

**Municipality/Organization:** Town of Eastham, MA  
**EPA NPDES Permit Number:** MAR041110  
**MassDEP Transmittal Number:** W- 040891  
**Annual Report Number** Year 12  
**& Reporting Period:** April 1, 2014 – March 31, 2015

**NPDES PII Small MS4 General Permit  
Annual Report  
(Due: May 1, 2015)**

**Part I. General Information**

**Contact Person:** Jane Crowley **Title:** Health Agent  
**Telephone #:** (508) 240-5900 **Email:** jcrowley@eastham-ma.gov  
**Mailing Address:** 2500 State Highway, Eastham, MA 02642

Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

**Signature:** Sheila Vanderhoef  
**Printed Name:** Sheila Vanderhoef  
**Title:** Town Administrator  
**Date:** April 30, 2015

## **Part II. Self-Assessment**

The Town of Eastham has completed the required self-assessment and has determined that our municipality is in compliance with all permit conditions.

**Part III. Summary of Minimum Control Measures**

**1. Public Education and Outreach**

<b>BMP ID #</b>	<b>BMP Description</b>	<b>Responsible Dept./Person Name</b>	<b>Measurable Goal(s)</b>	<b>Progress on Goal(s) – Permit Year 12 (Reliance on non-municipal partners indicated, if any)</b>	<b>Planned Activities</b>
1.1 Revised	<p>Educational Brochures</p> <p>Brochures educate the public about proper disposal of medical waste and prescription medication for unwanted and unused medical waste drop off box available to the public</p> <p>Participate in Drug Take Back Day and offer Drop Off box open 24 hours, 7 days a week.</p> <p>Participate in National Drug Take Back Day</p>	<p>DPW, Health</p> <p>Health, Police</p>	<p>Development of Brochures</p> <p>Proper disposal of prescription and non prescription drugs</p>	<p>Updated brochures; disseminated brochures concerning hazardous waste disposal days. Continued to coordinate with Cape Cod Commission on informational campaign. Drug Drop Box located in Police Department available 24/7 to remove medication from waste stream.</p>	<p>Continue to update educational brochures as new information arises; provide information on hazardous waste disposal days. Continue efforts to educate the public about proper disposal of unwanted medical waste.</p>
1.2 Revised	<p>Mailings to Homeowners</p> <p><a href="http://www.eastham-ma.gov/Public_Documents/EasthamMA_Health/index">http://www.eastham-ma.gov/Public_Documents/EasthamMA_Health/index</a> septic pumping brochure</p>	Health	Distribution of Brochures	Homeowner mailings regarding importance of septic system maintenance.	Continue annually. 3,371 number of mailings have been sent in 2014 to homeowners who have not pumped septic system in 3 or more years to encourage proper maintenance
1.3	<p>Mailing to all Property Owners</p> <p>Participate in Regional Waste water Planning efforts with Cape Cod Commission 208 Project</p>	Health	Distribution of Brochures and educational presentation on wastewater management	Homeowner mailings regarding importance of wastewater management plan including storm water.	Air local wastewater presentation and educational video on local cable and website video on demand

1.4	<p>Coastal/Pond Clean-up</p> <p>Remediation of Herring Pond conducted October 2012 with Alum Treatment</p> <p>Alum Treatment of Great Pond conducted October 2013</p> <p>Adopted Comprehensive Plan to Protect Pond Water Quality November 18, 2014</p>	<p>ConCom, DPW, Health Dept., Water Management Committee</p> <p>Water Management Committee</p>	<p>Conducting Clean-up</p> <p>Pond water quality monitoring for phosphorus + Al profiles. Also monitor D.O./PH/ALK dissolved; see attached.</p> <p>Establish proprieties and objectives</p>	<p>Private owners clean pond areas and test fresh water. DPW cleans as necessary. Mutt-mitt project for dog waste has been implemented and continued. Enhanced enforcement of pet regulations. Form local Citizens Advisory group to facilitate compliance</p> <p>Alum Treatment has improved water quality</p> <p>Adopted Fertilizer Regulation</p> <p>Held Community Volunteer Education Outreach and Appreciation Program September 5, 2014</p>	<p>DPW continues to clean up as necessary. Possible expansion of mutt-mitt program to other areas of town. Review pond report from CCC:</p> <p>Water quality monitoring to continue. Current water quality data for Great Pond and Herring Pond 2014 shows continued improvement.</p> <p>Continue Community Volunteer Education Outreach and Appreciation Program</p>
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1.5	Office Brochure	NR, DPW, Planning	Availability of Brochures	Brochures with local contact information corresponding with 1.1 displayed in NR, DPW, and Town Hall. Distribute educational materials from Cape Cod Water Protection Collaborative or Massachusetts Estuaries Project. Updated brochures; disseminated brochures concerning hazardous waste disposal days. Continued to coordinate with Cape Cod Commission on informational campaign.	Continue to update brochures and informational/educational brochures in Year 12, including information on fertilizers and other potential contaminants. Review grant-funded Pleasant Bay Watershed Management Plan for cross-applicability. Continue strategies to reduce TMDLs as required in Draft Mass Estuaries Report for Rock Harbor. Final reports on TMDL for Nauset expected 2015. Continue to update educational materials as new information arises; provide information on hazardous waste disposal days.
Revised					

**1a. Additions**

1.6	Post information on Countywide Rain Barrel Distribution Program <a href="http://www.eastham-ma.gov/Public_Documents/EasthamMA_Planning/rainflyer10.pdf">http://www.eastham-ma.gov/Public_Documents/EasthamMA_Planning/rainflyer10.pdf</a>	DPW, NR, Planning	Availability of rain barrels	Disseminate information from the Cape Cod Groundwater Guardian Team	Continue indefinitely
1.7	Beach Signage	Health	Post signage	Inspect condition of signage at every marine & freshwater beach to enforce compliance with state beach regulations, noting contact info, testing data and periods of testing. Include signage on Invasive Species	Continue indefinitely

## 2. Public Involvement and Participation

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 12 (Reliance on non-municipal partners indicated, if any)	Planned Activities
2.1	Stormwater Management Program  Town is developing GIS based mapping of the storm water system	NR, DPW, ConCom, Planning, Health, WMC  DPW, Planning, Health Con Com WMC	Development of Program, including prioritization of sites  Map all structures (manholes, Catch basins)	Program has been developed and sites have been identified. Catchbasins and discharge pipes have been mapped in GIS database, based on paper maps. <a href="http://www.eastham-ma.gov/Public_Documents/EasthamMA_Planning/NPDES/Maps/">http://www.eastham-ma.gov/Public_Documents/EasthamMA_Planning/NPDES/Maps/</a>  Maps under development for planning and future drainage improvement projects	Contacted Mass State Highway about stormwater drainage into Salt Pond and Minister Pond in attempt to mitigate impact to ponds and develop best management practices.  Structures being inspected for connectivity, condition, determining size, material of construction and condition of the network
2.2	Pollution Reporting	NR, DPW, Pond Stewards	Visual Monitoring / Recording	Continue routine monitoring of marine areas conducted by NR staff 7 times per week, daily monitoring of drainage system/road network by DPW, and monitoring of fresh surface waters by Eastham Pond Stewards. Monitoring capabilities augmented for summer months in Rock Harbor (marina) by seasonal employee. NR monitoring of Town Cove bacteria levels with MA Division of Marine Fisheries.	Continue with monitoring as described; receive report from Cape Cod Commission's monitoring efforts for action. Pond Report implementation strategies reviewed. <a href="http://www.barnstablecountyhealth.org/bseastham.htm">http://www.barnstablecountyhealth.org/bseastham.htm</a>
Revised					
Revised					

## 2a. Additions

2.3	Wiley Park Demonstration Project	NR	Educate public about alternative low impact sustainable landscape options	Project implementation. Project installed 2014.	Continue maintenance.
2.4	Pond Associations	NR, Health	Conduct outreach for Pond Remediation Project	2 Private pond associations formed to support Pond issues. Work to educate and gain support for pond remediation and continue to encourage best management practices	Continue indefinitely. Bi annual Association Meeting Planned to update developments on best management practices and pond remediation strategies.

### 3. Illicit Discharge Detection and Elimination

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 12 (Reliance on non-municipal partners indicated, if any)	Planned Activities
3.1 Revised	Map Outfalls	NR, DPW	Comprehensive Map GIS/GPS	Program has been developed and sites have been identified.	Continue to Refine and enhance source point/waterways map. Asset Management Program underway.
3.2 Revised	Detection of Non-Stormwater Discharge	NR, Health	Correction of Discharges	Continue to identify no stormwater discharges and remedy situations as they arise, depending on the source of the discharge	Continue project indefinitely. Update map as needed
3.3 Revised	Dry Weather Flow Screening	NR, Health	Screening Testing; Correction of Discharges	Incorporate dry weather flow screening into the routine monitoring of marine areas conducted by NR staff 5x per week spring through fall.	Continue project indefinitely.
3.4 Revised	Reporting Line <i>A team is assembled when an illicit discharge is confirmed (DPW, Health, Fire, Building Inspector)</i>	NR, DPW, Fire	Establishment of Line	Line established and maintained for NR and DPW to report any inappropriate inputs to the MS4. Reports involving oil or hazardous waste is reported to the Fire Dept, and MA DEP.	Illicit Discharge and Detection Hotline established. <a href="http://www.eastham-ma.gov/Public_Documents/EasthamMA_BBBoard/I022B6F8_0">http://www.eastham-ma.gov/Public_Documents/EasthamMA_BBBoard/I022B6F8_0</a> Continue project indefinitely.
3.5 Revised	Hazardous Product Collection Medical Waste Disposal Day	Health, DPW, Recycling Health, Police	Conducting Collection Day Conduct Collection Day	Hazardous waste collection day's schedules for July 18, 2015 and September 19, 2015. Planned Medical Waste take back day conducted in conjunction with DEA. Drop Box available in Police Department 24/7	Continue project indefinitely. Planned for July 18, 2015 and September 19, 2015 conducted in reciprocal agreement with Orleans to allow residents additional opportunity to dispose of HHW.

#### 3a. Additions

3.6	Outfall Elimination	DPW	Reduction of outfalls contributing to bodies of water	Projects Completed	Maintenance and Operations Plan
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3.7	FDDE	DPW Board of Health	Found and Eliminated	See attached enforcement	Continue monitoring
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**4. Construction Site Stormwater Runoff Control**

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 12 (Reliance on non-municipal partners indicated, if any)	Planned Activities
4.1 Revised	Construction Site Runoff Control Bylaw	Planning	Developed Bylaws	Bylaw adopted by Planning Board and Town Meeting	Implement bylaw
4.2 Revised	Enact Construction Site Runoff Control Bylaw	ConCom, Planning, Town Meeting	Implement Bylaw	Continue to discuss the creation of a bylaw to be incorporated into local wetland control bylaw and local subdivision rules and regulations.	Continue to work on the development and implementation of bylaws. There is a policy, but not a bylaw.
4.3 Revised	Sand Nourishment	ConCom	Regulations	Continuation of goal for better compliance and quality of sand. NR agent frequently meets with applicants.	Homeowners required to do sand nourishment must do so with sand of comparable grain size to what is natural with no debris.
Revised					

**4a. Additions**


**5. Post-Construction Stormwater Management in New Development and Redevelopment**

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 12 (Reliance on non-municipal partners indicated, if any)	Planned Activities
5.1 Revised	Construction Site Runoff Control Bylaw	ConCom,	Develop Bylaws	Implement bylaw which was incorporated into local wetland control bylaw and local subdivision control rules and regulations.	Continue to work on the development and implementation of a bylaw. Review bylaw for adoption at town meeting for ConCom. Continue “Limit of Work” in Order of Conditions for project as well as use hay bales &/or silt fence until area is stabilized.
5.2 Revised	Amend Site Plan Review	Planning	Bylaw	Bylaw adopted.	Goal achieved
5.3 Revised	Enact Construction Site Runoff Control Bylaw	ConCom, Planning, Town Meeting, Bd. Of Highway Surveyors	Implement Bylaw	Enacted bylaw which was incorporated into local wetland control bylaw and local subdivision rules and regulations.	Enforce bylaw. Work on the development and implementation of bylaws completed
Revised					

**5a. Additions**

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## 6. Pollution Prevention and Good Housekeeping in Municipal Operations

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 12 (Reliance on non-municipal partners indicated, if any)	Planned Activities
6.1 Revised	Annual Training Right to Know Employee Training on Hazards and STS/GHS	NR, DPW, Planning, Fire, Health	Training Session	Annual training on best practices for pollution prevention and mitigation.	Annual training for worker safety, attend educational workshops for employees or public given by CCC or WBNERR, Barnstable County Health
6.2 Revised	Review of Town Properties	DPW, Building Maintenance	Monitor and Correct Problems	Audit conducted by MIIA.	Continue indefinitely.
6.3 Revised	Review of Town Operations	DPW, Facilities Manager	Monitor and Correct Problems	Pollution Prevention Control	Ongoing project
6.4 Revised	Catch basin Cleaning	DPW	Updated Log	Clean all town-owned catchbasins in spring and fall 2015	Continue to Clean and inspect all town-owned catch basins
6.5 Revised	Street Sweeping	DPW	Record areas swept	Sweep all town-owned roadways and parking lots in spring and fall 2014. Received beneficial use determination based on testing.	Sweep all town-owned roadways and parking lots in Spring and Fall 2014
6.6 Revised	Remediation of existing outfall	DPW	Elimination of stormwater discharge	One discharge site identified: Cole Road. Funding not received.	Complete survey
6.7 Revised	Drainage Alterations	DPW	Catch basin Replacement	Catch basins identified for replacement or closure. Design underway for Governor Prence Road	Continue project indefinitely. Incorporate green infrastructure in at least 1 location
6.8 Revised	Fuel Tanks	Fire	Fuel Tank Removal	Goal achieved.	Goal achieved

6.9 Revised	Flooding Remediation	DPW	Construction of Detention pond	Brackett Road stormwater design completed	Ensure compliance
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**6a. Additions**

6.10	Pesticide/Fertilizer Policy	Board of Health	Fertilizer and Pesticide reduction	Adopted Fertilizer Regulation	Policy adopted and enforced. Conduct community education program to include residents and businesses
6.11	Beach Cleaner Purchased	DPW	Aerate sand and remove debris	Operated June through September	Continue Beach Cleaning
6.12	Vegetation management with goats	DPW	Elimination of Herbicide	Pilot project complete	Publicize program

**7. BMPs for Meeting Total Maximum Daily Load (TMDL) Waste Load Allocations (WLA) <<Not applicable>>**

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 12 (Reliance on non-municipal partners indicated, if any)	Planned Activities
Revised					
Revised					
Revised					

**7a. Additions**


**7b. WLA Assessment**

#### **Part IV. Summary of Information Collected and Analyzed**

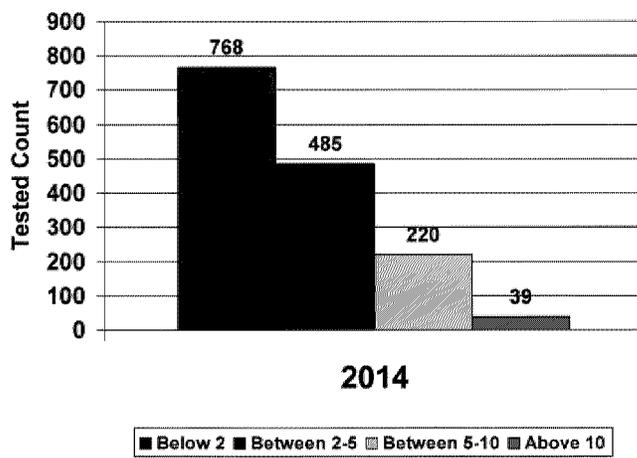
**Freshwater Sampling** – The Cape Cod Pond and Lake Stewardship (PALS) are continually sampling the Eastham ponds in an effort to identify possible pollutant and recommend best management practices for containing and eliminating possible pollutants. Eastham has a total of 12 ponds currently being sampled. (<http://www.capecodcommission.org/water/PALS/home.htm>). See attached.

