



Cedar Lake Photo by Susan Baur



President’s Message

by Judith McDowell

This has been a busy and productive year for the Falmouth Water Stewards. We installed two additional water stations in Falmouth – at the northern end of the Shining Sea Bikeway in North Falmouth and at the Woods Hole Waterfront Park – and received funding from the Community Preservation Committee for seven additional water stations at recreational facilities throughout Falmouth.

Our Water Watchers and Pond Watchers programs are excellent examples of citizen science programs monitoring our valuable freshwater and coastal ponds. In response to increasing frequency of reports of harmful cyanobacteria blooms in freshwater lakes and ponds across Cape Cod, we partnered with Association to Preserve Cape Cod to monitor Falmouth ponds for the presence and abundance of cyanobacteria. A pilot program was conducted in Falmouth during September and October 2019 at Deep Pond and Grews Pond, and this program will

be expanded to five ponds during 2020.

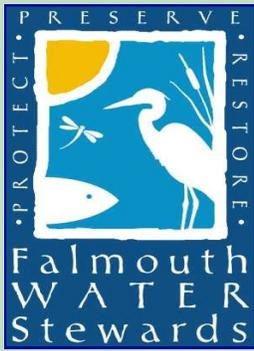
The APCC program was initiated in 2017 with the objective of monitoring the status of cyanobacteria blooms in freshwater ponds and providing information on bloom conditions to town public health officials if levels rise to the point of threatening human and wildlife health. The program increases local awareness of harmful cyanobacteria blooms, provides current monitoring data to natural resource managers and health department staff to support their missions of protecting public safety and environmental health, and raises awareness of factors that contribute to the trend of increasing frequency of cyanobacteria blooms.

In addition to Falmouth, monitoring programs are underway in Barnstable, Brewster, Chatham, and Mashpee. Some ponds on Cape Cod have experienced elevated cell counts of cyanobacteria

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that resulted in health advisories being issued for people and pets. This regional monitoring program will increase our understanding of the status of cyanobacteria blooms across Cape Cod, develop mitigating policies and practices that minimize bloom events, and share monitoring information with state, county, and community public health authorities.

I hope you enjoy our Fall Newsletter and please join us for our talks, and other activities during the year. Follow us on Facebook and on our website [FalmouthWaters.org](http://FalmouthWaters.org).



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### Mission

Falmouth Water Stewards' mission is to educate and inspire citizens to preserve, protect, and restore Falmouth's bays, salt ponds, estuaries, and fresh waters through education, advocacy and citizen science.

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*FWS is a 501(c)(3) organization. All dues and donations are tax deductible.*

## Local Donations Making a Difference

by Brenda Olson

This year Ted Rowan and his family reached out to Falmouth Water Stewards asking to include a water refill station in a park they would donate to honor their late wife and mother, Maryann Rowan. Ms. Rowan was a beloved Falmouth teacher and an avid bicyclist who passed away in January 2019.



The park her family created at the North Falmouth terminus of the Shining Sea Bikeway includes a picnic table, bike repair station and water bottle refill station. The water and bike repair stations feature yellow, Ms. Rowan's favorite color.

Another enthusiastic bike rider, was delighted to discover the park when he came for a ride this October.



Claude Hoopes of Marion posed for a picture.

In May FWS board member Alan Robinson was one of three speakers at a program organized by the Falmouth Jewish Congregation's Social Action Committee on Climate Change. The other speakers were Andrew Gottlieb, Executive Director, APCC, and Madhavi Venkatesan, Executive Director, Sustainable Practices Ltd.

The three organizations will share funds donated to the congregation's Social Action Tzedakah (charitable giving) program.

Additionally, the Congregation's K-7 Hebrew School students selected FWS Reuse Refill program as the local recipient of their 2019-2020 school year Tzedakah donations.

Falmouth Water Stewards was noted for efforts to reduce pollution and single-use plastic, to provide filtered water to humans and pets, and to promote drinking Falmouth's fresh water.

The students' international recipient is Innovation: Africa, for a program to bring Israeli solar and water technologies to remote Tanzanian villages, to improve villagers' daily life, agriculture, education, and health.

The students' goal is to raise \$1,000 for each organization.

