THE IPA NEWSLETTER

Mystic Lake, Middle Pond, and Hamblin Pond

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CATASTROPHE IN MYSTIC AND MIDDLE
HUNDREDS OF THOUSANDS OF MUSSELS DIE

Beginning in mid-August and continuing well into September, Mystic Lake lost nearly its entire population of freshwater mussels, victims of the lethal consequences of a massive algal bloom. It is estimated that the death toll was in the hundreds of thousands, and that possibly only less than 1% of the once-plentiful mussel population survived (see related article on page 3).Middle Pond, into which Mystic flows, also suffered from this algal bloom and lost many of its mussels.

Although local residents may have noticed unusual conditions on Mystic Lake earlier in August, the first documented observations of dead, floating mussels were made on August 15. Some weeks prior to this, considerable quantities of water weed had drifted into the northeast cove of the lake. By about mid-August, water throughout the lake had turned the color and consistency of "pea soup", indicative of a massive algal bloom. Within a matter of days after the initial sightings of dead, floating mussels, large numbers appeared throughout the entire lake and began washing up on shores. IPA members immediately sprang into action and began taking water quality measurements [i.e. temperature, dissolved oxygen, and clarity (via Secchi disk)] on Mystic over the next three weeks. *(Continued on page 4)*

ANOTHER SPARKLING YEAR AT HAMBLIN POND

Hamblin Pond, which has long been known as one of the state's top trout ponds, has regained its status as a great location for swimming, boating, and fishing. The many local residents and visitors who frequented the pond this year enjoyed a fine season of recreation in and around the pond's clear waters. In a year when Mystic Lake and Middle Pond suffered from severe algae blooms and deteriorating water quality, Hamblin Pond is a reminder of what a wonderful resource our ponds and lakes can be, thanks to an alum treatment done in 1995.

The Town beach at the south end of the 115-acre pond had a busy and successful season. The boat launch off Rte 149 provided access to fisherman who enjoy trolling and casting in the pond's waters. Motors up to 10 hp are allowed on the pond, but an increasing number of boaters are using electric motors. These silent motors seem to be more effective in trolling at the slower speeds required in trout fishing. More and more kayakers were evident on the pond this year. Fly fishermen patrolled the shoreline casting to rising trout and bass.

It was not long ago that conditions at Hamblin Pond were not as pristine. The Clear Lake Duck Farm, which operated from about 1920 until 1955 at the south end of the pond, dumped large quantities of fecal waste (containing phosphorus) into the water. During the 1980s and early 1990s, the water quality in the pond deteriorated dramatically. Severe algae blooms occurred each year, producing massive amounts of filamentous algae which would litter the shoreline. As a result, the water would turn bright green each spring. The visibility in the pond dropped to as low as 3 feet, which resulted in the closing of the Town beach.

After a year-long diagnostic and feasibility study, the Town decided to treat the pond with alum. The treatment was done in the spring of 1995. The water cleared and the algae blooms stopped. The alum treatment successfully locked the algae-producing phosphorus into the bottom sediments of the pond. Hamblin Pond has remained clear and vital for 15 years. A wonderful resource has been restored.

Robert Derderian

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PRESIDENT'S REPORT

It was a rough summer for Mystic Lake and Middle Pond, and for some other Cape ponds as well. Many days of spring and early summer rain, then the temperature rose in August and the sun simmered the water, already laden with excessive amounts of accumulated phosphorus, into a warm soup of algae. When the algae started to die off, the dissolved oxygen in the water was consumed. Mussels, unable to escape the rapidly-enlarging "dead zone", started to suffocate. On August 16, a tipping point was reached, and Mystic Lake began spewing up thousands of dead and dying mussels. A week later, the problem spread to Middle Pond. By mid-September, we realized that nearly all of the mussels in Mystic Lake had died. There were many mussel deaths in Middle Pond, but Mystic was a near-total wipe-out. Hamblin Pond, by contrast, remained clear and undisturbed, thanks to its alum treatment in 1995.

