



Coonamessett River flowing freely after restoration project.

Photo by Peter Fang

President's Message

by Judith McDowell

The COVID-19 Pandemic has affected all of us in different ways and it's hard to imagine when we will return to normal schedules and activities. Due to current stay-at-home policies, Falmouth Water Stewards has suspended its field programs, lectures, and workshops, but we are still working virtually on issues to protect and conserve Falmouth's freshwater and saltwater habitats, with plans to continue our monitoring programs as soon as conditions allow.

My mother was 8 years old during the 1918-1919 Flu Pandemic. She always considered it to be a transformative time for her family, not just because of the tragic losses in her own family and the community, but also because of the renewed sense of helping neighbors and the greater community heal from such losses. Let us look forward to that renewal at the end of the pandemic.

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Falmouth Water Stewards Support Local Science Fair Winners by Judith McDowell

Continuing with our long-standing practice to support and promote students interested in environmental science, Falmouth Water Stewards awarded two scholarships at local science fairs.

At the Falmouth Academy Science and Engineering Fair, Saniya Rajagopal was awarded the FWS Scholarship for her project "The Role of Coral Polyp Connectivity in Response to Tactile Stimuli." This is the second year that Saniya received the FWS Scholarship. She was also recognized this year with a first-place award sponsored by Sea Education Association.

At the Falmouth Public Schools Science and Engineering Fair, Gunnar Jensen was awarded the FWS Scholarship for his project on "The Effects of Caffeine on Heart Rates on the Freshwater Cladoceran *Daphnia*". He was also recognized with a 2nd place award.

Both students developed innovative projects to assess responses of aquatic organisms to environmental variables that could shed light on larger environmental problems.

Congratulations, Saniya and Gunnar!



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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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Water Filtration Plant and Reuse Refill Stations: A Perfect Combination

Have you tasted Falmouth tap water lately? That musty, high-chlorine taste is a thing of the past. Our new, state-of-the-art drinking water filtration plant, one of the most advanced water purification systems in Massachusetts, is located at Falmouth's Long Pond Reservoir. Online since October 2017, our filtered water now requires much less chlorine.

Long Pond is a protected surface water reservoir and the major source of drinking water for Falmouth, supplying up to 80% of daily water needs on a summer day. As a natural kettle pond surrounded by forest, Long Pond contains algae and other natural particles of organic matter derived mostly from decaying leaves. These materials fluctuate seasonally; chlorine is added to the drinking water supply to ensure that water arrives to every home properly purified.

When chlorine reacts with organic matter it often produces small amounts of disinfection byproducts. Prior to operation of the Water Purification Plant, some of these disinfection products could reach levels that exceeded EPA recommended limits.

With the new filtration plant online, organic particulates are removed first so less chlorine is required for disinfection. The plant removes algae by bubbling air through the water that forces most particulates to the surface where they are skimmed off. Water then passes through an ozone system that breaks down remaining organic matter.

These new advances in water treatment also remove a wide range of not-yet-regulated contaminants such

as pharmaceuticals, and represent technology that may be required by EPA in the future. We are already there!

The final steps in the drinking water treatment process are sand and activated carbon filtration. A smaller amount of chlorine, and sodium hydroxide to reduce acidity, are then added into a large underground holding tank before the water goes into the distribution system. The water department is constantly monitoring and reduces the amount of added chlorine when possible.

Carbon filtering at home will remove the last traces of the chlorine taste, but this is not required for healthy water.

Other sources of Falmouth's drinking water supply are from groundwater sources and do not have the same problem with organic materials. The 22% of Falmouth's water supply that comes from the Coonamessett Pond and Crooked Pond wells already passes through the Crooked Pond Water Filtration Plant.

Satisfying Falmouth's anything-but-typical seasonal water demands is another feature built into the new filtration plant. On an average winter day, Falmouth uses about 1.5 million gallons, but during the summer water usage increases dramatically. The new plant can deliver 8 million gallons per day and when combined with the town's existing wells Falmouth's water supply system delivers enough high-quality water to meet the high demand of summer months.

