

Aquatic Habitat Enhancement and Ecological Improvement of Lakeshore Village

*Final Report of the Lakeshore Village Condominium Association (LSVCA)
in Fulfillment of the Requirements of the Comprehensive Conservation and Management Plan
of the Sarasota Bay Estuary Program*

May 14, 2019

Prepared by
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Past President of LSVCA and Aquatic Ecologist

As stated in our grant application, the goals of this Habitat Enhancement project are to (1) re-vitalize our dying lakes through a proactive planting of Florida-friendly plants within Floating Islands and within the Littoral Zone to provide habitat and refugia for aquatic fauna and to serve as a biofilter for chemical input, and (2) stabilize sections of banks where shoreline failure and soil loss are occurring. All of this is to obtain a level of ecological stability for the lakes of Lakeshore Village. LSVCA lakes are among the headwaters of the Phillippi Creek watershed and drainage from these lakes influence the quality of water flowing through the Red Bug Slough Aquatic Preserve and the Phillippi Creek watershed. This project is to re-vitalize the lakes to not only improve water quality in this system, but to develop a model approach that can be applied throughout the Sarasota Bay watershed to improve water quality of stormwater retention ponds, enhance fisheries habitat and refugia, and to develop a nursery area of consequence for freshwater fish assemblages. In addition, wildlife habitat will be improved to allow for nesting of shore birds and increase the diversity of bird populations that are important to the overall aquatic ecosystem connected to Mirror Lake where a major active rookery exists. This project addresses all three of the focus areas of the Sarasota Bay Estuary Program in the following way: (1) Stabilizing the shorelines of four lakes in the headwaters of the Phillippi Creek watershed and re-creating littoral shelves to restore lost habitat for nursery areas and refugia for fisheries and wildlife; (2) Adding vegetated biofilters on the stabilized banks, in floating islands, and in the littoral zones that will ameliorate storm runoff while contributing to an ecological improvement; and (3) developing a model for assessment of ecological sustainability that would be communicated to other entities and associations that face the same issues. With this in mind, the project objectives are four-fold: (1) Stabilize banks in certain areas from soil loss and to establish vegetated buffer zones or biofilters from runoff; (2) Re-establish lost littoral shelves and create nursery habitat as foundations of aquatic habitat enhancement for fish populations and shorebirds; (3) Plant appropriate Florida-friendly species in floating islands and the littoral zone to produce habitat, cover, and refugia and serve as biofilters for chemical input from storm drains and runoff. This in turn allows a substantial reduction of chemicals and nutrients to improve water quality in the upper reaches of the Phillippi Creek watershed; and (4) develop and test an assessment tool that can be used beyond this project and to convene specialized workshops to provide a technology transfer option for Sarasota County and other entities as there is interest.

Components of Project

There are essentially four major components of this project – (1) Buffer Zone along the perimeter of each lake, (2) Littoral Shelf creation in selected areas of each lake, (3) Aquatic Planting in the Littoral Zone, and (4) establishing Floating Wetlands to serve as an additional chemical assimilation mechanism and as a nursery for transplanting plants to other littoral areas. This grant pertains to component 4, that is to help with establishing our floating wetlands or islands. However, a summary of the full project is as follows:

1. Buffer Zones or Low Maintenance Zones

Our lakes are 30 years old and very mature. Over the years we have lost bank structure through a management system that encouraged mowing down to the lake margin. Effects were realized by both physical degradation from mechanical equipment and chemical runoff from managed lawns. As part of this project, a buffer zone was established around each of LSV's four lakes. This buffer zone consists of no mowing within a 4 ft-wide perimeter of each lake and allowing the grasses to grow to a height of 14-16 inches. This in turn has allowed the root systems to grow deeper in the soil and has greatly stabilized our banks, thus reducing further soil loss. See **Attachment 1**, which is a collection of three slides taken from a presentation made to the residents of Lakeshore Village.

