

At the November 2020 Board of Governors meeting, Nick from The Pond and Lake Connection answered questions concerning lake management including drawdowns, chemical treatments, aeration and other topics submitted by the lake committee and from members attending the meeting. The following is a transcript of the questions and answers. A few of the questions and answers have been lightly edited for clarity and readability.

Note: The first group of questions were submitted by the lake committee.

Q1. Is the drawdown more of an art or a science?

ANS. I would say it is mostly a science but it really depends on your goals. There are two types of drawdowns that you could be doing. One would be to give access to the shoreline for maintenance so you could work on your docks, rake the leaves, etc. and the other would be to do a draw-down to kill aquatic plants. If you are just looking to do maintenance it is really more of an art - you just draw it down to whatever is going to make people the happiest to get their stuff done. If that is all you're looking to do, then the best time of the year is probably late summer into early fall, or any time in the fall really because the weather is still good and people can get out there and do work. If you are looking to actually kill plants, you want the water down at a time of year where it's going to freeze, and it has to freeze down into the sediment so it's not just like a one day or a couple of days that it's cold or below freezing, it has to be below freezing for probably a week or two, and then you get that ice to start going down into the sediment where there isn't water now because you've drawn it down, and the ice actually is what's killing the plants when the roots freeze - that's what kills them so they don't come back.

Q2. Is it best management practice to draw down and use chemicals?

ANS. I would say it's really lake specific and I would estimate somewhere around a quarter of the lakes that have the ability to draw down are actually doing it to manage plants. Most places do draw it down to provide access for maintenance and stuff like that. But I would say maybe a quarter of them actually do it to kill plants.

Q3. Drawdown only during January and February as opposed to in the fall as well?

ANS. Again, it depends on your goals. If you're just looking to kill plants it wouldn't be a bad thing, the only thing you want to be concerned about is there are amphibians and reptiles that hibernate underwater in the sediment and if they start hibernating in October and November, and you draw it down after that, then they become high and dry and that could cause an issue. Other animals like mollusks, fresh water mussels, they really don't have much ability at all to move around, so you want to draw down the lake slowly if at all possible, and then anything that can move will move, as long as it is not too late in the season.

Q4. How long does it take to kill plant roots?

ANS. I would estimate that it would take only a couple of days, but again the ice has to get all the way through the sediment so it would probably be a week or two of a good freeze.

Q5. Chemical only management effects on muck buildup?

ANS. There are a lot of questions about muck buildup in the lake, and it's natural for all lakes to build up muck over time. All lakes and ponds are basically trying to become a field again with a stream running through it so sediments are washing in, nutrients are washing in, and things are growing to fill it in. Every year plants are going to grow and if you were going to do nothing, the plants would all die sometime in the fall and all of that plant material does become muck, it gets degraded by bacteria and other things. It doesn't all stay as muck, it becomes nutrients for other things. Getting back to management by chemicals and how that affects muck. Basically at the worst you're going to kill plants and then they're going to do the same thing they would have done in the fall - they're going to degrade after a treatment, but the idea is to have less plants overall so it should be better in the long run. You're just not having a full lake worth of weeds that grow and die every year, you're just having less grow, therefore less die, and you get less muck in the end.

Q6. Other treatment approaches?

ANS. There are two types of treatment that you can do for aquatic weeds. What you are doing now is called a contact herbicide. It's a product that is in the water briefly, maybe several hours to a day or two at the most to do its job. It doesn't move very far from where you put it, and it's generally much less expensive than the other option which is systemic herbicide. That's a product that goes into the plant, kills the root, so you do get a better kill and you get longer-term control, but it's usually a lot more expensive, and it has to be in the water for a lot longer, something like 60 or 90 days. So you'll have more restrictions on things like watering your lawn or garden after a treatment (water drawn from the lake). So those are the types of treatment approaches. Contact herbicides you can be more specific, so we can treat just little areas whereas systemic herbicides are in the water a long time, it moves throughout the lake and you're basically going to be treating the whole lake.

Q7. Lowest depth of the drawdown while keeping the balance.