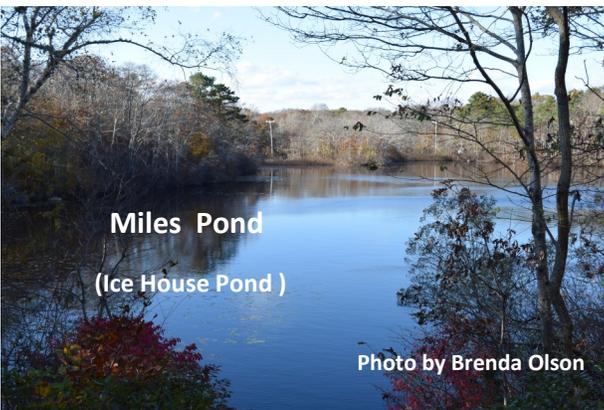
***Falmouth Water Stewards is very honored by the Rowan Family's and FJC's support of our initiative.***

I scramble down the bank, wade into shallow water, and swim out from a small patch of sand by the shoreline of the kettlehole pond where I have been swimming for 30 summers.

A few dozen yards out, in water over my head, I look down and can't see the bottom or even my toes. I tread water and aquatic vegetation grabs at my feet. This is not the clear, swimmable, water-lily-free open water that I remember.

I have a sense water quality is declining. But memories are not data.

In contrast to Falmouth's relatively well-monitored saltwater estuaries and coastal ponds, we know little about the 142 freshwater ponds that lie within our town's borders.



In salt water, scientists sample all of Falmouth's 20 major coastal embayments multiple times each summer using rigorous protocols for temperature, water clarity, salinity, dissolved oxygen, a suite of dissolved and particulate nutrients, and chlorophyll (which measures the total amount of algae suspended in the water).

In contrast, only a handful of freshwater ponds get any monitoring at

all. Freshwater pond sampling mostly has been targeted, shorter term, and motivated by specific concerns or problems—for example, a plume of contaminated groundwater from Joint Base Cape Cod arriving to Ashumet Pond, or a rapid expansion of aquatic vegetation in Mill Pond next to the East Falmouth Library.

Falmouth Water Stewards wants to change that.

Falmouth residents love their freshwater ponds in addition to their estuaries. We see ponds changing because of the same factors—rising temperatures, excess nutrients—that drive change along our coast. It's time to convert impressions into data.

Falmouth Water Stewards is designing a monitoring program for Falmouth's ponds. Chris Clark of North Falmouth, who heads up the effort, explains that one of the first steps is to find people who have ponds they care about that they'd be willing to monitor.

"Ideally, we'd like a mix of large and small, shallow and deep, densely and not so densely developed," Clark explained.

The greatest challenge for monitoring programs is deciding what to measure. Several key metrics rise to the top of the list.

One is tracking the coverage of the aquatic plants and pond bottom organic matter. The best way to do this is in plots that can be

resampled in exactly the same locations.

Another is water clarity. This is measured by lowering a 12-inch diameter circular black-and-white Secchi disk into the water and noting the point at which it disappears. (See Chris Clark's article on page 4.)

Another is temperature. Higher summer water temperatures, less winter ice and earlier warming in spring all potentially allow aquatic plants and benthic (bottom) algae to start their spring growth sooner. And if ponds stratify (when warm water floats over colder deeper water) for longer, deep waters could run out of oxygen sooner.

Water level is another simple metric that might be part of why some ponds seem to be in particularly bad shape this year. More inflowing water brings with it more nutrients. So high water years have the potential to be high nutrient years.

Falmouth Water Stewards' plan to start monitoring the visible responses that excess nutrients—potentially combined with higher temperatures—cause in ponds makes great sense. The more pond-lovers they can find and the sooner they start, the more we learn, and the more actions we will be able to take to keep our ponds healthy—and our toes visible.

Individuals—or groups—who might be interested in being pond monitors should email Water Stewards at [info@falmouthwaters.org](mailto:info@falmouthwaters.org).

## What and why is a Secchi disk?

Angelo Secchi was the Director of the Observatory at the Roman College (Pontifical Gregorian University). Born in 1818, he is credited with important astronomical discoveries and copious observations. There are many things in the heavens named for him, including a comet, Comet Secchi!

While Jesuits were sent away from Rome during the revolution of 1848, he studied and taught in England and the United States, in particular Georgetown University. He studied with and carried on a long correspondence with Matthew Maury, the first Director of the United States Naval Observatory.

In addition to astronomy, Father Secchi worked in physics, meteorology and oceanography. The latter pursuit resulted in his invention of the Secchi disk. The disk, originally all white—later black and white, was developed to measure water transparency in the ocean and lakes. By lowering the disk into the water, one can observe the depth at which it is no longer visible. This is a measure of the clarity of the water. With consistent measurements, one can track changes in water quality and biological activity.