Freshwater mussels are slow-growing creatures that normally live a long time, perhaps as much as a century. In large numbers, they perform awesome feats of water filtration. They have been an integral part of the web of life in these ponds for thousands of years. Losing so many mussels in a single, perhaps preventable, event is a tragedy for the pond ecosystem, for those who love the ponds, and for those who have devoted time and effort to preventing just such a catastrophe. It will take decades for mussels to re-establish themselves in their former numbers in Mystic Lake. If the pond continues to produce algal blooms every summer, they may not come back at all.

Ironically, the mussels died because people were trying to save them! Had three of the seven species not been listed as threatened by the MA Natural Heritage & Endangered Species Program (NHESP), the alum treatment would have been done in 2008, and this summer's algal bloom could have been prevented. NHESP prohibited the alum treatment because they were trying to preserve the habitat that had nurtured such a "magnificent assemblage" of mussels, even though that habitat had shown unmistakable signs of becoming inhospitable, even harmful. A timely intervention, rather than "leaving well enough alone" might have made all the difference to the creatures we all wanted to protect.

On August 31, 2009, NHESP notified the Town that it would allow Mystic Lake to be treated with alum. The treatment cannot now be done until the fall of 2010 at the earliest, which means that at least one more summer will pass before the problem is addressed. We do not know if conditions next summer will foster another algal bloom in Mystic or Middle, but we hope that they will not. We can also do our best to prevent it. The final regulatory hurdle for the alum treatment will be approval by the Barnstable Conservation Commission, which will meet to consider it on February 2, 2010.

Heavy rains carrying nutrient runoff from lawns, yards, driveways, and streets have been blamed for causing algal blooms in many Cape ponds this past summer. In the case of Mystic Lake, such runoff is clearly not the most significant source of phosphorus, as shown by the pond study, which attributed only 10% of the phosphorus load in Mystic to runoff and septic systems. We need to be aware that Hamblin Pond, with more lawns close to the shore than Mystic, had no algal bloom this summer. Nor did Lake Wequaquet, which has many lawns and septic systems near the water's edge. However, in a summer of heavy rains, in a pond already burdened with a large amount of phosphorus in its sediments, runoff may have added just enough to bring Mystic Lake to a lethal tipping point. We certainly want to do everything we possibly can to prevent another such algae bloom in our ponds next year. We all need to be aware of the potential danger of runoff from our property and work to eliminate it. The next time it rains hard, put on your foul weather gear, go outside, and look carefully at where the rainwater is going! If it's running into the pond, then you may be causing a problem! In future issues of the IPA Newsletter, there will be articles discussing things we can each do to help reduce the amount of nutrients entering the ponds.

IPA memberships are currently 174 households, compared to 179 at this time last year. I urge those of you who have not joined to sign up as soon as possible (go to the IPA website at http://www.indianponds.org/join.htm) or do so next year when we send out the annual membership/dues forms.

We at the IPA wish you peace and good cheer throughout the coming holiday season.

Holly Hobart

MYSTIC LAKE MUSSEL ESTIMATE

What was the mussel population in Mystic Lake?

A mussel survey in Mystic Lake conducted by ENSR staff in August 2007 indicated that most mussels were found in the shallower, sandy areas of the lake at depths less than 15 ft, with few mussels found at depths between 15 and 30 ft, and none found between 30 ft and the 47-ft bottom.

Based on over 11,000 digitized depth soundings (linked to location by GPS) that I have collected over the past two years, a very accurate and detailed bathymetric map of the lake has been prepared. There is about 3,000,000 sq ft of potential mussel habitat (shallower than 20 ft) in the lake. Assuming a mussel population of a particular size and then calculating the resulting average area that would contain one mussel, as shown in the table below, leads to a "reasonable" estimated mussel population of about 250,000 to 500,000. This means, on average, there would be one mussel for every 6–12 sq ft of bottom less than 20 ft deep. A dense mussel bed could easily have over 10 mussels per sq ft, which helps to make up for areas with few or no mussels.

Mussel population	Average area (sq ft) per mussel	Comments
1,000,000	3	Absolute upper limit
500,000	6	Reasonable upper limit
250,000	12	Reasonable lower limit
100,000	30	Seems far too low

How many mussels died and how many are left alive?