ANS. That's kind of a difficult one to answer. It's going to be lake dependent, but if you have an accurate bathometric map. I did get one sent over to me in the last couple of weeks - I think that was Greg Bugbee that did that one - and it seems like a really rough map. Just by standing on the road and looking at the lake bottom that is exposed now, it

doesn't really match what the map says. If you're just looking for a general idea of what the depth is, then it's probably OK, but to actually make a management recommendation, you're going to want something that is more accurate. Likely the one that was done before was done basically using a string and a weight - you drop it down in several spots to see how deep it is, you mark it on a piece of paper and you create a map out of that. The way that we do maps now is with a sonar system - we drive along the lake and it takes a measurement several times every second so that the map is way more accurate. So if you have that accurate map showing how deep the water is, and then you have a gauge somewhere on the lake that tells you the height of the water when it's full, then we can make a more scientific recommendation how much water needs to be drawn down to expose a certain amount of sediment.

Q8. The percent of vegetation required?

ANS. The DEEP recommends 20 to 40 percent of the lake to have some sort of vegetation growing on it, whether that's submerged plants growing on the bottom that you can't really see, or it's lilies or anything else, you want 20-40 percent to have a healthy lake that's healthy for the water quality, the fish, and everything else that uses the lake. I would guess that if you guys were to do nothing, you're going to have significantly more than the 40 percent. The last map that I saw, I think was 2018, it looked maybe 75 to 80 percent, somewhere around there. So you guys have plenty of plants to be healthy.

Q9. Is a map and a gauge beneficial?

ANS. That's what I was talking about before. If you guys are looking for a recommendation on how far to draw the lake down, that's going to be important to give you guys an accurate recommendation.

If the lake were a much bigger lake, it would probably be more advantageous to utilize a drawdown to kill plants. Where you guys are so small, we can easily cover the whole lake when we're there in a day. We can see the whole shoreline, we can see the center of the lake, and we get a readout on our sonar of how tall the vegetation is and where it is in the lake, and with that level of accuracy, we can go around the lake and specifically target with this product that is very fast acting and won't move far from where we put it. So we can be very specific in where we treat and where we're leaving plants. So to keep that 20 to 40 percent of vegetation that the DEEP is looking for, you have to find spots to put it. In the north cove, on the eastern side, there's a pretty good section where there are no houses, it's shallow, so that's a good spot for plants to grow, and other spots along the shoreline where there are no houses, beaches or swim areas, are all good spots to leave plants. And that's something we can do with a treatment, we just don't treat in those areas. With a drawdown, you're going to lower the water uniformly throughout the lake so the shallow areas are going to be exposed so that's where you're going to kill plants. The

shallow areas are going to be the same spots that I just mentioned, the north cove, and other spots along the shoreline where there's no houses. With a drawdown you're going to be killing plants in all those areas, you just can't be as specific as where you're managing plants with a drawdown.

Drawdowns are something we do recommend for certain lakes depending on the plant that you are managing. Some plants are not really affected by the drawdown and some really are. And I think somewhere in the later questions I mention - I think it was 2018 you guys had a big bloom of snail-seed pondweed in the southern cove and that might have been a good example of a plant that could survive a drawdown and all the other plants in that area were killed from the drawdown, so it opened up the area for that one plant to take hold. I don't know if that is exactly the case or not, but the timing seems right and snail-seed pondweed is one that usually is not affected by drawdowns.

Q10. Possible damage from drawdowns?

ANS. Drawdowns, while they kill plants where you expose the sediment, in other places where you are just making the water shallower, which is going to be the center of the lake, you can actually increase the plant growth because now it is getting more sunlight, it's closer to the surface, and plants think they are just in shallower water so they start growing out in the middle. You may impact adjacent wetlands - I don't know if you guys have any wetlands upstream of the dam, but that would be something like again in the north cove maybe where the water is coming into the lake, the wetlands plants up there where they normally have their feet wet and you draw it down, those plants up there might be affected as well. When you draw the lake down, you're obviously making the lake smaller, so it's going to concentrate fish into a smaller area and that makes it harder for fish to escape predation, so something like a bass or a pickerel or even yellow perch, can more effectively feed on other fish. You can end up with less fish, or it could skew the ratio of predator to prey.