2. Littoral Shelf Creation

The loss of any semblance of littoral zones in our lakes is substantial over our last 30-year period due to a management procedure that essentially was to remove any aquatic plants from our lakes. The re-establishment of these important zones required some innovative methods in this project. We elected to use geotextile tubing that were 5 feet wide and extended the length of the sections to be repaired. Bottom sediment from within the lake was pumped into the tubes which were anchored to the shore edge. Once completed, the filled bags were left to settle in until aquatic planting (Component 3) was accomplished. At this time, the geotextile tubes were maneuvered to provide a gentle slope of shallow water to form our new littoral shelves. **Attachment 2** provides an overview depth contour of the lakes and the identified sections of the littoral zones. **Attachment 3** is a collection of pictures showing the geotextile work. This phase of the project has been observed closely by Sarasota County because the technique may serve as a model for other associations with some age on them and which are facing the same issue of loss of littoral shelves. The existence of healthy littoral zones is critical to establishing ecological stability.

3. Aquatic Planting in the Littoral Zone

The aquatic planting required planning meetings and deliberation on the proper species. Our original proposal identified Arrowhead, Pickerel Weed, and Spikerush, and perhaps Cana, because of their general hardiness, Florida-friendly aspect, flowering for attracting butterflies and other pollinators, and their depth dependency to prevent too much spreading. However, the report of red spider mite infestation of pickerel weed caused some pause in whether we should proceed with this species. Our discussions included a couple of alternates such as Soft Stem Bulrush and White-Water Lily. See **Attachment 4** for pictures of the plants considered. The

decision was to go with the original species selection (Arrowhead, Pickerel Weed, Spikerush) for our littoral zone planting because there was a measure of uncertainty of how prevalent the spider mite infestation was in this area. Over 6,000 plants were planted in the littoral zones as illustrated in **Attachment 2**. Volunteers provided labor support to the vendor to accomplish the aquatic planting. See **Attachment 5** for pictures of the planting effort on the littoral shelves.

4. Floating Wetlands

Floating wetlands or islands are a relatively recent development for association lakes that were designed as retention ponds and are now being conserved as more robust ecological systems. While the islands don't cover much area within a lake, they serve an important purpose of providing a hydroponic system to assimilate chemicals, provide refugia for aquatic life, and essentially offer an in-lake nursery function for plant replenishment in the littoral zones. To establish a baseline on the chemical status of the lakes, we joined the Florida LAKEWATCH program and have been collecting data for the past two years (**Attachment 6**). The baseline indicates that our lakes are generally hypereutrophic and impaired. As we track the water quality over the next year or so, we hope to see an improvement due to both the floating wetlands and the aquatic plantings in the littoral zone.

We installed five islands in our four lakes – one each in Osprey, Heron, and Egret Lakes, and two larger islands in our largest lake, Cormorant Lake. Our floating wetlands went through two phases. In the first phase of development, a fish barrier was attached to retard the tilapia from harvesting the roots of our young plants. We found this barrier was too flimsy and ineffective. We used a tilapia harvester to come in and attempt to reduce the overall population of the tilapia and we also attached a stronger barrier to each of the islands. We replanted the floating wetlands with new plants, which are doing well at this time. **Attachment 7** illustrates the wetland creation process and associated aquatic planting.

Community Benefits Achieved

The greatest benefit of this project was the educational development of our residents in both associations we have here in this community. Through the several workshops held whereby we discussed the project purpose, goals, process, and outcome, and our Lake Teams which engaged residents in various phases of the project, we now have a residential community in full appreciation of why we must maintain ecological stability in our waterbodies. We logged 265 volunteer hours over the various phases of this project, not including the time spent to prepare the final report. Two special features of our workshops were to have Ann Paul, Regional Director of Florida Audubon, and several representatives of Sarasota County Environmental Department in attendance and participating in the discussion. These two aspects greatly affected how our residents embraced this project.

