

# Freshwater Initiative

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Stakeholder Meeting 2 – Sagamore Lens

OLD SANDWICH TOWN HALL | APRIL 23, 2024



CAPE COD  
COMMISSION

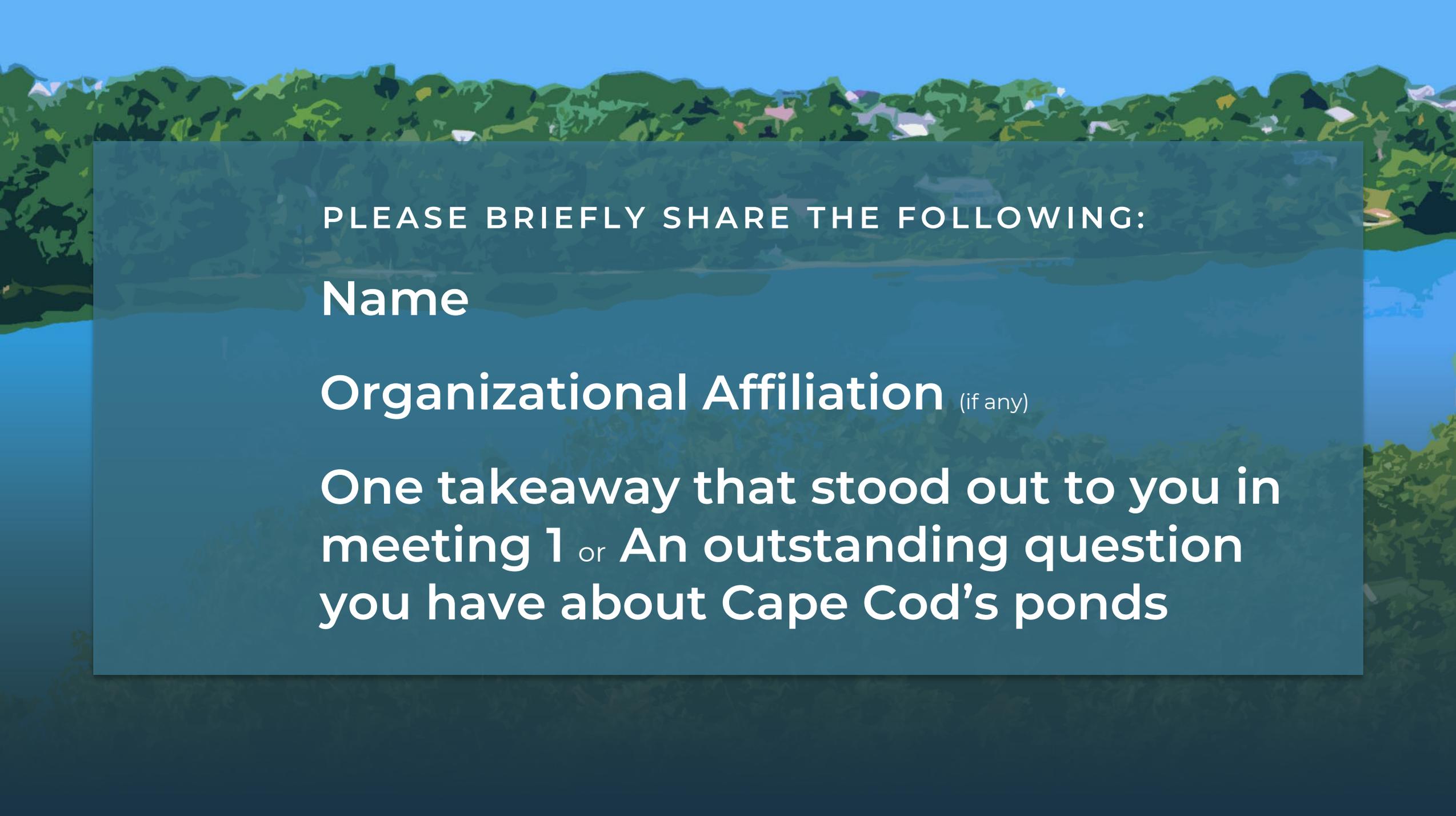
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**FRESHWATER  
INITIATIVE**

# Agenda

## Meeting 2

- Introductions
- Defining the Problems
- Strategies
- Projects
- Priorities
- Next Steps



PLEASE BRIEFLY SHARE THE FOLLOWING:

**Name**

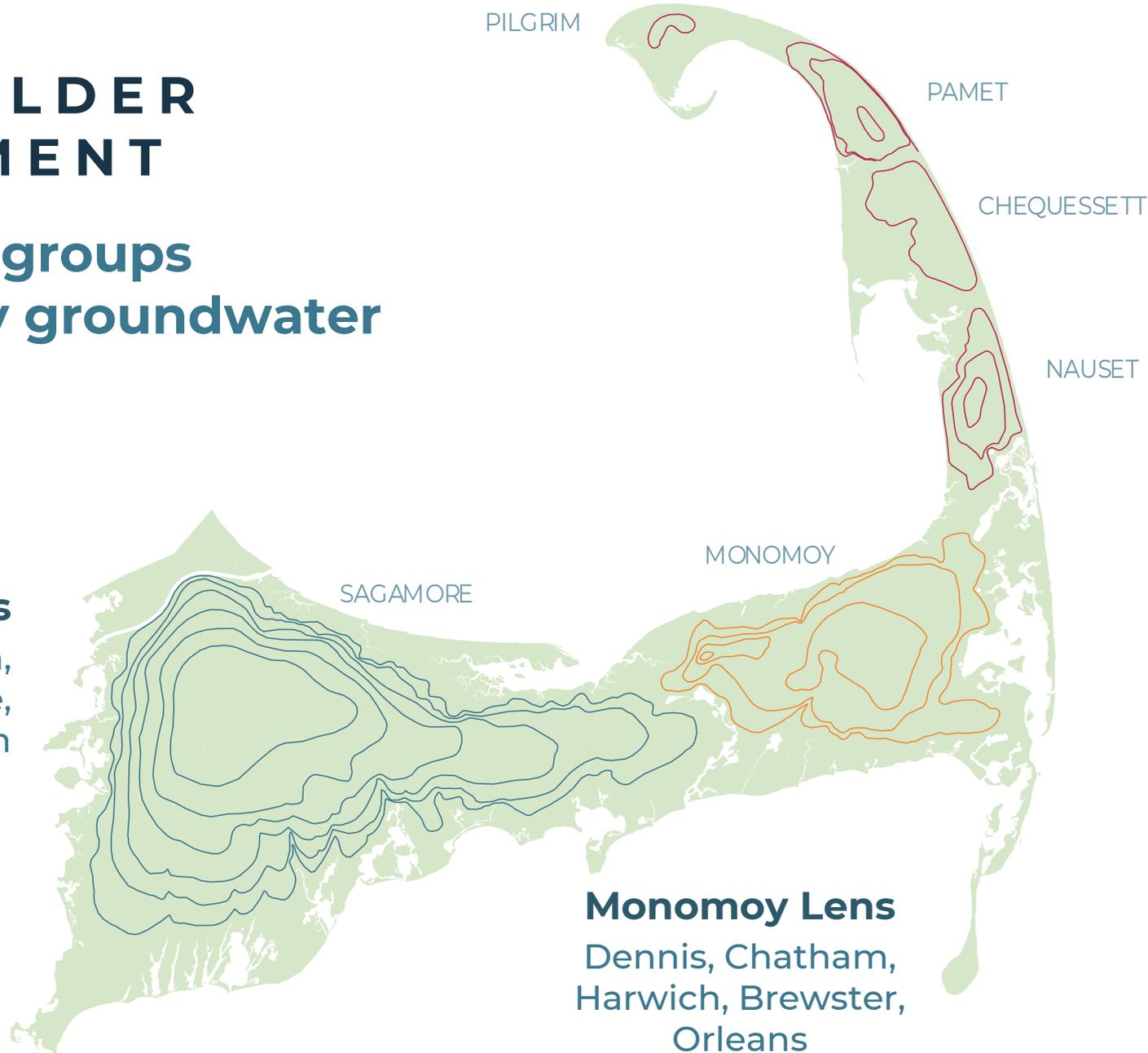
**Organizational Affiliation** (if any)

**One takeaway that stood out to you in meeting 1 or An outstanding question you have about Cape Cod's ponds**

# STAKEHOLDER ENGAGEMENT

Stakeholder groups  
organized by groundwater  
lenses

**Sagamore Lens**  
Bourne, Falmouth,  
Sandwich, Mashpee,  
Barnstable, Yarmouth



**Outer Cape  
Lenses**  
Eastham,  
Wellfleet, Truro,  
Provincetown

**Monomoy Lens**  
Dennis, Chatham,  
Harwich, Brewster,  
Orleans

# Stakeholder Meetings

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MARCH 19 AND 20

Meeting 1  
**Defining the Problem**

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Establish a shared understanding of freshwater systems, the Freshwater Initiative, and stakeholder perspectives

APRIL 22 AND 23

Meeting 2  
**Exploring Strategies and Priorities**

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Highlight existing pond management strategies, review breadth of potential strategies and identify priorities, discuss future pond management prioritization

JUNE 3 AND 4

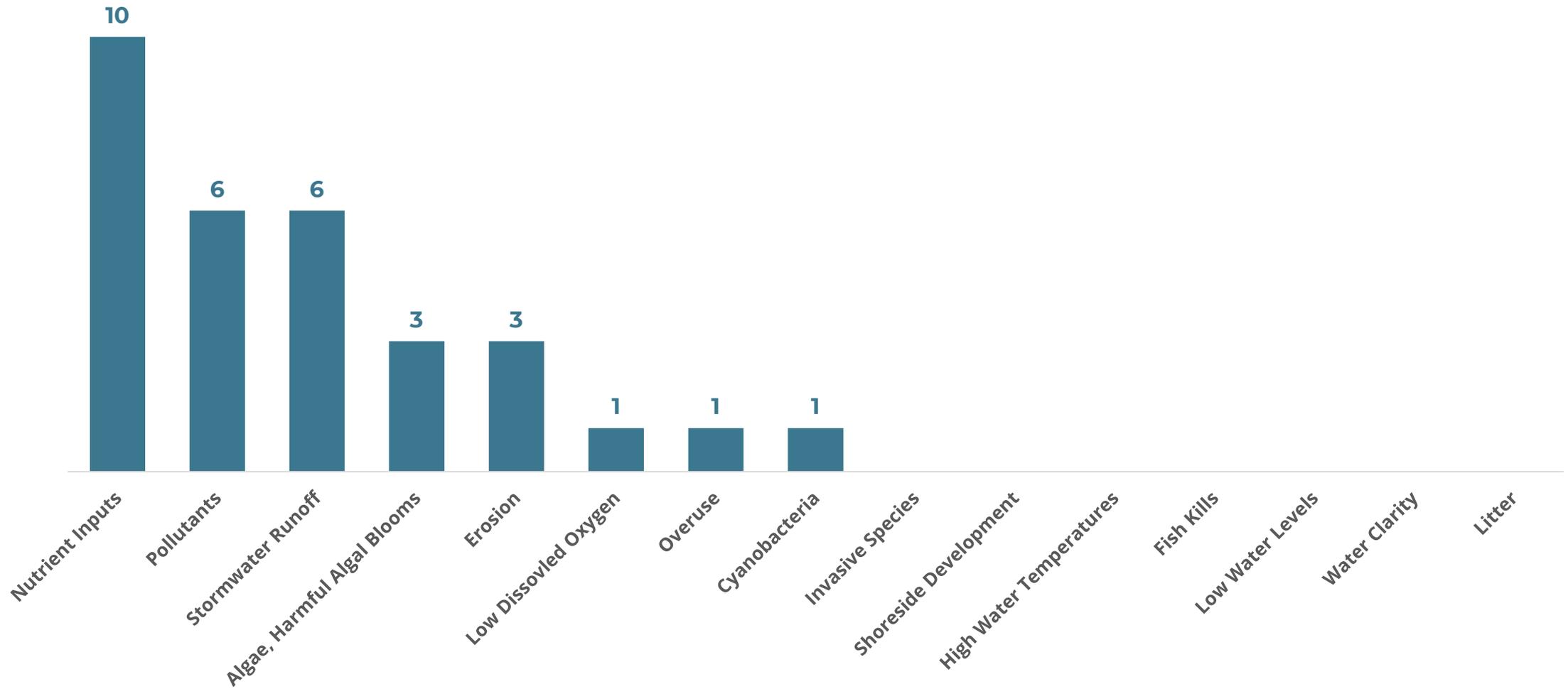
Meeting 3  
**Reviewing the Implementation Plan**