You guys have obviously been doing drawdowns for a while, and it doesn't seem to have had a huge effect so that may not be a huge concern for you guys

If it is started too late, you can kill hibernating reptiles and amphibians, reduce species richness (that's a measure of how many species of plants are in a given area), and again there are certain plants that will die from a drawdown and others that won't. So you can reduce the number of species and have less diversity in the lake because of drawdowns.

Exposed sediment when it rains during the winter or anytime that the lake level is down, sediments can wash down into the deeper parts of the lake and that brings nutrients and stirs up nutrients and accelerates the filling in of the lake.

The lower volume of water causing the fish to be more concentrated can increase the chance of low dissolved oxygen fish kill. Again, this hasn't been a problem for you in the past, so it might not be applicable to your lake.

Dried organic sediment (muck that has dried out after being exposed), when it re-floods in the spring, it can become buoyant and create floating mud islands. I don't know if that's something you guys have seen or not.

Q11. What are the costs of drawdown services from Pond and Lake Connection?

ANS. It is a service that we offer for some places. Where you have all the equipment in place (the valve), you can easily execute a drawdown, I don't see any reason why you would want us to actually take over doing the drawdown. I am waiting to hear back from the office the price on having us install a staff gauge, but again there may be someone at the lake who has the expertise to install one as well. It would just have to be measured off of the high water level at the dam so that's zero, and 12 inches down from that would be negative 1 (-1) foot. If you have a meter like that then that would work for us.

Q12. If there are no treatments can that spread more plants and cause more muck?

ANS. Yes. Ideally, with our treatments we are trying to stay on top of the problematic areas so they never really fill in to the point where they are fully covered. So if you're killing the plants before they reach their full biomass then you have less filling in at the end of the season.

Q13. Should the best management practice for managing the lake be any means that provides a good result and is natural?

ANS. Yes. I would say definitely. But again, for the reasons we're talking about, there are a lot of drawbacks to drawdowns when you compare it to a treatment. A treatment can be more targeted, it can be more selective in the areas and the species of plants you are targeting. So I think especially in your case, a treatment is going to be your best management practice.

Q14. Drawdowns have been effective in the past. Shouldn't they be continued?

ANS. Again, it is not as targeted, but it's been working for you guys in the past, so while I wouldn't have recommended for you to do it in the first place, but if it's something you want to continue with, it's something we can work around. It's not going to change the amount of product that we have to use, it's just going to change where that 20 to 40 percent of plant cover can go. Again, if you are going to kill plants in the coves and along the shoreline with a drawdown, we have to find somewhere else to preserve it. But when we do the treatment, the product is dosed basically at a certain parts per billion and that's regardless of the amount of plant material that's in a given acre or whatever size

area that we are treating. We do adjust it slightly if there is a ton of plants, but it is not really a huge difference.

Q15. DEEP recommended 1.19 meters for a shallow drawdown.

ANS. I'm not sure where that came from. If that was from one of the reports and they were actually talking about your lake, it seemed like the deepest spot that I could find in the lake anywhere was maybe 7 feet, and 1.19 meters is basically 4 feet, so that's more than half of the deep area is going to be gone. So I would say that that recommendation wouldn't really be a shallow drawdown, that's going to be more of a deep drawdown. But again, based upon what a map would show, what that's going to expose as sediment at 1.19 meters, that could be what you guys need or it could not, depending on the mapping.

Q16. Should we remove debris after treatment?

ANS. So again, we are killing plants, and they are becoming nutrients or muck in the lake, but to remove that would be extremely expensive. I'm not sure what the treatments are at the moment according to the contract, but the mechanical removal of that material after it's been killed would cost ten times (10X) more than the treatment itself.

Q17. Is the map that CAES (Connecticut Agriculture Experiment Station) did accurate enough?

ANS. Again, just looking at the lake bottom from the roadside, it doesn't really match the map. It might be good for fishing or just estimating where the deep areas are but it's really not accurate enough to make a management recommendation.

Q18. Other methods of control?

