



Bournes Pond during a short cold stretch in January



From Falmouth Water Stewards Co-Chairs Brenda Olson and Cheryl Holdren

This past year has been an exciting one for the Falmouth Water Stewards. We installed two water stations in Falmouth--at Peg Noonan Park and in Falmouth Heights--and will be installing two more within the next few months--in North Falmouth and Woods Hole. Several more are in the works. Our Skip the Straw program won grant support for a video about the enterprising young students who

started the program as Falmouth middle schoolers and have been spreading the word about the dangers of plastic pollution. Our Water Watchers program, also with grant support, has new binders to help local citizen scientists. And our Pond Watchers program continues to gather data on our local estuaries.

Please join us for our talks, and other activities this year.

Follow us on Facebook and on website FalmouthWaters.org.

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Time to Start Thinking About the Future and Climate Change *by Christopher Neill*

In Gloucester, 60 cars flooded with saltwater up to their windows in the high school parking lot after city officials instructed people to park there during 2018's January 4 powerful Northeaster.

In Boston, the tide during the January 4, 2018 storm was the highest ever recorded since measurements began in 1921. It broke the record set during the Blizzard of 1978. Water poured down the steps into the Aquarium stop on the MBTA's blue line.

New England weather has always been unpredictable. But climate change now loads the dice and makes rare severe weather events more likely.

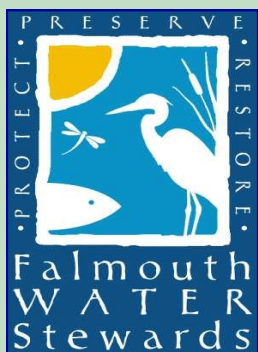
New studies indicate future coastal storms will—like Hurricane Harvey—come with more rain. And another new study warns that we have underestimated the threat from the “compound” flooding that comes from the combination of storm surge and high rainfall.

Falmouth, with its 68 miles of

coast and abundant developed, low-lying and coastal land, will face disruption from our new climate sooner than most other places.

Massachusetts took an important step last August to recognize the threats from this now-inevitable new climate when Governor Charlie Baker signed the Environmental Bond Bill that the Massachusetts House and Senate passed overwhelmingly earlier last summer.

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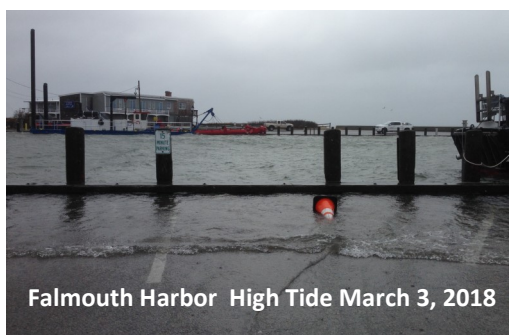
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FWS is a 501(c)(3) organization. All dues and donations are tax deductible.

Climate Change

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This bill does several important things that will help cities and towns adapt to climate change. It creates State Integrated Hazard Mitigation and Climate Change Adaptation Plan and Municipal Vulnerability and Preparedness Programs and then appropriates \$175 million for them. It allocates another \$100 million for coastal infrastructure and resiliency measures. The Bond Bill also codifies "nature-based solutions" and formally recognizes the importance of nature, alongside traditional gray infrastructure in adapting to climate change.



Falmouth Harbor High Tide March 3, 2018

The bill also contains new funding for land conservation programs that include matching grants to towns and fund for the Division of Ecological Restoration for dam removals, culvert replacements, water conservation, water quality improvement and urban river revitalizations.

In an age of national political paralysis, this bipartisan progress at the State House deserves praise.

With new programs to support coastal resiliency in place, the hard work now begins. In Falmouth, my concern is that we will focus first largely on engineering—raising buildings, pumping sand onto beaches, hardening shorelines—and put off the harder decisions about where not to invest or how to manage retreat

from places that rising seas will inevitably claim.

For years to come, Falmouth and other coastal towns will face conflicts between bold new thinking and business as usual. A case in point—in 2017, the Cape Cod Commission developed a creative vision for the Davis Straits area that included greenways and re-stored wetlands in low-lying areas to connect Falmouth Inner Harbor with Gus Canty and the Teaticket Park with Little Pond. It's a nature-based solution that would absorb water from storm surge and compound flooding.

But last August the Massachusetts Department of Housing and Community Development awarded tax credits and other state funding for a 40B project to develop 40 new housing units in the vulnerable low-lying town-owned land at the head of Little Pond off Spring Bars Road. It's affordable housing that Falmouth desperately needs—in a **place vulnerable to sea level rise.**

There will be no easy decisions. The new Bond Bill provides a mechanism to start thinking about a new future. If we don't start making hard decisions, nature will make them for us.