The total shoreline of the lake and island is about 15,000 ft. If 30,000 dead mussels floated ashore, the body count would average 2 for every foot of shoreline. However, there were areas of the shoreline with much greater numbers of dead mussels than 2 per foot [e.g. the Race Lane beach (as many as 10 per foot) and the Lynxholm beach]. Wind direction controlled where the bodies accumulated on a given day. To postulate a reasonable distribution, divide the shoreline into thirds, as follows:

- 5000 ft with 0.25 mussel per ft = 1,250 mussels
- 5000 ft with 1 mussel per ft = 5,000 mussels
- 5000 ft with 5 mussels per ft = 25,000 mussels

This gives a total of 31,250 mussel bodies, certainly "tens of thousands", which was the original rough estimate by some.

The body count of dead mussels that washed ashore was only the "tip of the iceberg". Based on my limited snorkeling and video surveys, the bottom of Mystic Lake that had previously been mussel habitat is now a graveyard; it is very hard to find living mussels. A majority of mussels are still embedded in the bottom, but are clearly dead, with gaping valves. From wading and snorkeling surveys, I found two live mussels, one at the Lynxholm beach and one at Halpert's beach at the south end of the lake. With underwater video camera, I have found two more obviously alive, one near the Lynxholm boat landing (which can be seen on my YouTube video that can be seen at http://www.indianponds.org/gallery.htm) and one near the Race Lane beach. With the very large ratio of observed dead to those obviously and possibly alive, I estimate that less than 1% of the population survived the recent die-off..

Based on all of the above, the total death toll was likely in the hundreds of thousands, and the remaining population is probably a few thousand, at best.

What was the filtering capacity of the mussel population?

Mussels are filter feeders. They draw water in through their siphons, filter very small pieces of detritus and microorganisms, such as algae and bacteria, with their gills, and carry them to their mouths with tiny hairs. So, how much impact do hundreds of thousands of mussels have on Mystic Lake?

The volume of Mystic Lake is 1.02 billion gallons. A single mussel can filter 0.5–1.25 gallons per hour[1]. A population of 250,000–500,000 mussels could filter 3–15 million gallons per day or the equivalent of the entire volume of the lake every 68–340 days.

Bob Nichols on Mystic Lake in his boat equipped with sonar for obtaining depth soundings. Photo by Annette Nichols.

Unfortunately, this summer's die-off of nearly all the mussels in the lake can be expected to have dire circumstances for the well-being of the lake. With the loss of the mussels' filtering capacity, the microscopic algae, which they have removed each year and consumed as food, will remain in the lake. As a result, we can expect , among other things, water clarity to remain poor. Some of the resulting ecological consequences (i.e. effects on other aquatic life) cannot be predicted.

Our hope is that an alum treatment will reduce the amount of available phosphorus and, hence, limit the excessive production of algae.

Robert Nichols

[1] http://www.dnr.maryland.gov/naturalresource/spring2009/mussels.pdf

Editor's note: *Bob Nichols, a retired mechanical engineer and IPA member, has fished and snorkeled Mystic Lake for 35 years..*

CATASTROPHE IN MYSTIC AND MIDDLE

(Continued from page 1)

On the first day of **water sampling** (August 17), surface water temperature was 79.5°F, much warmer than during comparable water sampling in mid-August in the previous eight years. Three days later (August 20), the surface temperature had increased to 83.1°F. A particularly interesting observation on the first three sampling dates (August 17, 20, and 21) was that the dissolved oxygen readings in the upper 13 ft of the water column were exceptionally higher than at this time in the previous eight years. Readings of dissolved oxygen taken at the surface and at regular intervals down to 13 ft averaged 11.1 mg per liter on the above three dates, 37% higher than the average of those taken on comparable dates in August in 2001–2008 (8.1 mg per liter) (see the full set of water quality data at http://www.indianponds.org/alum.htm).

These elevated dissolved oxygen readings this past August clearly confirmed the existence of a massive algal bloom. Algae are microscopic plants and, like all plants, produce oxygen by photosynthesis.

Another disturbing measurement throughout the entire 3-week sampling effort by the IPA was that of **water clarity**, taken by Secchi disk. Readings for the 11 samples taken between August 17 and September 9 averaged 3.3 ft. In comparison, the average Secchi disk readings taken on comparable dates in 2001–2008 were 11.1 ft. The lowest reading was only 2.3 ft on August 28, a reading that led to Mystic Lake being closed to swimming by the Town of Barnstable Health Division.