The Secchi disk is a simple measuring device that gives anyone with access to a kayak or a dock the opportunity to engage in Citizen Science. It is a tried and true measure of water quality, requires no chemistry or expensive electronic devices (although we like that stuff too). And it's fun.

How does it work? Its beauty is in its simplicity. The disk is lowered into a pond with the attached cord marked for measuring depth. When the disk is no longer visible, that is the water's "Secchi depth." The date, time of day and weather conditions are noted, and sometimes water temperature and other parameters. The clearer the water, the deeper you can see the disk. The time of year is important, because water clarity changes with the seasons. Summer growth of algae and plankton decrease clarity. Winter clarity is usually much greater. Record depths up to 66 meters have been found in the Sargasso Sea. Here in the summer, we will only see down a few feet.

In present day the results are used by scientists to measure turbidity (dissolved solids) and biota. A complex formula (Beer Lambert's Law) is applied in order to compare the results of your work with others. You don't have to do that, we will.

You can buy a Secchi disk online, or you can make one. I used PVC board with a weight made of a short piece of pipe on a floor flange attached to the board. An eye hook will hold the line. You can use nylon rope (not too stretchy)

and mark out one-foot increments. The board can be painted, or you can find a Secchi decal online. The photo below shows my Secchi. The weight can be done with smaller pipe. A fishing weight also works; anything that will sink the disk!



Go to a deep part of your pond. Note the location by looking in four directions (pick out houses or trees or whatnot). You can return to this spot if you note the four things you picked out and line them up again (three things won't work—it's the geometry). Again: date, time, air temperature, and weather (basically cloud cover)---AND---Secchi depth. If you do this monthly during the spring and summer, you will start to develop good data.

Then what? Send your seasonal data sheet to the Falmouth Water Stewards at [falmouthwaters.org](http://falmouthwaters.org). For questions, ask me at [chris.wm.clark@gmail.com](mailto:chris.wm.clark@gmail.com).

Father Secchi thanks you, and so will our ponds!!

What do you do if you spot a dozen golf balls, a beer can and a deck chair eight feet below you as you swim the length of a beautiful pond? Tuck them in your suit?

Last year I confronted that question with other pond swimmers and we came up with the idea of a group dedicated to cleaning up underwater garbage. We talked up the idea with some kayakers and launched our first project.



Julia Benz of Falmouth (far left) and Paula Wiseman of Chatham (center) and I swam in formation around Goose Pond in Chatham spotting litter from a depth of three feet to about twelve. We were followed by a kayaker who stuffed fishing lures, cans, bottles, balls, drowned dog toys, old bathing trunks, sunglasses, and assorted junk into a mesh bag carried on the kayak. In 90 minutes we had the pond cleaned up.

In the following weeks, our group scouted ponds from Falmouth to Chatham that had an underwater litter problem. We put Flax pond in Dennis on our list as well as Hamblin Pond in Marston Mills and Deep Pond in Falmouth.

The trick is to wait until September to do the clean-ups; kids are back in school and tourists have left. With wet suits, the water is still warm enough for a long swim. However, our plan to clean up Deep Pond last month was postponed when Falmouth Water Stewards found unsafe levels of cyanobacteria in the water.



**Susan Baur (far right), a new Water Stewards board member this year, is also known for her interest in turtles.**

## Woods Hole Science Stroll

by Judy McDowell

Falmouth Water Stewards joined over a dozen other science and education organizations on August 10<sup>th</sup> at the annual Woods Hole Science Stroll. The theme of our booth this year was “Know Your Water Cycle”, where we profiled our activities in monitoring, conserving, and protecting our local waters, and provided quizzes and games for all ages



to test their knowledge on the water cycle. Every family that completed the quizzes was entered into a raffle for our newly designed FWS water bottles.

We also shared our table with Skip the Straw to educate people on the problem of plastics pollution on beaches and in the ocean and a really easy way they can help prevent it by skipping the straw.

**Look for our bottles at future events. They are available for a donation of \$20 or more.**

## Mill Pond Clean Up Project

by Brenda Olson

East Falmouth Village Association volunteers, headed by Doug Brown and fellow EFVA board member Bernie Ignos, participated in a demonstration project removing vegetation and trash from Mill Pond this October. The project was initiated by a request from EFVA to the Water Quality Management Committee and approved by the Conservation Commission. Mitigation funds from the Air Force Center for Engineering and the Environment (AFCEE) will pay for the study and the project.