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Water Filtration Plant and Reuse Refill Stations: A Perfect Combination

Continued from p.2

With the need to reduce the number of single-use plastic bottles in the community, Falmouth Water Stewards launched the Water Reuse Refill Falmouth Initiative in 2018. Generous funding from private donors, the Falmouth Road Race, the Woods Hole scientific organizations, the Woods Hole Business Association, the Rowan

Family, and the Falmouth Community Preservation Fund paid for the five water stations currently installed, and an additional six stations to be installed at Falmouth recreation facilities in 2020 or 2021. Falmouth's Water Department installs and maintains the water stations.

Coupled with the completion of Falmouth's water treatment system,

Water Reuse Refill stations bring high quality drinking water to Falmouth's recreation facilities. Current water stations are located at Peg Noonan Park on Main Street, Falmouth Heights Ball Field, the North Falmouth end of the Shining Seas Bike Path, the Old Dock Road location of the Bike Path, and Woods Hole Waterfront Park.

Coonamesett River Restoration Project

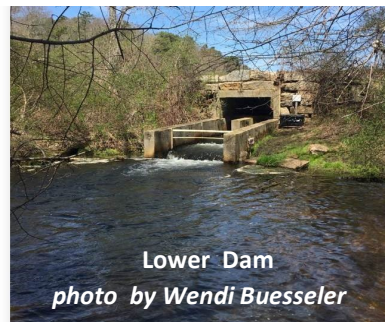
by Wendi Buesseler

Wonderful things are happening on the Coonamesett River! Phase 2 of the Restoration Project is scheduled to be finished by the end of May. This project of the Town of Falmouth includes over 40 partners, along with the Coonamesett River Trust, the 300 Committee Land Trust, and State and Federal Partners.

This next step of the restoration moved north to the "Middle and Upper bogs." Fifty-six acres of former cranberry bogs and 4,600 linear feet of river habitat are restored to species-diverse natural wetlands. The river channel now has a greater variety of habitat with bends, riffles, differing depths, gravel and woody debris. Trees will eventually shade the river, keeping it cool enough perhaps for brook trout to return.

The work also includes a new fish-friendly passage under John Parker Road and the removal of two dams giving herring and other fish access to 2.2 miles of free-flowing river. The former culvert under John Parker Road was a terrible obstacle to herring making their way to the Coonamesett Pond spawning grounds. The Coonamesett River Trust documented this problem through our herring tagging project. Herring would circle around and around the culverts tiring out, making themselves vulnerable to

predation, or sometimes just giving up and returning to the sea. The new bridge at John Parker Road allows not only free passage to herring and other fish such as the threatened American eel, but also other critters such as river otters. Now they can safely pass under the road. Sadly, otters used to be hit by cars at this location.



Currently the work may look like a moon scape, but it will green up very shortly! We saw this happen with Phase 1 on the Lower River. During the restoration, nearly three feet of sand was scraped off the old bog platforms, a relic from cranberry cultivation. Seeds hidden in the wetland soils for hundreds of years burst forth as they were exposed to sun and rain. CRT volunteer scientists documented that native plant species doubled in numbers while there are ten times fewer nonnative plants.

Phase 1 of the project was completed in spring 2018. It improved the lower

river channel making it 150% longer, and restoring 11 acres of bordering wetland. It also removed Lower Dam, the first time in over 300 years that the river flowed unobstructed here. This is now the location of the Dexter's Crossing boardwalk. It is named after Philip Dexter who built the first grist mill in Falmouth at this location in 1700.

A second boardwalk called Swift's Crossing, named after the brothers who first grew cranberries along the river, is located near Middle Dam. The removal of this dam will reunite the river valley floodplain for the first time in over 100 years. The unobstructed connection to Vineyard Sound allows this area to provide flood storage and protection during large storms especially as sea levels rise. The restored river wetlands will also remove some excess nutrients which can help improve water quality in the Great Pond estuary.

