Addendum to the Palmer Lake Restoration Plan

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This addendum addresses some specific questions raised by the Hill and Dale Property Owners, Inc. relative to the development of the Palmer Lake Restoration Plan.

The less experience options like the barrels of hay that DEC gave us weren't listed. Are those options?

The focus of the Restoration Plan was on measures that would directly reduce the amount of phosphorus in Palmer Lake in order to comply with the lake's TMDL. Many of the measures outlined in the draft DEC TMDL report are known to contribute toward improved water quality conditions but do not necessarily reduce phosphorus; the use of barley straw is one of them. Within the context of this addendum I assume the "barrels of hay" are in reference to barley straw. As the barley straw decomposes in the water it releases natural compounds that contribute toward reducing algal growth. Thus, while the use of barley straw may contribute toward improving the water quality of a lake or pond, it does not reduce the amount of phosphorus available for algal and plant growth. Again, this is why it was not considered in this Plan.

Based on our own project experience in using barley straw I have seen it work and I have seen it not work at all. In the cases where it worked, these were shallow, small ponds (< 1 to 3 acres in size) that did not frequently flush, particularly over the summer season. Where it has not worked is in waterbodies that have high flushing rates. Also, note that even in DEC's draft TMDL document it states that relative effectiveness is anecdotal. Essentially, it may or may not work, which is largely based on the application rate and the seasonal flushing rate of the waterbody; the effectiveness of the barley straw tends to be lower in wet growing seasons relative to dry growing seasons.

Mechanical harvesting was attempted in the past but not successful

I am not familiar with any past mechanical harvesting operations in Palmer Lake and I do not know how the term "successful" is defined. First, given the relatively shallow nature of Palmer Lake, the limited shoreline sites for the launching of a harvester and the deposition of harvested material, I can see some obvious limitations. Most conventional harvesters need at least 4 feet of water depth to operate so that may have been an issue.

Also, the relative success (how much plant biomass is removed) is based on harvesting rate, structure of the lake bottom, location of shoreline sites for deposition of harvested plant biomass and amount of funds allocated to the project. If the budget is limited to four days of operation but does not cover a specific area, it may be considered not successful by some but successful by others. The key is to establish targeted and prioritized locations for harvesting and goals relative to the amount of biomass (and thus phosphorus) that is removed. In addition, I do highly recommend harvesting since it does not require permits, will remove some phosphorus from the lake and will provide some immediate relief of nuisance conditions in selected areas of the lake.

There are several islands already in the lake but they are not floating islands. Could specialized vegetation be placed on the islands to help clean the lake up?

For any existing nature islands I would certainly recommend making sure that they are well stabilized and vegetated. Any exposed areas of soil should be stabilized with native vegetation. However, please keep in mind that natural island shoreline stabilization efforts may require State or local permits / approval. In addition, there is no specialized native vegetation that assimilates phosphorus at a higher rate relative to other species. The key is to have healthy and stable vegetation.

Relative to natural islands functioning as Floating Wetland Islands (FWIs), this is not the case. The FWIs operate more as "wetlands" than an "island." The high surface area of the plants and soils in a wetland provide a large and diverse habitat for a variety of microorganisms that assimilate and sequester pollutants, including phosphorus. This is why healthy wetlands are known to be net sinks for nutrients. The frayed, recycled plastic material in a FWI has an incredibly large surface area (one 250 square feet Island has approximately same surface area of 1 acre of wetlands), which harbors an incredibly high number of microorganisms that remove nutrients (including phosphorus) from the water column. Additionally, these Islands have been estimated to remove approximately 10 lbs of TP per year. It should also be noted that it is the microbes within the Island that remove the bulk of the phosphorus (80%) as oppose to the plants on top of the Island (that are estimated to remove 20%). However, we recommend planting native, healthy and attractive vegetation on the top of the Islands to maximize uptake rates.

Are there less expensive solutions that might also work?

Many of the recommended options are relatively expensive but they have been selected since they are well documented to reduce the amount of phosphorus in the water column. Many of the less expensive solutions (such as barley straw) are not effective all of the time and/or do not reduce available phosphorus. Others more small-scale actions can have collective efforts that can be quantified but will take some time to implement and may require permits. An example of this is the installation of rain gardens on private property to treat runoff and

remove phosphorus. If each person puts a rain garden onto their property (if they have the appropriate location and room), collectively this would reduce the annual phosphorus load and thus could be quantified. However, depending on site-specific conditions, local permits may or may not be required for the installation of rain gardens. Additionally, a specific soil mix is required for effective pollutant uptake and if the existing soils need to be augmented it increases the cost of installation.

Please note that the recommended measure that would remove the second largest amount of phosphorus on an annual based (17 lbs) is routine pump-outs of existing septic systems. From a watershed-wide perspective these actions are highly cost effective (approximately $150.00 spent every 3-5 years per resident, not including any additional maintenance or repair costs). Thus, routine pump-outs are a very low-cost solution on a watershed-wide basis. However, the implementation of this recommended measure must be community-wide in order to obtain the phosphorus reduction credit and some type of documentation will be required.