**Beach Sampling** – Sixteen Eastham beaches (12 saltwater and 6 freshwater) were sampled during the summer months by the Barnstable County Department of Health and Environment. In 2014 over 239 samples were tested for E. Coli or Enterococci as applicable. Samples exceeding the limits result in the posting of swimming advisory notices and posting on our website. In 2014 only samples 6 exceedences were detected. Total percentage failure for Maine Beaches was 3.13%. Fresh Water Beached had 1.27% failure. Repeat samples taken the following day were within acceptable limits in all cases but 1 and the beaches were reopened to the public when standards were achieved. (<http://www.barnstablecountyhealth.org/bseastham.htm>). See attached.

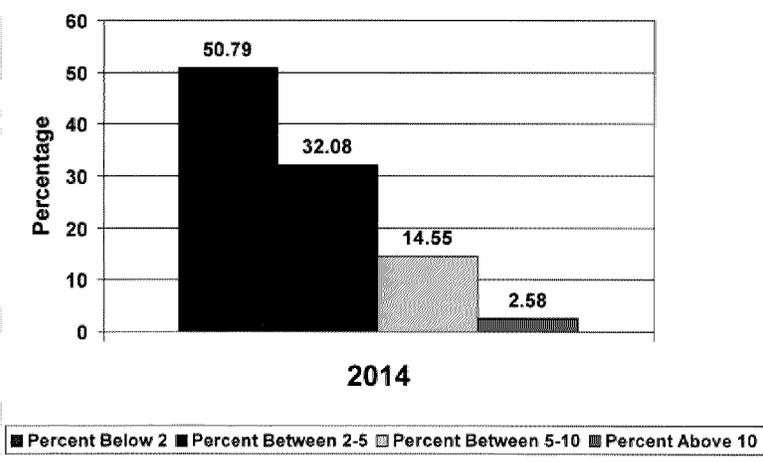
**Groundwater Sampling** – The town continued its voluntary sampling project to evaluate levels of nitrate in residential wells. Each year one-third of the town is sampled allowing for a three-year sampling rotation schedule. We are experiencing a return of approximately 60% of the vials mailed.

<b>Year</b>	<b># Samples Returned 2014</b>	<b># Samples Returned 2013</b>
	1512	1761
Below 2	768	991
2 to 5	485	542
5 to 10	220	185
Above 10	39	43

Eastham Total Nitrate Levels (all tests) In Area ALL



Eastham Total Nitrate Levels (all tests) In Area ALL



**Shellfish Sampling** – The Natural Resources Office continues to test for Red Tide and participate in shellfish sampling in coordination with Massachusetts Division of Marine Fisheries on a weekly basis through the Spring, Summer and Fall.

**Part V. Program Outputs & Accomplishments (OPTIONAL)**

(Since beginning of permit coverage unless specified otherwise by a \*\*, which indicates response is for period covering April 1, 2009 through March 31, 2014)

**Programmatic**

(Preferred Units) Response

Stormwater management position created/staffed	(y/n)	
Annual program budget/expenditures **	(\$)	
Total program expenditures since beginning of permit coverage	(\$)	
Funding mechanism(s) (General Fund, Enterprise, Utility, etc)		

**Education, Involvement, and Training**

Estimated number of property owners reached by education program(s)	(# or %)	
Stormwater management committee established	(y/n)	
Stream teams established or supported	(# or y/n)	
Shoreline clean-up participation or quantity of shoreline miles cleaned **	(y/n or mi.)	
Shoreline cleaned since beginning of permit coverage	(mi.)	
Household Hazardous Waste Collection Days		
▪ days sponsored **	(#)	
▪ community participation **	(# or %)	
▪ material collected **	(tons or gal)	
School curricula implemented	(y/n)	

**Legal/Regulatory**

	In Place Prior to Phase II	Reviewing Existing Authorities	Drafted	Draft in Review	Adopted
Regulatory Mechanism Status (indicate with "X")					
▪ Illicit Discharge Detection & Elimination					
▪ Erosion & Sediment Control					
▪ Post-Development Stormwater Management					
Accompanying Regulation Status (indicate with "X")					
▪ Illicit Discharge Detection & Elimination					
▪ Erosion & Sediment Control					
▪ Post-Development Stormwater Management					

**Mapping and Illicit Discharges**

	(Preferred Units)	Response
Outfall mapping complete	(%)	
Estimated or actual number of outfalls	(#)	
System-Wide mapping complete (complete storm sewer infrastructure)	(%)	
Mapping method(s)		
▪ Paper/Mylar	(%)	
▪ CADD	(%)	
▪ GIS	(%)	
Outfalls inspected/screened **	(# or %)	
Outfalls inspected/screened (Since beginning of permit coverage)	(# or %)	
Illicit discharges identified **	(#)	
Illicit discharges identified (Since beginning of permit coverage)	(#)	
Illicit connections removed **	(#); and (est. gpd)	
Illicit connections removed (Since beginning of permit coverage)	(#); and (est. gpd)	
% of population on sewer	(%)	

% of population on septic systems	(%)	
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**Construction**

	(Preferred Units)	Response
Number of construction starts (>1-acre) **	(#)	
Estimated percentage of construction starts adequately regulated for erosion and sediment control **	(%)	
Site inspections completed **	(# or %)	
Tickets/Stop work orders issued **	(# or %)	
Fines collected **	(# and \$)	
Complaints/concerns received from public **	(#)	

**Post-Development Stormwater Management**

Estimated percentage of development/redevelopment projects adequately regulated for post-construction stormwater control	(%)	
Site inspections (for proper BMP installation & operation) completed **	(# or %)	
BMP maintenance required through covenants, escrow, deed restrictions, etc.	(y/n)	
Low-impact development (LID) practices permitted and encouraged	(y/n)	

**Operations and Maintenance**

Average frequency of catch basin cleaning (non-commercial/non-arterial streets) **	(times/yr)	
Average frequency of catch basin cleaning (commercial/arterial or other critical streets) **	(times/yr)	
Qty of structures cleaned **	(#)	
Qty. of storm drain cleaned **	(%, LF or mi.)	
Qty. of screenings/debris removed from storm sewer infrastructure **	(lbs. or tons)	
Disposal or use of screenings (landfill, POTW, compost, beneficial use, etc.) **	(location)	

Basin Cleaning Costs		
• Annual budget/expenditure (labor & equipment)**	(\$)	
• Hourly or per basin contract rate **	(\$/hr or \$ per basin)	
• Disposal cost**	(\$)	
Cleaning Equipment		
• Clam shell truck(s) owned/leased	(#)	
• Vacuum truck(s) owned/leased	(#)	
• Vacuum trucks specified in contracts	(y/n)	
• % Structures cleaned with clam shells **	(%)	
• % Structures cleaned with vector **	(%)	

(Preferred Units) Response

Average frequency of street sweeping (non-commercial/non-arterial streets) **	(times/yr)	
Average frequency of street sweeping (commercial/arterial or other critical streets) **	(times/yr)	
Qty. of sand/debris collected by sweeping **	(lbs. or tons)	
Disposal of sweepings (landfill, POTW, compost, beneficial use, etc.) **	(location)	
Annual Sweeping Costs		
• Annual budget/expenditure (labor & equipment)**	(\$)	
• Hourly or lane mile contract rate **	(\$/hr. or ln mi.)	
• Disposal cost**	(\$)	
Sweeping Equipment		
• Rotary brush street sweepers owned/leased	(#)	
• Vacuum street sweepers owned/leased	(#)	
• Vacuum street sweepers specified in contracts	(y/n)	
• % Roads swept with rotary brush sweepers **	%	
• % Roads swept with vacuum sweepers **	%	

Reduction (since beginning of permit coverage) in application on public land of: ("N/A" = never used; "100%" = elimination)		
▪ Fertilizers	(lbs. or %)	
▪ Herbicides	(lbs. or %)	
▪ Pesticides	(lbs. or %)	
Integrated Pest Management (IPM) Practices Implemented	(y/n)	

	(Preferred Units)	Response
Average Ratio of Anti-/De-Icing products used **  (also identify chemicals and ratios used in specific areas, e.g., water supply protection areas)	% NaCl % CaCl <sub>2</sub> % MgCl <sub>2</sub> % CMA % Kac % KCl % Sand	
Pre-wetting techniques utilized **	(y/n or %)	
Manual control spreaders used **	(y/n or %)	
Zero-velocity spreaders used **	(y/n or %)	
Estimated net reduction or increase in typical year salt/chemical application rate	(±lbs/ln mi. or %)	
Estimated net reduction or increase in typical year sand application rate **	(±lbs/ln mi. or %)	
% of salt/chemical pile(s) covered in storage shed(s)	(%)	
Storage shed(s) in design or under construction	(y/n or #)	
100% of salt/chemical pile(s) covered in storage shed(s) by May 2008	(y/n)	

**Water Supply Protection**

Storm water outfalls to public water supplies eliminated or relocated	# or y/n	
Installed or planned treatment BMPs for public drinking water supplies and their protection areas	# or y/n	
<ul style="list-style-type: none"><li>• Treatment units induce infiltration within 500-feet of a wellhead protection area</li></ul>	# or y/n	

**Please See Additional Information Below**

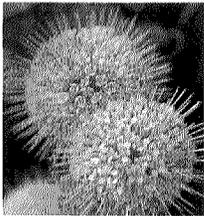
- Plant native plants.

Perennials such as liatris, aster, false indigo, swamp mallow, amsonia, turtle head, obedient plant, and butterfly weed.

Shrubs such as bayberry, beach plum, buttonbush, shadbush, arrow wood, American cranberry, viburnum, swamp azalea, blueberry, and summersweet.

Trees such as sassafras, eastern cottonwood, white pine, eastern red cedar, and swamp maple.

- Clean up after your dog.
- If you are building a new septic system, place it as far as possible from a pond.
- Encourage your town to continue stormwater management plans and to promote fertilizer controls.



### What your town is doing:

#### Brewster is...

- Buying land in pond watersheds and water supply areas.
- Completing its *Integrated Water Management Plan* to address storm water, wastewater, and drinking water supply.

#### Eastham is...

- Writing a guide for pond protection.
- Implementing its *Ponds Action Plan*.

#### Orleans is...

- Adopting a fertilizer bylaw.
- Implementing its *Comprehensive Wastewater Management Plan*.

All three towns are correcting road runoff and applying only slow-release fertilizer on town owned land.



Photos: Kristina Bayne, Jeff Hicks, Paul Higgins, Joe Mistretta



This brochure was produced by

**Orleans Pond Coalition**

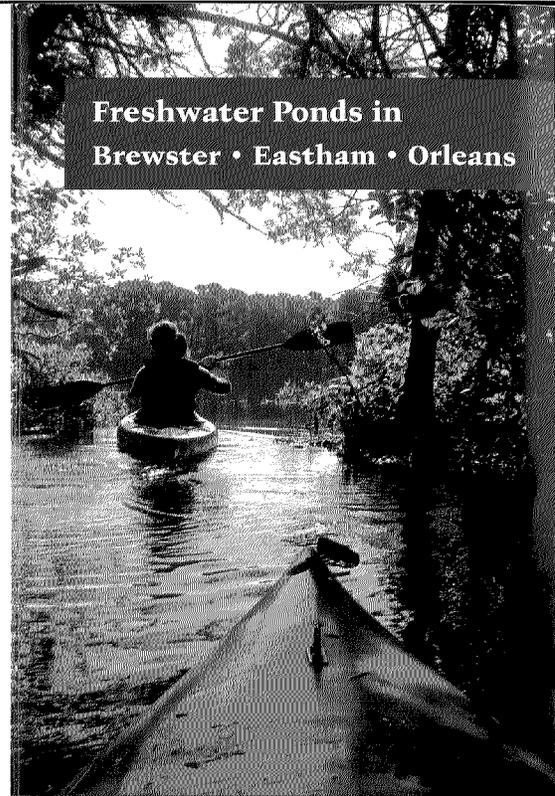
P.O. Box 2485, Orleans, MA 02653

[www.OrleansPondCoalition.org](http://www.OrleansPondCoalition.org)

with the support of

Brewster Conservation Trust

Eastham Conservation Foundation

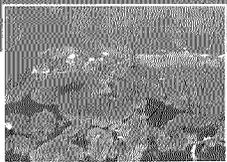


### Freshwater Ponds in Brewster • Eastham • Orleans

**Freshwater ponds are  
our treasure and our  
responsibility.**

**Let's protect them.**

**Here's what you can do...**



### **Our ponds are deteriorating.**

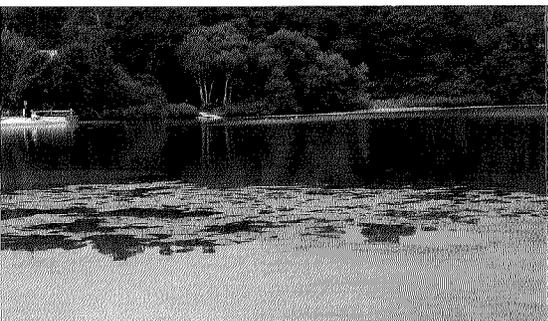
The ponds are a vital part of our economy, our ecology and our culture, but their health is being threatened.

#### **The problem is phosphorus.**

The nutrient phosphorus enters the ponds from many controllable sources.

The majority is from septic systems.

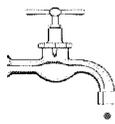
A significant amount of phosphorus comes from runoff of fertilizer and other products used in our yards. In high concentrations, phosphorus causes algae-filled water which smells and is unpleasant for swimming, fishing, or boating. It can also cause fish kills.