Eric Karplus, the owner of town consultant Science Wares, and his associate Kristen Rathjen used a small boat with a cutting tool mounted to the bow to cut surface vegetation. Its like a hedge trimmer made to work under water.

They also tossed a V-shaped cutting tool into near-shore areas and pulled it toward the boat.

The team removed approximately 765 pounds of vegetation.

The Conservation Commission will thoroughly discuss an Order of Conditions for cleaning the whole pond. They hope to have a plan in place by next September.



“Our idea is to cut the vegetation rather than pull it out by the root. That way it will grow back each



Photos by Charles Olson

year and continue to remove nitrogen and phosphorus from the pond naturally”, Brown said.

“The trick is to harvest it and remove it before it falls to the bottom and disintegrates into the black muck.”

Another aspect of the project will be to clear out the upper ditches which supply the water to the pond from the bogs above. They haven’t been maintained or cleaned for many years and they’re very well blocked.

## Aquatic Weed Harvesting in Brewster



Photo by Susan Baur

The town of Brewster’s water-lily-eating machine is seen here operating in Elbow Pond in Brewster. Like the manual equipment used in Mill Pond, Falmouth, the water lily eater cuts off plants but does not uproot them. The goal is to remove tons of material which then go into the town’s compost piles before the water lilies can die, sink to the bottom, and take oxygen

from the pond water as they rot into muck. The Town of Brewster also rents this machine to other towns.

**John Keith, president of the Elbow Pond Association, who organized this cleanup will speak on November 20, 7:15 pm at the Hermann Room, Falmouth Public library. Doors open at 7:00.**

Fall is a good time to join our Pond Watchers group to collect water samples from the bays, harbors, and estuaries of Falmouth. Two members meet early on Monday mornings at WBNERR (Waquoit) to collect the instruments and bottles before car pooling to either the West coast or South coast—

### Become a Pond Watcher

in the Summer every Monday and Winter every second Monday. They collect water samples and test the water for salinity, temperature, and dissolved oxygen before returning to WBNERR. There, sam-

**Hope to see you soon!**

ples are tested for turbidity and the results added to the project’s graphs which are emailed to members. If you would like to join these women and men scientists, send an email with your availability to paulketchum@comcast.net. Paul will contact you and provide more details and answer any questions you may have.

Endangered Kemp's ridley sea turtles are small, dark-colored and hard to see. Scientists actually know most about them from their autumnal strandings in Cape Cod Bay. We have a 40-year history of organized rescues beginning about 1980, led by Robert Prescott, Director of Mass Audubon's Wellfleet Bay Wildlife Sanctuary and later with the National Oceanic and Atmospheric (NOAA) stranding network.

Historically, when water temperatures in Massachusetts coastal waters cool, a small number of these cold-blooded turtles get trapped in Cape Cod Bay and become cold-stunned. "They are unable to sustain buoyancy, swim or dive," Kara Dodge, scientist at the Anderson Cabot Center for Ocean Life, New England Aquarium, explains. "They can't swim and the wind just blows them in."

The New England Aquarium now coordinates rehabilitation of cold-stunned turtles. For the 1980s and 1990s the annual strandings numbered in the 10s and 20s. In the early 2000s peak strandings rose to more than 200. In 2014 about 1200 Kemp's ridleys stranded, followed by 800 in 2018. Most were alive early in the season, by December many were dead.

Although conservation efforts at the breeding grounds of Kemp's ridleys in coastal Mexico have successfully increased the numbers of these turtles hatched, the deaths of stranded individuals are three times greater than the increased births.

Dodge recently tracked 16 cold-stunned Kemp's ridley sea turtles

picked up on Cape Cod Bay's shoreline. Each turtle, after a 9-month Aquarium rehab, was fitted with a satellite tag able to locate it for 4 months. Tags on 9 of the turtles could also record dives. They were then released south of Cape Cod.

More than 15,000 dives were recorded. The turtles stayed on the continental shelf in shallow water. Eighty percent of dives were less than thirty feet, most less than six feet. Most dives lasted fewer than 40 minutes. "They are diving to eat", Dodge said.

The satellite tags also recorded the temperature of the water where the turtles swam. They spent all their time in waters between 57 and 82 °F, and



Photo by Kara Dodge

60 percent of the time in water warmer than 64 °F. They are basically warm-water creatures.

