

THE IPA NEWSLETTER

Mystic Lake, Middle Pond and Hamblin Pond in Marstons Mills, MA

Fall 2017

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IMPORTANT MEETING TO ATTEND

The IPA is happy to help advertise the following important project being launched by the Silent Spring Institute and collaborators who are investigating contaminants in our drinking water.

STEEP Center Community Kick-off Meeting
Monday, December 4, 2017 at 1:30–3:00 pm
2nd Floor Hearing Room
Barnstable Town Hall
367 Main Street, Hyannis, MA

Per- and Polyfluoroalkyl Substances (PFASs) are a class of highly persistent, man-made compounds that are showing up in drinking water across the US, including the Hyannis water system and private wells near Joint Base Cape Cod. The STEEP (Sources, Transport, Exposure and Effects of PFASs) Superfund Research Center is a five-year project that will study how PFASs move through the environment, how people can be exposed through drinking water, and how these compounds can affect our health.

Come to our community kick-off event and meet the members of the STEEP team from the University of Rhode Island, Harvard University, and Silent Spring Institute.

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SECOND LIFE FOR MIDDLE POND HERRING RUN REBUILD?

In the summer issue of this newsletter, we reported on plans by the Town to rebuild the 1,100-foot man-made herring run that connects to Middle Pond from the Marstons Mills River. This rebuilding plan, in play since 2010, was contingent upon a proposal submitted by the Association to Preserve Cape Cod, with support from the Town of Barnstable (Department of Public Works and Natural Resources Program), Indian Ponds Association, Three Bays Preservation, Massachusetts Division of Marine Fisheries, and the Cape Cod Conservation District for a NOAA Coastal and Marine Habitat Restoration grant in order to obtain additional funds (about \$365,000) to complete the project, whose overall cost is about \$756,000. Unfortunately, it was learned in late July that the proposal was not funded, but that the Town had granted an extension on the existing funds and that other funding sources were being explored. It now appears that those other funding sources have materialized.

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REVISED 2017 MARSTONS MILLS RIVER HERRING RUN COUNT

Year	Visual count	Run size
2006	719	6,302
2007	1,741	13,862
2008	5,232	42,404
2009	1,332	10,668
2010	478	3,944
2011*	53	428
2012	10,327	87,308
2013	8,117	56,987
2014	6,396	47,006
2015	3,667	23,840
2016	483	13,954
2017	5,251	36,148

*Data likely underestimated due to count not covering entire spawning migration.

An article in the previous issue of this newsletter reported the Marstons Mills river herring run size for 2006–2017 calculated by the Massachusetts Division of Marine Fisheries (DMF) based on visual counts at the Mill Pond ladder. We learned after the issue had gone to press that DMF staff (namely John Sheppard, DMF Diadromous Fisheries Biology & Management Project, New Bedford) had prepared revised run-size estimates for 2006–2011 that are slightly lower than the earlier estimates owing to the use of a different experimental design in the statistical model used to convert the visual counts into run-size estimates. Accordingly, the table now shows the revised run-size estimates.

-Emory D. Anderson

SILENT SPRING INSTITUTE MEETING

(continued from page 1)

Some of STEEP's activities will be based on Cape Cod, including testing private wells for PFASs, studying the movement of PFASs in groundwater from firefighting foams used at Joint Base Cape Cod, field testing new methods for detecting PFASs in surface waters, and engaging with residents and officials to share STEEP research findings and address local concerns. Other STEEP research projects will include health studies in children in the Faroe Islands, laboratory studies on toxicity in animals, and studies of the bioaccumulation and chemical properties of PFASs.

The project is led by Rainer Lohmann, an oceanographer at URI, and co-led by Philippe Grandjean, an environmental epidemiologist at Harvard. Other team members include: Geoffrey Bothun, Bongsup Cho, Alyson McCann, Nicole Rohr, Angela Slitt, and Judith Swift from URI; Elsie Sunderland from Harvard; and Laurel Schaidler and Cheryl Osimo from Silent Spring Institute. Local project partners include the Mass. Breast Cancer Coalition, GreenCAPE, and the Sierra Club Cape and the Islands Group.

This project is funded by the National Institute of Environmental Health Sciences. For any questions about the event, please contact Laurel Schaidler at schaidler@silentspring.org.

RESTORING A MILL POND

Zenas Crocker, executive director of the Barnstable Clean Water Coalition, says it's time to shout "hair on fire" about the degrading quality of the Cape's water resources -- from its groundwater to fresh water ponds and salty estuaries.