Dr. Neill is a senior scientist at the Woods Hole Research Center and a member of the Falmouth Water Stewards board of directors.

Water Watchers is the Falmouth Water Stewards program which invites residents to “adopt” a Falmouth pond, estuary or river and report on it throughout the year. A grant from Woods Hole Foundation enabled the Falmouth Water Stewards to provide binders for all Water Watchers with information on local flora and fauna to help with reporting.

Our newest Water Watchers, Lucia and her mother Valerie, are incorporating the Water Watchers program into their home schooling for the sixth grade. The Water Watchers program is part of their science curriculum. They have adopted Mill Pond in Woods Hole (they are neighbors of the pond) for Lucia's work. Lucia plans to visit Mill Pond weekly and record air temperature, water temperature, weather, cloud cover, water level, presence of algae, wildlife sightings, and maybe pH.

Sixth grade is a perfect time to work on complex systems, including phenology.



Lucia and mom Valerie at Mill Pond, Woods Hole

STEM (Science, Technology, Engineering and Math) education encourages the understanding of relationships.

It is a time when seeing natural processes really kicks in. Watching a pond, with its biology, limnology, geology, climate processes and more, is an ideal vehicle for learning how science illuminates the world. Lucia and her mom are busy exploring all of that.

President Obama once said, “[Science] is more than a school subject, or the periodic table, or the properties of waves.

It is an approach to the world, a critical way to understand and explore and engage with the world, and then have the capacity to change that world...” (Quote from an archived portion of the website of the U.S. Department of Education).

Now Mill Pond is rather “mature” in the sense that it is shallowing as sediment encroaches. The pond has a covering of algae over half its surface. But Lucia wasn't bothered by the algae---she was impressed by the small birds that could walk on it.

She also liked that it was close to home, so she could make it *her* pond.

There are so many benefits from and for Water Watchers. Developing a group of Falmouth residents who regularly visit and document activities in their favorite pond broadens our understanding and creates a group of citizens who will have an informed understanding of our water resources.

Visit our website and join us as we watch the waters of Falmouth.

Falmouth Water Stewards Lecture Series

Paula Peters, member of the Mashpee Wampanoag Tribe, will speak about the Tribe's cultural relationship with our local waters for Falmouth Water Stewards' spring lecture.

Join us on Thursday, March 21, 2019 at 7:30 in the Hermann Room of the Falmouth Public Library.



Woods Hole Business Association Donates to Falmouth Water Stewards



Beth Colt, president of the Woods Hole Business Association, second from left, awards a check to Falmouth Water Stewards (FWS) Co-presidents Brenda Olson and Cheryl Holdren as the first contribution to the Falmouth Water Stewards' fundraising to install a water bottle refill kiosk on Water Street in Woods Hole. Representatives from many of Woods Hole's science institutions gathered for the presentation. Funds were raised as part of the Woods Hole Business Association's Sea Around Us Festival September 15 and 16, 2018, through the sales of Long Trail Ale, which were donated by the brewing company.

Falmouth Water Stewards REfill REuse Program Takes Off

by Alan Robinson

2018 was a year of progress towards reducing plastic litter generation in Falmouth and the resulting impacts to the marine environment through the REfill REuse Program.

Falmouth Water Stewards first two water kiosks—at Peg Noonan Park on Main Street and Falmouth Heights Ballfield—are a hit. We heard many happy comments from residents and visitors from as far away as Australia. They mentioned the stations as a healthful amenity, as providing an alternative to single-use plastic bottles and as a message that refillable water bottles reduce litter and protect the marine environment.

FWS received a generous donation for the purchase and installation of Falmouth's third outdoor water kiosk at the north end of the Shining Sea Bikeway from the Rowan family in memory of Maryann Rowan. This water station will be dedicated this spring.

The Woods Hole Business Association donated the proceeds from the sale of Long Trail Ale at the late summer Sea Around Us Festival towards the purchase and installation of a water kiosk along Water Street. FWS is talking with various parties with hopes of obtaining sufficient donations to be able to also dedicate a Woods Hole water kiosk this spring.

MacDougalls' Cape Cod Marine Service, Inc. donated two hand-designed and stitched canvas water kiosk winter covers for use in winter 2019-20 and beyond.

The Falmouth Community Preservation Fund Committee selected the Falmouth Water Steward's grant application for funding of water kiosks at eight town recreation facilities. The vote for final approval for the grant award will be made at the April Town Meeting. If the grant receives this final approval, at least one of the eight water

kiosks will be installed and go into operation in 2019 with the others following in 2020.