ANS. That would be something like suction harvesting or dredging. Dredging would be more like lowering the level of the lake and then using big machinery to pull out sediment and plants, which would be a big project. If you were going to do more targeted areas, that would be suction harvesting or suction dredging, which is basically like a vacuum that sucks up muck and debris and plants. It is also really expensive but it's something that you could probably do, like an individual homeowner would do in front of their house. It is not something you would want to do throughout the whole lake.

Q19. Is there harm if the lake is lowered and there is no freeze?

ANS. I would say no. But then you're getting all of the cons of doing the drawdown without getting any of the benefit, so that wouldn't be a good outcome of the drawdown if you're looking to kill plants

Q20. Somebody mentioned brown water after treatment.

ANS. Brown is generally a diatom, it's a brown algae. It's something that blooms naturally in a lot of different lakes. When you do a treatment you release some nutrients so it

could have been a contributing factor, but again, we treat very targeted areas. It's not like we're killing 50 percent of the vegetation in the lake, or treating the entire lake, which has been done by other people - that would definitely cause the water quality to go way down.

Q21. Someone asked about controlling muck.

ANS. Again, there's dredging, suction harvesting, I think we talked about aeration briefly. So without getting all the way into it, there's a good bacteria in the lake naturally that kind of "eats" organic material, so muck and dead plants etc. and it's limiting factor is oxygen. So if you can add more oxygen to the water, you can have more of this good bacteria, so you could effectively reduce the muck by adding aeration. For a system to aerate the whole lake - you guys aren't that large of a lake that it wouldn't be feasible. There are two different types of aeration. One is a diffused air system which looks like bubbles hitting the surface in a dozen or two locations throughout the lake, and the other is called a nanobubble system. There is a lot of information about both systems online if you search diffused air system or nanobubble system. The nanobubble system makes really tiny bubbles and it concentrates oxygen, and the bubbles are so small that they don't rise to the surface, they move throughout the whole lake, and you get that oxygenation effect with one unit and without all of the hardware of a diffused air system. The diffused air system has rubber lines running out to all these diffuser heads, and that's where you would see the bubbles coming off of these diffuser heads. It's generally not an issue having all that equipment in the water, but the installation for a nanobubbler system is much easier. If anyone has questions, we can talk about that at another time.

Q22. Does using chemicals or lowering cause more muck?

ANS. It's probably going to be about the same. The amount of nutrients in the lake is pretty finite, meaning whether nutrients become a plant and they're killed, or you don't allow a plant to grow because of the drawdown, the nutrients are still there. Something is going to grow. If it's not a plant, it's going to be algae. So as far as muck buildup, it's probably pretty similar.

Note: The remaining questions were from members attending the meeting:

Q23. The one question that I have is that when you said, just as a reference, the aerators, the two systems are what?

ANS. It's a diffused air system, which is older technology and there are a lot of lakes using that now, and then the other system is a nanobubble.

Q24. Just in the interest of clarity, I'm, wondering if you could distill the questions and answers down into a simple recommendation. If this was your decision to make solely, about the best method to deal with our lake on a limited budget, and the lake as you know it ecologically, what would be your recommendation?

ANS. If you guys didn't have it written into the bylaws to do a drawdown every other year, it wouldn't have been something that I would have recommended (for a freeze). But that's not to say it is a bad thing or you shouldn't be doing it. If you want to do it, we can work around it, but I would not have recommended it otherwise.

Q25. Our bylaws states that we're supposed to draw it down in October - it has no end date. The bylaw itself has no end date. And we can change the bylaw if it's recommended to do so. I mean if it seems like October is a little too soon or a little too late to do it just for working on shorelines and docks and whatnot. I mean, do you think that, and we've been doing it like mid-October.

ANS. If this is just for maintenance around the docks etc., October is great. There is still good weather in October. The animals have no problem moving at that point, they're not in hibernation mode in October. . .

And an end date for that would be . . . prior to doing any damage to any ecological whether reptile or amphibious whatever?

I would think mid-November, late November - you're not going to have a solid freeze by then in any given year, so I would say October and November, and bring it back up by December.

Q26. On the aeration systems, when you go and infuse the lake with the bubbles, will that bring the gases up and will there be an odor associated with doing such a treatment as that?