Formerly Three Bays Preservation Inc., the Barnstable Clean Water Coalition now works to restore and preserve clean water throughout the entire town of Barnstable. Crocker and his team warn that the Cape's water is impaired, mostly by excess levels of nitrogen. On average, 85 percent of nitrogen in our waters comes from septic systems, 10 percent from fertilizers that most of us dump on our lawns every year, and 5 percent from stormwater runoff.

The Massachusetts Estuaries Project has determined that the Three Bays estuary and embayment system, comprised of West Bay, North Bay and Cotuit Bay on the south side of the Cape, receives about 46,000 kilograms of nitrogen per year from septic systems, fertilizer and stormwater runoff. The total watershed limit for Three Bays is about 26,000 kilograms per year. As a result, about 20,000 kilograms of nitrogen must be removed from the watershed.

How is that accomplished?

According to the Cape Cod Commission, about half the excess nitrogen, or 10,000 kilograms, could be removed by aquaculture alone. Oysters and quahogs filter nitrogen from the water. About 43 acres of aquaculture beds would be needed to remove this amount of nitrogen, and finding suitable sites may be the most challenging obstacle. After all, oceanfront homeowners have gone to court to stop aquaculture projects near their beaches.

Of course, mitigating stormwater runoff and managing fertilizers would also reduce the nitrogen load.

But in one of the most ambitious projects to reduce nitrogen in the Three Bays watershed, the Coalition also supports restoring Mill Pond off Route 149 in Marstons Mills. Mill Pond dates back to the 17th century when it was created by a small dam, built to power a gristmill. The Cape is home to scores of mill ponds.

Currently, Mill Pond receives most of its nitrogen from the Marstons Mills River, which flows into the pond from the north. But because the pond is very shallow, less than two feet deep on average, most of the nitrogen flows right through the pond and continues heading south to Three Bays.

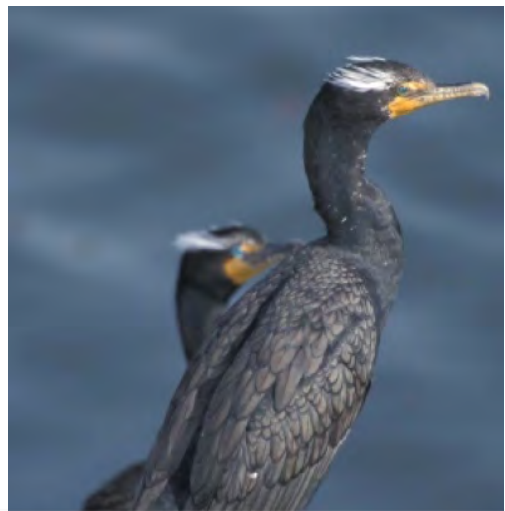
According to a study conducted by Lycott Associates Inc. in 2008, about 90 percent of the pond contains organic sediment in excess of seven feet deep. In 2012, under contract with the Cape Cod Water Collaborative, Horsley Witten Group Inc. prepared an Environmental Notification Form (ENF) for the Massachusetts Environmental Policy Act office (MEPA). The ENF was submitted for the proposed Mill Pond Improvements Project with the overall goal of nutrient attenuation, water quality, habitat improvements in Mill Pond and water quality improvements in the downstream systems.

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OVERVIEW OF 2017 POND TESTING

Routine pond testing of the three Indian Ponds by IPA volunteers has been completed for this year. The purpose of this testing was to monitor the general well-being of the ponds and detect any unusual changes that might warrant more detailed investigation. The first testing was done on May 12 and the final testing on October 20. Between those dates, the ponds were tested at roughly two- to three-week intervals. Each individual testing, which is done over the deepest depth of the pond, required about one-half hour and included a Secchi disk to measure water clarity and an instrument (YSI Pro20) to measure temperature and dissolved

oxygen at 1-meter intervals from just below the surface to just above bottom. On August 16 (Mystic Lake and Middle Pond) and August 24 (Hamblin Pond), additional sampling was done as part of the Cape Cod Pond and Lake Stewardship (PALS) program. This consisted of water samples taken at three or four depths (the number depending on the depth of the pond) for subsequent laboratory analysis at the UMass Dartmouth School for Marine Science and Technology (SMAST) to determine the levels of nitrogen, phosphorus, alkalinity, chlorophyll *a*, and pH. These results are then compiled with those from other participating Cape ponds in a report made available later on the general health of those ponds.