The new Falmouth water stations highlight the improved town water. With over a year of operation, Falmouth's state-of-the-art water filtration plant is providing high quality drinking water to Falmouth residences and businesses.

Falmouth residents, who for years have chosen to purchase bottled water, now have a product coming out of our taps that is second to none. Yes, there still is chlorine addition—this is mandated for public health—but a lot less of it than pre-water treatment plant.

If you are still using bottled water, please give the tap water a try. If the you still taste the chlorine, a "Britta-type" water filter will remove this.

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As we approached the winter solstice Pond Watchers begin by weekly sampling of Falmouth bays and estuaries. Daylight decreases to less than 9 hours in late December. The water temperatures of summer (80°F) drop to a frigid 40°F and ice begins to form on the fresh ponds and flooded cranberry bogs.

These conditions end the sporadic phytoplankton blooms and patches of macroalgae in our once pristine estuaries. In winter the general absence of growing microorganisms clears the water column and one can see the sandy bottom in four to five feet of water.

Since Pond Watch began in 1995, Falmouth's population has continued to grow. The estuaries along our south shore are inundated with unhealthy biological growth, especially in the eastern part of town where most of our estuaries are located.



Upper Green Pond in winter at low tide showing the stumps from ancient cedar trees.

The pure, cold, dark ground water does not support biological growth.

Mixing occurs when the plume reaches a body of salt water and the nitrate is added to the nutrients of the estuary. During our winter, the cold water with shorter days of sunlight limits phytoplankton growth.

For these reasons, beginning in the 1950s oceanographers who studied marine productivity went to sea and collected winter samples to measure

nitrogen. They understood that in winter, nitrification would convert the ammonia to nitrate because there was plenty of oxygen in the cold waters. Nitrate accumulated during the winter months ready for the first phytoplankton blooms in the spring.

Our Pond Watchers have the skills to collect samples during the winter, but currently we lack the financial resources to have the samples tested for nutrients.

There is a general agreement that wastewater nitrate (NO₃) is the main pollutant that causes the deterioration of our estuaries. The nitrate enters the ground water from septic systems and joins a local plume that carries it downstream to the closest river or stream at an average flow rate of 1.5 feet per day.



This photo, taken in fall 2018, shows the macroalgae on the bottom of Eel River.

Refill REuse Program Takes Off

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Even though single-use plastic water bottles can be recycled, giving them up will reduce the Town's waste stream and reduce the opportunities for some of those bottles to become litter and impact the marine environment.

In other positive environmental news, Falmouth Fall Town Meeting members approved a bylaw to ban

expanded polystyrene (Styrofoam) for food service use and for packaging peanuts. The ban will eliminate a source of plastic litter that degrades our roadsides and can impact the marine environment. This follows the ban of retail plastic bags in Falmouth four years ago.

Building on the successful and growing water kiosk initiative, our

focus for 2019 will be on developing the means and methods of communicating to residents, part time residents and visitors alike as to what they as individuals, families and organizations can do to reduce the use of single-use plastic.

Please watch for messaging and information on events at the FWS Facebook site.

For the last lecture to undergraduate environmental science students each fall I talk about a paper that asks: What would it take for Massachusetts—today a highly forested state—to produce all of the wood, paper and cardboard its residents consume?

The answer, according to authors Mary Berlik, David Kittredge and David Foster, requires two actions. First, reduce consumption by 75 %, roughly what most Europeans (who live in smaller homes and recycle more) now use. Second, increase wood harvest in Massachusetts dramatically, cutting every cubic foot of wood that grows every year on the state's public and private woodlands.

A starting point is understanding that we residents of urbanized regions tend to push the effects of our consumption off onto rural, less affluent, and far-away places. Wood and paper are produced in southern US and western Canada; food in the farmlands of the Midwest; and energy in fracking regions of Pennsylvania, North Dakota, and US public lands.

This creates the impression at home that we have less impact on the environment than we really do. This paper's title, "The Illusion of Preservation," makes this point. By using a lot of wood and paper, and letting forests grow inside Massachusetts, we consume forests elsewhere. A take-home message is that trade affects the environment—a lot.

Berlik and colleagues argue that greater cutting of forests in Massachusetts would allow for more pri-

mary forests to remain uncut and preserved elsewhere in the world.

That is certainly true, but it begs another question—shouldn't we let our forests regrow, so that they soak up carbon to offset our own fossil fuel emissions? Especially in places like Massachusetts, where forests are excellent carbon sinks because they are nowhere as big and as dense as they once were?

There are no simple solutions, but avoiding to think how trade and differences from place to place influence the environment won't help.

The second point that describes our environmental predicament is that collectively, we humans simply consume too much. The planet can't support the demands of a



growing global middle class and retain enough of the wild spaces that we will need to conserve biodiversity and slow climate change.