With the final completion of the aquatic planting in the floating wetlands and various sectors of the littoral zone in each lake and the buffer zone established around the perimeter of each lake, we believe the ecological benefit of assimilating the chemical runoff and curtailing its contribution to the Phillippi Creek watershed has been achieved to a great extent. Our continuation in collecting water samples and participating in the Florida LAKEWATCH

program will provide us with data to support this belief. As we proceed with more aquatic planting via transfer from the islands, we believe our water quality will continue to improve.

The benefit of establishing buffer zones along the perimeter of each lake which are low or no maintenance has been realized in stabilizing our bank structure and hardening the soil beneath to prevent soil loss. We have experimented with wildflower plantings in the buffer zone and are discussing ground cover alternates to the grass buffer zone. However, the acceptance by the community for these grassy and sometimes weedy zones has been admirable.

Our draft Habitat Assessment Protocol presented in the proposal is picking up traction within Sarasota County and the Florida Water Extension. We hope to further test this protocol to include other association lakes as well as those we might consider as reference lakes in an attempt to obtain regional reference conditions. The use of this protocol will enhance the ability of other associations to prioritize their restoration efforts and to document condition.

Invoices Relevant to the Sarasota Estuary Grant Program

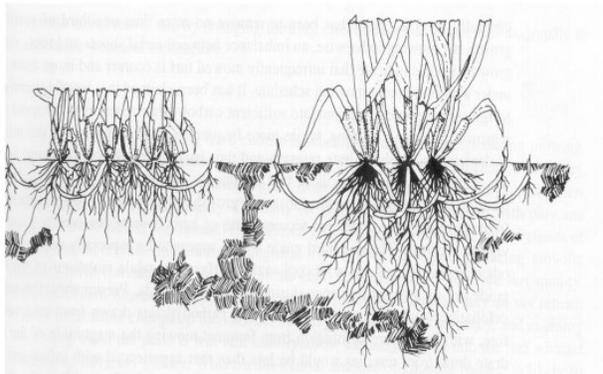
Attachment 8 includes two invoices for the Floating Island creation for Lakeshore Village Condominium Community (Component 4 of Project). The first invoice is from Beautiful Ponds for \$15,540 for the initial island construction and planting, and from Beemats for \$2,688 when replanting was required. A total of \$18,228 was invoiced for Component 4 of the project. The grant award from Sarasota Bay Estuary Program is \$2,300.

Shoreline Erosion Progression



Attachment 1:
Progression of bank stabilization issues and correction through buffer zones. Slides taken from workshop presentation to residents of Lakeshore Village.

