THE IPA NEWSLETTER

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

Winter 2023 **A quarterly publication of the Indian Ponds Association, Inc.** **Vol. 24 No. 1**

THE UNDERAPPRECIATED CHARM OF THE PONDMUSSEL

This article is meant to explore why the clarity of Mystic Lake and Middle Pond are lower than that of Hamblin Pond, as pointed out in the fall 2023 issue of this newsletter. One explanation is that the 2015 alum treatment was the main contributor to Hamblin Pond clarity being well above the other two since 2015. It is hoped that the planned alum treatment for Mystic Lake in 2024 will increase its clarity, but what about other measures of pond health; what about living species like mussels as an indicator of pond health?

On August 19, 2009, Jake Berry of the *Cape Cod Times*, reported that "Hundreds of dead and decaying mussels had surfaced at Mystic Lake". He went on to say that "they do signal deteriorating water conditions that could eventually affect fish and other water life, according to conservation officers".

Mystic Lake				
	2007	2010	2011	2017
Tidewater mucket	529	31	1	147
Triangle floater	10	7	0	2
Eastern pondmussel	9	0	0	0
Eastern elliptio	?	?	74	1460
Eastern lampmussel	?	?	3	127
Eastern floater	?	?	13	390
Total count	>4300	>1800	91	2126
Density (no./m^2)	15–20	About 5	0.202	14.48

Table 1. Species counts and average densities from mussel population surveys in Mystic Lake, 2007–2017. Bottom three species not precisely counted in 2007 and 2010.

Middle Pond				
	2007	2010	2011	2017
Tidewater mucket	829	-	135	81
Triangle floater	5	-	3	3
Eastern pondmussel	41	-	0	2
Eastern elliptio	-	-	936	1731
Eastern lampmussel	-	-	83	59
Eastern floater	-	-	7	69
Total count	875	-	1164	1945
Density (no./m^2)	3.889	-	2.328	9.364

Table 2. Species counts and average densities from mussel population surveys in Middle Pond, 2007-2017. No survey was conducted in 2010. The 2007 survey focused only on the top three species; bottom three species considered too numerous to count.

Surveys conducted by Biodrawversity between 2007 and 2017 showed that Mystic Lake lost more than 98% of its mussels between 2007 and 2011. Some mussels in Mystic, especially the bottom three species listed in Table 1, grew back from 2011 to 2017, but we lost a very high percentage of the top three species, including the eastern pondmussel, which has disappeared.

Middle Pond suffered fewer losses, but in 2017 was on the edge of losing the endangered triangle floater and the eastern pondmussel, shown in Table 2.

So why care about mussels?

Mussels in a pond or water body are bioindicators. They are very sensitive to pollution and provide an early warning of stress conditions. Their value is not limited to being just a probe or an alarm, mussels are filter feeders and comb the water for food, such as algae, bacteria, and small microscopic plankton. They filter and digest impurities and algae and turn them into food for other species like fish. They protect the fish from algae blooms. Ecologists call them ***ecological engineers***, or even the ***liver*** of a pond, given the variety of tasks they accomplish. A mature mussel filters between 10 and 15 gallons of water a day.

For their survival and propagation, each species of mussel needs a specific fish species to be a temporary host to carry, feed, and spread its glochidia (fertilized eggs), within its ecosystem. To visualize this process, please watch these videos: www.youtube.com/watch?v=I0YTBj0WHkU and www.youtube.com/watch?v=s_CaNfFtHhg See more videos on the website.

Mussels are both contributors to resilience and yet are highly sensitive to water quality. The decline in mussel density in Mystic Lake from 15–20 per square meter in 2007 down to 0.202 per square meter in 2011 (Table 1) meant that it took the surviving mussels 74–98 times the number of days in 2011 to filter the same water volume as in 2007. This dramatic difference greatly impacted the clarity of the pond as well as the survival of some mussel species. Middle Pond (Table 2) was not as sorely affected in 2011. *(Continued on page 4)*

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NOTES FROM THE PRESIDENT

A big thank you to all the volunteers who support the mission of the Indian Ponds Association. Between 2,500 and 3,000 hours have been donated from May through October monitoring the water quality conditions in the three ponds. A shout-out to the small army of volunteers that help to make the newsletters a reality, writing articles, creating the copy, and placing stamps and stickers on the finished newsletters for mailing. Our website, Facebook page, and database are the work of volunteers. Donations to the Indian Ponds Association are posted, deposited, and acknowledged all by volunteers. An immeasurable number of hours are spent attending meetings and monitoring the activities of the Town Council and Conservation Commission. Finally, researching to stay abreast of the activities of the Association to Preserve Cape Cod, the Barnstable Clean Water Coalition, and the science of onsite wastewater treatment are all volunteer efforts. This month, Tom Hamilton's article honors one of these volunteers, Bob Dederian's significant, long-term contribution, putting a real face on one of these volunteers.