Double-crested cormorants

CORMORANTS I HAVE KNOWN

Cormorants seem to be a sore subject on Cape Cod. Most of us know what they look like and have seen them any time we are near salt water. If we have a boat in the salt water, we have probably found cormorants perching on it at one time or another, and we have had to clean up behind them from time to time. We have all seen them on the wires over that little pond at the end of the Mid-Cape highway just before you get to that rotary before you go into Eastham.

Cormorants are a much maligned species for the most part, but they are a huge family and worth the time it takes to become acquainted with. There are at least 40 species in the family and they are found all over the world. The one we are most familiar with is the double-crested cormorant which is not especially attractive, but some in the family are quite brightly colored and nowhere near as drab. I will include pic-

tures of some of the ones we have on our list as examples of this.

The family is made up of cormorants and shags. They are medium-to-large birds that run from less than one pound up to 10 or 11 pounds. They have wingspans between 18 and 48 inches. They are excellent divers and propel themselves underwater with both their feet and their wings. They are all fish eaters, although fish are not the only food in their diet. They will also dine on small eels and water snakes.

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OVERVIEW OF 2017 POND TESTING

(continued from page 4)

Temperature and dissolved oxygen measurements this year again confirmed that water in Hamblin Pond (maximum depth = 63 ft) and Mystic Lake (maximum depth = 47 ft) forms a warm, well-mixed upper layer (epilimnion) overlying a cold, deep layer (hypolimnion) during the warm months in a process called stratification (see figure below). Middle Pond, being shallower (about 33 ft deep), is well mixed from top to bottom due to wind action. Organic material in the bottom sediments of all three ponds is continually decaying, consuming oxygen in the process and producing conditions where the lower depths contain little or no oxygen. This lack of oxygen permits phosphorus bound up in the sediments to be released into the overlying water. This phosphorus, in turn, fertilizes the growth of algae and rooted aquatic plants. When the algae die, they sink to the bottom and consume oxygen as they decay, creating conditions that foster the release of yet more phosphorus in an unhealthy cycle that can eventually result in serious degradation of water quality.

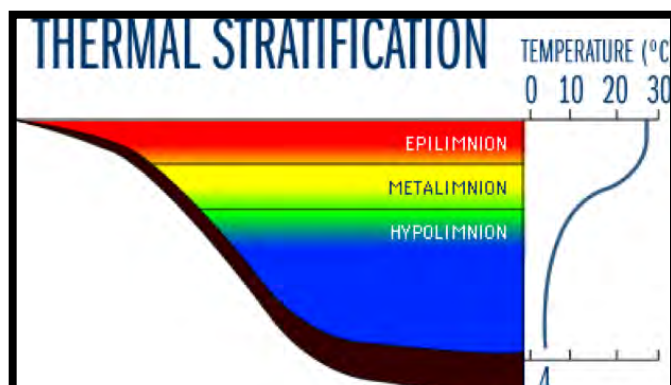


Diagram showing the water layers in ponds deeper than about 30 ft that separate or stratify in summer into different layers.

The depth of clarity is based on the amount of phytoplankton (algae) or other suspended matter in the water column. Hamblin Pond had the clearest water (average of 20.3 ft) because of the suppression of algal growth by the recent (2015) alum treatment, whereas Mystic Lake had the poorest (average of 10.6 ft); Middle Pond averaged 15.3 ft. Decreases in clarity from one sampling date to the next generally correspond to the occurrence of algal blooms. Even though Mystic Lake was treated with alum in 2010, the dosage authorized by the Mass Natural Heritage & Endangered Species Program was less than that recommended by the consulting firm hired by the Town. Observations to date, particularly in the latter part of the season, suggest that the reduced dosage was, in fact, insufficient to fully inactivate the phosphorus in the lake's sediments that fuels the growth of phytoplankton.

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Clarity (feet) over deepest part of pond

Date	Mystic Lake	Middle Pond	Hamblin Pond
May 12	19.2	19.0	15.1
Jun 8	15.6	20.5	-
Jun 9	-	-	22.0
Jun 30	9.8	15.3	-
Jul 2	-	-	22.0
Jul 15	9.8	16.4	-
Aug 4	9.0	12.5	21.3
Aug 8	9.0	12.1	-
Aug 16	11.5	14.3	-
Aug 24	-	-	20.7
Sep 8	-	-	20.3
Sep 27	5.6	17.4	-
Sep 28	-	-	20.7
Oct 20	5.6	10.5	20.3

The table to the right shows the Secchi disk readings on the testing dates this past season.