I show students my personal ecological "Footprint" by logging onto one of several footprint calculators. I choose one that allows me to leave half of the Earth for other species. I learn my lifestyle combined with my desire for wild spaces requires seven Earths.

It would be horribly unfair—not to

mention politically unworkable—to ask that reductions in consumption come from people who now consume relatively little. But this raises what has been up to this point something generally kept out of our national discourse. How to get people who have a lot to consume less? It's hard to ask people to give up things they already have.

Just ask American Red Cross. Early during World War II, they provided comfort stations for soldiers with free coffee and doughnuts. But in 1942 the Secretary of War requested that they start charging two cents. 70 years later, as National Public Radio reported, US servicemen still hadn't forgiven the Red Cross. It wasn't just a price hike—it was a relationship shift.

Personally, I have little confidence that we will work our way to sustainable habitation of our planet by convincing people that they should pay for the services of natural ecosystems—things like generation of rain, habitat for pollinators, absorption of carbon dioxide—that they always obtained for free. But I have many colleagues who want to argue it's all about money.

I think our future needs a relationship shift— a new framing in moral terms. How much forest do we think we want to hand over to our children? How much prairie? How many tigers? How many shorebirds? Because how much we consume influences those things.

I tell the students at the end of my lecture that we adult residents of Earth haven't done a credible job of figuring these things out. That work, they increasingly understand, will fall to them.

Skip the Straw Helps Spread the Word on Plastic Pollution

The Skip the Straw and Trash Shouldn't Splash campaigns continued over last summer. The program began several years ago when six Falmouth middle school students started a campaign to get local restaurants to "skip the straw" as a way to curb marine pollution. This past year, the girls, now in junior high school, continued to spread the word.

Visits were made to Falmouth elementary school students in late May and early June in which 53 children participated in a program about Skip the Straw.

Kalea Holdren, one of the original "Skip the Straw" students, now lives in Boulder, Colorado and gave four talks to seventh graders at her school last May and September. A total of 101 students heard the message.

The Skip the Straw team also participated in an annual Quissett Beach Clean up on June 23 with a total of 17 people. It was very wet and stormy weather and so the group could not use data sheets or weigh total trash amounts. However, items of note were a fishing fighting chair and a drone. Most other items were small pieces less than two inches in diameter.

Judging for a Skip the Straw Ocean Art contest took place in April, May and June. The contest was for Falmouth school

students and prizes were awarded for the winning illustrations. These works will be displayed again in Falmouth during Mass Art Week in April.

In August, two of the Skip the Straw girls, Kalea Holdren and Meredith Kincade, joined scientist Kara Lavander Law at the Quissett Wheeler Lecture to show their poster, which had been presented earlier in the year at the Sixth International



Super Hero Skip the Straw Girls in a scene from their CARE video.

Marine Debris Conference.

Through grant support from CARE for the Cape and Islands and Woods Hole Foundation, Falmouth Water Stewards was able to support a video produced by Brian Switzer with the Skip the Straw girls.

Brian, a retired middle school teacher, involved the girls in the script writing, editing and production of the video. The aim of the video was teaching other young people how to start environmental action.

Watch the CARE video at <http://www.falmouthwaters.org/skip-the-straw-video/>

The talented Skip the Straw group actually produced their first video in 2017. They submitted that work to Ocean Awareness Challenge's Bow Seat Film Contest in June 2018.

In January this year FWS Board members were delighted with the following announcement, passed along to Cheryl from Jill.

"Congratulations! Your group has won the Bronze Award in the 2018 Bow Seat Ocean Awareness Contest Film Category. Your submission was impressive and stood out from the nearly 1,000 Junior Division entries we received from around the world. You should be incredibly proud of your accomplishment!"

Watch the Bow Seat video
<https://www.youtube.com/watch?v=h2DNXpKreIQ>

Check out our website for upcoming events

falmouthwaters.org

Spring Lecture on March 21

Mass Art Week in April/May

Arts Alive in June

FWS Annual Meeting in July

Woods Hole Science Stroll in August

New Water Stations

Water Watchers' Progress

and more to come...

CARE for the Cape & Islands Director Jill Talladay

Talladay presented a grant award to the group to pay for a portion of a Skip the Straw video. The video was made by Brian Switzer in conjunction with the group of Falmouth teens who have organized a Skip the Straw campaign for the last several years. In addition to the donation from CARE, the Woods Hole Foundation also played a major role in contributing to the Skip the Straw video.



John Hobbie, Judy McDowell, Lucia Carroll, Jill Talladay, Maggie Geist, Cheryl Holdren, Paul Ketchum and Chris Clark at the Water Stewards September board meeting.

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