Current board member John Chiniara has been researching the contribution of freshwater mussel populations to the health of ponds. His research has led us to consider the merits and potential of repopulating several of the mussel species that lived in our ponds prior to 2009 when the ponds experienced a major mussel die-off. Middle Pond and Mystic Lake are unique treasures because of the diversity of mussels found in these ponds. Be sure to check out the links to the videos noted in John's article.

The Town of Barnstable has 182 ponds and 25 of them are large enough to be classified as "Great Ponds". Most do not have an active local advocate organization dedicated to preserving them and yet most are facing the same issues that confront our Indian Ponds. There has been a major focus at the state, county, and local governmental level addressing the excess nitrogen that is contaminating our bays and estuaries. However, the focus on the excess phosphorus that is threatening our freshwater ponds lags far behind. Is it time for a town-wide Freshwater Ponds Coalition to help marshal more resources to ensure the health of all the ponds in the Town of Barnstable? If you have thoughts regarding this concept, please contact me at info@indianponds.org.

Butch Roberts

NEWS FLASH

The Town of Falmouth Water Quality Management Committee (WQMC) recently completed a study in collaboration with The Green Center Inc. and the Massachusetts Septic System Testing Center (MASSTC) involving 59 participants in 39 homes to gather data on collected household urine. The study measured volume and tested nitrogen and phosphorus concentration in the collected urine on a household basis. The results of this study were so effective that the group is presenting an article at the Falmouth Town Meeting to raise $1.9 Million for a pilot program installing urine diversion toilet fixtures in 50–75 homes to monitor the nutrient removal performance for three years. If approved, this will be the first urine diversion municipal project in the US.

Urine contains 80% of the nutrients found in septic wastewater streams. Once the urine is collected and pasteurized, it will be available for use as fertilizer. The Rich Earth Institute is a Vermont-based non-profit that has instituted a successful community-scale project in Vermont. This has proven to be a highly cost-effective and environmentally friendly method of nutrient removal from human wastewater streams.

Watch for more to come on this intriguing technology!!

VOLUNTEER SPOTLIGHT: BOB DERDERIAN

What do Cal Ripken, Jr. and Bob Derderian have in common? They've both achieved decade-spanning Ironman streaks. But unlike Ripken's consecutive games streak, which ended in 1998, Bob's streak of collecting data on Hamblin Pond is still going strong.

Ever since Bob and his wife Gail built their house on Hamblin Pond in 1980, they've been advocates for the ponds. From their vantage point on Hollidge Hill Lane, they've witnessed first-hand the pond's beauty. But they've also seen the pond's ups and downs – from cycles of extensive algae blooms to dramatic improvements from alum treatments in 1995 and 2015. Motivated by his desire to protect the ponds, Bob began his volunteer work collecting pond data back in 1995.

Bob Derderian, a long-time Hamblin Pond volunteer and avid fly-fisherman, began collecting data on pond health in 1995.

Collecting the data: When Bob started taking measurementson Hamblin Pond, data collection was done on an *ad hoc* basis. Starting around 2009, though, pond data collection was formalized. Since then, measurements for all three Indian Ponds have been taken bi-weekly from mid-May to mid-October. Over just the last 10 years, Bob has made 93 trips out onto the pond and collected about 2,500 distinct measurements.

To gather the data, Bob rows his one-man aluminum boat out to the deepest part of the pond, dropping anchor down to about 60 feet. To keep his hands free, Bob uses his cell phone and headset to relay the measurements back home to Gail, who records the data. Working as a team, they complete the data collection in about an hour.