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Discuss recommendations and implementation plan; solicit stakeholder feedback

# Sagamore Lens Meeting 1

## Top Threats to Freshwater Pond Health



# | THE PROBLEMS

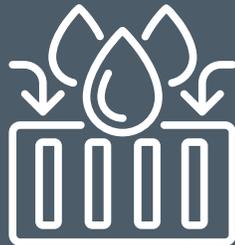
## CLIMATE CHANGE



*Average ambient temperatures have increased 2.9°F since 1895*

*Projected 4.6-8.2°F increase by the end of the century*

## INCREASED STORMWATER



*55% increase in heavy precipitation since 1958*

*Projected 2.5 more  $\geq 1$ " precipitation days by the end of the century*

## EXCESS NUTRIENTS FROM STORMWATER, FERTILIZER, AND WASTEWATER

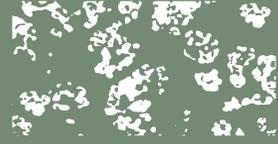


*46 of the 50 monitored ponds are at or above the ecoregion threshold for total phosphorus*

# | POND IMPACTS



.....  
WATER COLUMN  
MIXING



.....  
ALGAE BLOOMS



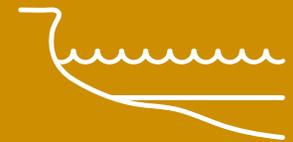
.....  
INVASIVE SPECIES



.....  
LOW DISSOLVED  
OXYGEN



.....  
HABITAT IMPACTS



.....  
EROSION

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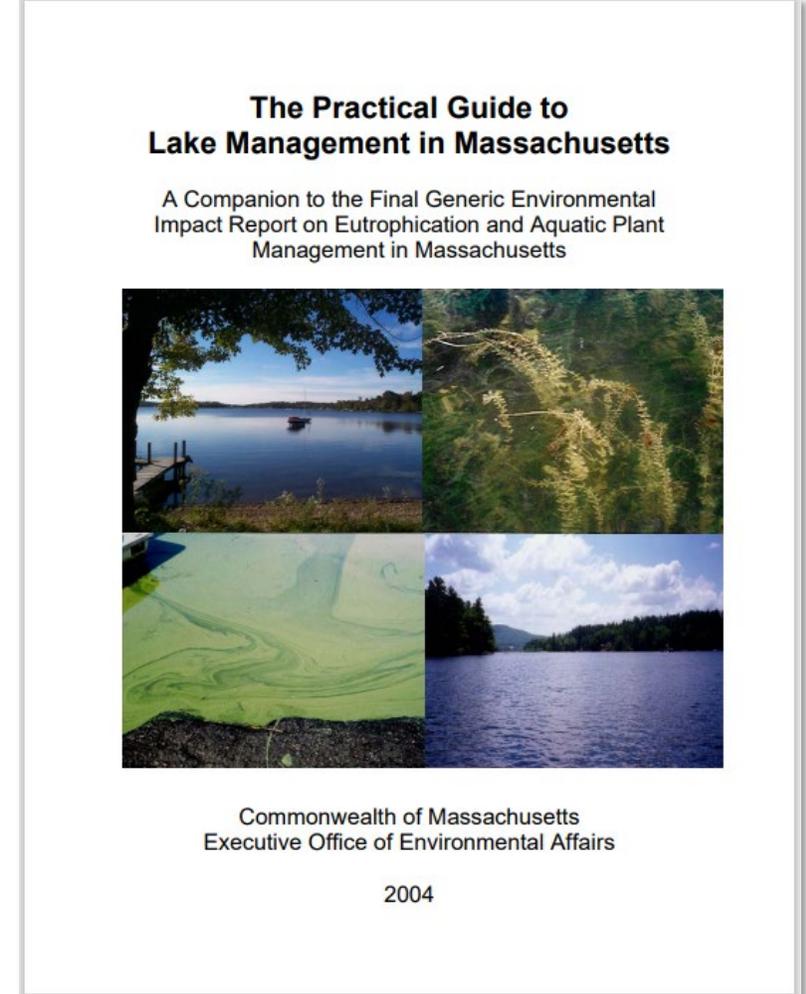
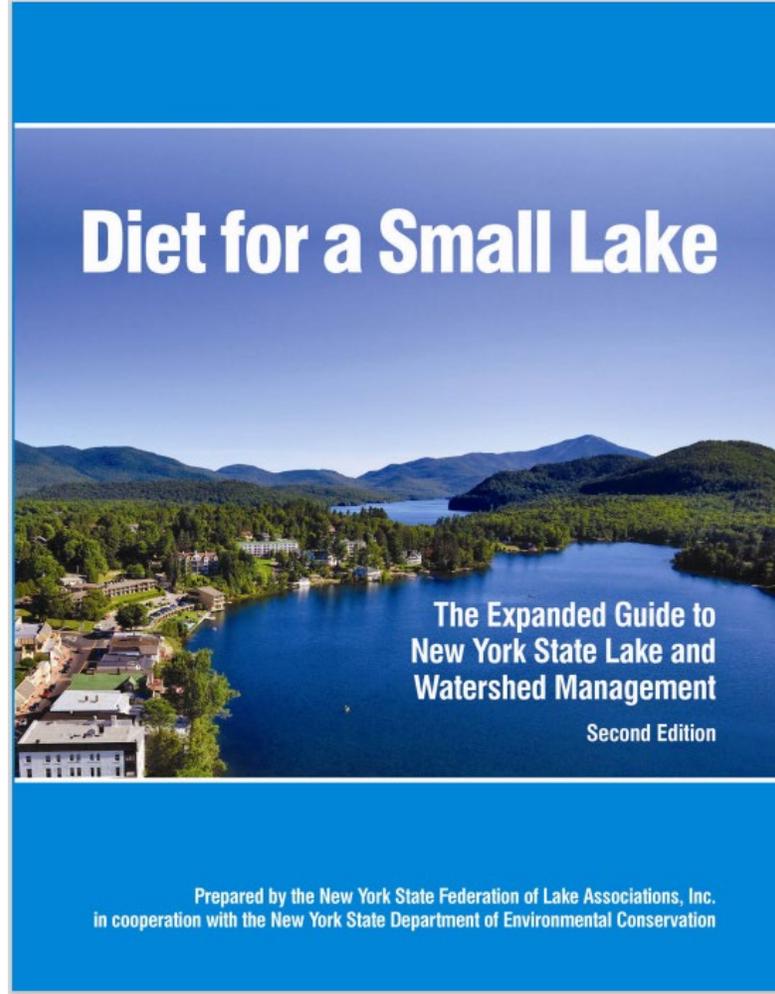
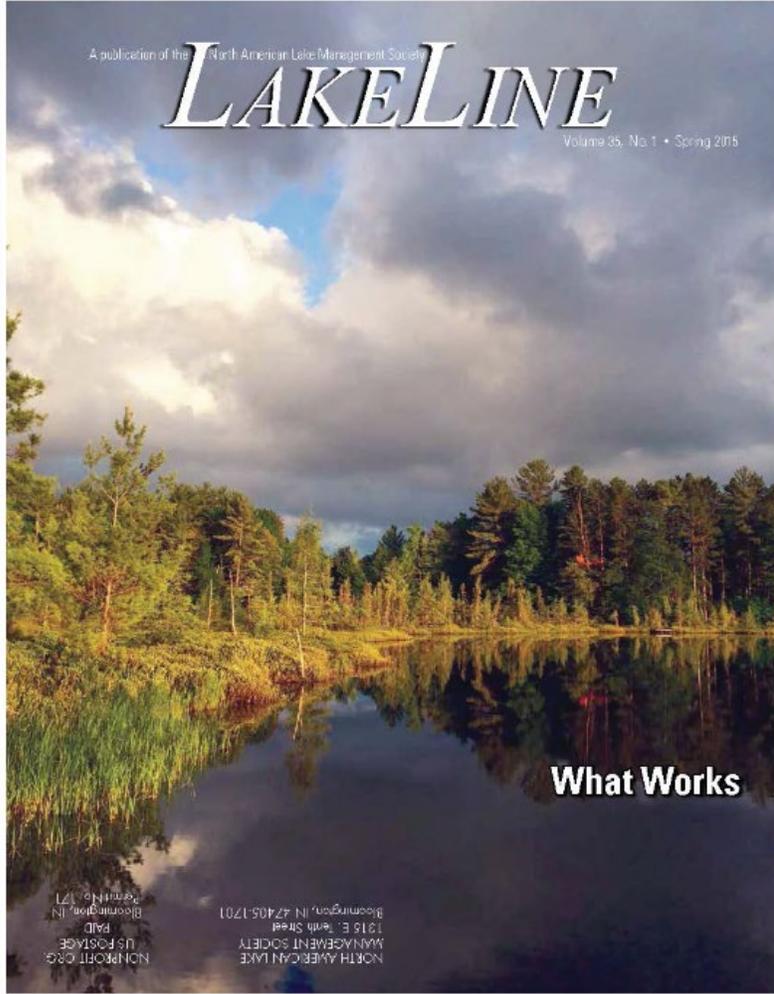
## THE PROBLEMS AND IMPACTS

*Are there other impacts we haven't captured?*

*Are there other long-term planning considerations we should be including?*

## STRATEGIES DATABASE

Developing a pond-specific strategies database that includes a range of technologies, regulatory and voluntary options, and management approaches for protecting and restoring pond water quality