However, the most alarming measurements taken during the 3-week sampling effort were those of **dissolved oxygen** in the deeper layers of the lake. In summer, the amount of dissolved oxygen in the deeper portions of the lake normally drops to critical levels (i.e. less than 1 milligram per liter) because of the bacterial decomposition of organic detritus. This bottom area has been termed the "dead zone" because of its inability to support oxygen-breathing animals. Sampling in 2001–2008 had indicated that dissolved oxygen dropped to critical levels at a depth of about 26–30 ft. As a result, the "dead zone" in the summer in Mystic Lake, in recent years, had been from about 30 ft to the bottom (maximum depth of 47 ft).

Race Lane beach on Mystic Lake littered with dead mussels.

On the first day of sampling this past summer (August 17), dissolved oxygen reached the critical low level at a depth of 26 ft. However, on succeeding sampling days, the depth of the critical level climbed higher and higher in the water column until, on August 24, dissolved oxygen disappeared at a depth of only 16 ft. Therefore, in only a week, an additional 10 ft of water had been added to the "dead zone", which, at that point in time, included all water deeper than 16 ft. Accordingly, any mussels living in water deeper than 16 ft suffocated from lack of oxygen. This dramatic increase in the "dead zone" was caused by the oxygen-consuming decomposition of the huge amounts of algae that had been produced by the unprecedented bloom. Subsequent sampling over the next two weeks showed the top of the "dead zone" dropping slowly to about 23 ft.

During this time, most of the IPA's attention had been focused on Mystic Lake, although there was, nevertheless, **concern for the well-being of Middle Pond**. In the first week of sampling on Mystic Lake, several testings were also done on Middle Pond, indicating reasonably normal conditions (i.e. Secchi disk clarity reading of about 15 ft and dissolved oxygen present almost to the bottom). When traversing by boat from Mystic to Middle, or vice versa, via the cut, the transition was initially stark; clear water in Middle and "pea soup" water in Mystic. However, by about a week after the first dead mussels were seen in Mystic, they also began to appear in Middle. Shortly thereafter, the water in Middle also started to exhibit the green coloration of an algae bloom. Since there is water flow from Mystic into Middle, initial thinking suggested that the dead mussels and green water in Middle had simply floated/flowed in from Mystic. But, later observations confirmed a substantial die-off of mussels throughout Middle. The definitive cause of this mortality has not been determined. Since later water sampling did not indicate the loss of dissolved oxygen in the water column, as in Mystic, the mussel mortality in Middle must have been caused by something else related to the algal bloom.

On August 16, after the first sightings of dead, floating mussels in Mystic Lake and observations of deteriorating water quality, the IPA notified Tim Simmons of the MA Natural Heritage & Endangered Species Program (NHESP), who, later that week on August 20, accompanied IPA members and Rob Gatewood, Town Conservation Division Director on a tour of Mystic and Middle and observed the water sampling done that day. Simmons, in turn, notified staff of the MA Division of Fisheries and Wildlife and Department of Environmental Protection (DEP). Samples of dead mussels collected by staff of the Division of Fisheries and Wildlife included all seven species of mussels in the lake, three of which are listed by NHESP as of "special concern".

As the algal bloom persisted and more and more dead mussels were observed, the **magnitude of the kill** began to be debated, as well as the cause(s) of this mortality. In addition to mussels, dead fish as well as a few frogs were noticed. Fish that died included mainly white suckers and brown bullheads,

but also a few yellow perch and bass. The number of fish that died was minimal compared to mussels. At first, it was thought that the number of dead mussels was in the hundreds, but then "thousands" and eventually "tens of thousands" began to be considered. Eventually, however, based on calculations as well as wading, snorkeling, and underwater video surveys made by Bob Nichols, a retired mechanical engineer and IPA member (see article on page 3), it is more likely that the death toll is in the hundreds of thousands, and that perhaps less than 1% of the original population of mussels survived the catastrophe.