ANS. I have seen that with the diffused air system - the diffused air system is an air compressor that sits on shore and pumps air to the bottom of the pond in a number of locations - and when you first turn on a system like that there are a lot of gasses down there and it can release a lot of those, but it's not a long-term thing. Maybe on the order of a week or a couple of weeks, and then you shouldn't have that issue again. Gasses do build up in the bottom of a lake and when you disturb it you can release it.

Q27. And that's not a . . . you're saying that annually, you're going to have that gas smell or that gas and aroma at each . . . you don't run it 12 months out of the year I assume.

ANS. We normally run those April through October. I've noticed it (odor) on new installations the first time you turn it on. I don't usually notice it when you turn it on

seasonally. There could be a possibility of it, but I assume that it would be a lot less. The gasses build up after a long period of time, and after they are released, they don't build up to that same level before the next season begins.

Q28. As far as the depth of the lake, I know that you mentioned they used a string and weight previously. If you do the sonar way, will that measure into the sediment or does it stop at the muck? Does the sonar have a way of getting to the true depth of the lake?

ANS. If there is muck, there are a lot of degrees of muck. There is aqueous, watery muck that you can just brush away with your hand, and there is muck that you step in with your boot, and your boot doesn't come out. Sonar will read through that top little bit, but once it becomes actual substantial muck, it's going to read that as the bottom. We also get a reading of bottom hardness, so we should be able to see if there is a substantial portion that has a sandy bottom, or rocky bottom, that would come up on a map so a lot of times people will use that map to see where they want to dredge if they were dredging a whole lake. They could focus on where the bottom was really mucky.

Q29. That's what I was wondering if we have a way to determine what really our lake depth versus the muck and if it's really that much of a difference between how much is just leaves and debris - 'cause I know that from my own cover over here, I can see the sand and as soon as we raise the lake back up it looks like all muck to me, but I know that the sand is like right there.

ANS. There is a way that we can go and map the whole lake and we use a device to measure how deep the muck is, and then we can overlay that map onto the bottom hardness map. We can also come up with a depth map of the muck.

That would be more of a true amount of how much we're actually losing of the lake for muck versus where. . .cause we are a man-made lake, right Jay? (Yes) So I don't know what we have as far as a man-made lake depth from the start.

Q30. What benefit do you think that we had just from the previous drawdowns that were beneficial?

ANS. I think that it is really beneficial to be able to get into your beach area and around your dock, to pull out the leaves that have accumulated over the season or two. Just with a wheelbarrow and a shovel and rake you can do a lot of good in that first 5 or 10 feet from shore, especially if you're concerned with a swimming area or something like that. I think that's the biggest benefit you can get from drawing the lake down. Getting out there on a nice day and removing some of that muck yourself.

Q31. I think you're generally saying that just a small drawdown is beneficial maybe 10 to 15 feet from the shore so that everybody can rake it out. And then to have the scientific knowledge of a true mapping would be the most important thing so that you could make an accurate recommendation as to what we should do to the lake. Is that correct?

ANS. If you are just looking to do that maintenance drawdown, it may not be worth it to pay for a bathometric map and the muck sampling and things like that.

For the whole lake, a recommendation as far as the weeds and everything else, wouldn't you need to do an accurate mapping of the whole lake whether at times of drawdown and in times of whole lake?

If you are looking to do a drawdown to kill plants, then you want to know exactly how deep it is in each spot and have a gauge where you can reference i.e. if we draw down the lake 18 inches, we are going to expose these specific areas.

And with the lake at full depth too, you should know that too, what the accurate measurements are for the lake when it's full, right?

You would do the map when the lake is full, and get a full map of what exactly the lake looks like. But you get these contour lines where it will show a ring around the shoreline, where it is one foot deep, two feet deep, three feet deep etc. and you can reference that to your staff gauge and if you draw it down 24 inches, then you can measure that area between the 2-foot contour line and the shoreline and see exactly how big the area is that you are exposing when you draw it down.

And would you overlay those maps as to how to take care of the plant growth and the beaches and everything else as to keep the lake at the healthiest point? And that's the type of recommendation we would want, correct? With the chemicals and everything.