Each trip involves taking three types of measurements: water clarity, dissolved oxygen, and temperature. Water clarity is measured visually by lowering a black-and-white disk known as a "Secchi disk" into the water. The clarity measurement is the average of two readings: the depth when the disk disappears as it's lowered into the water and the depth when it reappears as the disk is raised again. Dissolved oxygen (DO) and temperature readings are taken by lowering a probe into the water starting at just below the surface. Measurements are taken at 1-meter intervals all the way to the bottom, resulting in an average of about 18 readings each for DO and temperature on Hamblin Pond.

The importance of pond monitoring: These measurements are vital to monitoring pond health and understanding long-term and seasonal trends. Figure 1 shows the

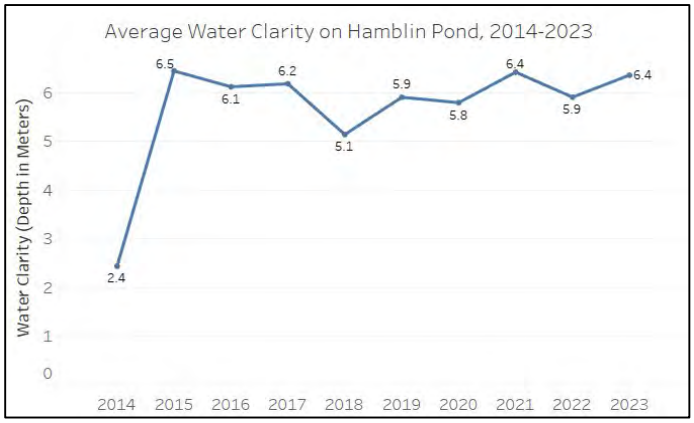


Figure 0. Water clarity measurements show the dramatic improvement after the 2015 alum treatment.

dramatic improvement in water clarity that occurred following the 2015 Hamblin Pond alum treatment. The average water clarity jumped from 2.4 meters in 2014 to around 6 meters since. Unfortunately, alum treatments don't last forever (effectiveness generally lasts from 15 to 21 years), so ongoing monitoring is critical.

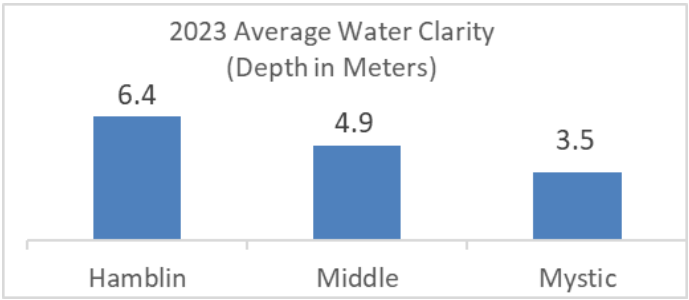


Figure 2. Average water clarity in 2023 ranged from 6.4 meters on Hamblin Pond to 3.5 meters on Mystic Lake.

Like Bob, Emory Anderson has also been a data collection Ironman and has been collecting data on Mystic Lake and Middle Pond. Combining the data from Bob and Emory allows the ponds to be compared and highlights where attention is needed most. For example, Figure 2 shows that 2023 average water clarity on Mystic Lake (3.5 m) was significantly lower than Hamblin's (6.4 m) and was

close to the level seen just prior to the last Hamblin alum treatment. Data like these helped to quantify the need for action and garner support for the Mystic Lake alum treatment that is scheduled for 2024.

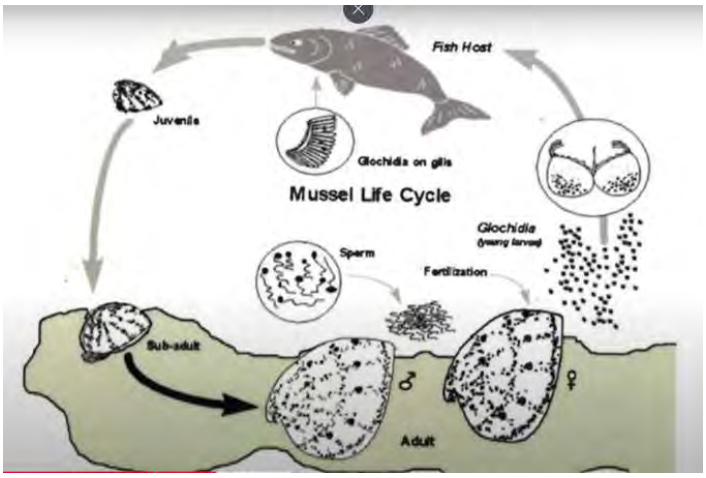
Final thoughts: When asked if there was a message he would like to deliver to the community, Bob said without hesitation: "Care for the close to the level seen just prior to the last Hamblin alum treatment. Data like these helped to quantify the need for action and garner ponds, support the Indian Ponds Association, and above all else – don't take the ponds for granted." We couldn't have said it better.