An **interesting observation** made by many residents during the height of the mussel die-off was the **conspicuous absence of waterfowl and scavengers.** In the northeast cove of Mystic Lake prior to the die-off, scores of Canada geese were feeding on the accumulated uprooted water weed, but they suddenly disappeared with the appearance of the floating, dead mussels. Scavengers (e.g. gulls), which are normally available to collect any dead animals, were nowhere to be seen. It was only by about the last week of August that the waterfowl and scavengers began to reappear. Perhaps they sensed something in the water associated with the algal bloom that warned them to stay away.

Turkey vulture eating dead mussels.

Observations and concerns voiced by local residents that **blue-green algae might be involved** led to DEP staff testing both Mystic and Middle on September 14. This sampling revealed that both Mystic and Middle had counts of cyanobacteria (blue-green algae) cells in excess of the Mass. Department of Public Health guideline (70,000 cells per milliliter). The count for Mystic was 109,200 cells per milliliter and 91,422 for Middle. As a consequence, both ponds were closed to swimming. Had testing been done in mid-August at the height of the bloom in Mystic, the cell counts would have been much higher. On September 28, both ponds were tested again and subsequently reopened to swimming, with Mystic having a cell count of 32,000 and Middle a count of 62,000, both below the state guideline.

Blue-green algae or cyanobacteria produce toxins that can be harmful to humans and other animals. However, according to scientific reports, these toxins pose no risk to mussels, as they merely accumulate them without any harmful effects.

So, what killed the mussels? The disappearance of dissolved oxygen from all water deeper than 16 ft in Mystic Lake is likely to have killed the mussels living there. However, a mussel survey in Mystic Lake conducted by ENSR staff in August 2007 indicated that most mussels were found in the shallower, sandy areas of the lake at depths less than 15 ft, with few mussels found at depths between 15 and 30 ft, and none found below 30 ft. Therefore, something else must have killed the mussels living in waters shallower than 16 ft.

Dr. David Strayer, a freshwater mussel expert at the Cary Institute of Ecosystem Studies in Millbrook, NY, when appraised of the Mystic Lake mussel kill, suggested **ammonia as a possible cause**. The decaying process of the massive amounts of algae could have produced ammonia, forms of which are highly toxic to mussels. Once mussels started dying, their decay would produce a positive feedback leading to more ammonia, which would cause more mussel deaths, followed by more ammonia, and so on. This type of feedback has been described to cause large, rapid kills of the Asian clam (*Corbicula fluminea*), which suggests that this could also have happened to the mussels in Mystic Lake and Middle Pond.

Ironically, the Town received notification from the NHESP in late August that it had reversed its earlier denial of an alum treatment for Mystic Lake. Regrettably, this decision came too late to save the mussels. If the Town's request for an alum treatment, which was originally submitted in October 2007, had been approved then, the catastrophe of the summer of 2009 would have been avoided. The alum treatment would have immobilized the excessive phosphorus contained in the bottom sediments of the lake that fueled the massive algal bloom of this summer.

It is likely that the definitive cause of the mass mortality will never be known with certainty, but one or more of the above possibilities clearly played a role. Regardless of the cause, it is evident that Mystic is markedly changed as a result of the loss of the mussels. It is presently not known exactly how many mussels survived, but likely fewer than 1%, based on subsequent visual surveys (see article on page 3). It is also uncertain whether any of the species of "special concern" survived. A professional mussel survey to be done sometime prior to the now-expected autumn 2010 alum treatment will help to confirm both the presence and abundance of the remaining mussels. Now, it will likely take decades for the few surviving mussels to replenish themselves. Equally worrisome is the ecological health of Mystic Lake with the filtering capacity of the mussels now gone (see article on page 3).

The NHESP initially denied the alum treatment for fear that some harm might befall the endangered mussels. This decision was made in spite of strong evidence indicating that doing nothing would jeopardize the well-being of the lake and, possibly, the mussels themselves. Two lakes, Mystic and Middle, once the locations of the largest concentrations of the mussel species of concern to the NHESP, now no longer have that distinction.

It is clear that new, ecological-based thinking must govern future decision-making relative to species of "special concern" in order to protect not only rare species, but also their habitats.

Emory D. Anderson, Ph.D.