When we do a treatment, we're in the boat and we have the depth on our depth finder so we know how much product to put in, we can see where the plants are - again you aren't a huge lake - so we cover the whole thing looking while we are there and we treat where it needs to be treated. A map that shows the accurate bathymetry of the lake and a gauge would be helpful to manage the lake.

Q32. I may be a little thick here and not grasping everything, but if I picked up what you said, treating the lake on an annual basis, while it's helpful in some ways, it also contributes to the decaying plants and roots that then settle on the bottom and creates more muck. So I'm wondering if by doing this, which we have been doing because we like to have a clear lake and something that's nice to look at, is it in some ways counterproductive because in the long run what we're doing is decreasing the depth of the lake?

ANS. I think you cut out just a couple of words, and you were talking about doing the drawdown was having these effects?

No, I was talking about the chemicals. Whether it's chemicals or drawdown, I mean regardless of what method is utilized, if the end result is that it creates a situation where debris is dying and staying on the bottom of the lake, minus dredging or hydro raking which obviously we can't afford, are these efforts in the long run counterproductive to maintaining a certain depth of the lake?

Where muck is concerned, the worst possible case scenario would be to do nothing. If you don't do treatment, you don't do drawdown, you don't do anything, then you are going to have the most plant growth out of any of the scenarios, and then at the end of the year you have the most plant death, because it all dies in the winter. So any management option is going to be better concerning muck than not doing anything.

Q33. One question about fish. I was reading one of the DEEP reports and it said that if you have an overabundance of bluefish, blue gills, pan fish, whatever you want to call them, sunnies, that kind of throws off the bass population and growth.

ANS. What you are referring to is a stunted sunfish population. That is when you have too many small sunfish. I think that what you are getting at is if you were to draw the lake down and concentrate those, you could have the effect of killing off the excess blue gill and you could actually help things. The only way to know if that's an issue would be if the DEEP were to electro-fish the lake. That is something we could do as well, but the DEEP would likely do it for a lot cheaper because they are subsidized by the state, but they don't always do it for private lakes. If it were a public lake then they would definitely do it. It's something that I could talk to them about for you, or I could put you in touch with a fisheries biologist.

It just seems to me the years that I have been here that the sunfish population has been quite extensive over the past 40 years. And in reading that and saying, OK, if you draw down, you're gonna reduce the population of pan fish, sunnies, which allows bass to have more food.

Yes, so again, if that's an issue that's going on, then that would be likely a good way to help it resolve. But you can't go off of anecdotal situations like you were fishing and you caught a lot of fish and had a significant amount of fish that were bluegills every season for a long time - even that isn't good enough to make a management recommendation off of. You really want electro-fishing data. That's because you can compare it to other lakes in the state and see if the population you have is representative of what's in the state or is it an overabundance of that certain size class.

Q34. The nano-bubbler that you mentioned, the system that you mentioned with the tiny bubbles that don't come up to the surface. Did I hear you correctly that one system could be implemented for our lake?

ANS. Yes, I think the biggest unit can service a 60 acre lake (ours is 39 acres). I don't think you'd need the biggest system, but yes, you could theoretically just have a single unit that serves the whole lake. They're not a cheap product, especially because they are fairly new - they've only been on the market for a couple of years - but there is a lot of scientific evidence and reports that have been done on it showing the advantages of it. I think one of the main advantages is how compact the equipment is. It's one unit that sits on the shoreline with a pipe that goes into the water and a pipe that comes out. The diffused air system which is what used to be recommended for anyone who wanted aeration of a lake, you need a lot of tubing and you need to put compressors at several spots. It's the tubing that is really expensive in the diffused air system. If you have all the compressors at one location, say at where the boats launch on your lake in the north there, you need tubing that reaches the entire lake. So you really want the compressors located in several location, one at each corner of the lake, that way you only have short runs of tubing from each one out into the middle. It becomes a very complicated system quickly. Whereas the nano-bubbler is located in one location and has a pipe about 10 feet long - one that goes in and one that comes out.

Q35. Can you give us a ballpark figure of what a nano-bubbler system might cost for our lake?