# STRATEGIES RESEARCH 208 Plan Technologies Matrix



# STRATEGIES RESEARCH Freshwater Pond Restoration Projects Viewer

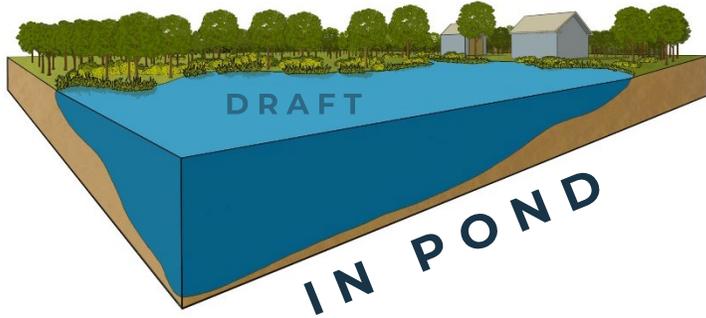
## POND RESTORATION PROJECTS

Find address or place

- All Management Approaches
- Freshwater/Pond Area Regulation
- Vegetation Management
- Nutrient Management
- Sediment (Watershed) Management
- Algae Management

# POND STRATEGIES DATABASE

## SCALE OF APPROACHES



Sediment, nutrient, algae, and vegetation management approaches



Vegetated buffers, fertilizer management, septic setbacks, I/A septic systems



Comprehensive watershed planning, land use regulations, land protection, advanced wastewater treatment

THREATS  
ADDRESSED



Excess  
Nutrients



Pollutant  
Inputs



Algal  
Blooms



Erosion



Invasive/Nuisance  
Species

# OVERVIEW OF AVAILABLE STRATEGIES

44 STRATEGIES GROUPED INTO 6 MANAGEMENT APPROACHES



**Planning & Regulations (7)**



**Algae Management (5)**



**Nutrient Management (16)**



**Vegetation Management (7)**



**Sediment Management (8)**



**Fisheries Management (1)**

# 44 STRATEGIES GROUPED INTO 6 MANAGEMENT APPROACHES



## Planning & Regulations

- Pond Use Planning & Regulations
- Land Use Planning & Regulations
- Watershed Planning
- Land Protection
- Freshwater Ponds District of Critical Planning Concern (DCPC)
- Comprehensive Wetland Restoration
- Education & Outreach



## Sediment Management

- Biological Sediment Digestion
- Dredging
- Reverse Sediment Layering
- Sediment Capping
- Erosion Control
- Stormwater Management (Structural)
- Stormwater Management (Non-Structural)
- Stormwater Management (Source Controls)



## Nutrient Management

- Pondshore Buffer Plantings
- In-Pond Vegetation Planting
- Floating (Treatment) Wetlands
- Freshwater Aquaculture
- Waterfowl Management
- Hydraulic Control
- Hypolimnetic Withdrawal
- Circulation
- Oxygenation
- Phosphorus Inactivation
- Permeable Reactive Barrier
- Biochar
- Innovative / Alternative (I/A) Septic System
- Composting Toilets
- Urine Diversion Toilets
- Advanced Wastewater Treatment



## Vegetation Management

- Vegetation Harvesting
- Benthic Barriers
- Shading
- Herbicide
- Biocontrol
- Water Drawdown
- UV-C Light Exposure



## Fisheries Management

- Liming



## Algae Management

- Algaecide
- Ultrasonic
- Biological Control
- Algae Harvesting
- Shading

## Technical Advisory Group

### **Non-Profit & Academic**

*Association to Preserve Cape Cod, Rensselaer Polytechnic Institute, UMass Boston, UMass Amherst*

### **Government**

*Cape Cod National Seashore, MA Department of Conservation and Recreation, MA Division of Fisheries and Wildlife, MA Department of Environmental Protection, MA Alternative Septic System Test Center*

### **Consultants**

*Water Resource Services, Fuss & O'Neill, Princeton Hydro, Anchor QEA*



# Pondshore Buffer Plantings

STRATEGY SCALE



### THREATS ADDRESSED

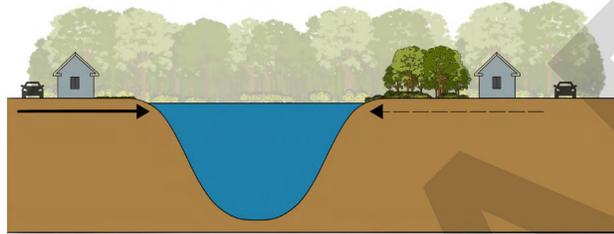
- Excess Nutrients
- Pollutant Inputs
- Algal Blooms
- Erosion
- Invasive/Nuisance Species

### STRATEGY GOALS

- Protect
- Manage
- Rehabilitate

### STRATEGY CO-BENEFITS

- Habitat
- Aesthetics
- Recreation



### CAPE COD APPLICATION

- Permittable in Massachusetts**  
Local review through the Conservation Commission may be required. See a list of potential permits [here](#)
- Implemented on Cape Cod**  
See examples of pond projects implemented on Cape Cod [here](#)
- Listed in 208 Plan Technologies Matrix**  
Learn more about the nutrient management strategies in the Tech Matrix [here](#)

### DURATION OF BENEFITS

- Less than one month
- One season or year
- Multiple seasons or years\*

\*The benefits of pondshore buffer plantings are expected to last many years

### MAINTENANCE REQUIREMENTS

- Monthly
- Annually
- Infrequent\*

\*If appropriate native plantings used, maintenance is expected to be minimal

## DESCRIPTION

Pondshore buffer planting involves the planting of native, beneficial plants within a buffer area along a pond shoreline. It may include enhancing existing pondshore plantings or replacing lawn, invasive species, and impervious surfaces within a certain distance (e.g., 100'-300') of the pond edge with native plants suitable for the pondshore environment. Through pondshore buffer planting, plant roots and associated soils prevent erosion, intercept sediments, absorb stormwater, nutrients and other pollutants and prevent these from entering and degrading ponds.