To learn more about the Coonamesett Restoration Project, you can find copies of a self-guided trail brochure at a kiosk located at the lower end of the river. Entrance to the river is off of John Parker Road, directly opposite Clark St. down a steep dirt road.

Wendi Buesseler is Executive Director of Oyster Pond Environmental Trust and President of Coonamesett River Trust.

When spring finally arrives at the bottom of Cape Cod's 999 ponds, there is no burst of color and no promising green shoots. Instead, small patches of the pond floor begin to shift and move. Tiny clouds of mud erupt. If you were swimming in the crystal clear, 45-degree water, you'd see a small black head appear. Then a shell.



Journal page Susan Baur

Gradually, a painted turtle would emerge from its winter burrow in the floor of the pond. Several weeks later, as the water approached 50 degrees, stinkpot turtles would follow. Finally, mud storms the size of your dining room table would erupt, and up would come snapping turtles. All of these turtles would be as groggy as Rip Van Winkle emerging from his 20-year sleep in the Catskill Mountains.

When turtles emerge from their four- or five-month long coma which is technically called brumation instead of hibernation, they are not exactly operating at full speed. Although brumation for cold-blooded creatures is much like hibernation for mammals,

there is some evidence that turtles and other cold-blooded animals can wake up on particularly warm days, move around, then go back to sleep when the cold returns. Painted turtles are quite often seen under thin layers of ice at the edge of ponds in late February and March.

Grade school students often wonder how a turtle can live for months underwater without oxygen. Even hibernating bears get to breathe. The answer delights them. Apparently smaller turtles can absorb just enough oxygen to maintain life through thin membranes in their throats. Snapping turtles use a different method. They butt breathe. Taking water in, they absorb the oxygen then let it out.

When I finally put on a wet suit in May as the water hits 58, I see turtles that are more skittish and less active than they will be once their cold-blooded bodies warm up to 70 degrees. On sunny days I find them in the shallow waters warmed by the sun. In bad weather, I see their heads poking up from the dark mud which absorbs heat and is often warmer than the water.

The turtles' springtime jobs, of course, are to eat whatever plant and animal food they can find to replace the weight they have lost over the winter, and to mate so

that females can lay eggs in May and June.

Another sign of early spring in Cape Cod ponds is fish stocking. The people at Mass Wildlife dump thousands of trout into many of the ponds throughout Cape Cod. Fisherman quickly follow. And you can too.

A walk around Grews Pond, Coonamessett or Jenkins Pond in this cold, rainy time of year can lift your spirits if you patiently look for signs of spring. Both in the water and along the shore life is gearing up again as it has for millions of years. Be part of the regeneration. Get out there in your rain coat with your binoculars, sketch pad, and curiosity. You're part of Nature too.



Photo by Susan Baur

Susan Baur is the author of Turtle Sisters of Cape Cod series.

FWS's Fresh Water Watchers may be able help those interested in starting a pond association. Contact Falmouth Water Stewards at info@falmouthwaters.org.

FWS/APCC Results for Cyanobacteria Monitoring in Falmouth Ponds Pilot Study

by Judith McDowell

Increased frequency of harmful cyanobacteria blooms has been reported for freshwater lakes and ponds across Cape Cod. To address this problem in Falmouth's ponds, the Falmouth Water Stewards (FWS) partnered with the Association to Preserve Cape Cod (APCC) to conduct a monitoring program for cyanobacteria in Falmouth. FWS conducted a pilot monitoring study during Fall 2019, comparing Deep Pond with Grews Pond, both located in Falmouth.

Analysis of results revealed significant differences between the two ponds, with Deep Pond having an active cyanobacterial community, and Grews Pond showed little to no evidence of cyanobacteria activity. Of particular concern during the pilot study was the high presence of *Microcystis* in Deep Pond, a highly virulent genus of cyanobacteria that produces the micro-

cystin toxin. Visible observations of the water in Deep Pond over the three sample dates found suspended green particulates, turbid, foggy, and green to yellow-amber coloration, all of which are indicators of an active cyanobacterial community.