THE GIANT BLOB

What next? After green water and dead mussels, amid concerns about toxic blue-green algae in Mystic Lake, a mysterious, gelatinous, gray blob washed up in Centerville's Long Pond in September 2009. A sinister type of algae bloom? An alien substance from outer space? It took an e-mail to Tim Simmons at the MA Natural Heritage & Endangered Species Program to identify it as a colony of freshwater bryozoans whose Latin name is *Pectinatella magnifica*.

Freshwater bryozoan Pectinatella magnifica found this past summer on the shore of Long Pond in Centerville. Photo courtesy Debbie Lavoie, Barnstable Natural Resources Division.

Bryozoans (or "moss animals") are ancient creatures more complex than sponges and somewhat like corals. Of the more than 4,000 species of bryozoans worldwide, only 50 are found in freshwater; all the others live in the sea. The individual animals are small, about half a millimeter, but they live clustered together in large colonies. The mysterious blob was one such colony.

Bryozoans secrete calcareous, chitinous, or gelatinous structures to house the colony. Not all colonies are in the form of blobs; some colonies form intricate, lacy patterns on rocks or seaweeds; others look like bushes or fans. Some of the freshwater blobs are so large they can block water intakes and cause fouling problems on boats.

The individuals that make up a colony are called "zooids". Marine colonies may have different types of zooids specialized for feeding, reproduction, defense, or mobility, but in a freshwater colony, all the zooids are specialized for feeding. Each individual is composed of a gelatinous stalk with a crown of tentacles used to sift food particles out of the water. This food is digested in a u-shaped gut with an anal opening near top of the stalk. Each member of the colony can function as either a male or female. These versatile creatures reproduce in various ways, depending on the season or external conditions. Although they are capable of producing free-swimming larvae, during the summer and fall, freshwater colonies produce "statoblasts", spore-like cells enclosed in shells to protect them from severe conditions. Some are set adrift in the water, while others may attach to and be dispersed by waterfowl, mink, muskrats, etc. Others remain with the mother colony. Some have been known to survive the digestive tracts of waterfowl, turtles, and fish. When conditions improve, new zooids germinate from the statoblasts and each becomes the founding member of a new colony.

Although they are extremely simple creatures, bryozoans produce a great variety of chemical compounds, some of which are being investigated for possible medical uses. One of them, the substance bryostatin 1, produced by a common marine bryozoan, is currently being tested as an anti-cancer drug.

Holly Hobart

Sources: http://www.earthlife.net/inverts/bryozoa.html, https://kb.osu.edu/dspace/handle/1811/3463, www.ucmp.berkeley.edu, www.wikipedia.com

PUBLIC MEETING ON ALUM TREATMENT

As follow-up to an IPA White Paper on the alum treatment for Mystic Lake sent out to most of our readers on September 26 (see http://www.indianponds.org/alum.htm), a public meeting was held Saturday morning, October 24. Held by the IPA in Liberty Hall, Marstons Mills, courtesy of the Liberty Hall Club, and attended by nearly 50 people, the purpose was to discuss the alum treatment, hear objections, and answer questions. Following an introductory PowerPoint presentation by President Holly Hobart, the remainder of the 2-hr meeting was devoted to comments by opponents to the alum treatment and responses by IPA members and local and state experts.

Concerns and opinions voiced by the few in opposition ranged from doing nothing (let Nature take its course), using ozone instead of alum, using bacteria to control the algal blooms, and to reducing or eliminating phosphorus input from lawn runoff and septic system discharges, perceived as the main source of the excess nutrients in the lake. Concern was also expressed that the alum treatment was too costly, particularly at a time when the Town was in financial difficulty.

Various experts responded that different treatment options had been considered, but that alum was viewed as the most cost efficient and had been effective in other Cape ponds. The use of bacteria to control algal blooms would only address the symptoms of the problem, and would not inactivate the phosphorus. **The 2006 pond study results clearly identified phosphorus already in the sediments as the chief problem**, not that from runoff or septic discharge. Attendees were reassured that Town funding for the treatment was secure.

The vast majority of attendees approved the alum treatment. Some stated their frustration with the few who questioned credible scientific data supporting the need to treat the lake.

WHAT CAN I DO?