## ADVANTAGES

- Simple to implement
- Low-maintenance if native plants used
- Enhances pondshore aesthetics and habitat value
- Depending on scale, may provide recreational opportunities

## CONSTRAINTS

- Need to source or grow appropriate plants
- Up-front costs to purchase and install plants
- Plants require monitoring and maintenance
- Competition among plants will affect results



# Pondshore Buffer Plantings



## IMPLEMENTATION

### POTENTIAL ACTORS

- Towns:** Towns can install vegetated buffers on town-managed pondshores
- Private Landowners:** Installing and maintaining vegetated buffers is something the private homeowner can do to protect ponds
- Land Trusts:** Land trusts with pondshore properties can install and maintain buffers as well as providing a supportive role through education
- Pond Groups:** Pond groups can provide a supportive role through education.

### SITING REQUIREMENTS

All ponds, especially those with developed or altered pondshores

### INFORMATION NEEDED

- Shoreline vegetation survey
- Landscape/restoration plan



Credit: Allison Leitch

### IMPLEMENTATION EXAMPLE

A homeowner on Nyes Pond in Falmouth installed a pondshore buffer of native trees, shrubs and perennials. The project required an Order of Conditions from the local Conservation Commission. After the plants were established, the homeowner reported a noticeable increase in bird and insect activity.

### RESOURCES

- The Berkshire Regional Planning Commission developed the [Massachusetts Buffer Manual](#) for MassDEP in 2003. Other states, agencies, and pond organizations have developed buffer guidance including Maine's [Buffer Handbook](#), Vermont's [Guide to Healthy Lakes Using Lakeshore Landscaping](#), and the Southeast New England Program's [Buffer Restoration Guide](#).
- The Massachusetts' Department of Conservation and Recreation's [Lakes and Ponds Program](#) provides related resources.

## COST

### RELATIVE COST

(∞) COST: Variable

### FINANCIAL CONSIDERATIONS

**Cost:** Depends on scale of planting project. Varies depending on extent of planting area, sourcing of desired vegetation, planting method, monitoring level, and labor

**Assessment:** Planning, design, and permitting (if applicable)

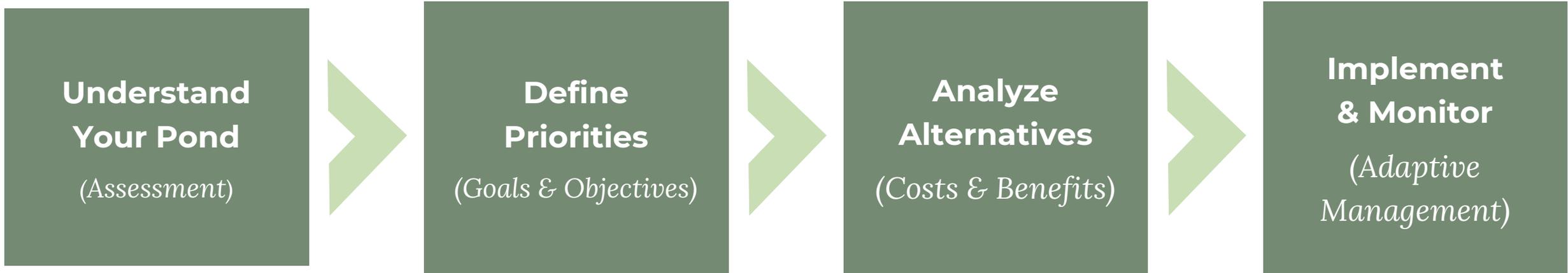
**Implementation:** Cost of plants, equipment and installation costs (rent vs. purchase, hire landscaper or DIY)