Based on their size, turtles that strand are one to three years old, but they don't breed until they are about ten. Dodge wants to know, do rehabilitated turtles join the breeding population? Are they surviving long-term? Are they mating? Are they producing young? And what will happen to the larger numbers of turtles now coming north? "We need to look at what they do before they cold-strand," Dodge says.

Her data show that rehabbed Kemp's

ridleys can survive in the wild, and now Dodge wants to follow released turtles with acoustic tags that last more than five years. These would allow turtles to "check in" with a large array of receivers now deployed for studies of fish (such as great white sharks) up and down the east coast.

Lucas Griffin, of the Department of Environmental Conservation at the University of Massachusetts, Amherst, compared stranding numbers with the sea surface temperatures in the Gulf of Maine in late October and early November. Higher cold-stunning years occurred when the Gulf of Maine was warmer.

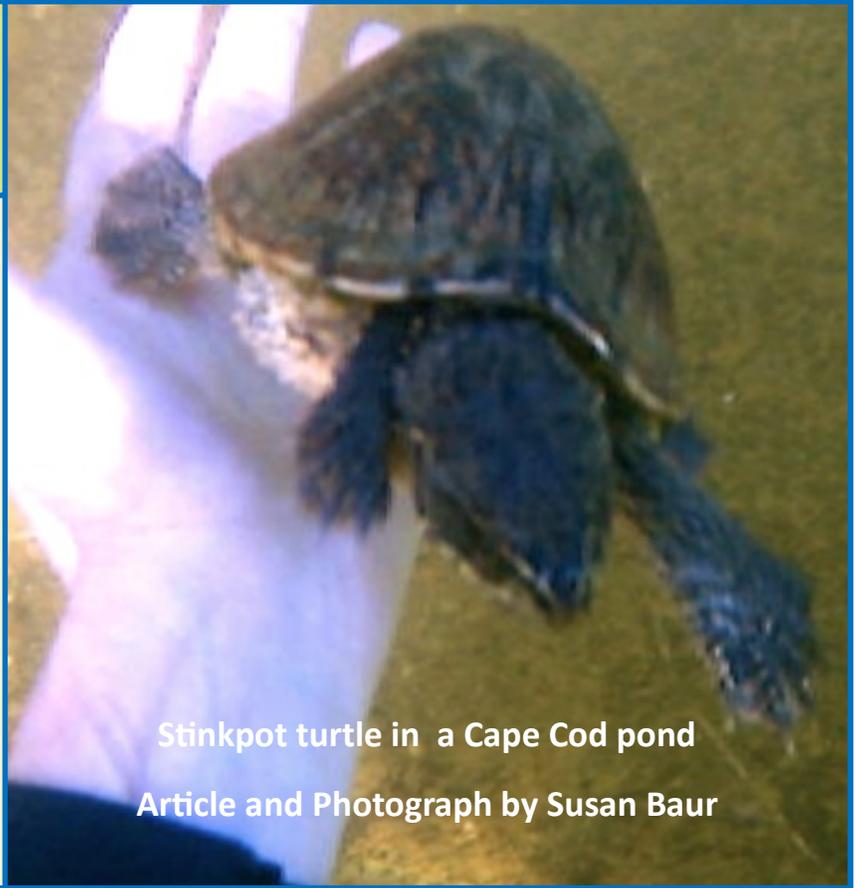
Based on forecasted sea surface temperatures, Griffin and his coauthors projected that more than 2,300 Kemp's ridley turtles may cold-stun annually by 2031 as ocean temperatures continue to rise.

These warm-water animals—like many other species with more southerly ranges—now range farther north as the climate changes. Griffin recommends continuing to rehabilitate cold-stranded turtles "to maintain population resiliency for this critically endangered species in the face of a changing climate."

Sadly, this is what we face these days. Efforts to help wild animals will require more and more heroic efforts by citizen volunteers and professional scientists until we act to stop the climate change that threatens to undo most of the conservation gains we've struggled so hard to make.

Susan Baur has a passion for Cape Cod's turtles. Here she meets with one of her friends.

"This is one of about 4000 photos I have taken underwater. It is not Photoshopped or altered. Stinkpot, or musk turtles, are less common than painted turtles or snappers and, being active at dawn and dusk, are not often seen. When they are spotted, most people think they are baby snapping turtles. Known for their curiosity and independent nature, male stinkpots check out everything and everyone that comes to their pond. These small drab turtles get their name from the musk gland in their tail. They are the skunks of the underwater world."



Stinkpot turtle in a Cape Cod pond  
Article and Photograph by Susan Baur

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