We are expanding this monitoring program in 2020 to monitor five Falmouth ponds with biweekly sampling from spring through fall. Three of the ponds – Deep Pond, Cedar Lake, and Jenkins Pond – are located in densely populated neighborhoods, whereas the other two ponds – Crooked Pond and Mares Pond – are located in less dense neighborhoods and supply water to wells within Falmouth's Drinking Water System.

Parameters to be measured during each sampling include temperature, wind speed and direction, water clarity, and visual evidence

of water color.

This project will contribute to the Cape Cod regional assessment for cyanobacteria blooms in freshwater ponds. Depending on the intensity of bloom conditions, recommendations will be made to Falmouth town officials on factors that could mitigate bloom conditions and when advisories should be issued to protect the public from the effects of cyanobacteria blooms. Falmouth Selectmen and members of the Falmouth Board of Health will be kept informed of monitoring results in each pond throughout the 2020 sampling season.

The long-term results we hope to achieve with this program include a better understanding of the status of cyanobacteria blooms in Falmouth ponds and identification of mitigating policies and practices that minimize bloom events.

Summary of Results for Deep Pond and Grews Pond 2019

Pond	Date	Water Temp (F)	PC Whole Lake (µg/L)	PC Bloom Forming Colonies (µg/L)	Community Composition	Field Observations
Deep	9/5/19	74	14.15	165.98	72% <i>Microcystis</i> (MC), 28% <i>Dolichospermum</i> (DS)	Small particulates visible, water slightly green colored
	9/19/19	67.7	5.09	31.38	44% MC, 44% DS, 12% <i>Woronichinia</i> (WO)	Water slightly turbid, green colored.
	10/3/19	NA	16.16	39.11	100% MC	Water slightly turbid, yellow-amber colored.
Grews	9/5/19	74.2	0.77	5.39	None found	Water clear.
	9/19/19	66.7	2.02	16.46	None found	Water clear.
	10/3/19	NA	6.12	32.12	100% DS	Water clear

I've lived in Falmouth for more than 30 years, but I grew up on the banks of the Hudson River within sight of New York City.

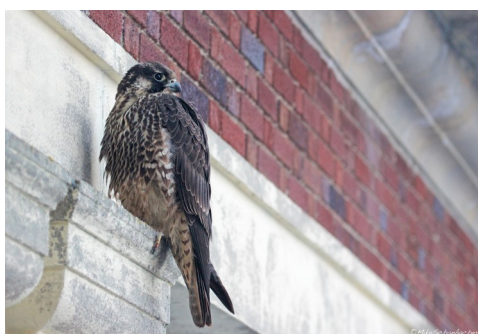
In the spring of 1968, the students in Mrs. Hodgens' fifth-grade science class were challenged to write a science report. I was captivated by a book—published a few years earlier. That book was *Silent Spring*. To say I read it is not accurate. I consumed it. It captured my emerging love for birds, but also my concern—maybe panic is a better word—over what Rachel Carson wrote was happening to them. For me that did it. It opened a door to thinking about ecological connections. And the idea that these connections could be understood by studying biology.

Rachel Carson's personal history intertwined with Woods Hole, where I have spent almost all of my scientific life. Rachel Carson was a student here in the summer of 1929. She returned to Woods Hole many times and Woods Hole science was the basis for her 1951 best seller, *The Sea Around Us*. But Carson soon turned attention to her growing interest in the harmful effects of pesticides—which consumed her for the rest of her life.

For me, the most important legacy of Rachel Carson was this—understanding ecology creates pathways to fixing the environment. That's what many of us try to do in Woods Hole. There would not be an Ecosystems Center at the MBL, or a Woods Hole Research Center here without Rachel Carson. To ecologist George Woodwell, the

founder of both these institutions, the harmful effects of DDT were one of the compelling issues of our time. George believes ecological science showed us how to fix things. So did Rachel Carson. So do I.

Think back to 1968. Ospreys were in precipitous decline. I didn't see a bald eagle or peregrine until I was almost out of high school even though the Hudson River was a prime habitat. In 1968, six years after *Silent Spring* was published, Rachel Carson was still being attacked viciously. But her science was on the mark. And it led to change.