BUFFLEHEAD DUCKS

Pretty soon, the buffleheads will return to the ponds. These compact ducks with large heads are one of the smaller ducks that we see locally. They spend the warm months in north central Canada up by the Arctic Circle and take their winters in the US as far north as the Cape. They provide much entertainment as they claim certain territory on the water and defend it against other males by spritely chasing them away. Such displays of activity involve jumping out of the water and almost going airborne scampering across the surface to chase away intruders. It's hard to figure out where these "territories" are as all the buffleheads hang out together in groups as large as fifteen. They are monogamous and the females help their mates chase intruders away.

The ducks disappear in the blink of an eye diving for food. Even these gestures are unique as they jump up and arch over in their pursuit of food under water. They all seem to dive together as one second they're all there, then nobody is left on the surface. They're all back in less than 30 seconds. The males have big white areas on their heads that wrap around to the opposite side. Females are grayish brown with a white cheek spot. Buffleheads take shelter in abandoned woodpecker (flicker) holes in trees, but spend most of their time on the water. When the pond freezes over, they head out to protected salt water inlets by the seashore. When the pond thaws in early spring, they return to pick up where they left off. After enjoying their antics all winter long, suddenly at the end of April they're gone heading back to Canada to raise a new batch.

-Aaron Fishman



Buffleheads

OVERVIEW OF POND TESTING

(Continued from page 5)

Owing to its recent alum treatment, Hamblin Pond was generally well oxygenated down to 49–53 ft from May until early July, after which oxygen-rich water gradually diminished below about 40 ft by the final sampling on October 20. In contrast, Mystic Lake, after having sufficient oxygen as deep as 40 ft on May 12, had steadily worsening conditions with virtually no oxygen below about 26 ft in July and August, with conditions subsequently improving so that ample oxygen was present almost to the bottom by the time of the final sampling on October 20. Middle Pond, however, benefiting from its shallower depth and continued wind-driven circulation, experienced strong levels of oxygen throughout the season to within a foot or so of the bottom.

A big thank-you to Emory Anderson, Geri Anderson, Peter Atkinson, Greg Cronin and Bob Derderian for their volunteer efforts. Bob handled Hamblin Pond, while the others covered Mystic Lake and Middle Pond.

-Emory D. Anderson

CORMORANTS

(Continued from page 4)

Cormorants nest around the shore. They are coastal rather than oceanic birds, and some have taken up nesting on inland waterways. As I said above, they are found all over the world. The exception to this is the central Pacific islands.

There is no consistent distinction between cormorants and shags, so dividing them into two separate families has not been successful. The same bird can be referred to as a cormorant in one place and as a shag in another. As an example of this, the great cormorant is called a black shag in New Zealand. In general, the name shag applies to those species that have a crest.

They may often be seen holding their wings out in the sun. This wing-drying action, which is seen even in the flightless species such as the Antarctic shag and the red-legged cormorant, is a way to dry the plumage since cormorant feathers are not waterproof. It has been suggested that it might also aid in temperature regulation and digestion. Our local



Red-legged cormorants

favorite is the double-crested cormorant, which is considered a large bird. It has a body length between 28 and 35 inches and a wingspan between 45 and 48 inches. It takes its name from crests located just above the eyes, which are white, black, or a combination of the two. The adult, in breeding plumage, is black, while the juveniles are more dark gray or brown.

Happy birding,

-Dave Reid

RESTORING A MILL POND

(Continued from page 3)

But dredging requires a series of state and local permits. And according to the Natural Heritage & Endangered Species Program (NHESP), Mill Pond contains the bridle shiner, a small fish protected under the Massachusetts Endangered Species Act. According to the Cape Cod Commission, the NHESP provided recommendations to alter the project footprint to confine dredging to a more limited portion of the pond to protect the shoreline habitat as well as provide an area of refuge in the southeastern portion of the pond during dredging. Based upon this information, a revised project has been designed that includes a more limited dredging area.

Crocker believes the Mill Pond project could be “a living laboratory,” where lessons from the project could be applied to all the other mill ponds across the Cape.

Reprinted, with permission, from the October 8, 2017 edition of *The Cape Cod Times*.

SECOND LIFE FOR MIDDLE POND HERRING RUN REBUILD?

(Continued from page 1)

On October 4, it was announced that the US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) had awarded \$10 million to the Cape Cod Water Resources Restoration Project, a cooperative effort between the USDA, the Cape Cod Conservation District, and Barnstable County. This funding will be used to plan, design, and construct 16 priority coastal restoration projects on the Cape. One of these priority projects is in the Town of Barnstable for improvement of fish passage and habitat on the upper Marstons Mills River (i.e. the Middle Pond herring run). Thanks to the efforts of Rep. William Keating (D-9th District) and his staff, who advocated with the NRCS for the Cape's projects, the initial proposal for \$7.5 million to fund the 16 pro-

jects submitted by the Association to Preserve Cape Cod resulted in an even higher amount of \$10 million.