## **What Can YOU Do?**

### **In your home**

- Use phosphorus-free cleaning products.
- Dispose of medications, food and grease at the transfer station; dispose of chemicals and hazardous waste at a town-scheduled collection.



- Throw nothing but toilet paper into toilets.
- Pump your septic system every three years.
- Conserve water.

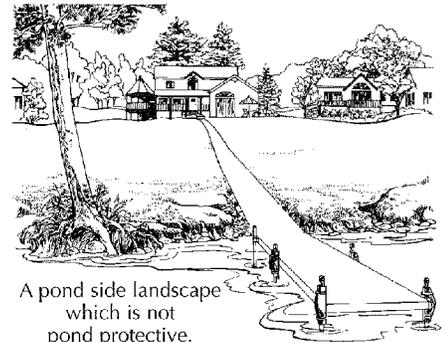
### **In your yard**

*Note: If you are altering land within 100' of a pond, you will need local Conservation Commission approval.*

- If you fertilize your lawn, use slow release organic types, avoiding phosphorus entirely, or spread compost and leave the grass clippings in place.
- Better yet, grow a "Cape Cod lawn" composed of drought-tolerant fescues. Avoid herbicides and pesticides or try organic ones.
- Mow some areas of lawn infrequently, allowing deep rooted wildflowers to grow.

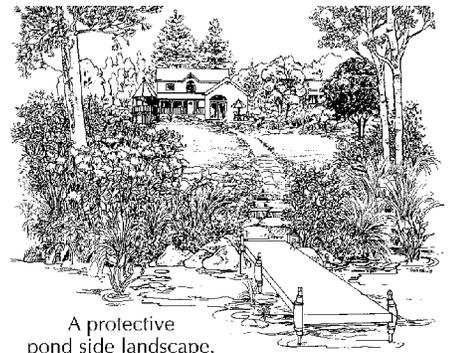


- Prevent run off from your property as much as possible as it may reach ponds. Use gutters to drywells and "rain gardens" to absorb nutrients.
- Maintain or create shoreline buffer plantings, 25' - 50' wide, composed of deep-rooted native plants that trap and filter storm water.



A pond side landscape which is not pond protective.

Manicured lawns offer little filtering of pollutants when it rains, allowing fertilizer, pesticides and soils to wash into the water.



A protective pond side landscape.

## Protecting Our Sole Source CAPE COD AQUIFER

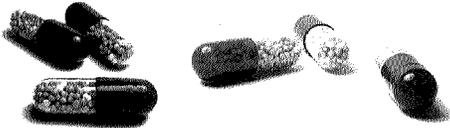


### **What is an aquifer?**

A **Sole Source Aquifer** is an underground supply of water designated by the Environmental Protection Agency as the "sole or principal" source of drinking water for an area. We get **ALL of our drinking water** on Cape Cod from our Sole Source Aquifer.

### **How important is it?**

All uses of water on Cape Cod – whether for drinking, swimming, boating, shellfishing, cranberry farming, or wetland habitat – **depend on the health and quality of our aquifer.** Cape Cod's Sole Source Aquifer is directly affected by everything that goes down your drain, **including expired or unwanted medications.**



### *For More Information Regarding Safe Medications and Prescriptions Disposal...*

- Contact the Cape Cod Cooperative Extension at (508) 375-6699
- Visit [www.capecodextension.org](http://www.capecodextension.org)
- Visit [www.capecodgroundwater.org](http://www.capecodgroundwater.org)
- Visit [www.smarxtdisposal.net](http://www.smarxtdisposal.net)

## Think Twice About **UNWANTED MEDICATION DISPOSAL**

*A Guide to Safe Disposal of  
Medications and Prescriptions*



Barnstable County  
**HAZARDOUS MATERIALS PROGRAM**  
Collaborating with the University of Massachusetts Cooperative Extension

(800) 319-2783

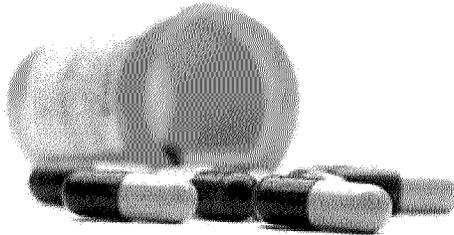
(508) 375-6699

## THE PROBLEM WITH FLUSHING MEDICATIONS

When you flush medications down the toilet or pour them down the drain, they flow into the Cape Cod community's underground source of fresh drinking water, as well as into our lakes, ponds, rivers, and coastal waters, where they can harm our populations of local fish and wildlife.

.....  
**M**edications that are flushed down the toilet **can and do** find their way into our nation's waterways every day. Those drugs are present in water that supports many species of fish and other wildlife."

- H. Dale Hall, Director of the U.S. Fish and Wildlife Service



## Four Safe Steps Toward PROPER DISPOSAL

- 1 Pour medication into a sealable plastic bag. If medication is a solid (pill, liquid capsule, etc.), crush it or add water to dissolve it.
- 2 Add cat litter, sawdust, coffee grounds (or any material that mixes with the medication and makes it less appealing for pets and children to eat) to the plastic bag.
- 3 Seal the plastic bag and put it in the trash.
- 4 Remove and destroy ALL identifying personal information (prescription label) from all medication containers before recycling them or throwing them into the trash.

Patients should ALWAYS refer to printed material accompanying their medication for specific instructions.

### DO NOT...

- ...flush medication down the toilet!
- ...pour medication down a sink or drain!

## COMMON QUESTIONS

### **Why doesn't Barnstable County collect these medications at an official place or time?**

Due to Federal and State law, collections are costly and complex to arrange and require an on-duty police officer and pharmacist to be on site.

### **Why can't I just dump pills into my kitchen trash can? Do I really need to go through all those steps?**

When pills are thrown directly into the trash, it can lead to unintended exposure to people or animals. People may go through the trash to obtain unused medications or personal information found on discarded prescription bottles. The extra steps provide a safer method for disposing of unused medications.

### **What do we know about the impacts of medications found in water on fish and wildlife?**

Many pharmaceuticals and their by-products have been detected in waters. Researchers are currently examining the potential effects of these compounds on fish and wildlife.



N ↑ **Eastham Ponds**



#	Pond	Area (Acres)	Priority for treatment
1	Bridge**	6.7	Low
2	Depot	27.9	Medium
3	Little Depot	2.3	Medium
4	Great**	109.7	<b>High</b>
5	Herring**	44.2	<b>High</b>
6	Jemima	6.4	Medium
7	Ministers	16.8	<b>High</b>
8	Schoolhouse	6.8	<b>High</b>
9	Molls*	3.4	Low
10	Muddy	10.5	<b>High</b>
11	Widow Harding	8.7	Low

\*located outside the area of the map

\*\*Herring spawn in Bridge, Great and Herring Ponds

Data taken from Tables 3.1 and 5.2 (updated in 2013), Action Plan for the Town of Eastham Ponds. EcoLogic and GHD, December 2011.

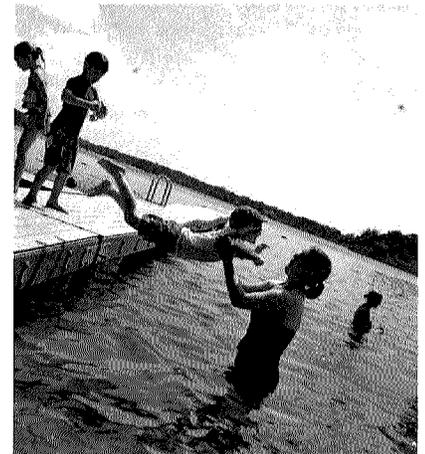
**What the Town is doing/has done**

- The Town has long avoided use of fertilizer and pesticides on Town managed land. It has now codified that practice in a policy strictly limiting fertilizer and pesticide use.
- The Board of Health is considering adoption of a regulation limiting fertilizer use in town.
- Work is ongoing to eliminate storm water runoff from roads.
- A medicine disposal box is maintained at the Police Station.
- Consultants have been retained to assess both the impact of wastewater on our ponds and other water bodies and our pond water quality. The Town is moving forward with remedial actions recommended.
- Town committees are developing an action plan for pond protection.

**Resources:**

- Policy on the Content and Application of Fertilizer and Pesticides on Municipal Land in the town of Eastham, 2013.
- Action Plan for the Town of Eastham Ponds. EcoLogic and GHD, 2011.
- Town of Eastham Local Comprehensive Plan, 3rd Edition, 2010, with 2012 revisions.
- Eastham Freshwater Ponds: Water Quality Status & Recommendations for Future Activities, 2009.
- Final Interim Needs Assessment and Alternatives Screening Analysis Report, Stearns & Whcler, 2009.
- The Orleans Blue Pages, Orleans Pond Coalition, 2008.
- The Massachusetts Lake and Pond Guide, Dept. of Conservation and Recreation, 2004.

**Keeping Eastham Ponds Healthy**



**Town of Eastham Water Management Committee**

2500 State Hwy  
 Eastham, MA 02642  
 508 240 5900  
<http://www.eastham-ma.gov>

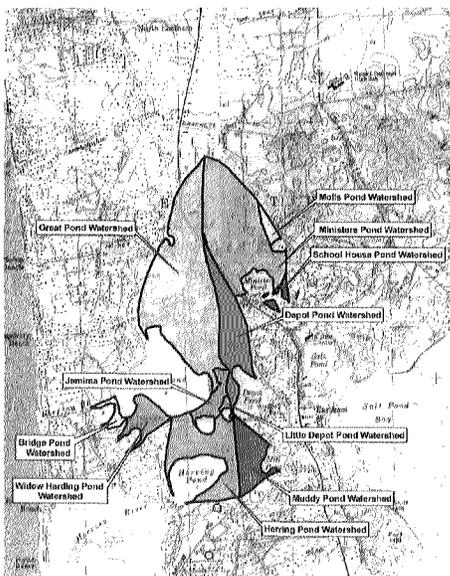
**Acknowledgements:**

Board of Health  
 Conservation Commission  
 Natural Resources  
 Open Space Committee  
 Recreation and Beach Department

January 2014

## What's happening to our ponds?

- Eastham's freshwater ponds are kettle ponds in coarse sandy soil fed by groundwater and rain.
- Cape Cod obtains all its fresh water from a single aquifer with several separate lens. One of these lens is the source of all the groundwater in Eastham and it contains everything that enters the groundwater in the town.
- Each pond has a watershed whose groundwater flows into that pond and most land in Eastham is either in a pond watershed or in the watershed of one of our estuaries. The map shows the watersheds for 11 of our many ponds.



- Our ponds are a major recreational resource and keeping them healthy is essential to their continued use. Both Herring and Great Pond have heavily used town beaches.

- The health of a pond depends on its having an adequate supply of oxygen to support fish and shellfish, good clarity and a good balance of native plants and animal habitat
- Massachusetts has established Surface Water Quality Standards (314 CMR 4:05) to ensure the health of ponds.
- If a pond receives too much phosphorus, there is an overgrowth of algae causing loss of clarity, loss of oxygen, potential fish kills and, overall, loss of diverse aquatic habitat.
- Effluent from septic systems, fertilizers, storm water runoffs and bird droppings all contribute phosphorus in our ponds.
- We cannot eliminate phosphorus from our groundwater but we can limit it.
- Volunteers began a program of sampling the water in 11 of our Eastham ponds in 2001. As a result of their findings, these ponds were evaluated by professional consultants in 2010 and all were found to suffer from excess phosphorus.
- Remedial treatment was advised for the most affected of the 11 ponds and taking action in all ponds to reduce future accumulation of phosphorus was recommended.
- Herring, the pond with the highest priority for treatment, was treated in the fall of 2012.
- A second high priority pond, Great Pond, was treated in October 2013.
- Both ponds are showing improvement and close monitoring is continuing.
- The town Water Management Committee is exploring methods for treatment of Ministers/Schoolhouse ponds, another high priority.

## What you can do to help?

- Don't flush medications or pour them down the drain. Take them to the Drop Box at the Police Station or follow the Barnstable County guidelines for disposal in the trash. <http://www.town.barnstable.ma.us/watersupply/medicationdisposal.pdf>
- Dispose of food or grease in the trash.
- Hold hazardous waste until scheduled collection days. Find out what's hazardous at: <http://www.barnstablecounty.org/wp-content/uploads/2011/04/>
- Clean up after pets and don't feed aquatic birds.
- Prevent runoff from hard surfaces using gutters, drywells, drains or water gardens.
- Enjoy the ease of a natural "Cape Cod" lawn.
- Minimize fertilizer use by using native plants, trees and shrubs.
- Choose low or no phosphorus fertilizers. Labels have three numbers like 5-10-5. The first is nitrogen, the second is phosphorus and the third potassium. Get your soil checked by the County Extension Service to see if you need additional phosphorus.
- GreenCAPE has a table of fertilizers in use on the Cape that shows their phosphorus content. <http://www.greencape.org>
- Use slow release fertilizers and use sparingly.
- If you live on a pond you should not use fertilizer within 100 feet of it and should create a buffer zone of native plantings to slow runoff after consultation with the Conservation Commission.

SAVE THE DATE

# 2015 SCHEDULE EASTHAM & ORLEANS



9am to Noon  
Eastham DPW and Natural Resources Building, 555 Old Orchard Rd.



9am to Noon  
Orleans DPW and Highway Garage, 22 Bay Ridge Lane

Questions?  
Visit the Hazardous Materials Program at [www.capecodextension.org](http://www.capecodextension.org)

PRSR-STD  
U.S. POSTAGE  
PAID  
LEOMINSTER, MA  
PERMIT NO. 17

Cape Cod Cooperative Extension  
P.O. Box 367  
Barnstable, MA 02630-0367  
[www.capecodextension.org](http://www.capecodextension.org)  
508-375-6699



\*\*\*\*\*ECRWSS\*\*\*\*

LOCAL POSTAL CUSTOMER



YOUR LOCAL WATER.  
IT'S A CAPE COD THING.

Love your local water. It's a Cape Cod thing. It's a symbol of Cape Cod Cooperative Extension's Pesticide, Waste & Water Quality Department.

# too TOXIC to TRASH



## HOUSEHOLD HAZARDOUS WASTE 2015 COLLECTION SCHEDULE



LOVE YOUR LOCAL WATER.  
IT'S A CAPE COD THING.



**COVANTA**  
ENERGY  
for a cleaner world

HHW Collections are funded by the Towns of Eastham, Orleans; Covanta SEMASS; and Barnstable County's Cape Cod Cooperative Extension.

# SIMPLE & FREE



LOVE YOUR LOCAL WATER.  
IT'S A CAPE COD THING.



PROTECT WHAT WE LOVE ABOUT THE CAPE.  
IT ALL STARTS WITH YOU!