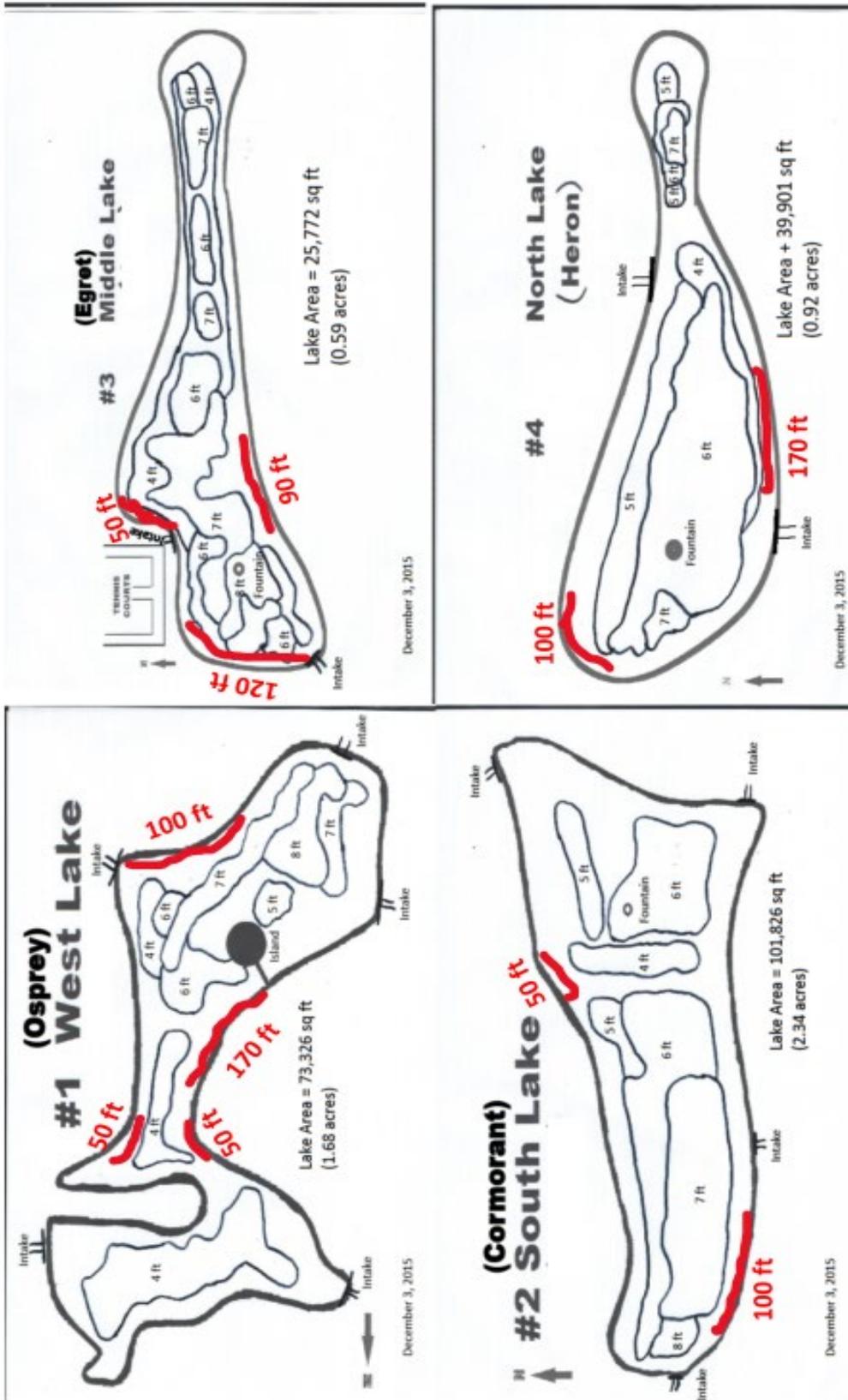
Influence of Plant Height on Plant Health



Example of our Buffer Zone here at LSV



Attachment 2: Profiles of LSVCA lakes and sections identified for littoral shelf creation.



Attachment 3: Illustration of using Geotextile Tubing to sequester sediment from the lake and to form littoral shelves in lakes that had severe loss of the littoral zone.