Thanks to volunteers like Bob, we're all able to work together to preserve the beauty and value of these precious resources. If you would like to get involved, please send us a message at www.indianponds.org/contact.

Tom Hamilton

THE UNDERAPPRECIATED CHARM OF THE PONDMUSSEL (*Continued from page 1*)

It had a mussel population of 2.328 per square meter in 2011 and a smaller water volume than Mystic Lake. The surviving mussels in Middle Pond were in a much better position to filter the water.



Female mussel spreads the glochidia (young larvae) onto a host fish which feeds and spreads them throughout the pond.

North America is home to around 300 species of freshwater mussels, the most in the world. Worldwide, there are about 1000 species, so we are home to almost one-third of the world's species. Most of those are found east of the Mississippi River.

To ensure the health of our ponds, the IPA is developing a relationship with scientist Dr. Allison Roy at the USGS and UMass Amherst who is conducting cutting-edge research on optimal conditions to repopulate mussels. We are also working with experts from Massachusetts Fish and Wildlife and NALMS (North America Lake Managers Society) to establish our ponds as learning sites for sustaining their health using best practices aided by our historical surveys of mussel and fish populations. The IPA is putting together a multidisciplinary group of scientific advisors to help guide our efforts to enrich the conservation curriculum at Barnstable schools.

We invite IPA members to volunteer and assist our effort to keep our ponds healthy, provide a platform for learning and enjoyment, and to share in tackling the ecological challenge of mussel survival and pond health.

Eastern pondmussel

Communities around the country are addressing the mussel survival issue. For example, the Partnerships for the Delaware Estuary advise:

- Pick up your dog's waste off the street and in your yard. Like litter, stormwater carries pet waste into our waterways and pollutes them.
- Participate in local drug take-back programs or obtain drug disposal packets at the pharmacy instead of flushing prescription drugs down the toilet.
- Put food grease and oil in a separate container for trash disposal instead of pouring it down the drain.

John Chiniara

2024 DUES NOTICE

The Indian Ponds Association is an all-volunteer, tax-deductible 501(3)(c) organization. Our volunteers maintain our website and Facebook page, create, and publish our quarterly newsletter, monitor the temperature, clarity, and oxygen concentration in all three ponds on a bi-weekly basis from May through October, and advocate for the three ponds at the Town Council, Conservation Commission, and the Marstons Mills Village Association meetings as needed, just to name a few of the tasks accomplished. Despite all our volunteers, we cannot provide these services without your financial support.

Our **Annual Calendar Year Dues** are used to pay for the cost of publishing the quarterly newsletter and filing fees required of non-profit organizations in Massachusetts.

The **Scholarship Fund** supports the two scholarships that we award to assist young adults seeking to further their education in environmental sciences.

Our **Pond Restoration Fund** provides us with the ability to proactively respond to threats to the health of our three ponds. In 2023, we provided funding for Barnstable Clean Water Coalition's interns to take monthly samples of Mystic Lake and Middle Pond to test for nitrogen and phosphorous. They also provided us with a survey of invasive species in and around these two ponds. In the past, we have funded our own extensive pond studies when there was not the political support to have the Town of Barnstable pay for these studies.

Please contribute as generously as you can to support all the efforts provided by our volunteers to keep these three ponds as healthy as possible. We have provided two ways for you to make your tax-deductible contribution. Dues self-addressed payment envelopes are included in this newsletter so you can simply write a check made out to the IPA and mail it in the envelope or go to our website (www.indianponds.org) and make a payment through PayPal. Either way, your support is appreciated. Thank you!

Butch Roberts

YOUR RIPARIAN BUFFER ZONE

I'll bet that when you purchased that waterfront property on one of the Indian Ponds, you believed that you had complete control of that property down to the water. Between the State and the Town Conservation Commission, there are regulations controlling the use of your land next to a Great Pond. This area between the pond and your developed lot is called riparian buffer zone, a transition zone between the water-based ecology and the land-based ecology. In its natural state, this zone has a significant impact on the quality of the pond and the ecosystem surrounding the pond. Our love of turf grass in that zone is hazardous to the health of our ponds and the ecosystem surrounding them.