Household hazardous waste (HHW) collections protect what we love about Cape Cod, especially our precious local drinking water. Most chemicals are too toxic to throw away in regular trash or dump down the drain, so FREE collections are being held to take that waste off your hands and keep it out of our water supply.

Are you a small business? Do you use chemicals? To make your state required disposal arrangements and obtain pricing, contact Mike Maguire at 508-375-6699.

## BRING THESE ITEMS TO YOUR COLLECTION



### PAINTS, POLISHES & STAINS

Alkyd-Based Paint & Stain • Marine Paints & Sealers • Metal & Furniture Polish • Oil-Based Paint & Stain  
Paint Thinner & Remover • Solvent-Based Wood Finish • Wood Preservatives • Auto Paint (no latex)



### YARD CHEMICALS

Driveway Sealer with Solvent • Fertilizers with Weed Killer • Rodent Poison • Weed Killer  
Insecticides • Pesticides



### CLEANERS & CHEMICALS

Pool Cleaners & Chemicals Solvents • Photo & Hobby Chemicals • Oven Cleaner • Drain Cleaner  
Spot Remover • Acids • Degreasers • Disinfectants



### AUTO FLUIDS

Car Cleaner with Solvent • Brake & Power Steering Fluid • Bug & Tar Remover • Camp Fuel  
Radiator Flush • Car Polish • Gasoline

For items not listed here visit [www.capecodextension.org](http://www.capecodextension.org) for disposal instruction.

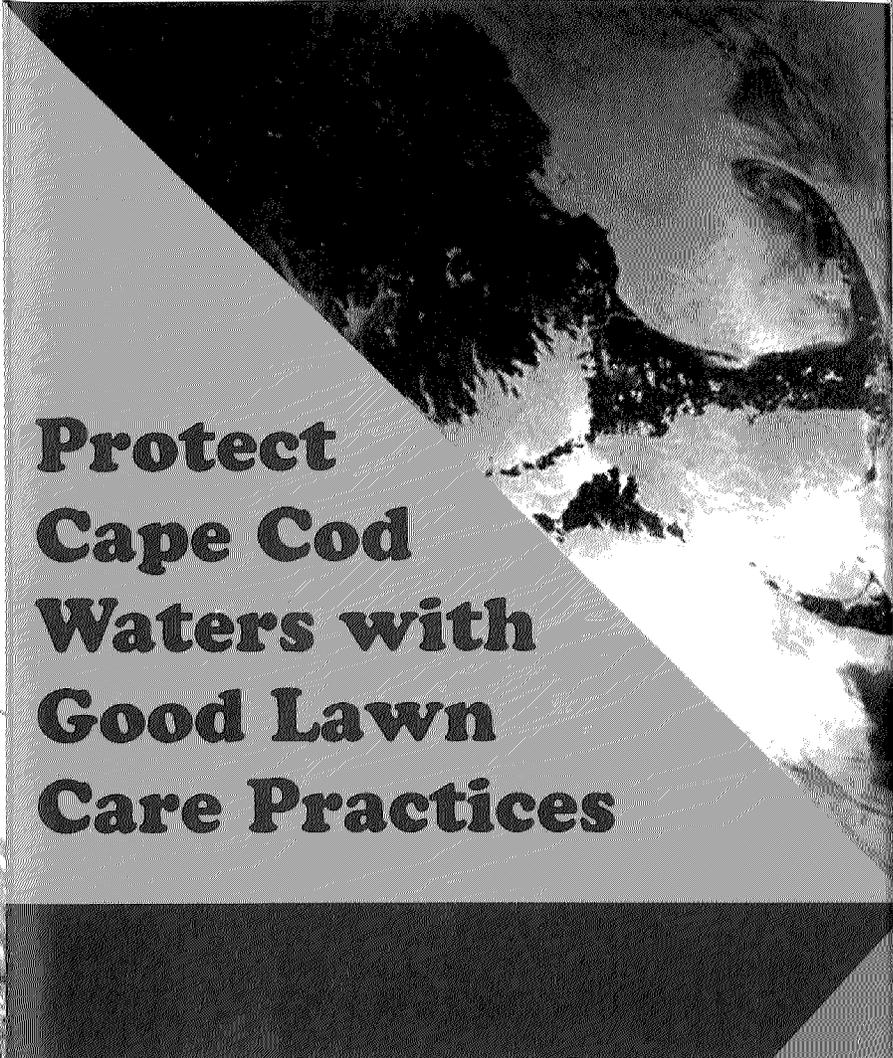
# WANTED! MERCURY

It is important to keep mercury out of our environment and water supply. To dispose of household mercury containing products, such as **thermometers, thermostats or barometers**, bring these items to your local HHW collection. If you come across larger amounts of mercury in your home please contact the Barnstable County Hazardous Waste team at #508-375-6699.



(508) 375-6699

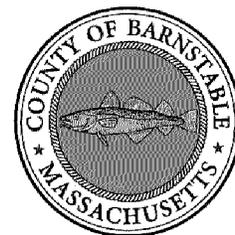
**ECRWSS  
POSTAL CUSTOMER**



**Protect  
Cape Cod  
Waters with  
Good Lawn  
Care Practices**



**CAPE COD  
Cooperative  
Extension**



**UMass  
Extension**

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CENTER FOR AGRICULTURE

**Test the soil at least every three years.**

Follow recommendations for pH adjustment and nutrient applications.

**Choose the right grasses for your yard based on site conditions and how much you use your lawn.**

Whenever possible include low maintenance grasses such as the fine fescues (creeping red, Chewings and hard fescue) that require less fertilizer and water.

Choose pest resistant grasses.

Don't try to grow grasses in places where they may not grow well, such as in heavy shade.

Overseed bare and thin spots to keep grasses growing and to prevent erosion and weed invasion.

**Water wisely, providing the lawn with water only when necessary.**

Water established lawns deeply and infrequently, moistening the top 6" of soil.

Water new seedlings and repaired areas more frequently and less deeply to ensure that small seedlings do not dry out.

Don't overwater! This is wasteful and will result in a poorer, less drought tolerant lawn.

For established low maintenance lawns consider allowing the lawn to go dormant in the summer.

Fertilize in late summer or early fall when growth resumes. Overseed then, too, if the lawn thinned during dormancy.

**Use good mowing practices to make your lawn dense and to increase rooting.**

Mow high (~3") and follow the "1/3 Rule" (avoid removing more than 1/3 of the grass height with any single mowing event).

Make sure the mower blades are sharp and balanced.

Use a mulching mower and let the clippings remain in the lawn to recycle nutrients and help build the soil. If you return the clippings on a regular basis you will be able to reduce the amount of fertilizer you use over a season.

**RESOURCES FOR HOME LAWN CARE**  
[www.capecodextension.org](http://www.capecodextension.org)  
<http://ag.umass.edu/topics/home-lawn-garden>  
<http://soiltest.umass.edu/>

**Apply fertilizers when grasses are actively growing.**

The best time to apply fertilizer is late August to late September, followed by mid- to late spring.

Use no more than 1 lb. of actual nitrogen (N) per 1000 sq ft per application, with an annual maximum of 3.2 lbs. of actual N per 1000 sq ft.

The amount of fertilizer needed may vary from lawn to lawn depending on many factors such as the type of grass, intensity of lawn use, amount of sun and shade, and quality of soil. Many lawns may do well with less than 3.2 lbs. of N per season.

Use a fertilizer that has at least 20% or more of its N in a slow release form.

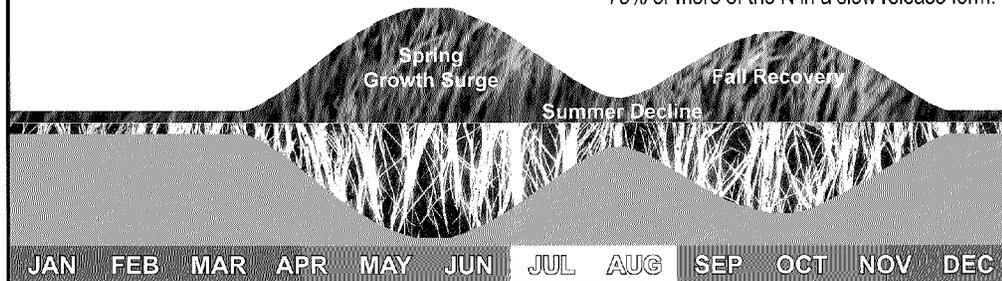
Use phosphorus (P) containing fertilizers only for new seedlings or if a soil test indicates the need. Follow label directions for product application rate and watering in after application.

**Timing is everything!**

 Do not apply fertilizer at these times as turf is generally not actively growing.

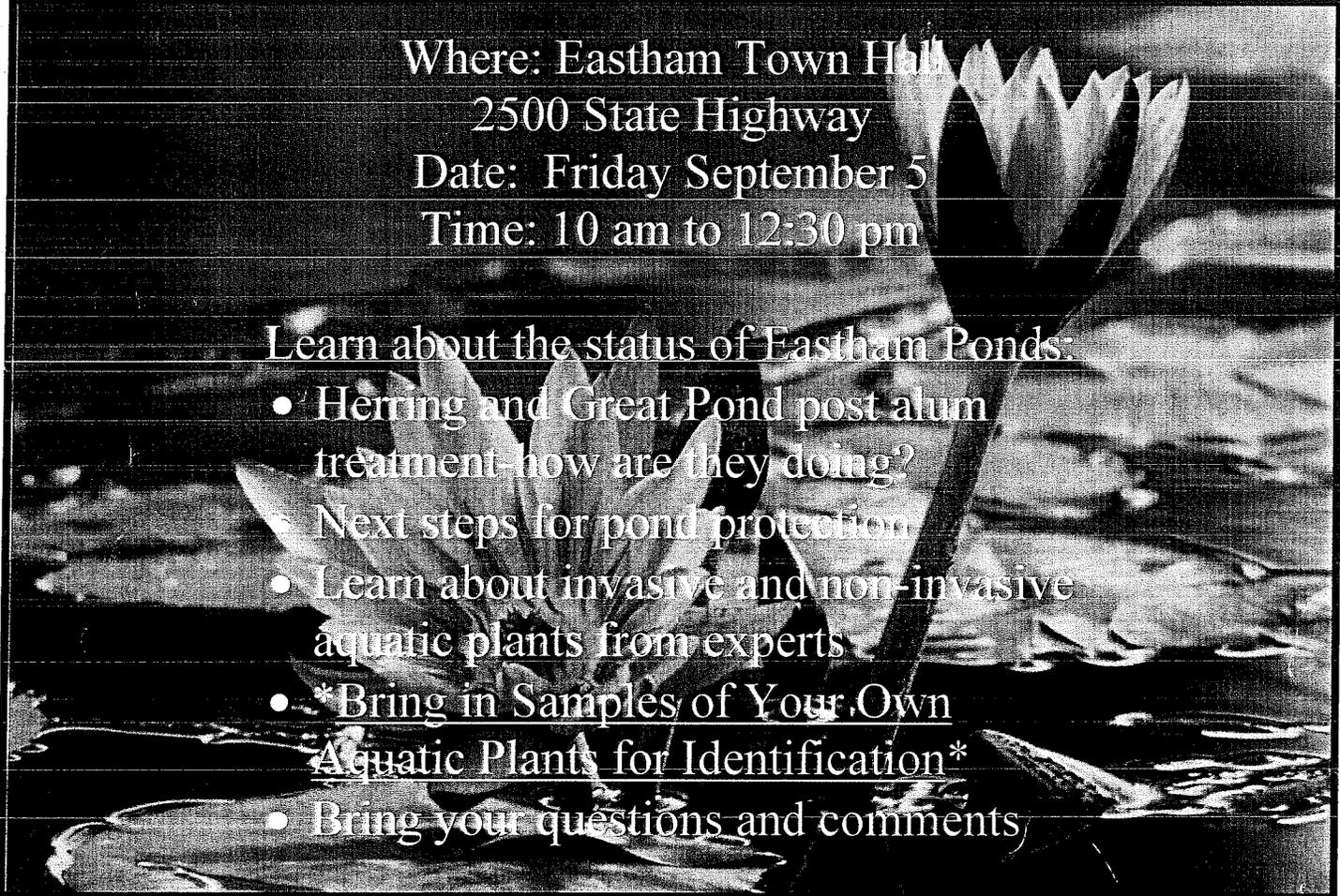
 Fertilizing during these times is acceptable.

Fertilizing during these times is acceptable if the lawn is irrigated and fertilizers contain 50-75% or more of the N in a slow release form.



**Save the Date**  
**Join us Friday September 5, 2014**  
**10:00 am to 12:30**  
**Eastham Pond Education and Volunteer**  
**Appreciation Day**  
**Pond Update and Invasive Species Workshop**

**Please register in advance free of charge**



**Where: Eastham Town Hall**  
**2500 State Highway**  
**Date: Friday September 5**  
**Time: 10 am to 12:30 pm**

**Learn about the status of Eastham Ponds:**

- Herring and Great Pond post alum treatment-how are they doing?
- Next steps for pond protection
- Learn about invasive and non-invasive aquatic plants from experts
- **\*Bring in Samples of Your Own Aquatic Plants for Identification\***
- Bring your questions and comments

**Come join our discussion of the most recent results of the Eastham Pond Monitoring Program and learn how you can help keep our ponds healthy!**

**Register online by contacting us at [health@eastham-ma.gov](mailto:health@eastham-ma.gov) or Call Eastham Health Department 508-240-5900 x 230 for information**

## Eastham • Orleans July 19, 2014 HHP Collection Survey Results

Town	#Cars	#Households	Households Breakdown*	Year-round Resident	New Participant	Moving In or Out*	Small Business	How did they hear about the collection?
Eastham July 19	278	305 86.65%	1 257	209 75%	97 35%	22 8%	0 0%	Brochure 122 43.9%
			2 17					Newspaper 45 16.2%
			3 2					Signs 79 28.4%
			4 2					Radio/TV 14 5.0%
			Total 305					Other 18 6.5%
Total 278 100%								
Orleans July 19	35	47 13.35%	1 27	24 69%	14 40%	5 14%	0 0%	Brochure 19 54.3%
			2 5					Newspaper 10 28.6%
			3 2					Signs 0 0.0%
			4 1					Radio/TV 0 0.0%
			Total 47					Other 6 17.1%
Total 35 100%								
Totals	313	352 1	1 284	233 74%	111 35%	27 9%	0 0%	Brochure 141 45.0%
			2 22					Newspaper 55 17.6%
			3 4					Signs 79 25.2%
			4 3					Radio/TV 14 4.5%
			Total 352					Other 24 7.7%
								Total 313 100%

\*Number of cars bringing 1, 2, 3 or 4 households' HHP

\* Bringing waste left by a previous resident.