Filling the Geotextile Bags



Placing the Bags in the Water



Attachment 4: Pictures of Aquatic Plants for LSVCA's Littoral Zone

Keystone Aquatic Plants for
our Littoral Shelves



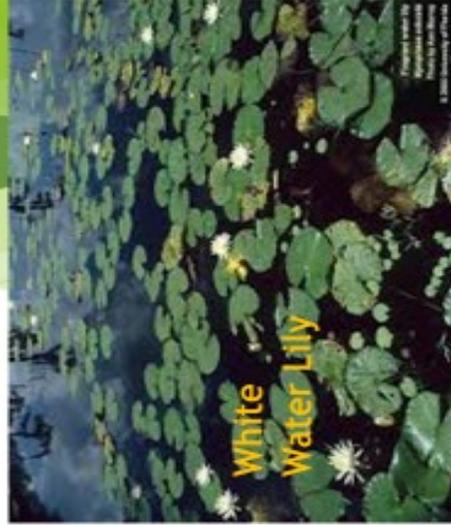
Spikerush



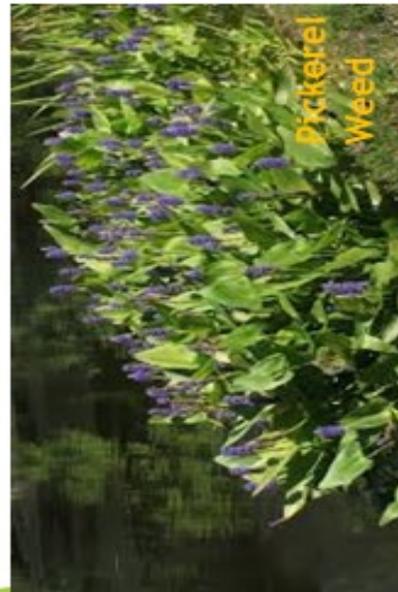
Soft Stem
Bulrush



Arrowhead



White
Water Lily



Pickerel
Weed

Attachment 5: Aquatic Planting in the Littoral Zone



(Attachment 6) LAKESHORE VILLAGE
Water Quality Results for Egret Lake and Cormorant Lake
Multiple Samples taken: December 11, 2017 – December 5, 2018

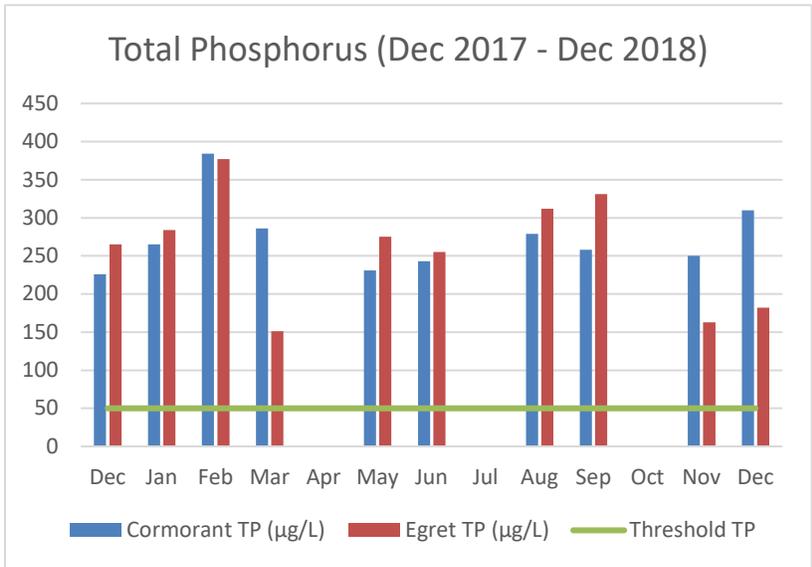


As we strive to improve the water quality of our lakes at Lakeshore Village, we are taking monthly water samples in two of our lakes for Florida LAKEWATCH. Presented here are our water quality data, which emphasize results for phosphorus, nitrogen, chlorophyll, and water clarity. These four parameters are regarded as the best suite of indicators of overall water quality.

Our lakes are in the Southwest Florida Flatlands Region, which are typically eutrophic (*rich in organic and mineral nutrients*) and having dark colored water. Florida LAKEWATCH compares our results to regional lakes with similar physiography, geology, soils, hydrology, water chemistry and vegetative climate.