A peregrine falcon perched on the Lillie Building at MBL.

Photo by Mike Schanbacher

I want to read to you one the best examples of how science can move the needle. It's a line from an EPA order, dated December 31, 1972. It states simply:

"The general use of DDT will no longer be legal in the United States after today."

Thank you, Rachel!

Today, Falmouth, Martha's Vineyard and the Westport Rivers in Massachusetts have the densest concentrations of ospreys anywhere in the entire world. One

winter after Carson's likeness appeared on a bench in Woods Hole, a peregrine falcon spent two days perched on the Lillie Building at MBL. And when I was in my home town recently to visit my sister, who still lives in the house I grew up in, I saw a bald eagle perched in the tree overlooking the river at the end of the street. I ran into my old childhood friend John, now retired and slowed by a hard lifetime in the construction trade. He looked at me with a great big smile and said, "yeah— isn't it great! It's been there most of the winter. You didn't see that when we were kids!"

Thank you Rachel!

We need more Rachel Carsons. We need more people who communicate the potential of science and the beauty of nature to the world. We need more people who are willing to stick their necks out, people willing to "kick the hornet's nest." We also need people strong enough to stand up to withering criticism. Because as far from 1968 as we think we are, many things have not changed—indeed they have gotten worse.

To me, the messages of *Silent Spring* are more important than ever. The natural world is full of beauty and wonder. The work of science and government are central to its preservation. And collectively, we can change things.

Thank you Rachel!

Chris Neill is a Senior Scientist at the Woods Hole Research Center.

Earth Day, Rachel Carson Day, and Opening of Water Station at Marine Park Woods Hole

Heather Goldstone, Chief Communications Officer of Woods Hole Research Center, and Science Editor at WGBH and WCAI, introduced the virtual event. Local scientists' comments follow. Chris Neill's comments are on page 6.

You can watch a video of the event on our Facebook page: Falmouth Water Stewards



Rachel Carson statue at Waterfront Park, Woods Hole. You can see the new Water Station in the background on Water Street.

Photo by Brenda Olson

Alan Robinson:

My Rachel Carson Moment

A sun-spangled morning
A shadow passing along the dock
I look up
50 years ago on the first Earth Day
Rowing on this same river
Never could I have imagined
A bald eagle
Above the Schuylkill's sparkling waters
In Fairmount Park
Philadelphia

This moment occurred 6.5 years ago during the Head of the Schuylkill Regatta. My first sighting of a bald eagle in Philadelphia. It remains a lifetime thrilling moment.

Heather Goldstone:

"Rachel Carson has been an inspiration to me at every stage of my career, and I know that I am not alone in that. My mother gave me a copy of *The Sea Around Us* when I was a thirteen year old with a budding interest in marine biology and environmental science - and I was hooked. Later, when I was in graduate school studying persistent pollutants, I connected deeply with *Silent Spring*, and with Carson's scholarship and advocacy in the face of personal challenges and pervasive sexism. Her beautiful writing and dedication to sharing science with public audiences are lasting examples of what science communication can and should be."



Bald Eagle at Great Pond, East Falmouth

Photo by Peter Fang



Photo by Peter Fang

American Kestrel at Crane Wildlife Management Area, Hatchville

Judith McDowell:

"Rachel Carson made us aware of the dangers of indiscriminate pesticide use, and challenged us to become informed and act. Her legacy led to legislation to protect our drinking water, the air we breathe, our coastlines, and our protected lands. Personally, Rachel Carson influenced my career to ensure that sound science was used to structure environmental policies that will protect our environment for future generations."

Judith McDowell is a Scientist Emeritus at WHOI, and President of Falmouth Water Stewards



Osprey family nest on Surf Drive, Falmouth *Photo by Charles Olson*



Woods Hole: The Scientists Sculptor: Elaine Pear Cohen 1980

Given to the MBL by Dr. Virginia Peters 1991

Photo Charles Olson

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