7/21/2014

Cost/Collection:	Eastham	\$5,812.10
	Orleans	\$895.63
	<u>Total</u>	<u>\$6,707.73</u>

### Mercury Collection Eastham

- 29 thermometers
- 38 thermostats and switches
- 0 pounds elemental mercury
- 0 blood pressure gauges
- 0 digital thermometers given
- 0 digital thermostats given
- 0 shopping bags

**Orleans • Eastham September 20, 2014 HHP Collection  
Survey Results**

Town	#Cars	#Households	Households Breakdown*	Year-round Resident	New Participant	Moving In or Out*	Small Business	How did they hear about the collection?
Eastham September 20	50	59 29.06%	1 43	40 80%	26 52%	4 8%	1 2%	Brochure 25 50.0%
			2 5					Newspaper 5 10.0%
			3 2					Signs 17 34.0%
			4 0					Radio/TV 3 6.0%
			Total 59					Other 0 0.0%
Total 50 100%	Total 50 100%							
Orleans September 20	124	144 70.94%	1 113	105 85%	51 41%	14 11%	0 0%	Brochure 70 56.5%
			2 4					Newspaper 29 23.4%
			3 5					Signs 14 11.3%
			4 2					Radio/TV 11 8.9%
			Total 144					Other 0 0.0%
Total 124 100%	Total 124 100%							
Totals	174	203 100%	1 156	145 83%	77 44%	18 10%	1 1%	Brochure 95 54.6%
			2 9					Newspaper 34 19.5%
			3 7					Signs 31 17.8%
			4 2					Radio/TV 14 8.0%
			Total 203					Other 0 0.0%
								Total 174 100%

\*Number of cars bringing 1, 2, 3 or 4 households' HHP

\* Bringing waste left by a previous resident.

9/21/2014

Cost/Collection:            Eastham            \$1,605.70  
    Orleans            \$3,919.01  
    Total                \$5,524.71

**Mercury Collection Orleans**

17 thermometers  
 47 thermostats and switches  
 0.25 pounds elemental mercury  
 0 blood pressure gauges  
 0 digital thermometers given  
 0 digital thermostats given  
 0 shopping bags

**Eastham**

2008=227 cars/332 households cost/household=\$19.65  
 2007=153 cars/205 households cost/household=\$25.48  
 2006=244 cars/312 households cost/household=\$23.62  
 2005=138 cars/213 households cost/household=\$24.53  
 2004=143 cars/222 households cost/household=\$23.74  
 2003=152 cars/198 households

**Orleans**

2008=143 cars/259 households cost/household=\$19.65  
 2007=158 cars/242 households cost/household=\$25.48  
 2006=167 cars/225 households cost/household=\$23.62  
 2005=224 cars/358 households cost/household=\$24.53  
 2004=153 cars/193 households cost/household=\$31.76  
 2003=147cars/164 households

## Eastham • Orleans Summary of Waste Collected 2014

Waste Collected	Eastham Health Dept July 19			Orleans DPW September 20				Annual Totals									
	Unit Gallons	Unit Pounds	Unit Cost	Number Units	Total Gallons	Total Pounds	Total Cost	Number Units	Total Gallons	Total Pounds	Total Cost	Total Units	Total Gallons	Total Pounds	Total Cost	% Total Cost	% Total Volume
Oxidizer Lab Pack	55	200	\$263.71	1	55	200	\$263.71	1	55	200	\$263.71	2	110	400	\$527	4.18%	2.23%
Alkaline Lab Pack	55	200	\$148.59	2	110	400	\$297.18	2	110	400	\$297.18	4	220	800	\$594	4.71%	4.47%
Acid Lab Pack	55	200	\$263.71	2	110	400	\$527.42	1	55	200	\$263.71	3	165	600	\$791	6.28%	3.35%
Pesticides Lab Pack	55	200	\$201.58	6	330	1200	\$1,209.48	8	440	1600	\$1,612.64	14	770	2800	\$2,822	22.34%	15.63%
Hex Liquid <5000 BTU	20	125	\$0.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Paint Liquid Cu Yd Box	220	690	\$366.11	6	1320	4140	\$2,196.66	5	1100	3450	\$1,830.55	11	2420	7590	\$4,027	31.88%	49.14%
Reactives for incineration	5	20	\$0.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Paint Sludge	55	700	\$161.79	11	605	7700	\$1,779.69	5	275	3500	\$808.95	16	880	11200	\$2,589	20.49%	17.87%
Aerosols	55	150	\$144.53	3	165	450	\$433.59	3	165	450	\$433.59	6	330	900	\$867	6.86%	6.70%
Oxidizer Liquid	15	150	\$0.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Gasoline	55	500	\$146.46		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Ballasts	5	75	\$0.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Acid Lab Pack	30	250	\$0.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Asbestos	5	25	\$35.00		0	0	\$0.00	1	5	25	\$35.00	1	5	25	\$35	0.28%	0.10%
Paint Liquid Sludge Overpack	15	150	\$0.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Waste Oil for refining	55	500	\$0.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Copper Cyanide	5	20	\$106.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Cat 2 Cylinders, medium	5	20	\$125.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Nitric Acid <small>(5 min cans)</small>	15	75	\$131.86		0	0	\$0.00	1	15	75	\$131.86	1	15	75	\$132	1.04%	0.30%
(consolidated from cu yd box)	55	350	\$0.00		0	0	\$0.00		0	0	\$0.00	0	0	0	\$0	0.00%	0.00%
Waste smoke detectors	5	20	\$88.33		0	0	\$0.00	1	5	20	\$88.33	1	5	20	\$88	0.70%	0.10%
Mercury contaminated debris	5	20	\$159.19		0	0	\$0.00	1	5	20	\$159.19	1	5	20	\$159	1.26%	0.10%
<b>Totals for Waste Disposal:</b>				<b>31</b>	<b>2695</b>	<b>14,490</b>	<b>\$6,708</b>	<b>29</b>	<b>2,230</b>	<b>9,940</b>	<b>\$5,925</b>	<b>60</b>	<b>4,925</b>	<b>24,430</b>	<b>\$12,632</b>	<b>100%</b>	<b>100%</b>
<i>Set-up Fee Paid by Barnstable County:</i>							\$420				\$420				\$840		
<i>VSQG Credit:</i>							\$0.00				-\$400.00				-\$400.00		
<b>Total Cost of Collection to Town:</b>							<b>\$6,707.73</b>				<b>\$5,524.71</b>				<b>\$12,232.44</b>		

	Eastham July 19 Collection	Orleans September 20 Collection		
#Cars-#Households	313 352	174 203	Total Cars 2014	487
WU/Car/Household	46 41	57 49	Total Households	555
Cost/Household	\$21.43 \$19.06	\$31.75 \$27.22	Cost Per Car/VSQG	\$25.12
			Cost Per Household	\$22.04
2014 Mercury Collecti	46 thermometers		Average Weight Per Car	50.2
	85 thermostats and switches		Average Weight Per Household	44.0
0.25	pounds elemental mercury		Average Gallons Per Car	10.1
0	blood pressure gauges		Average Gallons Per Household	8.9
0	digital thermometers given		Average Cost Per Collection	\$6,116
0	digital thermostats given			
0	shopping bags			

• FULL CAR count based on 25 lbs HHP/vehicle

Eastham 641

Orleans 309

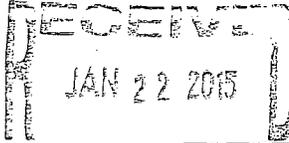
Use for DEP Municipal Recycling Data Sheet

**R.J. Gabriel Construction Co., Inc.**  
 785 Bedford Street  
 Bridgewater, MA 02324

# INVOICE

Invoice Number: easthamcbc14req4  
 Invoice Date: Jan 20, 2015  
 Page: 1

Voice: 508-697-6779  
 Fax: 508-697-6916



Duplicate

**Bill To:**  
 Town of Eastham  
 555 Old Orchard Rd.  
 Eastham, MA 02642

**Ship to:**  
 Town of Eastham  
 555 Old Orchard Rd.  
 Eastham, MA 02642

Customer ID	Customer PO	Payment Terms	
EASTHAM01		Net 10 Days	
Sales Rep ID	Shipping Method	Ship Date	Due Date
			1/30/15

Quantity	Item	Description	Unit Price	Amount
43.00		1/12/15: CBC	19.50	838.50
43.00		1/13/15: CBC	19.50	838.50
41.00		1/14/15: CBC	19.50	799.50
<i>Article 13- Clean Catch Basin            011235- 590461</i>				

**COPY**

Subtotal	2,476.50
Sales Tax	
Total Invoice Amount	2,476.50
Payment/Credit Applied	
<b>TOTAL</b>	<b>2,476.50</b>

Check/Credit Memo No: *126-15*

**R.J. Gabriel Construction Co., Inc.**

785 Bedford Street  
Bridgewater, MA 02324

**INVOICE**

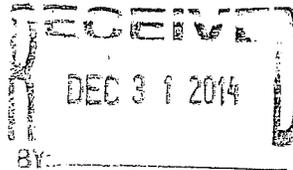
Invoice Number: easthamcbc14req1

Invoice Date: Dec 29, 2014

Page: 1

Duplicate

Voice: 508-697-6779  
Fax: 508-697-6916



**Bill To:**  
Town of Eastham  
555 Old Orchard Rd.  
Eastham, MA 02642

**Ship to:**  
Town of Eastham  
555 Old Orchard Rd.  
Eastham, MA 02642

Customer ID	Customer PO	Payment Terms	
EASTHAM01		Net 10 Days	
Sales Rep ID	Shipping Method	Ship Date	Due Date
			1/8/15

Quantity	Item	Description	Unit Price	Amount
43.00		12/23/14: CBC	19.50	838.50
26.00		12/24/14: CBC	19.50	507.00
<p>Article 13 - Clean Catch Basin 011235 - 590461</p>				

COPY  
12-15

Subtotal	1,345.50
Sales Tax	
Total Invoice Amount	1,345.50
Payment/Credit Applied	
<b>TOTAL</b>	<b>1,345.50</b>

Check/Credit Memo No:

**R.J. Gabriel Construction Co., Inc.**

785 Bedford Street  
Bridgewater, MA 02324

**INVOICE**

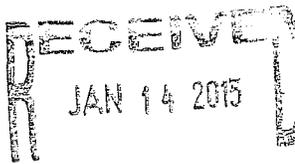
Invoice Number: easthamcbc14req3

Invoice Date: Jan 12, 2015

Page: 1

Duplicate

Voice: 508-697-6779  
Fax: 508-697-6916



BY: \_\_\_\_\_

**Bill To:**  
Town of Eastham  
555 Old Orchard Rd.  
Eastham, MA 02642

**Ship to:**  
Town of Eastham  
555 Old Orchard Rd.  
Eastham, MA 02642

Customer ID	Customer PO	Payment Terms	
EASTHAM01		Net 10 Days	
Sales Rep ID	Shipping Method	Ship Date	Due Date
			1/22/15

Quantity	Item	Description	Unit Price	Amount
43.00		1/5/15: CBC	19.50	838.50
42.00		1/6/15: CBC	19.50	819.00
43.00		1/7/15: CBC	19.50	838.50
41.00		1/9/15: CBC	19.50	799.50
		<u>Article 13 - Clean Catch Basins</u>		
		<u>011235-590461</u>		

COPY  
1-15-14

Subtotal	3,295.50
Sales Tax	
Total Invoice Amount	3,295.50
Payment/Credit Applied	
<b>TOTAL</b>	<b>3,295.50</b>

Check/Credit Memo No:

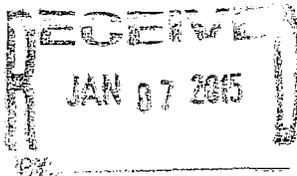
**R.J. Gabriel Construction Co., Inc.**

785 Bedford Street  
Bridgewater, MA 02324

Voice: 508-697-6779  
Fax: 508-697-6916

**INVOICE**

Invoice Number: easthamcbc14req2  
Invoice Date: Jan 5, 2015  
Page: 1  
Duplicate



**Bill To:**  
Town of Eastham  
555 Old Orchard Rd.  
Eastham, MA 02642

**Ship to:**  
Town of Eastham  
555 Old Orchard Rd.  
Eastham, MA 02642

Customer ID	Customer PO	Payment Terms	
EASTHAM01		Net 10 Days	
Sales Rep ID	Shipping Method	Ship Date	Due Date
			1/15/15

Quantity	Item	Description	Unit Price	Amount
34.00		12/29/14: CBC	19.50	663.00
42.00		12/30/14: CBC	19.50	819.00
42.00		12/31/14: CBC	19.50	819.00
44.00		1/2/15: CBC	19.50	858.00
Subtotal				3,159.00
Sales Tax				
Total Invoice Amount				3,159.00
Payment/Credit Applied				
<b>TOTAL</b>				<b>3,159.00</b>

Check/Credit Memo No:

COPY  
1-12-15

**Eastham Public Beaches - 2014**

EPA ID #	Days since rain:		0		1		0		4		0		0		4		4		0		0		3		3		0		0		1		0		3		0	
	Rain Event?	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO			
Sampling Date:	6/5/14	6/12/14	6/19/14	6/23/14	6/26/14	6/27/14	6/30/14	6/30/14	7/10/14	7/17/14	7/24/14	7/31/14	8/7/14	8/14/14	8/15/14	8/18/14	8/21/14	8/28/14																				
			Re-test		Re-test		Re-test								Re-test		Re-test																					
<b>Marine Beaches</b>																																						
MA813829	Boat Meadow	62	<2	12																																		
MA113854	Campground Beach	2	2	2																																		
MA562661	Cole Road Beach	2	<2	<2																																		
MA408301	Cook's Brook	<2	<2	<2																																		
MA957865	Dyer Prince	<2	8	2																																		
MA687258	First Encounter Beach	<2	2	<2																																		
MA377157	First Encounter River	2	<2	6																																		
MA789600	Kingsbury	<2	10	2																																		
MA125754	S. Sunken Meadow	2	<2	<2																																		
MA827016	Thumpertown	<2	<2	2																																		
MA272144	Town Cove	4	<2	10																																		
	Salt Pond	62	98	>400	6	>400	140	28																														
<b>Fresh Water</b>																																						
			Re-test		Re-test		Re-test								Re-test		Re-test																					
MAFW3386	Great Pond	4	4	80																																		
MAFW3387	Herring Pond	8	<4	12																																		
MAFW3388	Long Pond (Depot St)	40	136	76																																		
MAFW3389	Minister Pond	4	16	4																																		
MAFW3392	Wiley Park	<4	4	28																																		
	Jemima Pond	<4	8	12																																		
<b># Marine Beach Samples</b>		<b>160</b>																																				
<b># Marine Beach Failures</b>		<b>5</b>																																				
<b>% Marine Failures</b>		<b>3.13%</b>																																				
<b># Fresh Water Samples</b>		<b>79</b>																																				
<b># Fresh Water Failures</b>		<b>1</b>																																				
<b>% Fresh Water Failures</b>		<b>1.27%</b>																																				

**Save the Date**  
**Join us Friday September 5, 2014**  
**10:00 am to 12:30**  
**Eastham Pond Education and Volunteer**  
**Appreciation Day**  
**Pond Update and Invasive Species Workshop**

Please register in advance free of charge



Where: Eastham Town Hall  
2500 State Highway  
Date: Friday September 5  
Time: 10 am to 12:30 pm

Learn about the status of Eastham Ponds:

- Herring and Great Pond post alum treatment-how are they doing?
- Next steps for pond protection
- Learn about invasive and non-invasive aquatic plants from experts
- \*Bring in Samples of Your Own Aquatic Plants for Identification\*
- Bring your questions and comments

Come join our discussion of the most recent results of the Eastham Pond Monitoring Program and learn how you can help keep our ponds healthy!