**Maintenance:** Monitoring plants, landscape maintenance, and replacement plants, as needed

### POTENTIAL FUNDING SOURCES

- Community Preservation Act
- Capital Budget
- Grants
- Private Funding

# | SELECTING A STRATEGY



## **PRIORITIES**

*When considering pond management strategies, what are your priorities?*

*Cost, impact, time to see results, co-benefits, other?*

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## STRATEGIES DISCUSSION

### STRATEGIES INFORMATION

*Is there other information you need?*



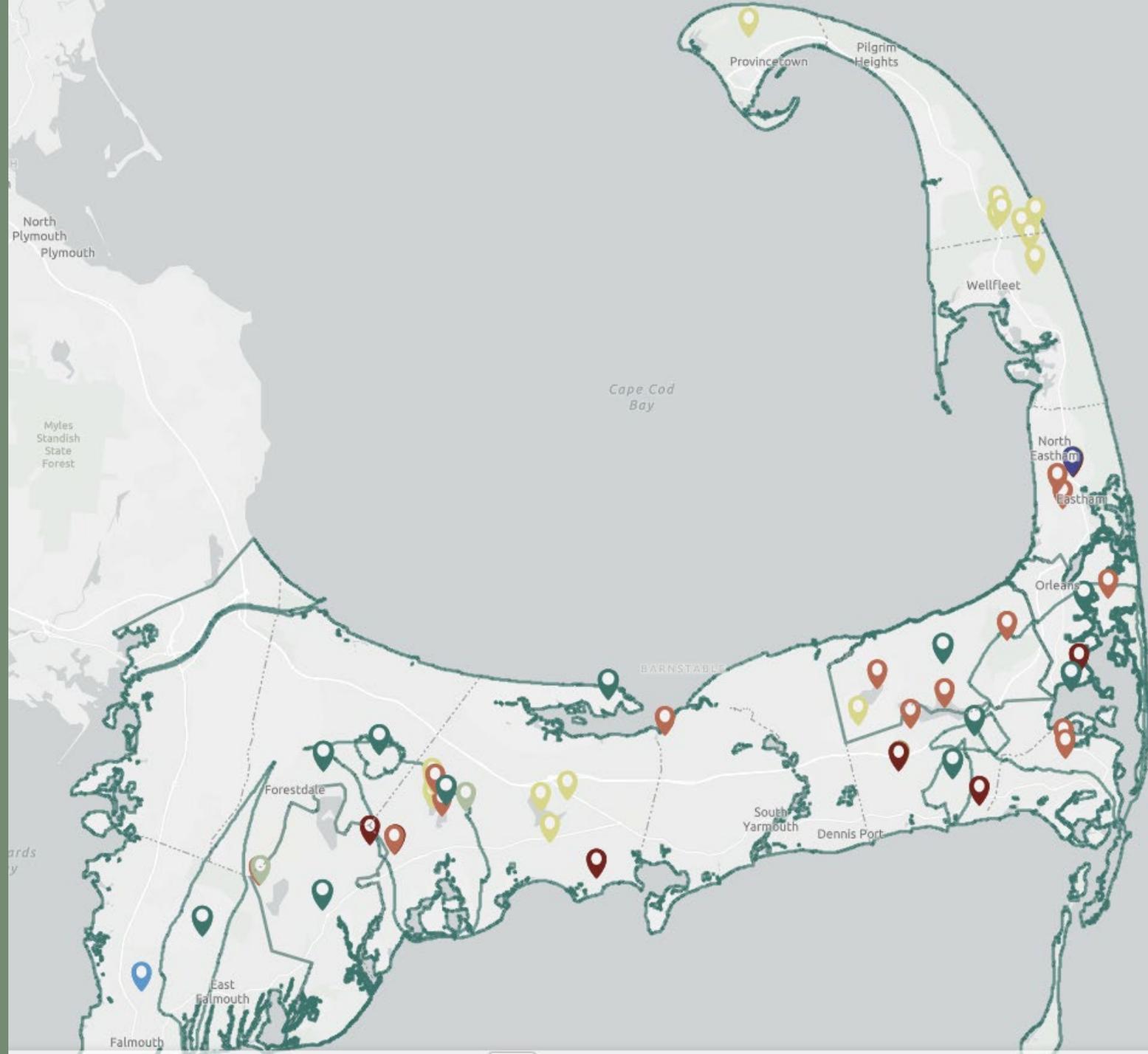
# Pond Management Actions

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# Freshwater Pond Restoration Projects Viewer

A map-based resource showing pond-specific projects, years implemented, and results to help inform further action.

[Freshwater Pond Restoration Projects | Cape Cod Commission](#)