Most of us love paddling around a tree-lined pond.This is the aesthetic value of a natural buffer zone. The scientific community has long recognized the contribution of a riparian buffer zone to the health of both the water body and the health of the ecosystems around that body of water.

\Naturally vegetated buffer zones provide erosion control, water infiltration, pollutant removal, and drought tolerance. The leaves on the trees slow down the water from rainstorms. The leaf bed on the ground slows down the flow of the water across the buffer zone allowing the water to percolate into the soil. This allows the runoff to be absorbed by the root systems, cleansed by the minerals in the soil and purified by the microorganisms in the soil. For this to work effectively, the buffer zone must be sized appropriately. The leaf bed and decomposing organic material hold moisture even in drought conditions. This is the clean water service provided by the buffer zone.

Plants growing in a naturally vegetated buffer zone "improve air quality by reducing temperature, removing air pollutants, sequestering carbon, and reducing energy use in nearby buildings." Air temperature is reduced both from the shade of tree leaves and from transpiration of water through the underside of leaves. This lower temperature helps to reduce temperature-dependent pollutants and ozone-forming chemicals. Leaves also intercept particles and take up air pollutants. Most importantly, plants growing in this zone remove carbon through photosynthesis and store it for the life of the plant.

A wide naturally vegetated transitional buffer zone provides an important ecosystem for water-dependent terrestrial wildlife. These include migrating and local birds, mammals, salamanders, turtles, and frogs. Wildlife "provide important functions such as pollinating flowers, distributing seeds, breaking down (eating) plants, and controlling the population size of organisms lower on the food chain." Protecting and encouraging the wildlife function of a buffer zone requires a wider buffer zone, up to as much as 300 feet necessitated by the larger spatial requirements of several species.

The effectiveness of a natural buffer zone is directly related to its size. As the slope increases, the size of the buffer zone must also increase. The recommended buffer zone width for sediment and phosphorus removal is 30–100 feet, for nitrogen removal is 100–160 feet, and wildlife protection requires a minimum of 100–300 feet. [1]"Buffers of less than 50 feet (are) more susceptible to degradation by human disturbance. In fact, no buffers of 25 feet or less were found to function in reducing disturbance in the adjacent wetland".

Green grass leads to green lakes. Turf lawns provide none of the benefits that a naturally vegetated buffer zone provides. Lawns have shallow roots which do not slow water drainage washing the soil and nutrients into the water during heavy rainstorms. Green lawns require fertilization and irrigation. The irrigation washes the natural and applied nutrients into the groundwater table and into the ponds. The same is true for any insecticides and herbicides that might be applied to make your lawn green. Raking the leaves off your lawn also removes an important filtering medium which cleans sediments and pollutants from the groundwater flow.

The transition zone between a freshwater lake and a developed lot is vitally important to the health of the freshwater lake and the natural ecosystems around that lake. It contributes to clean water, fresh air, and diverse wildlife, but only if it is left in its natural state and is of sufficient width to sustain these ecosystem services. This runs counter to our cultural tendencies to value lush green lawns running right down to the water line. If we want clear blue water in our ponds on Cape Cod, we need to understand the impact of our landscaping decisions around our ponds. Providing room for an effective natural riparian buffer zone allows nature to keep our ponds clean and healthy.

Butch Roberts

THE ROBIN IN WINTER

The robin in winter tends to congregate in nomadic flocks, called waves, which consist of anywhere from three to thousands depending where in the country they are. The farther south they are located, the larger the wave is liable to be. Waves on Cape Cod tend to contain between three and twenty, while in Florida, they may be in the thousands.

Usually, these flocks appear where there are plentiful fruits on trees and shrubs. Robins are always here in the winter, just not in as great numbers as in other times of the year.

Researchers don't fully understand why some robins migrate while others do not. Females are more likely to migrate than males, so it may be that males stay to give themselves an advantage in establishing a breeding ground in the spring. Even in freezing weather, robins can stay warm enough to make staying through the winter worthwhile. Those that remain near their mating grounds will get first choice of the best nesting grounds when spring arrives.