Mystic Lake regained its clarity with perfect timing to present admirers with the best of autumn's colorful splendor. A very welcome change from the spectacle of this summer's extraordinary algal bloom and resultant mussel kill in, first, Mystic Lake and then Middle Pond. The cool, fall weather accounts for the temporary reprieve, but **excess phosphorus, the underlying cause**, has returned to the bottom sediments for the winter. The IPA has spent the last several years working with state and local agencies and experts to devise the best course of action, with an alum treatment consistently leading the list of remedies. Unfortunately, it took the massive mussel kill to gain final approval from the state, and there are still a few remaining hurdles.

We believe the alum treatment will control the existing phosphorus, but we wonder what we can do, individually, to help our lakes. We would like to enjoy them now and also be able to leave them in good condition for future generations to enjoy. There are some simple suggestions that we, as ordinary homeowners, can do to help reduce the amount of phosphorus that flows from our homes and impacts the lakes.

Control septic systems: What goes in will come out! Even the best Title 5 septic system will allow phosphorus and nitrogen to flow into the groundwater. We can help our septic systems work correctly by having them pumped every two years. In addition, check the labels of the detergents that you buy and use. Laundry detergent is now required to be phosphate free; however, dishwasher detergent is still allowed to contain phosphates. Check the labels; many are available that are phosphate free and work well, including products such as Simply Green, Seventh Generation, and Trader Joe's. You can further help your septic system work correctly by not overloading it. It's better to stagger wash loads throughout the week than to do several on any one day.

Control runoff: Many people love a rolling green lawn; however, that can contribute green algae to our lakes. A smaller lawn, **fertilized sparingly with organic, slow-release fertilizers**, or not at all, might be a better choice. An attractive yard can be created with low-maintenance groundcover, flowers, and shrubs. Native plants require less water and little or no fertilizer. A buffer zone of vegetation between the lake and any lawn is important to catch and filter excess nutrients that might wash away during a heavy rain. Gravel or crushed-shell driveways control and filter rainwater. If you already have a paved driveway, it's important to see where the runoff occurs and plant a buffer of vegetation that will slow and filter any pollutants. It's better for our lakes if you use a commercial carwash, but if you must wash at home, there are phosphate-free detergents for autos and boats.

Control animals: Are waterfowl foul? **Do not feed ducks and geese**. They create a large amount of waste, and feeding them causes an unnaturally large population. Also, **it's unlawful to feed ducks and geese on public land**. We all know to "curb" our dogs on the street, but their waste still can cause a problem in our yards and streets near the water. **Clean up after your pets and dispose of the waste.**

Betsey Godley

CYANOBACTERIA ("BLUE-GREEN" ALGAE) FACT SHEET

What are algae and Cyanobacteria?

Algae are microscopic plants that grow naturally in rivers and lakes. Most types of algae are harmless to people and are an important part of the food chain, though excess algae can cause problems like fish kills. "Blue-green" algae are not actually true algae, but are a type of microscopic organisms called Cyanobacteria. Blue-green algae grow in the summer in calm, warm, shallow water that is rich in nutrients (nitrogen and phosphorous). Blue-green algae are not always visible on the surface of the water. Generally, they become visible when they are present in large numbers in one area, blue-green algae "blooms." A bloom can be detected by a bright green coloration in the water or at the water surface. It may look like thick pea soup, green paint, or green cottage cheese. Blue-green algae mats may smell like freshly cut grass.

Why be concerned with blue-green algae?

Blue-green algae can produce natural toxins, which are released into the water as the algae die and break down. The toxins can persist for up to three weeks in the water after the bloom is no longer visible. The toxin can cause harm to people and their pets.

What are the health effects?

Blue-green algae and the toxins they produce may cause health effects. Skin rashes and irritation of the nose, eyes, and or throat are common side effects that result from skin contact with water containing algal toxins. If water containing algal toxins is ingested, health effects include stomach ache, diarrhea, vomiting, and nausea. Young children and pets are more at risk to algal toxins than adults, since they are more likely to drink contaminated water. Other health effects, which are rarer, include dizziness, headache, fever, liver damage, and nervous system damage.