Register online by contacting us at [health@eastham-ma.gov](mailto:health@eastham-ma.gov) or  
Call Eastham Health Department 508-240-5900 x 230 for information

# **Town of Eastham Comprehensive Plan to Protect Pond Water Quality**



*Herring Pond*

**Eastham Water Management Committee  
Version 1.0  
November 18, 2014**

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## **1.0 Introduction**

### **1.1 Purpose**

The purpose of this plan is to recommend actions that will be taken to restore water quality in the freshwater ponds in the Town of Eastham, Massachusetts and reduce further pollution. For the purposes of this plan, pond water quality is defined in Appendix A.<sup>1</sup>

### **1.2 Motivation**

The need to take steps to restore the water quality of Eastham's ponds has been demonstrated by studies of our pond water over the past 12 years showing deteriorating water quality, which is likely to continue without intervention to remediate the damage already done and reduce the likelihood of recurrence by addressing the causes of the deterioration. These studies concluded that the main cause of deterioration is the flow of phosphorus into the ponds from individual septic systems in the watersheds, phosphorus held in sediment in the ponds, lawn and garden maintenance, precipitation, road and parking lot runoff, roof runoff and bird droppings.<sup>2</sup>

While long range efforts to deal with excess nutrient flow from phosphorus and nitrogen into estuaries and ponds through the replacement or upgrading of septic systems and other steps offer the possibility of a cure for the problems of our ponds and coastal waters down the road it is imperative to take steps now to protect our waters with tools that are readily available with a reasonable amount of effort. The purpose of this plan is to identify and recommend actions that we believe can be taken with reasonable effort and to restore the water quality of our ponds and reduce conditions that would contribute to a recurrence of the problem.

### **1.3 Charge**

In its letter dated August 13, 2012, the Board of Selectmen requested that the Water Management Committee (WMC) "take the lead on a project to develop and implement a plan to reduce phosphorus in the town's ponds."<sup>3</sup>

The board further requested that the WMC develop "a comprehensive plan to protect town ponds through a policy or regulation for residents on the use of

---

<sup>1</sup> Version 1.0 of the plan and its subversions only address thirteen of Eastham's freshwater ponds because they are included in the current pond water-sampling program. Future versions (2.0, 3.0, etc.) may include other freshwater ponds as well as salt ponds and estuaries.

<sup>2</sup> Table 3-9, pg. 21 of Ecologic Study

<sup>3</sup> The WMC will recommend to the Selectmen that the plan include limiting nitrogen as well as phosphorus as nutrients.

fertilizers, removal of animal wastes, prohibition of phosphate based detergents, and control of storm run-off to ponds [and asked] that the WMC coordinate its efforts with the Board of Health and Conservation Commission and provide a draft plan by the end of November 2012.”

## 1.4 Objective

The objective of this plan is to define a comprehensive and coordinated approach and schedule that will result in well-defined policies, regulations and procedures leading to the remediation of pond water quality and the subsequent maintenance of pond water quality in the Town of Eastham. The WMC will take advantage of the previous work done within Eastham (i.e., Appendix B and Policy on the Content and Application of Fertilizers and Pesticides on Municipal Land in the Town of Eastham) and by other municipalities<sup>4</sup> and groups to provide the basis for reasonable, actionable and effective procedures.

## 2.0 Roles and Responsibilities

The roles and responsibilities of the various organizational entities that will participate in the plan are grouped as follows: Primary Participants, Coordinating Organizations, and Review and Comment Organizations.

### 2.1 Primary Participants

The primary participants in the development of this plan and their roles and responsibilities are:

- The **Water Management Committee** is responsible for drafting the plan, soliciting input from the other primary participants, coordinating a review and comment process to ensure all stakeholders have appropriate input, finalizing the plan and monitoring its execution.
- The **Board of Health** assists in the development and evaluation of the plan by providing input as requested by the WMC and reviewing and commenting on the plan drafts to ensure the content is complete and consistent with respect to Eastham Board of Health regulations.
- The **Conservation Commission** is responsible for supporting the development of the plan by providing input as requested by the WMC and reviewing and commenting on the drafts to ensure the content and the

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<sup>4</sup> E.g., Best Management Practices for Landscape Fertilizer Use on Nantucket Island, <http://www.nantucketlandcouncil.org/Reports/fertilizerbestpractices.pdf>

responsibilities ultimately allocated to the Commission are complete and consistent with the charge of the Commission.

- The **Board of Selectmen** is responsible for approving the plan, reviewing progress to ensure the team remains on the right track, reviewing and commenting on the appropriateness of the products proposed to be developed and actions to be carried out in accordance with the plan (e.g., policies, regulations), and monitoring and guiding the execution of the plan.

## 2.2 Coordinating Organizations

Coordinating organizations are entities within Eastham's governance structure, other than the primary participants, who will have responsibilities and duties as a result of the policies and procedures developed under the plan and, therefore, must be given the opportunity to voice their opinions, concerns and recommendations. The specific list of organizations will evolve as the plan unfolds but at this writing the list of coordinating organizations may include the following:

- Public Works Department
- Natural Resources Department Office
- Building Department
- Planning Board
- Zoning Board of Appeals
- Recreation and Beaches

As appropriate, the WMC will inform the coordinating organizations of the intentions of the plan and their potential roles, solicit their inputs and recommendations, and provide the opportunity to review and comment on the plan drafts as well as the drafts of the products during the execution of the plan.

## 2.3 Review and Comment Organizations

Review and comment organizations are the groups external to Eastham's governance structure that may be interested in and concerned about the results of the plan and, therefore, will be given the opportunity to provide inputs and voice any concerns they may have. The specific list of organizations will evolve as the plan unfolds but at this writing the list may include the following:

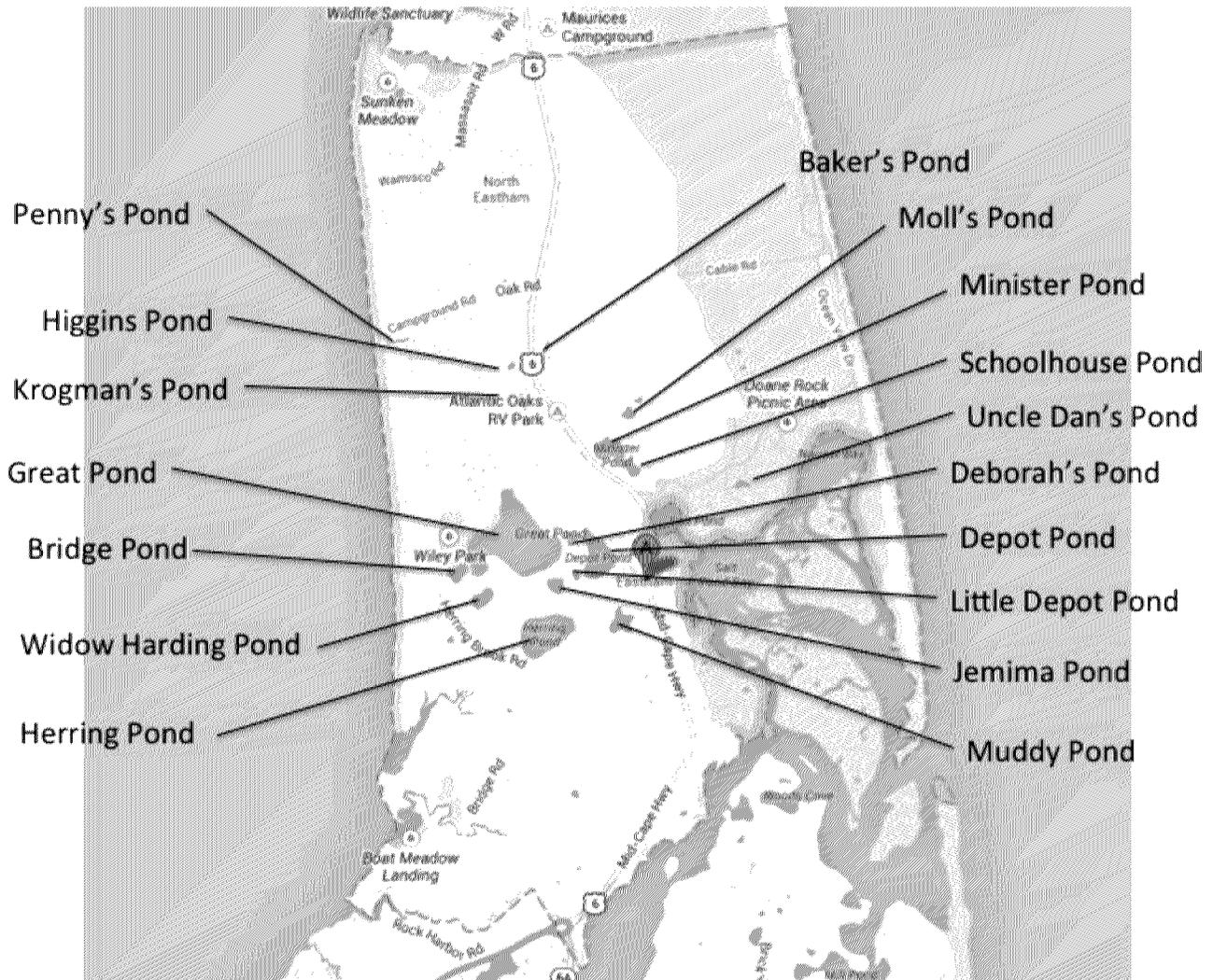
- Eastham town taxpayers
- Eastham pond associations (e.g., Depot, Herring, Minister/Schoolhouse Pond Associations and Widow Harding)
- Pond and Lakes (PALs) Volunteer Group
- Cape Cod National Seashore
- Local landscaping contractors

- Local housing contractors
- Local plant nurseries
- Local realtors
- Cape Cod Commission
- Barnstable County Department of Health and the Environment
- Massachusetts Department of Transportation

It is expected that the review and comment process will include public hearings and the provision of drafts of the plan and associated products consistent with the Open Meeting Law.

### 3.0 Scope of the Plan

The Town of Eastham has many freshwater ponds of varying sizes and usage, as illustrated in the following figure.



The initial version of this plan includes the eleven freshwater ponds for which there are mature pond sampling and testing programs. Table 1 provides some descriptive data about the ponds. <sup>5</sup>

**Table 1**  
**Town of Eastham Ponds Included in the Initial Version of the Plan**

<b>Pond<sup>6</sup></b>	<b>Surface Area (Acres)</b>	<b>Maximum Depth (Feet)</b>	<b>Watershed Area (Acres)</b>	<b>Impairment</b>
Bridge	6.7	20	7.9	Slightly Impaired
Depot	27.9	33	65	Impaired
Little Depot	2.3	15	2.3	Impaired
Great	109.7	37	226	Highly Impaired
Herring	44.2	35	80	Highly Impaired
Jemima	6.4	15	18	Impaired
Ministers	16	14	151	Highly Impaired
Schoolhouse	6.8	14.5	5.7	Slightly Impaired
Molls	3.4	13	8.1	Impaired
Muddy	10.5	5	40	Highly Impaired
Widow Harding	8.7	13	26	Slightly Impaired

Six smaller ponds do not have specific recommendations for action in this initial version of the plan because there is no or only limited water quality data for those ponds. There is no water quality data for Krogman’s, Baker’s, Uncle Dan’s or Deborah’s because there is no pond sampling program in place for those ponds. There is only limited data available for Penny’s and Higgins because sampling began there only recently. These ponds may be added to a future version of the plan if corrective actions are indicated as a result of sampling.

The most recent study of pond water quality recommends the following town and homeowner actions to mitigate the negative impact and enhance water quality in

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<sup>5</sup> This section is based on, “Action Plan for the Town of Eastham Ponds,” prepared by EcoLogic, Dec 2011, Cazenovia, NY, and GHD, Hyannis (Final document on Town website. ([http://www.eastham-ma.gov/Public\\_Documents/EasthamMA\\_WebDocs/WaterManagementDocs/FinalReportPondsActionPlan05142012.pdf](http://www.eastham-ma.gov/Public_Documents/EasthamMA_WebDocs/WaterManagementDocs/FinalReportPondsActionPlan05142012.pdf)).

<sup>6</sup> Ponds with beaches include Great and Herring Ponds. Ponds with boat ramps and landings include Great, Herring, and Ministers Ponds. Ponds with other public access or use include Jemima’s, Depot, Widow Harding, and Bridge Ponds.

the Town of Eastham. These actions, and the policies and procedures needed to accomplish these actions, will be considered within the initial scope of this plan.

The following are actions that may be undertaken by the Town:

- Engage in public education
- Promote septic system maintenance/upgrades as required by Massachusetts Department of Environmental Protection and BOH Regulations and recommendations
- Manage storm water runoff from paved surfaces
- Require maximum feasible setbacks from surface water for new or replacement septic systems as required by Massachusetts Department of Environmental Protection and BOH regulations.
- Conduct in-pond treatments as needed (e.g., alum treatment, enhanced mixing)
- Control phosphorus levels through best management practices
- Discourage feeding water fowl
- Identify and acquire open space parcels of land

The following are actions that may be undertaken by individuals and associations:

- Become more aware of the watersheds within which they reside and their needs and sensitivities
- Become more educated as to the best residential practices for lawn care and wastewater management
- Adopt responsible lawn maintenance and gardening practices
- Pursue septic structure maintenance/upgrades
- Restore and maintain vegetated shoreline
- Control residential water runoff
- Implement aquatic plant controls
- Discourage large flocks of birds
- Pick up pet waste

Additional actions may be added if identified during the development or execution of the plan

## **4.0 Approach**

The following steps will be taken to develop and implement the comprehensive plan. Additional details will be added to the plan, including appendices for each individual pond, as specific actions are selected for implementation, with approval of the Board of Selectmen, and will be updated periodically as appropriate.