ANS. I don't have the number off of the top of my head, but I would think in the \$50,000 to \$60,000 range. It is not a cheap piece of equipment. A diffused air system would probably be pretty similar even though it's a lot less technology but there is so much more tubing and things associated with it.

And what exactly would the benefit be if we were to invest in something like that for our little lake?

ANS. I didn't expect so many questions on aeration, but there are a ton of benefits that you can get from aeration. More oxygen means more invertebrates, which is the base of the food chain for fish, birds, etc. Again, that good bacteria that degrades muck at the bottom of the lake is limited by the amount of oxygen. Usually the thing that sells people the most if they are on the fence is the cost of dredging. To dredge a lake the size of yours might be \$500,000. If you put in an aeration system and you can eat away even a couple of inches, or a foot of muck - you really don't know how much unless you did a study of how much muck is there, you don't know what the end goal would actually be. But it's much less expensive to get rid of it that way than to dredge. There are less fish kills, although you don't seem to have much of an issue with that. The main nutrient that drives algae growth is phosphorus, and it's concentrated in the sediment, and when there is no oxygen down at the sediment/water interface, there is a chemical reaction that pulls phosphorus out of the sediment and up into the water. That usually happens in June, July

and August, and that's when people usually have algae and plant growth. If you add oxygen, you keep that phosphorus down in the sediment. The list goes on - it's really a great thing for lakes.

Q36. Summarizing, is it your opinion that it is OK to draw down the lake for maintenance every 2 years, but that you don't recommend drawing down the lake to freeze plants, but instead to stick with chemical treatments?

ANS. Yes. Again, you could be much more targeted with a treatment. I can treat in front of two houses and not affect something two more houses down. Where with the drawdown, if you have all the perfect scenario for a drawdown kill, you're going to kill all the shoreline all the way around and in the coves, which are the shallowest. If you had a perfect winter, you wouldn't have plants in any of those areas, and a lot of those areas are spots where you DO want plants. Again, the north cove comes to mind, and if you kill those plants with the drawdown, you have to make up that 20% to 40% somewhere else. So the worst case scenario, you do a drawdown and you kill a lot of plants in all these areas and you call us and say there are a lot of plants in front of my house and in the middle of the lake now and we want you to kill those too, that is something we wouldn't advise, because you are going to have a lot of issues if you kill a lot of plants.

Q37. It's not a question, it's just an FYI. Dale Fiore at Evergreen Cemetery has The Pond and Lake Connection treating his good-sized pond. He had told me that they have an aeration system there and he really likes it a lot. So if anyone has a question they can always ask Dale

ANS. He's actually my customer as well. We do very limited treatments there. He's got 3, maybe 4 now, fountains. So that's something that sits on the surface. It's a third type of aeration. It shoots water up into the air, and it's a little more geared towards the visual aspect of it, but you do get a lot of oxygen and circulation - you get all the same benefits. But we only treat right around the fountains so that they don't get clogged. They don't boat or do anything else on that pond. It's a different scenario, but I think he is really happy with the aerators, it's just a different style than what I'd recommend for you guys.

Q38. So I guess my biggest question would be you're stating that the way that it has been done in the past was more of a natural process but the chemicals would be better?

ANS. Again, you can be more targeted with a chemical treatment than you can with a drawdown. Some people are not fond of a chemical treatment because it is not a natural thing, but the products that we use in our industry especially are designed to be used in the water so they are safe for the fish and the birds, people swimming and drinking and all of that stuff. So while it is not a "natural" process, it is a better fix for the problem that you guys have.

Q39. If the bubbler system is so expensive and the fountains are not the way to go, is there something in between the two that might be worth looking into?

ANS. I'd have to run the numbers on the diffused air system versus the nano-bubbler. One of them is going to be cheaper, but I just don't know which one would be cheaper. One of those is going to be your in-between option, but just for reference, the fountains at the Evergreen cemetery are likely \$16,000 to \$20,000 each, and they are using 4 of them. He's probably invested as much into aeration of his little pond then we would suggest to do the entire lake.