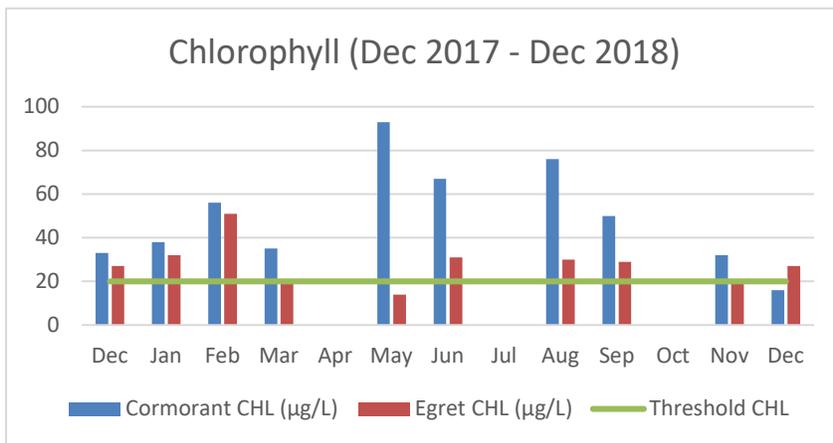
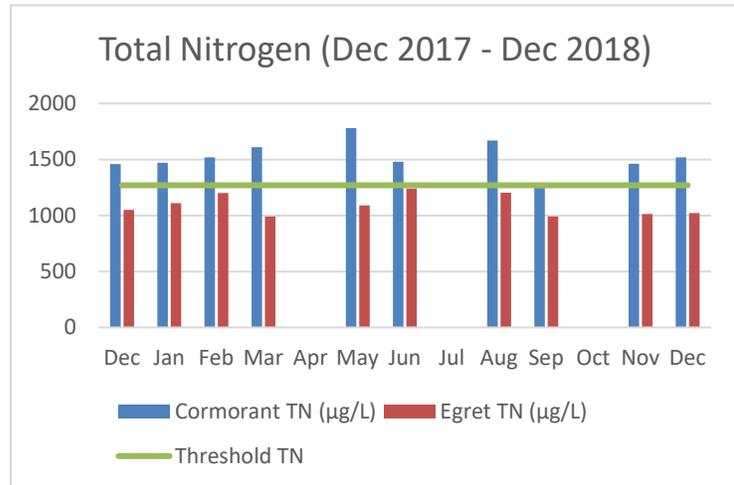
As representatives of our four lakes, only Egret Lake and Cormorant Lake are being sampled. Interpretation of the data are made to the Florida Department of Environmental Protection’s (FDEP) Nutrient Criteria for lakes. Applicable interpretations for Total Phosphorus and Total Nitrogen are used to assess impairment based on the nutrient criteria. The table below summarizes the average value from December 2017 through December 2018.

Lake:	Egret		Cormorant	
Phosphorus	250 µg/L	Exceeds Criteria	250 µg/L	Exceeds Criteria
Nitrogen	1049 µg/L	Below Criteria	1481 µg/L	Exceeds Criteria
Chlorophyll	27 µg/L	Exceeds Criteria	39 µg/L	Exceeds Criteria
Water Clarity	2.5 ft	Less than Desired	2.2 ft	Less than Desired



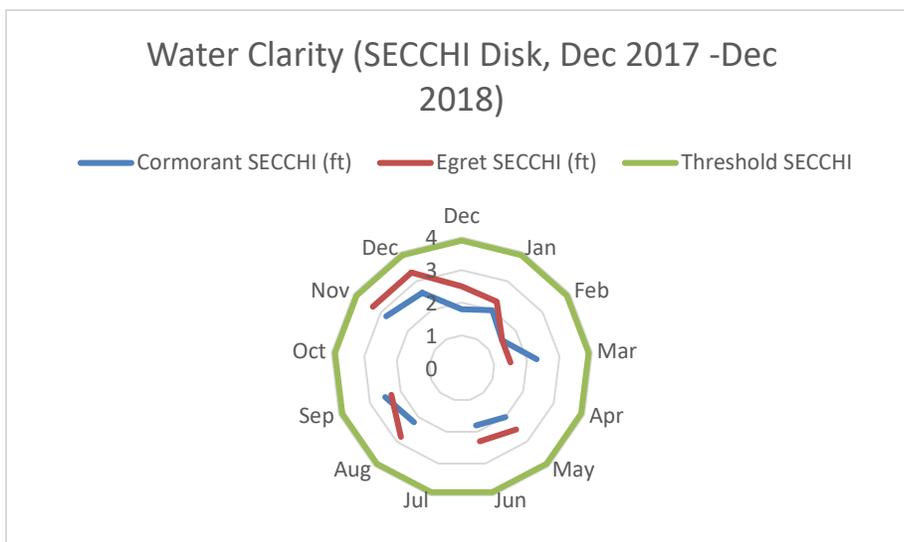
Elevated levels of **phosphorus** can cause shifts in water quality balance and is the most common cause of undesirable growth of aquatic weeds and algae. Lawn and landscape fertilizer runoff are another major source of phosphorus in lakes. Both Cormorant and Egret Lakes exceed the nutrient criteria.