## **4.1 Compile a pond issues inventory**

In addition to common issues, an inventory of the specific issues of each pond will be compiled and used to develop individual action plans as needed. The issues inventory will be based on prior studies of the ponds, in particular the “Action Plan for the Town of Eastham Ponds”. Additional information may be gathered where there are gaps in information for any individual pond.

## **4.2 Analyze the candidate actions for feasibility and potential effectiveness**

Each of the candidate actions identified in section 3.0 and recommended by the “Action Plan for the Town of Eastham Ponds” will be evaluated as candidates for implementation with the following as guiding principles:

- Degree to which the action may contribute to meeting the plan’s objectives for the Town’s ponds<sup>7</sup>
- Products (e.g., policies, regulations) that may be required to achieve the action
- Processes that may be required to be put in place to achieve the action (e.g., Planning Board review)
- Identification of coordinating organizations that would be involved in executing the action
- Identification of review and comment organizations that would be affected by the action
- Any expense or funding required to achieve the action
- Identification of timeframe within which the action can be initiated
- Identification of timeframe within which positive results would be expected in improving pond water quality
- Quantitative means by which progress can be measured and monitored once implemented

During this process inputs will be solicited from the coordinating and review/comment organizations as appropriate.

## **4.3 Prioritize the candidate actions**

The candidate actions will then be prioritized based on a subjective assessment of:

- Degree to which they are most likely to have the greatest impact on improving water quality of the respective ponds
- Degree to which they can be executed quickly with positive impact and modest cost and effort

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<sup>7</sup> Different ponds may have different pressing needs that best align with different candidates.

- Identification of which candidates have near-term benefits and which are considered long-term solutions
- Degree to which the candidate is intrusive on the stakeholders and likely to be supported (or not) by the stakeholders

During this process additional inputs will be solicited from the coordinating and review/comment organizations as appropriate.

#### **4.4 Select candidates and coordinate with Selectmen**

Select a set of actions that the WMC, in coordination with the Board of Health and the Conservation Commission, will present to the Board of Selectmen based on the results of the previous steps. Meet with the Board of Selectmen and present the recommendations with the supporting rationale for their approval. Update the comprehensive plan to include the details of the selected actions (i.e., Appendix C).

#### **4.5 Implement the selected actions**

The WMC will work with the other organizations to develop the products and implement the processes for the approved initiatives. It is anticipated that this may include, but is not limited to, the following types of products and activities:

- Town-initiated products and activities such as:
  - New or modified bylaws<sup>8</sup> coordinated with the appropriate organizations (e.g., Planning Board, Zoning Board of Appeals, Board of Health)
  - New or modified permitting processes coordinated with the appropriate organizations (e.g., Building Department, Planning Board, Zoning Board of Appeals, Board of Health)
  - Development or acquisition of educational materials for the public<sup>9</sup> and the conduct of public education forums
  - Targeted education of citizens on such items as how to improve pond quality by better lawn and gardening management practices, including fertilizer and soil conditioners
- Physical activities coordinated with and implemented through the appropriate organizations (e.g., DPW, pond associations), such as:
  - Construct/reconstruct storm water control devices to limit the movement of plant nutrients, in dissolved and solid form, from paved areas directly into surface waters
  - Alum treatment of ponds, such as Herring Pond

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<sup>8</sup> Such as accelerated replacement of remaining non-Title 5 septic and cesspools.

<sup>9</sup> E.g., "The Massachusetts Lake and Pond Guide," prepared by Mass Department of Conservation and Recreation.

- Consideration of new/alternative technology to limit the movement from septic structures of plant nutrients in dissolved form to nearby surface and groundwater
- Pond restoration/remediation actions to promote a diverse aquatic ecosystem including enhanced water mixing, enhanced dissolved oxygen, and retard release of phosphorus from bottom sediments
- Means to reduce or eliminate cormorant and migratory bird roosting on high voltage, electrical transmission lines over ponds like Little Depot Pond
- Work with land owners to cut, collect and remove rooted, submerged aquatic plants from near shorelines
- Continue pond sampling by PALS volunteers
- Coordination with applicable Barnstable County<sup>10</sup> and Commonwealth of Massachusetts<sup>11</sup> organizations

During this process further inputs and comments will be solicited from the stakeholder organizations either directly or in public hearings. Town Counsel may also be asked to review any materials that may have legal implications or require petitioning outside of Eastham.

#### **4.6 Monitor and assess progress**

Work with the applicable organizations to measure and monitor progress in achieving the plan's objectives. Periodically review progress with the Board of Selectmen. Adjust the plan based on achieved results in coordination with the Board of Health and Conservation Commission, as approved by the Board of Selectmen.

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<sup>10</sup> E.g., Cape Cod Commission, County Board of Health, Cape Cod Water Protection Collaborative, Cape Cod Cooperative Extension Service

<sup>11</sup> E.g., Department of Environmental Protection, Department of Conservation and Recreation, Department of Fish and Game

## 5.0 Schedule for Completing the First Version of the Plan

Event	Start Date	End Date	Status
Coordinate approach with BoS	11/7/12	11/7/12	Completed
Coordinate approach with Conservation Commission	12/11/12	12/11/12	Completed
Coordinate approach with Board of Health	12/27/12	12/27/12	Completed
Complete pond issues inventory (4.1)	12/4/12	2/12/13	Completed
Complete appendix A and C. Accept changes as version 0.7.	12/4/12	2/18/13	Completed for coordination purposes
Coordinate version 0.7 with ConsCom and BoH	3/28/13	4/23/13	BoH coordinated on the plan on 3/28. Suggested scheduling a workshop with them to coordinate Appendix C actions. ConsCom meeting held on 4/23 and comments received.
Address comments from the ConsCom and BoH (if necessary)	4/23/13	7/1/13	Draft responses provided on 6/11/13  Responses completed on 7/1/13 to be sent to BoH and ConsCom
Coordinate final changes with ConsCom and BoH (if necessary)	7/22/13	11/12/13	Harris presented responses to BoH and provided electronic copy of v0.8 to ConsCom on July 22.  Met with BoH on July 22. BoH met on July 25 to go over the document and provide comments. Received additional comments on July 29 and have included them.

			Received final comments from ConsCom and completed corresponding changes on 11/12/13
Meet with the BOS to seek approval to coordinate with Coordinating Organizations (2.2), to post latest version on the town website and hold a public hearing (if appropriate)	12/2/13	12/2/13	Presentation was given to the BoS and they approved moving ahead as proposed.
Send letter to Coordinating Organizations (2.2) with latest version attached to make them aware of the plan and to offer to meet with them if desired	11/12/13	12/23/13	Letter drafted on 11/12/13 and revised as an email on 12/23/13  Email sent with comment deadline of 2/15/14
If approved by the BOS, post latest version on the Town's website	12/10/13	12/16/13	Posted on the town website under "Hot Topics," "News & Announcements" and in the WMC section
Post a story in the Cape Codder informing of the draft plan on the website and soliciting feedback from Review and Comment Organizations (2.3)	12/10/13	12/16/13	Draft announcement was sent to the Cape Codder on 12/16 and the story appeared in the 12/20/13 edition

If desired by the BOS, hold a public hearing on the draft plan			Only one comment was received. A public hearing is not required.
Address comments from the Coordinating (2.2) and Review and Comment (2.3) Organizations	12/20/13	4/15/14	
Prepare the final draft of v1.0	4/15/14	6/10/14	
Coordinate final draft of v1.0 with BoS, BoH and ConsCom. Revise if necessary.	9/11/14	11/18/14	No comments were received from the BoS, BoH or ConsCom
Approve v1.0	11/18/14		
Publish v1.0 on town website			
Revise v1.0 in future sub-releases (v1.1, v1.2, etc.) to reflect updates as described in 4.6			As required

## Appendix A

### Definition of Pond Water Quality

Water quality in Eastham is defined in terms of its effects on the safe and pleasurable use of the ponds by residents and guests. “Over fertilization,” which results from nutrient accumulation in the ponds, stimulates the growth of algae, which in turn causes several water quality problems in these surface waters including:

- Loss of water clarity which makes swimming, fishing, and boating less attractive
- Algae settling to the bottom of the estuaries and ponds where it decays, using up dissolved oxygen (DO) in the process; the impacts of decaying algae and associated low DO can kill fish and shellfish
- Loss of animal habitat and the production of odors from the rotting algae.
- Occurrence of Blue-green algae resulting in toxic blooms.

Good water quality is also essential to the well being of humans and to the ecology of our ponds. In Massachusetts, water quality standards are found in the regulations written to interpret the Massachusetts Clean Water Act, General Law c. 21 Parag. 26-53. These regulations are found in the Massachusetts Surface Water Quality Standards (314 CMR 4) in the section that applies to ponds that are not drinking water supplies. It is against these standards that the Eastham ponds were evaluated in 2009 and again in 2011. These studies found that all Eastham ponds are currently impacted by nutrients, particularly phosphorus.

In technical terms a lake or pond is usually classified as being in one of three possible classes: *oligotrophic*, *mesotrophic* or *eutrophic*. Lakes and ponds with extreme trophic indices may also be considered *hyperoligotrophic* or *hypereutrophic*. The table below demonstrates how the index values translate into trophic classes.

*Relationships between Trophic Index (TI), chlorophyll (Chl), phosphorus (P, both micrograms per litre), Secchi depth (SD, metres), and Trophic Class (after Carlson 1996)<sup>12</sup>*

TI	Chl	P	SD	Trophic Class
<30—40	0—2.6	0—12	>8—4	Oligotrophic
40—50	2.6—20	12—24	4—2	Mesotrophic
50—70	20—56	24—96	2—0.5	Eutrophic
70—100+	56—155+	96—384+	0.5—<0.25	Hypereutrophic

<sup>12</sup> Carlson R.E. and J. Simpson (1996) A Coordinator's Guide to Volunteer Lake Monitoring Methods. North American Lake Management Society; <http://www.secchidipin.org/tsi.htm>

Oligotrophic lakes generally host very little or no aquatic vegetation and are relatively clear, while eutrophic lakes tend to host large quantities of organisms, including algal blooms. Each trophic class supports different types of fish and other organisms, as well. If the algal biomass in a lake or other water body reaches too high a concentration (say  $>80$  TI), massive fish die-offs may occur as decomposing biomass deoxygenates the water.

## Appendix B

### **(Draft) History of Related Pond Quality Actions to Date**

2001: Eastham Water Resources Advisory Board (WRAB) initiates annual Water Quality Monitoring Program involving about 60 private wells to be tested for nitrogen. Volunteers trained by Cape Cod Commission (CCC) and Cape Cod National Seashore staff begin to sample Eastham freshwater ponds for Nitrogen (N), Phosphorus (P), chlorophyll-a, dissolved oxygen and clarity.

2002: Eastham Wastewater Management Planning Committee (WMPC) is founded.

2003: Water Quality Monitoring Program expanded to include town wide well testing with town divided into three sections with wells in each section to be tested every three years.

2004: WRAB and WMPC merge in order to work together on the closely linked issues of drinking water protection and wastewater treatment planning. Eastham Health Agent named Eastham rep to Cape Cod Wastewater Planning Collaborative (CCWPC).

May 2006: Town meeting funds an initial wastewater management planning Article; Stearns and Wheler selected as consultant. Technical subcommittee begins to work with the consultant to determine the needs of the town for wastewater management planning .

2006: Barnstable County Department of Health and Environment formulates a report on the effectiveness of Eastham's many Innovative/Alternative (I/A) sewage treatment systems. Pond sampling data for years 2001-2006 submitted to CCC water quality staff for evaluation, interpretation and recommendations.

Jan. 2008: WMPC technical subcommittee, having reviewed the draft Rock Harbor MEP report which had been received in fall 2007, sends questions regarding its findings to Dept. of Environmental Protection (DEP) via BOS.

May 2008: Town meeting approves a formal study of Eastham's wastewater management planning needs.

Dec. 2008: BOS approves WRAB-WMPC name change to Water Management Committee (WMC) and revised mission statement for WMC that adds pond water quality charge.

March and June 2009: Two Stearns and Wheler reports, *Final Interim Needs Assessment and Alternatives Screening Analysis Report* and *Wastewater Project Plan Evaluation Report*, received and presented publicly. The report recommends that the town either sewers the pond watershed or treats impacted ponds with alum. (Executive Summary of the latter available at <http://www.eastham-ma.gov/>)

Public Documents/EasthamMA WebDocs/  
WaterManagementDocs/WWMgtFinalExecSum.pdf )

May 2009: *Eastham Freshwater Ponds: Water Quality Status and Recommendations for Future Activity*, prepared by UMass Dartmouth and CCC Water Resources Program received and presented at a public meeting. (Available at [http://www.eastham-ma.gov/Public\\_Documents/EasthamMA\\_WebDocs/WaterManagementDocs/PondsFinalRpt.pdf](http://www.eastham-ma.gov/Public_Documents/EasthamMA_WebDocs/WaterManagementDocs/PondsFinalRpt.pdf) )

May 2010: Town Meeting approves the inclusion of funds for pond restoration planning in the five year capital plan.

June 2010: Brochure describing the conclusions of the June 2009 Stearns and Wheler Wastewater Project Plan Evaluation Report sent to all homeowners. [Get a copy for WMC records]

Sept.- Dec. 2010: WMC meets with Orleans Citizens Peer Review Committee and Brian Howes and Ed Eichner of the UMass Dartmouth Coastal Systems Group regarding the Draft Rock Harbor MEP report, DEP's Brian Dudley observing, and BOS meets with Brian Dudley.

Dec. 2010: WMC prepares a Request for Proposals (RFP) for pond restoration study and submits it to BOS accompanied by a request that BOS request Town Meeting approve funding for pond restoration in the capital budget in May 2011.

May 2011: Town Meeting approved expenditure of \$65,000 to fund a study by a consultant of the 11 ponds in Eastham to evaluate their water quality and recommend at least two of the ponds for remedial action. RFP is issued and Ecologic LLC and GHD selected to perform pond study.

August 2011: Ecologic and GHD present Review of Findings and lead public discussion of how to set priorities for action at a joint session of BOS, WMC, Board of Health (BOH) and Conservation Commission (ConsCom)

October 2011: Ecologic and GHD submit their Draft Report which is posted on Town website and subsequently present highlights of the Report for comment and public discussion at a joint session of BOS, WMC, BOH and ConsCom.

November 2011: WMC recommends that one deep pond, Herring, and one shallow pond, Minister/Schoolhouse be selected as candidates for remediation to test alternative approaches appropriate to ponds of different depths and decides to seek approval from BOS to make an application for Community Preservation Committee (CPC) funds to support remediation consistent with the previous motion on priorities and recommendation on costs.

December 2011: Ecologic and GHD submit Final Ponds Action Plan

December 2011: BOS approves selection of Herring and Minister/Schoolhouse for priority remediation.