Q40. I understand targeted areas and I understand keeping the vegetation or the weeds if you want to call them, in the coves where they're not a hindrance to everybody, then basically what you're saying is that chemicals are the only real options because if we draw down that's the first kill, the first kill is the border, the edges of the water if we get a deep freeze. The unfortunate part about this lake, and at least on south cove here and all the way out to almost the middle of the lake it's just almost as shallow there as it is on the edges. And one thing that we've always tried to do is get the weeds from the center, so basically I mean you are saying that if we draw down to a point where we can freeze the center of the lake on here on south cove, then we'll be drawing too much water down and we'll be targeting, not targeting just the center because we have to do the outside, it'll expose the outside perimeter as well.

ANS. Treatments aren't the only option but yes, if you are looking specifically at the south cove, it's a big shallow area. If you wanted to draw it down, enough to kill plants in the south cove it's going to also draw down along the entire shoreline and in the north and the west cove. So what you're asking for, killing plants just in the south cove and leaving them in the other places, the perfect thing to do exactly that would be a treatment, because we could kill them in the cove and leave them elsewhere.

Q41. My biggest pet peeve about this lake is the stumps in this lake, and I have taken quite a few out over the years, but the only way I can take them out of the center here is by a drawdown, because we have to let it freeze at least a little bit in order to even walk out there and get them and we still have to walk on pallets to do that, but they are fairly easy to uproot when we do do this. What I want to know again is what would be the, let's say two years from now we want to take some stumps out. How would you as The Lake and Pond Connection react to that in the spring, I mean we would have to have, what, we would have to have weeds in all the other places except for the center of south cove and the north cove.

ANS. It's something that we could work around if you guys had to do a big drawdown, or would like to do a big drawdown. We can work around it and we'll find other places to keep weeds, and not let them hit the surface maybe in the center. If it's a one-off thing, like you're going to go remove a bunch of stumps, we'll just work around it. If you're looking to

do that every other year, then that's a different thing then say maintenance just for stump removal.

Q42. How expensive is stump removal? If we don't lower the lake all the time, every year or every other year, and we keep the weeds in the south cove, north cove, and all the coves, isn't that beneficial to us and how much would it cost to remove the stumps? And how much damage would we do if we dropped down the lake low enough to remove all the stumps? Are we better off leaving it the way it is or are we better off drawing it down and removing the stumps cost wise and beneficial wise?

ANS. Something to remove stumps you'd want a piece of machinery like a hydro rake or basically an excavator that floats - something that has the power to pull something like that up and out. That's not something we have. Something that we've looked into that might be an option from us in the future, so if you'd like an estimate for something like that I can put you guys in contact with somebody that does have that machinery. But if you have the means to do it, and you can remove a good portion of them in a season, then all means you guys should do it.

Disposal costs?

Jay responded that the dump will take the stumps.

Q43. Over the years we've looked at the stumps and Dave Carlson went over to the west cove and removed a ton of them. When he tried to get into the south cove, he almost lost the back loader. He quit because there is so much muck there. It's almost impossible unless you're working from a boat or something like that. To go a little further with the conversation, as the Hidden Lake Committee chairman, we explored a lot of aspects, we drew this water down a lot. And one aspect when we were having the dam repaired, we had three years without water, and the freeze down was incredible, but every year the weeds came back. I would say to you, Nick, the best weed removal I have seen in this lake in 30 years. Thank you. I say the only way to go is to continue with that. And again, we talked about dredging, the problem with dredging - we did drill and we found out that there is nothing to sell, and we have no place to put the sediment. That is what we came up with. I just don't agree with drawdown period.

Q44. What about a diver with a water saw to go under the water and just take these stumps out, because to draw it down to get the stumps we're killing everything else in the lake. Would that be something we should look into? And there are companies that will come in and they will take all the stumps out, but we haven't seen it in Connecticut. I don't know if they would come to Connecticut. Do you dive Nick?

ANS. I don't personally, but we do work with a lot of other companies. There's a suction harvest company that we do a lot of collaborative work with, a dredging company. My boss Jeff has a lot of industry connections. So if you're looking for someone to give you an estimate on something like that, I can ask him and see what he knows.

Note: Jay stated that he built the "stump barge" to pull stumps, but there is a problem getting volunteers to help in the project.