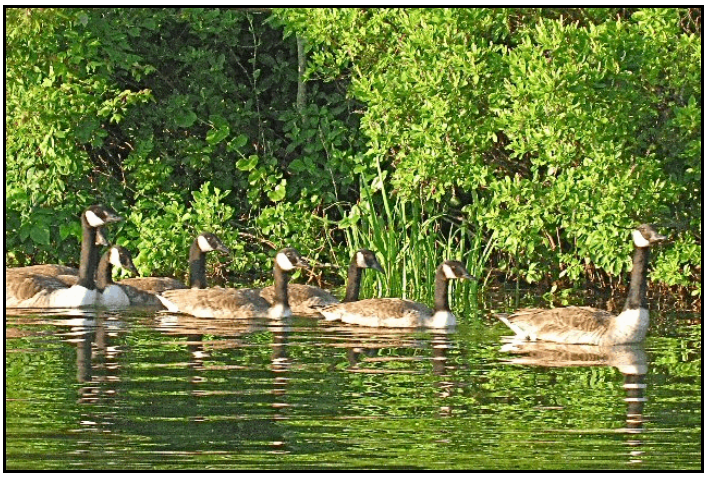
Editor's note: *Above information obtained from Charles River Watershed Association.*

Who to contact regarding a blue-green algal bloom?

Massachusetts Department of Public Health, Bureau of Environmental Health Assessment: (617) 624-5757
Massachusetts Department of Environmental Protection, Southeast Region Main Office: (508) 946-2700
Barnstable County Health Department: (508) 362-2511
Town of Barnstable Health Division: (508) 862-4644

CANADA GEESE – A BIG PROBLEM

The current US population of Canada geese is estimated to be 3.5–5 million (http://www.geeseoff.com/). The website also reports that "the average Canada goose eats 3 lbs of grass each and every day damaging up to 5 sq. ft. of turf in the process" and that "each adult dumps 1½ lbs of effluent on your grass each and every day."



Canada geese on Mystic Lake. Photo by Betsey Godley.

On dry land, and for most healthy people, goose feces can be harmful only if inhaled or eaten, but as with all things, the old and the young, and pregnant or breast-feeding women, are particularly susceptible to the parasites that inhabit Canada goose feces.

In ponds or lakes, Canada geese present another problem. They will eat their 3 lbs of water plants (just as easily as 3 lbs of grass from lawns, golf courses, and fields), and then deposit their feces directly into the water. As the season progresses and the water warms up, nutrients (phosphates) that have leached into the water column from the decaying feces can help cause an instantaneous algal bloom.

If used properly, these nutrients are really just fertilizer, but, when they are introduced into a body of water without restraint, they become a menace to all life in the pond.

Maintaining a beautiful, well manicured lawn can add to the problem by allowing fertilizer to leach into the pond. There are several things you can do to minimize your impact. Don't mow right down to the water's edge. Allow a buffer to grow. Plant fescues, not Kentucky bluegrass, which geese love. Plant aquatic plants at the pond shore. This acts as a physical barrier and provides a habitat for more desirable wading birds. **Don't throw food into the water.**

Remember, it is extremely difficult to control nature, and if you try to eliminate every goose from your property, you will end up extremely frustrated. Your goal should be to eliminate that which attracts them to you in the first place.

Dave Reid

CRITICALLY ILL PATIENT

There are some people who say the best way to save our very sick Mystic Lake is to do absolutely nothing now, but start to work on the long-term solutions of replacing septic systems with sewers and minimizing use of garden chemicals.

In my view, that is akin to having an emergency room physician say to a patient brought in under full cardiac arrest: "Just look at you. You smoke. You're overweight. You obviously don't get enough exercise. Get off that gurney and run a couple of laps around the hospital!"

Obviously, we need to immediately save the life of this lake so that it has a chance to benefit from these very long-range solutions.

Dr. Carl Thut

WANT TO KNOW MORE?

VISIT THE IPA WEBSITE

www.indianponds.org

- New video of dead mussels in Mystic Lake
- IPA White Paper on Alum Treatment
- All previous IPA newsletters
- 2006 CCC Pond Study Report
- A Resident's Guide to the Indian Ponds
- Photographs of the ponds
- History of the IPA

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