WMC applies to Community Preservation Committee (CPC) for a grant of \$280,000 to cover the cost of remediation at both ponds.

WMC recommends that BOS proceed with an application for a permit for alum treatment for Herring Pond, Ecologic's recommended treatment method for that pond and that BOS have further discussions with Ecologic with respect to a treatment method for Schoolhouse/Minister.

February 2012: WMC receives Ecologic/GHD memorandum detailing cost estimates for remediation of Herring and Minister/Schoolhouse at a total cost of \$280,000. In response to request from CPC that WMC limit its grant application to \$140,000 for treatment of Herring, WMC decides to submit amended application.

March 2012: [ck date] CPC submits Article for Town Meeting Warrant to authorize expenditure of \$140,000 for alum treatment at Herring Pond.

April 2012: [ck date] Application for permit to treat Herring submitted to ConsCom by consultants.

August 2012: ConsCom files permit and Order of Conditions with Mass. DEP. Permit issued.

## Appendix C

### Common and Individual Pond Action Plans

#### C.1 Overview

This appendix delineates the specific actions that will be taken. These include common actions that will apply to all ponds and actions that are specific to individual ponds.

#### C.2 Common Actions that Will Benefit All Ponds

The follow actions will be taken that apply to all ponds.

Action	Start Date	End Date	Lead(s)	Status
<b>Regulation</b>				
Encourage maximum possible setbacks from pond shorelines for new and replacement septic systems	Ongoing		Conservation Commission	This is already within the ConsCom's authority and is an ongoing activity.
Work with the ConsCom to encourage pond abutters to maintain or reestablish a 100' buffer zone of native plantings on the pond side	Ongoing		Conservation Commission	This is already within the ConsCom's authority and is an ongoing activity.
<b>Pond-related Public Works Management</b>				
Work with DPW to develop a prioritized schedule for needed corrections for controlling storm runoff at ponds				Harris to meet with DPW in December to fully understand his plans for storm water runoff.
<b>Pond Monitoring and Remediation</b>				

Continue pond sampling to monitor water quality by means of the Barnstable County supported Ponds and Lakes Steward (PALS) Program, or similar program, as needed to assure its continuation and expansion if necessary	Ongoing			
BoH continues to conduct water sampling and testing for harmful bacteria at ponds used by the public	Ongoing		Board of Health	Ongoing, business as usual in accordance with state regulations. Information is available to the public in multiple ways, including town web site.
Develop a strategy and schedule for seeking funding for and conducting treatment of remaining ponds that require treatment (see pond plans for specifics)				
Monitor ponds to identify the presence of large flocks of birds, analyze the extent to which it is possible to restrict/deter large flocks of birds and identify steps to discourage their presence where needed				Example of possible actions: Orleans recommendations for Cedar Pond on Orleans web site.
Coordinate pond-related activities with the respective pond associations				Ongoing activity
<b>Public Education/Communication</b>				
Develop strategy for educating the public about best practices to protect pond water quality	5/14/13		Dumas	Target list of groups and candidate methods to reach them was created on 6/9/13.
Develop awareness brochure of good practices for property owners for distribution within the town, e.g. what to look for	12/12		Sisterson	Version 2.3 of draft brochure on 5/4/13. Version 2.4 of draft

<p>in fertilizers</p>				<p>provided on 6/8/13.  V2.4 presented to BoS on 7/1/13.  Updated drafts sent to WMC on Sept 6 and Oct 4.  WMC is developing recommendations as to the numbers to be printed and distribution methods for submission to BoS.  6000 copies were printed and picked up in May 2014. The WMC has begun distributing the brochures.</p>
<p>Acquire funding for printing awareness brochure</p>			<p>Harris</p>	<p>Graphic Arts at Cape Cod Regional High School can print for \$0.19/copy for 2000 or more copies.  Town has agreed to pay for cost of printing the brochure after BoS approval.  6000 copies were printed and picked up in May 2014. The WMC has begun distributing the brochures.</p>

## Appendix C, Annex 1 Bridge Pond Action Plan

### CA1.1 Bridge Pond Issues Inventory

Bridge Pond is hydrologically connected to Great Pond for inflow and outflows to Herring Brook, which in turn outflows to Cape Cod Bay. Therefore, Bridge Pond inherits some Issues from Great Pond. The specific issues are:

- Deep waters have low dissolved oxygen
- Possible sediment release of phosphorus
- Water runoff from Herring Brook Road

### CA1.2 Bridge Pond Actions

The following actions are and will be taken with regard to Bridge Pond:

Action	Start Date	End Date	Lead(s)	Status
Coordinate remedial actions to reduce phosphorus with Great Pond actions	As required			
Monitor Eastham DPW upgrades to Herring Brook Road relative to Bridge Pond	Fall 2012			Construction under way as of March 2013
Take actions to improve and maintain shoreline vegetative buffers of 100'				

## **Appendix C, Annex 2 Depot Pond Action Plan**

### **CA2.1 Depot Pond Issues Inventory**

The specific issues of Depot Pond are:

- Most likely phosphorus sources: Septic, birds, roads, roofs
- Deep waters have oxygen depletion in summer
- 6 residences within 300' up-gradient with one other developable parcel
- Septic system contribution may increase as discharges slowly reach the pond
- Sediment phosphorus release

### **CA2.2 Depot Pond Actions**

The following actions are and will be taken with regard to Depot Pond:

<b>Action</b>	<b>Start Date</b>	<b>End Date</b>	<b>Lead(s)</b>	<b>Status</b>
Plan and conduct alum treatment if necessary				
Take actions to improve and maintain shoreline vegetative buffers of 100'				

## **Appendix C, Annex 3 Great Pond Action Plan**

### **CA3.1 Great Pond Issues Inventory**

Great Pond is hydrologically connected to Bridge Pond. Therefore, actions taken for Great Pond will also benefit Bridge Pond. The specific Issues of Great Pond are:

- Deep waters have oxygen depletion in summer
- Most likely phosphorus sources: Sediment, precipitation, septic
- 22 properties within 300' up-gradient
- Septic system contribution may increase as discharges slowly reach the pond (time of travel estimated 35-81 years)
- Sediment phosphorus release
- Water runoff from roads, Town Beach and Wiley Park

### **CA3.2 Great Pond Actions**

The following actions are and will be taken with regard to Great Pond:

Action	Start Date	End Date	Lead(s)	Status
Plan and conduct alum treatment	2/4/13	6/6/13	Blong, Board of Health	<p>Application submitted to Community Preservation Committee for \$220K on 2/4/13.</p> <p>The proposal was approved at Town Meeting and an implementation schedule has been developed by BoH.</p> <p>Staff meeting with Ecologic and company to schedule site visit and address questions/issues that all town departments might have.</p> <p>Sediment sampling done in late July.</p> <p>Will be used to determine chemical dose.</p> <p>ConsCom Orders of Condition have been registered and is available on their web site.</p> <p>Alum treatment was completed by October 6, 2013.</p> <p>Draft EcoLogic report provided on October 23,</p>

				2013. Results reported to be very positive at Town pond meeting on September 5, 2014.
Consider actions to replace septic systems with sewers				
Take actions with DPW to curtail road and parking lot run-off				
Take actions to improve and maintain shoreline vegetative buffers of 100'				

## Appendix C, Annex 4 Herring Pond Action Plan

### CA4.1 Herring Pond Issues Inventory

The specific Issues of Herring Pond are:

- Abundant algae
- Dissolved oxygen depletion in deep water
- Increasing phosphorus
- Most likely phosphorus sources: Sediment, roads, precipitation, roofs, septic
- 20 leach fields within 300' up-gradient
- Septic system contribution may increase as discharges slowly reach the pond (time of travel estimated 35-81 years)
- Sediment phosphorus will continue to be important

### CA4.2 Herring Pond Actions

The following actions are and will be taken with regard to Herring Pond:

Action	Start Date	End Date	Lead(s)	Status
Monitor the results of alum treatment			Crowley	Encouraging report on 6/18/13  Crowley reported on Aug 13 that results so far are very positive.  Results reported to be very positive at Town pond meeting on September 5, 2014.
Take actions for aquatic plant controls				
Take actions to improve and maintain shoreline vegetative buffers of 100'				

## **Appendix C, Annex 5 Jemima Pond Action Plan**

### **CA5.1 Jemima Pond Issues Inventory**

The specific Issues of Jemima Pond are:

- 6 residences within 300'
- Most likely phosphorus sources: birds, septic, precipitation, road runoff
- Septic system contribution may increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

### **CA5.2 Jemima Pond Actions**

The following actions are and will be taken with regard to Jemima Pond:

<b>Action</b>	<b>Start Date</b>	<b>End Date</b>	<b>Lead(s)</b>	<b>Status</b>
Monitor Samoset Road shoulder for indication of possible road runoff flowing into the pond				
Take actions to improve and maintain shoreline vegetative buffers of 100'				

## Appendix C, Annex 6 Little Depot Pond Action Plan

### CA6.1 Little Depot Pond Issues Inventory

The specific Issues of Little Depot Pond are:

- 3 residences within 300'
- Most likely phosphorus sources: birds, septic, precipitation, road runoff
- Septic system contribution may increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

### CA6.2 Little Depot Pond Actions

The following actions are and will be taken with regard to Little Depot Pond:

Action	Start Date	End Date	Lead(s)	Status
Take actions with DPW to curtail road runoff from Samoset Road				
Take actions to improve and maintain shoreline vegetative buffers of 100'				
Take actions to discourage cormorants from perching above pond as required				

## Appendix C, Annex 7 Minister Pond Action Plan

### CA7.1 Minister Pond Issues Inventory

Minister Pond is hydrologically connected to Schoolhouse Pond. Phosphorus concentrations are presently stable but may increase over time as septic system contributions increase.

The specific Issues of Minister Pond are:

- Dissolved oxygen loss in deep waters
- Most likely phosphorus sources: birds, septic, precipitation, road runoff
- Approximately 18 residences within 300'
- Septic system contribution may increase as discharges slowly reach the pond (time of travel estimated 35-81 years)
- Receives substantial storm water runoff from Route 6

### CA7.2 Minister Pond Actions

The following actions are and will be taken with regard to Minister Pond:

Action	Start Date	End Date	Lead(s)	Status
Take actions to improve and maintain shoreline vegetative buffers of 100'				
Request MassDOT expedite construction of a storm water runoff infiltration structure to replace direct discharge from Route 6 into the pond				
Pursue temporary means to deflect Route 6 storm water inflow from entering into water body				
Coordinate actions with Schoolhouse Pond actions	As required			
Take actions to increase circulation in the pond				

## **Appendix C, Annex 8 Molls Pond Action Plan**

### **CA8.1 Molls Pond Issues Inventory**

The specific Issues of Molls Pond are:

- Occasional low oxygen in deeper waters
- Most likely phosphorus sources: Roads, septic, sediment
- 16 residences within 300' and 2 developable parcels
- Septic system contribution may increase as discharges slowly reach the pond (time of travel estimated 35-81 years)<sup>13</sup>

### **CA8.2 Molls Pond Actions**

The following actions are and will be taken with regard to Molls Pond:

<b>Action</b>	<b>Start Date</b>	<b>End Date</b>	<b>Lead(s)</b>	<b>Status</b>
Take actions to improve and maintain shoreline vegetative buffers of 100'				

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<sup>13</sup> There was an incident of potentially harmful algae bloom (Microcystin toxin) in July 2012.

## **Appendix C, Annex 9 Muddy Pond Action Plan**

### **CA9.1 Muddy Pond Issues Inventory**

The specific Issues of Muddy Pond are:

- Dense aquatic plant growth
- Most likely phosphorus sources: Roads, septic, birds, precipitation
- 5 residences within 300' up-gradient
- Septic system contribution may increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

### **CA9.2 Muddy Pond Actions**

The following actions are and will be taken with regard to Muddy Pond:

<b>Action</b>	<b>Start Date</b>	<b>End Date</b>	<b>Lead(s)</b>	<b>Status</b>
Take actions to improve and maintain shoreline vegetative buffers of 100'				
Take actions for aquatic plant control				
Take actions to increase circulation in the pond				

## Appendix C, Annex 10 Schoolhouse Pond Action Plan

### CA10.1 Schoolhouse Pond Issues Inventory

Schoolhouse Pond is hydrologically connected to Minister Pond. Phosphorus concentrations appear stable. The specific Issues of Schoolhouse Pond are:

- Most likely phosphorus sources: Birds, roads, precipitation, input from Minister Pond
- Occasional stratification and low oxygen may allow sediment phosphorus release
- One leach field within 300' up-gradient
- Some road runoff from the landing

### CA10.2 Schoolhouse Pond Actions

The following actions are and will be taken with regard to Schoolhouse Pond:

Action	Start Date	End Date	Lead(s)	Status
Coordinate actions with Minister Pond actions	As required			
Take actions with DPW to curtail road runoff				
Take actions to increase circulation in the pond				
Take actions to improve and maintain shoreline vegetative buffers of 100'				

**Appendix C, Annex 11  
Widow Harding Pond Action Plan**

**CA11.1 Widow Harding Pond Issues Inventory**

The specific Issues of Widow Harding Pond are:

- Occasional stratification and low oxygen may allow sediment phosphorus release
- Most likely phosphorus sources: birds, septic, precipitation, road runoff
- 11 residences within 300' up-gradient
- Septic system contribution may increase as discharges slowly reach the pond (time of travel estimated 35-81 years)

**CA11.2 Widow Harding Pond Actions**

The following actions are and will be taken with regard to Widow Harding Pond:

<b>Action</b>	<b>Start Date</b>	<b>End Date</b>	<b>Lead(s)</b>	<b>Status</b>
Take actions to improve and maintain shoreline vegetative buffers of 100'				

## Appendix D

### References

1. "Policy on the Content and Application of Fertilizers and Pesticides on Municipal Land in the Town of Eastham," July 2013
2. "Action Plan for the Town of Eastham Ponds," prepared by EcoLogic, Dec 2011, Cazenovia, NY, and GHD, Hyannis (Final document on Town website) ([http://www.easthamma.gov/Public\\_Documents/EasthamMA\\_WebDocs/WaterManagementDocs/FinalReportPondsActionPlan05142012.pdf](http://www.easthamma.gov/Public_Documents/EasthamMA_WebDocs/WaterManagementDocs/FinalReportPondsActionPlan05142012.pdf))
3. Best Management Practices for Landscape Fertilizer Use on Nantucket Island, <http://www.nantucketlandcouncil.org/Reports/fertilizerbestpractices.pdf>
4. "The Massachusetts Lake and Pond Guide," prepared by Mass Department of Conservation and Recreation.
5. Carlson R.E. and J. Simpson (1996) A Coordinator's Guide to Volunteer Lake Monitoring Methods. *North American Lake Management Society*; <http://www.secchidipin.org/tsi.htm>