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AQUATIC VEGETATION CONTROL AND MANAGEMENT

August 29, 2014

Ms. Susan Parker
Town Administrator
Town of Sunset Beach
700 Sunset Beach Boulevard, North
Sunset Beach, NC 28468

Subject: Aquatic Vegetation Management for Twin Lakes
August 2014 Summary and Recommendation

Dear Ms. Parker:

As AquatiCO completes a year of management for the Twin Lakes water bodies, I wanted to describe our past activities, provide you a current assessment, and also offer recommendations for the coming months and year.

I'm sure you are aware of the levels of nuisance vegetation present a year ago, particularly in Twin Lakes East. Our focus from July through October of 2013 was in getting the lakes to a manageable maintenance level. This included aquatic herbicide applications, repair of the existing diffused air systems, and the introduction of grass carp as a supplemental tool to help keep submersed vegetation in check going into the next season. Routine inspections of the Twin Lakes aquatic systems were conducted and treatments were strategically implemented to maintain the desired integrity of the water resources. A management program, specifically designed to address the unique conditions in Twin Lakes East, was implemented early in 2014.

Initial laboratory testing through our partners at the SePRO Research and Technology Campus (*ISO 17025 certified laboratory*) characterized Twin Lakes East as having elevated levels of phosphorus (*eutrophic-hypereutrophic conditions*). Problematic levels of submersed vegetation were present. Additionally, nuisance types of potentially toxic cyanobacteria were identified.

Based on these conditions, a routine maintenance program was determined to be the best approach in managing these systems. This *'Pond Solution Program'* was designed specifically for these types of situations. Part of this program included a two-part application of Sonar One, a product used to control the nuisance submersed vegetation. Another underlying goal of this program was to start early in the season with lower amounts of an efficient product on a routine basis for algae management. This has been shown to be more effective in management than reactively addressing problems as they become severe. The base product in this program that helped in achieving results was SeClear®, which is the first and only USEPA registered Algaecide and Water Quality Enhancer.

SeClear provided us a multi-dimensional, holistic approach to algae management in Twin Lakes, with effective algaecidal activity (*i.e. curative*) and a formulation that removes phosphorus from the system (*i.e. preventative*). Field site evaluations of this product use have consistently shown: (1) Efficient copper use, which results in an increased algaecidal efficacy and lower product amount to maintain designated action thresholds, (2) decreased nuisance algae re-growth rates following treatment, and (3) an ability to maintain low densities of beneficial algae that support the food chain through the prevention of harmful algae. By directly controlling nuisance algae and removing the primary nutrient responsible for re-growth, long-term benefits to water quality can be measured. With decreased harmful algae densities there is less potential for negative impacts (*e.g. dissolved oxygen*

sag) following an algaecide treatment and less product required at the time of application for desired control. Additionally, the removal of phosphorus and shift in nutrient ratios can help retain more beneficial algae types (*e.g. diatoms and green algae*) for the support of desired organisms and fish populations.

Since SeClear works extremely well in this proactive manner, it was crucial to do routine applications before nuisance algae were readily visible. Despite what may seem to be the appearance of over-treatment, research has shown great efficiencies in controlling nuisance algae when they first begin to grow and are at lower densities/biomass. By using lower amounts of SeClear in this preventative approach, much less intense applications and product is typically required to control reactively since the algae is not allowed to get out of hand, resulting in significant benefits to aquatic systems.

The SeClear program provided positive results on Twin East and increased water clarity. Although there were numerous efficiencies of this program approach with SeClear, there were also some algae found in the population that it may not control as efficiently. Lyngbya arose with rapid growth rates in July. This is an extremely tough alga (*cyanobacterium*) that has been causing severe issues in numerous water resources throughout the country, especially the Southeast United States. Due to the tough nature of this alga, SeClear was not the ideal product for achieving control. The management program shifted to include strategic targeting of the Lyngbya with Captain® XTR, a product specifically designed for tough algae/cyanobacteria. Lyngbya can rapidly get out of control and take over an aquatic system, and is capable of producing multiple toxins (*neuro, liver, skin*) and taste/odor compounds. The late July laboratory analysis found Lyngbya to be overwhelmingly dominant in the Twin East samples. The management program in Twin Lakes East was consequently adapted to target this threat to the water resource.

Laboratory analyses on Twin Lakes West in July also revealed a concern. Multiple nuisance cyanobacteria (*Pseudanabaena, Cylindrospermopsis, Raphidiopsis*) were identified in the sample at extremely high levels. Collectively, these cyanobacteria are capable of producing numerous, potent toxins. In part, these toxins include microcystin, cylidrospermopsin, and anatoxin, all of which are on EPA's candidate contaminate list for impacting public health. Effective reactive solutions are available to target these nuisance algae. Additionally, phosphorus availability is often a driving factor supporting these nuisance algae types/densities. A proactive program, implemented to decrease available phosphorus would probably be recommended (*pending further laboratory analyses*) following control of these nuisance algae. This program, implementing the Phoslock product, would be intended provide longer-term benefit to both Twin Lakes water bodies.

Diffused air systems, such as those installed in Twin Lakes East, are generally placed in water bodies to help manage oxygen depletion symptoms, such as unusual odors, excessive algae, and fish kill risk. Their function is to provide additional aeration and circulation by drawing water from the pond bottom to the surface where atmospheric oxygen may be absorbed and transferred into the water column. Due to the shallow waters in this lake, these systems may not be as effective as other types of aerators. However, with proper placement they can still offer some level of benefit. Though the diffused air systems were repaired, there will continue to be maintenance needs for proper operation. A number of badly damaged parts were replaced. It is recommended that older air lines be replaced with weighted hoses, and that placement of diffuser heads be altered in a few locations. It is common and reasonable to have the diffused air system turned off during the cooler season as a cost savings measure.

Based on our observations over the past year, as well as the laboratory analyses performed on lake samples, it is expected the nuisance vegetation levels in the East Lake will return to summer 2013 levels if left unattended. As noted, recent samples also confirmed the presence of Lyngbya in the East Lake and Cyanobacteria in the West Lake, both of which have potential to present health risks to humans and wildlife.

Due to the rampant growth rates, and voracious potential of Lyngbya, it is not advisable to halt treatments at this time. It is not uncommon for this species to overtake water bodies, rendering them unusable. For the remainder of the year, we suggest regular algaecide treatments on the Lyngyba in Twin East. We also recommend implementing a specific SeClear maintenance program for Twin Lakes West if the cyanobacteria remain.

Additional laboratory analyses are suggested in the Fall to evaluate the impact of these management programs, adapt as necessary, and outline approaches to prevent these nuisance vegetation levels from recurring.

Given the current conditions in the East Lake, the following budget estimate is projected to cover anticipated treatments for maintenance of the through year end, the provision of Fall 2014 sampling and lab work for proper analysis in both water bodies, and the development of prescriptive measures for the coming year for the East and West Lakes:

- $2,193/month ($8,772 total from Sept – Dec 2014)
  - $2,520 Labor
  - $1,300 Sampling & Lab Analysis
  - $4,952 Materials (Herbicides)

If the nuisance vegetation observed in the West Lake persists, and you would like treatment during the remainder of the year, the total treatment projection, beginning in September, is as follows:

- $3,400 Materials (Herbicides)
- $1,650 Labor

Please contact me as you review this material with any questions. Also, my SePRO partners and I would be glad to arrange an information session to review in more detail our findings and recommendations if you wish.

Thank you for allowing AquatiCO to assist with your lake vegetation management needs.

Sincerely,

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Michael A. Norton
President, AquatiCO, Inc.