As of this writing, next steps, timeline, and final approvals necessary prior to funding allocation to the various 16 projects are still in progress and have not been made public. However, we are optimistic that the long-term plans for the restoration of the Middle Pond herring run will finally be realized. We will keep readers apprised of progress in this regard in subsequent issues of this newsletter.

-Emory D. Anderson

A LANDSCAPE APPROACH TO IMPROVE THE THREE BAYS WATERSHED

This fall, a graduate studio of landscape architecture students from UMass Amherst, led by Professor Jack Ahern, completed a “studio” project focused on the Three Bays watershed. Three Bays is an iconic and notable estuary, well known for its beauty, recreational value, shellfish production, and heritage. Unfortunately, it is recently also known for its serious water quality problems, compromised by both nitrates and bacteria, causing algae blooms and fish kills in recent years. While 80 percent of the contaminants can be traced to groundwater contamination caused largely by septic system leaching, the other 20 percent originates from landscape and stormwater runoff. The studio focused on strategies and specific projects that could achieve significant short-term reductions of this landscape-related contamination.

The studio was sponsored by the Barnstable Clean Water Coalition (BCWC). Executive Director Zenas Crocker advised the studio in understanding the nature and magnitude of the Three Bays water quality problem and provided local pilot projects for the studio to engage. The studio also worked closely with the Association to Preserve Cape Cod and the Horsley Witten Group. Our challenge was to demonstrate how representative agricultural, residential, and public lands could be re-designed to intercept, retain, and reduce the amount of nitrates entering the surface and groundwaters of the Three Bays. The pilot projects were clustered around the Marstons Mills River where landscape solutions hold the potential to provide rapid improvements in water quality.

Two students, Sara Lawler and Andrew Capelluti, proposed alternative agricultural and wetland restorations for a 30-acre cranberry bog property located on River Road in Marstons Mills. These proposals included ideas for maintaining some cranberry production and public access, while restoring some bogs to Atlantic white cedar swamps and alternative agricultural systems. This work recommended locations for water quality monitoring, as currently done by BCWC, to learn which strategies and practices are most effective over the short and long terms.

Students also demonstrated how a “Cape-friendly” re-design of residential properties could improve water quality and support native biodiversity and Cape Cod landscape character. Doug Serrill designed landscape improvements to a Mill Pond waterfront property including an expanded shoreline native plant buffer, removal of invasive species, and restoration of a meadow land

scape. Collectively, this design has the capacity to intercept and mitigate runoff, enhance biodiversity, and reduce fertilizer use, while reducing long-term landscape maintenance. Diance Tian designed a “Cape-friendly” landscape for a new property on River Road with no lawn and a series of comfortable landscape spaces defined by native grasses, wildflowers, and shrubs. This landscape graphically shows how a landscape can complement the natural environment while eliminating the need for fertilizers and permanent irrigation. The plants proposed here would directly support local biodiversity and pollinators.

Other projects by Maggie Kraus and Allison Gramolini looked at how the historic Mill Pond could be dredged and renovated to restore ecological integrity and historic character, and renew the existing herring run at Mill Pond. In these projects, the water quality benefits were strongly supported with improvements to public landscapes through restoration and improved access.

South of Route 28, Kate O’Conner and Mimi Lo designed a network of interpretive trails and landscape restorations for an existing protected parcel managed by the Barnstable Land Trust and the Trust for Public Land. Their proposal included a new kayak landing, new wildlife-viewing areas, and a novel concept based on celebrating the sounds of the diverse wetland forests in an “symphonic landscape”.

At Prince Cove Marina, Alysha Thompson designed improvements including restored marsh edges, extended trails and boardwalk, and a floating aquaculture demonstration lab to research and teach about new technologies for water purification using shellfish.

Collectively, these pilot projects illustrate the potential for incremental, house-by-house, project-by-project landscape solutions to “turn the tide” on the current water quality crisis in the Three Bays. Rather than accepting the reality that every property contributes to the problem, we boldly propose that every property can be part of the solution.

*-Jack Ahern, PhD (jfa@umass.edu)
Professor of Landscape Architecture,
UMass Amherst*

"To preserve and protect the natural environment and ecological systems of the Indian Ponds and surrounding parcels of land and watershed and to participate in studies and work with other agencies, individuals, and groups to educate the public, serve the community, and promote and preserve the Indian Ponds and surrounding areas." IPA Mission Statement

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FORWARDING SERVICE REQUESTED

