Septic systems
 - Pond remediation projects

Pond Waterfront Improvement Guide

Prepared by AmeriCorps Member Ben Howard

and

Gwen Pelletier, Jan McGann, & John Keith
of the Brewster Ponds Coalition

7/20/2016



A Funding Option for Neighborhood Projects

As a 501(c)3 charitable organization, the Brewster Ponds Coalition is willing to accept tax-deductible donations for specific pond improvement projects and hold those funds in a restricted account.



Basic requirements:

- The recipient organization must be a non-profit entity. (The BPC cannot accept funds that benefit individuals or for-profit organizations.)
- Funds collected must be used for purposes that protect or improve the health of Brewster's Ponds.
- Neighborhood organizations and the BPC document the purpose, expected time frame, and other details in a simple agreement.
- The BPC will disperse funds to the neighborhood association as the project moves forward.

Regulatory Engagement

- Active participation in Town and regional developments affecting ponds and groundwater.
- Advocating for sound, science-based policies.
- Seeking involvement of neighborhood leaders.



BPC Events, Programs and Volunteer Opportunities



- 2016 Events
 - Healthy Ponds Art Fest at the Cape Cod Museum of Natural History
 - PALS volunteer reception and program review
 - Beautify Brewster Volunteer Clean-up Day
 - Weed Watchers Workshop
 - Brewster Conservation Day
 - Ponds & Neighborhood Summit
- Upcoming Programs
 - **August 13 – Brewster Ponds Coalition Annual Meeting**
 - August 20 – Bike to Ponds Summer Celebration
- More to Come!



Thank You!

For more information or to join us:

Go to

www.brewsterponds.org