# Pond Restoration Projects Viewer





# POND RESTORATION PROJECTS



Find address or place



 All Management Approaches

 Freshwater/Pond Area Regulation

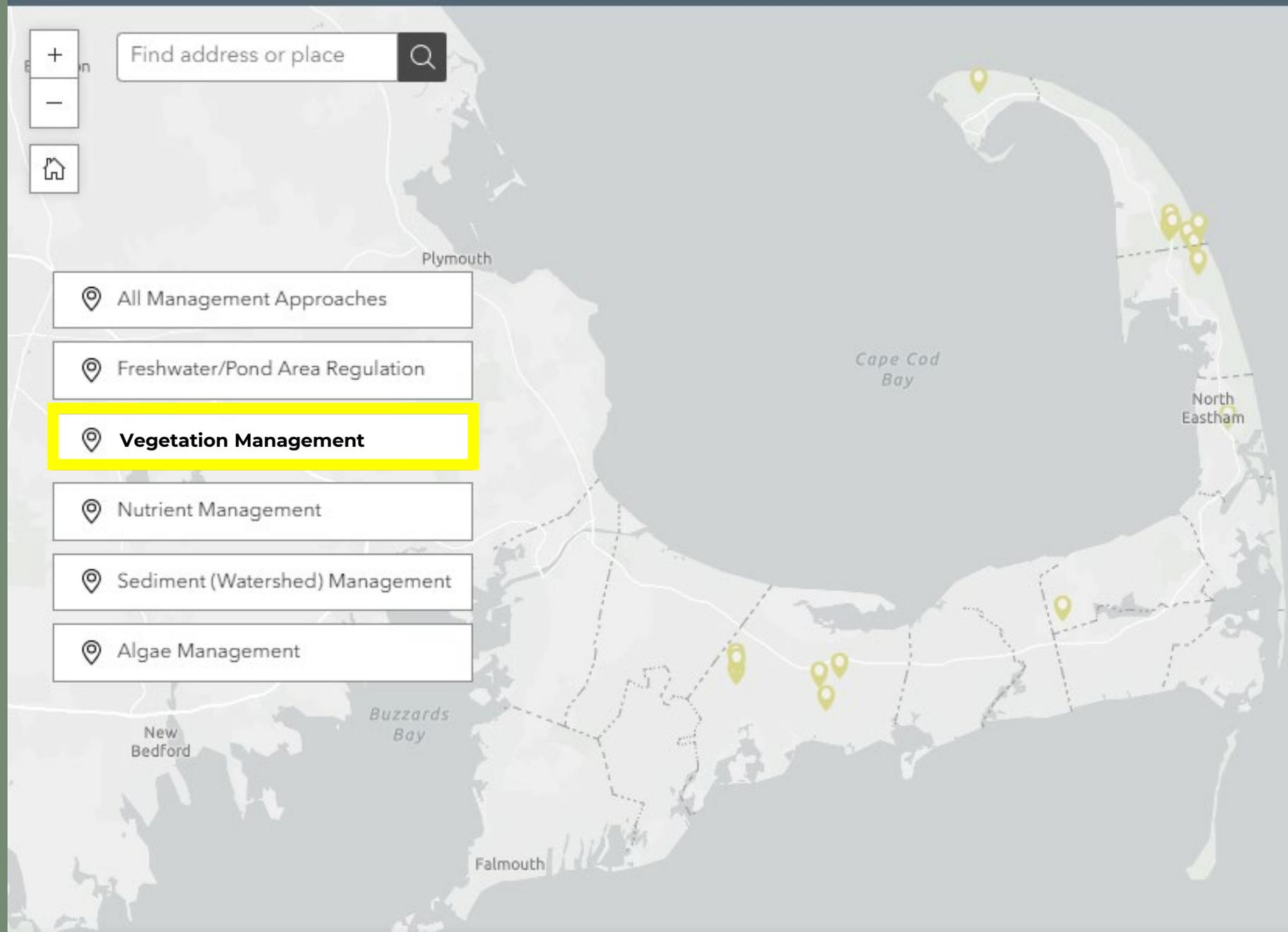
 **Vegetation Management**

 Nutrient Management

 Sediment (Watershed) Management

 Algae Management

Select a specific type of management





# POND RESTORATION PROJECTS



Find address or place

📍 All Management Approaches

📍 **Freshwater/Pond Area Regulation**

📍 Vegetation Management

📍 Nutrient Management

📍 Sediment (Watershed) Management

📍 Algae Management

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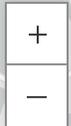
**Peters Pond Sandwich** 

🔍 Zoom to

Management Approach	Freshwater/Pond Area Planning/Regulation
Project Strategy	Use Restriction - Personal Watercraft Ban
Problem Addressing	Safety Concerns
Results	The Town of Sandwich banned the use of personal watercraft on



# POND RESTORATION PROJECTS



All Management Approaches

Freshwater/Pond Area Regulation

Vegetation Management

**Nutrient Management**

Sediment (Watershed) Management

Algae Management

Sandwich

Forestdale

A Crane Pheasant Wildlife Management Area

## Mystic Lake Barnstable



Zoom to

Management Approach

Nutrient Management (Inactivation)

Project Strategy

Alum Treatment

Problem Addressing

Algae blooms and decreased water clarity from elevated phosphorous levels (from internal loading), mussel die off

Results

Following treatment, water clarity increased. While chlorophyll data was limited, chlorophyll levels in deep waters generally declined. Phosphorus values at the top of the water column remained high while levels at the bottom were low following treatment. The treatment addressed high levels in the bottom of the pond but did little to reduce levels in the upper strata of the pond.



# Pond Restoration Projects Viewer

Updates and additional projects are needed. To add or edit a pond restoration project go to:

<https://www.surveymonkey.com/r/CapeCodPondProjects>

## Add Or Edit Pond Restoration Projects

### Cape Cod Pond Remediation Project Information Inquiry

#### Cape Cod Freshwater Initiative

To provide a regional resource to track management efforts and share lessons and results about remediation strategies, **the Cape Cod Commission is calling for information on pond remediation implementation projects across Cape Cod.**

Use this form to add information about additional projects not yet included in this regional resource, or to edit the information on projects already featured in the viewer (LINK). You can fill out this survey to add or edit projects as many times as needed.

OK

0 of 33 answered

<https://www.surveymonkey.com/r/CapeCodPondProjects>

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# POND MANAGEMENT ACTIONS DISCUSSION

## TOWN ACTIONS

*Implementation Example: What were the considerations or driving factors in picking a strategy?*

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# POND MANAGEMENT ACTIONS DISCUSSION

## TOWN ACTIONS

*Implementation Example: What were the considerations or driving factors in picking a strategy?*

***What questions do you have about how or why towns chose certain approaches?***

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# POND MANAGEMENT ACTIONS DISCUSSION

## INFORMATION

*Implementation Example: What, in hindsight, do you wish you had asked, considered, or researched?*

*What other information could have been helpful?*

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# POND MANAGEMENT ACTIONS DISCUSSION

## INFORMATION

*What do you see as successes?*

*What worked or didn't work with the strategies?*



# Prioritizing Ponds

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Schoolhouse/Minister's Pond, Eastham

## Potential Criteria for Prioritizing Ponds

- **Pond physical characteristics**
- **Pond water quality**  
(such as TMDL, trophic status, water quality data, bacterial closures)
- **Watershed metrics / CWMP**
- **Prior management actions**
- **Pond ownership and access**  
(such as public/private, public access, amenities eg bathrooms or parking)
- **Sensitive resource areas, habitat**
- **Community involvement**
- **Environmental Justice**

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## PRIORITIZING PONDS FOR MANAGEMENT

*Are there additional criteria you would include?*

*Are there criteria you would remove?*

*Are there criteria you would weigh more heavily?*

*Are there superseding factors that would elevate a pond's  
priority?*

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# UPCOMING STAKEHOLDER MEETINGS

APRIL 22 AND 23

## Meeting 2

### Exploring Strategies and Priorities

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- Strategies Overview
- Identifying Priorities
- Comment and Discussion

JUNE 3 AND 4

## Meeting 3

### Reviewing the Implementation Plan

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- Incorporating Stakeholder Feedback
- Recommendations
- Implementation
- Discussion



**Other questions or feedback?**

**[www.capecodcommission.org/freshwater](http://www.capecodcommission.org/freshwater)**

# Thank you!

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[www.capecodcommission.org/freshwater](http://www.capecodcommission.org/freshwater)

STAKEHOLDER MEETING 2 | APRIL 2024



CAPE COD  
COMMISSION