When robins migrate, it is access to food that causes the move, not temperature. They can withstand cold temperatures, but in winter, they need more food, so they tend to congregate where a constant supply of food is available. Many robins, especially those in the northern states and southern Canada, change their diets in winter. Since worms and insects are not usually available, they look for trees and bushes that still have fruit such as crabapple, holly, and juniper. I have several large holly bushes in my yard that are usually heavily laden with berries until the onset of winter. When all of the berries disappear, I know that I have been visited by the robins of winter.

A robin's internal temperature is 104°F, and yet they can be perfectly functional in areas below freezing just by fluffing up their feathers and getting really big. They can survive by eating snow, but really appreciate a watering dish for drinking and bathing. I have seen a couple of robins almost empty my water dish just by seeming to be playing in the water.

As temperatures warm in the spring, the bulk of the robin population follows a reliable northward migration pattern. The ground thaws and that is when earthworms and some insect larvae are available. That is when you see big movements in the robin population. That is when you first begin to see signs of robins switching from winter behavior to courtship and nesting behavior, and becoming territorial instead of being neighborly with the wave.

Dave Reid

MYSTIC LAKE ALUM TREATMENT SCHEDULE

The following table was prepared by Amber Unrah, Senior Project Manager – Special Projects, Department of Public Works, Town of Barnstable, in order to inform readers of the various tasks associated with the alum treatment for Mystic Lake, including their duration and timing. Based on this schedule, the actual treatment will take place in late November to early December of this year.

MYSTIC LAKE ALUM TREATMENT SCHEDULE 01-31-2024			
Task name	Duration	Start	Finish
Contracting	**18 days**	**Thu 9/14/23**	**Mon 10/9/23**
Permitting	**94 days**	**Fri 11/17/23**	**Fri 3/29/24**
Prepare NOI Application	48 days	Fri 11/17/23	Wed 1/24/24
NOI Submission DMF	21 days	Thu 1/25/24	Fri 2/23/24
NOI Submission to NHESP	21 days	Fri 2/2/24	Mon 3/4/24
Public Notice to Env. Monitor	11 days	Thu 1/25/24	Thu 2/8/24
NOI Submission to Conservation	*1 day*	*Fri 2/9/24*	*Fri 2/9/24*
Abutter Notification	*14 days*	*Mon 2/1/24*	*Fri 3/1/24*
Conservation Hearing	*1 day*	*Tue 3/5/24*	*Tue 3/5/24*
OOC Issued	*15 days*	*Wed 3/6/24*	*Tue 3/26/24*
Record OOC	*3 days*	*Wed 3/27/24*	*Fri 3/29/24*
Bidding (RFQ)	***157 days***	***Fri 3/1/24***	***Tue 10/29/24***
Prepare RFQ	*22 days*	*Fri 3/15/24*	*Tue 4/16/24*
Issue RFQ	*15 days*	*Tue 9/3/24*	*Mon 9/23/24*
Award	*3 days*	*Tue 9/24/24*	*Thu 9/26/24*
Executed Contract	*22 days*	*Fri 9/27/24*	*Tue 10/29/24*
Alum Application	***35 days***	***Wed 10/30/24***	***Fri 12/20/24***
Pre-Treatment Coordination Meeting	*5 days*	*Wed 10/30/24*	*Tue 11/5/24*
WM04 License	*10 days*	*Wed 11/6/24*	*Wed 11/20/24*
Notice to Conservation	*10 days*	*Wed 11/6/24*	*Wed 11/20/24*
Pre Sampling	*10 days*	*Wed 11/6/24*	*Wed 11/20/24*
Treatment	*10 days*	*Thu 11/21/24*	*Fri 12/6/24*
Post Sampling	*10 days*	*Mon 12/9/24*	*Fri 12/20/24*
Adaptive Management Report	***480 days***	***Tue 4/15/25***	***Mon 2/15/27***
2025 Monitoring	*132 days*	*Tue 4/15/25*	*Wed 10/15/25*
2026 Monitoring	*132 days*	*Tue 4/14/26*	*Wed 10/14/26*
Reporting	*88 days*	*Thu 10/15/26*	*Mon 2/15/27*

Tasks in black were completed as of 01/31/24. The dates for tasks in red (italics and gray) are anticipated and subject to changing depending on Permitting.

**TO VIEW THIS NEWSLETTER IN FULL COLOR,
GO TO THE IPA WEBSITE: www.indianponds.org**

"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