Nitrogen can promote plant and algae growth when combined with phosphorus. Nitrogen levels should remain in the low range to maintain a healthy lake system. While Cormorant exceeds the criteria, Egret is below but approaches the threshold.



Chlorophyll a is measured to estimate the level of eutrophication in lakes, evident by the amount of phytoplankton present. Chlorophyll a, one of the green pigments involved in photosynthesis, is indicative of algal concentrations and of nutrient enrichment. Excessive phytoplankton concentrations, as indicated by high levels of Chlorophyll

a, cause adverse impacts on dissolved oxygen levels due to biological oxygen demand as plant life decays. Both lakes have high levels of Chlorophyll, but more so in Cormorant Lake.



Secchi depth is a mechanical test to judge the **depth of clarity** of a body of water. Generally, nutrient rich lakes tend to have Secchi depths less than 8 feet and highly enriched sites less than 3 feet. However, many lakes are exceptions to this rule based on other parameters, and Secchi in isolation cannot

always diagnose a lake's overall health. Cormorant and Egret Lakes have water clarity less than desired.

Explanation of Nutrient Criteria in Relation to Lake Classification:

The numeric nutrient criteria for Florida require that lakes must first be grouped into three groups based on color and alkalinity or specific conductance. They are (1) Colored Lakes, (2) Clear Hard Water Lakes, and (3) Clear Soft Water Lakes. The lakes in Lakeshore Village are classified as Colored Lakes. The specific criteria or thresholds for Colored Lakes and to which the water quality data from Cormorant and Egret Lakes are compared are as follows:

- Total Phosphorus = 50 µg/L
- Total Nitrogen = 1270 µg/L
- Chlorophyll = 20 µg/L
- Water Clarity = >3.9 ft

The table presents the values obtained from a geometric mean of all values (used to offset skewed values such as a storm event) of each lake over the full time period. The graphs provide the monthly data to observe trends over time.

Attachment 7: Planting of the Islands with Red Bent Grass, Seashore Paspalum, Arrowhead, Pickerel Weed, Cana, and some Blue Iris



Beautiful Ponds
140 Triple Diamond Blvd. Suite G
Nokomis FL 34275
(941) 488-1942

P.O. No.

Invoice No.	6250
Date	8/9/2018
Terms	Due on receipt

Lakeshore Villages C.A.
6051 Wilshire Blvd.
Sarasota, FL 34238

Attachment 8: Invoices from
Beautiful Ponds and
Beemats for Floating Islands

Service Date	Service Description	Qty	Amount	Balance
5/23/2018	Floating Islands (3 - 224 sq ft. 2 - 512 sq ft.) (additional fish barriers)	0.5	15,540.00	7,770.00

Balance Due

\$7,770.00

Beemats LLC
 3637 State Road 44
 New Smyrna Beach, FL 32168
 P-386-428-8578



Invoice

Date	Invoice #
5/1/2019	13-720

Lakeshore Village Condo Association
 6051 Wilshire Boulevard
 Sarasota, FL 34238

P.O. Number	Terms
BEE001	Net 10

Quantity	Description	Price Each	Delivery Date	Amount
672	-Sq. Ft. - Floating Wetland Restoration @ Includes: Retrieval, Harvest, Repair, Replanting and Re-Anchoring of the Floating Wetlands Islands. * 3 islands @ 224 sq. ft. each = 672 sq. ft. * NET 10 SIGN _____ _____ DATE _____ _____	4.00		2,688.00
Payments/Credits				\$0.00
Total				\$2,688.00

Email: beemats@gmail.com

Web Site: www.beemats.com

Balance Due	\$2,688.00
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