

**FINAL**

**HARRIS CHAIN OF LAKES RESTORATION COUNCIL**

**SITE VISIT SUMMARY**

**of the**

**LAKE APOPKA MARSH FLOW-WAY – PHASE I**

**March 5, 2004**

The regular meeting of the Harris Chain of Lakes Restoration Council (Council) was cancelled due to the site visit to the Lake Apopka Marsh Flow-way Project. Council members met at the staging area for the site visit at 11:00AM on 3/5/04.

**Members Present**

Hugh (Dave) II, Chairman  
Skip Goerner, Vice Chairman  
Thomas A. Cook, MD, Secretary  
Charles C. Clark  
Keith Farner  
Robert Kaiser  
Don Nicholson  
Rick Powers

**Member Not Present**

W. Thomas Brooks

The St. Johns River Water Management District (District) hosted a site visit to the Lake Apopka Marsh Flow-way Project on 3/5/04. They began operation of Phase I of the flow-way in November 2003, after years of study and redesign.

Phase I of the flow-way includes 660 acres of former agricultural land that was purchased by the District for construction of this project and to better manage the nutrients that had previously flowed from that land into area water bodies. Water from Lake Apopka enters the flow-way via ten 60" corrugated metal culverts at the south end of the project. Flow is controlled by adjustable plates at each of the culverts and flows via gravity. The land used for the flow-way has experienced approximately 4' of subsidence due to the former agricultural operations at the site, which facilitates the gravity flow into the system. The flow-way is designed with four independently operating cells that each receives untreated water from Lake Apopka via four culverts. The four culverts not only allow for better control of flow into and out of the cells, it also helps to prevent channeling of water flowing through the cells in a "stream-like" manner. Suspended solids removal efficiency is also improved by sending the flow perpendicular to the historic rows where crops were once grown.

The water flows west to east across the cells where it enters separate canals for discharge into the Apopka – Beauclair Canal. After approximately two days of residence time in the cells, the “treated” water flows into a canal which discharges into a temporary holding pond where it is then pumped into the Apopka – Beauclair Canal, via three 50 cubic feet per second (cfs) electric pumps. During modifications to the pumping system it was determined that converting the former diesel powered agricultural pumps to electric, would reduce operating costs and liabilities. Additionally, the District installed a 37.5 cfs electric pump to serve as backup to the four primary pumps. During normal operations at this pumping station approximately 150 – 160 cfs are being pumped into the canal and of that, approximately 12 cfs or 7.5% is released to the Harris Chain of Lakes. The remaining water is sent back to Lake Apopka which will add to the other lake restoration efforts being conducted on that lake.

The system operates by slowing the flow of water from Lake Apopka which is very turbid and contains large quantities of suspended solids. As the water passes through vegetation in the cells, it is slowed which allows suspended solids including nitrogen and phosphorus, the targeted nutrient, to settle to the bottom of the cell. The District estimates that the suspended solids will accumulate in the cells at a rate of 1 centimeter (cm) or approximately 0.4” per month and that the water level in the cells will be periodically drawn down to allow for compaction of the settled solids. Based on these estimations, the District believes that the flow-way should be able to operate for approximately 50 years before major removal of sediments would be required.

Removal efficiencies for the flow-way have been very good. Since Phase I operation begun in November 2003, the system has produced a 99% efficiency in the removal of Total Suspended Solids (TSS). Included in this efficiency is the removal of 37% of the Total Nitrogen (TN) and 10% removal of Total Phosphorus (TP). As the District continues to fine tune the performance of the flow-way, they have a goal to reduce TP by 30%. However, initial operations of the flow-way produced a substantial increase in the discharge of TP due to phosphorus-rich soils at the site during start-up of the system. The District estimates that this initial discharge of phosphorus amounted to 1% of the total annual discharge formerly discharged to the Harris Chain of Lakes through the Apopka-Beauclair Canal. The improved removal of phosphorus in the flow-way is estimated to have produced a net decrease in phosphorus that has been discharged to the lakes, when compared to previous years due to agricultural operations.

A demonstration was also made to compare the clarity of the pre-treatment and post-treatment water. A laboratory flask was filled at the point where water enters the flow-way and a second flask was collected from the canal just prior to being discharged into the holding pond. There was a stark difference in the turbidity or cloudiness of the untreated water as compared to the clarity of the treated water, which appeared very clear with a little yellowish color due to the tannins in the water.

District personnel also discussed the success they have had with the reduction of phosphorus in Lake Apopka. They accredited this to the purchase and better management

of agricultural lands along the shore of the lake and also from the successful gizzard shad harvests that they have conducted. They stated that in the past 18 months, approximately 2 million pounds of the shad had been removed from the lake. It was explained that the shad are bottom feeding fish that stir up phosphorus-rich sediments which resuspends the phosphorus. Additionally, they eat the phosphorus which is in the sediments then excrete phosphorus with greater bioavailability to the water column and lake. The gizzard shad are considered to be “phosphorus pumps” when it comes to cycling nutrients in lakes. Based on these two management practices, Lake Apopka has seen recent phosphorus concentrations in the 60 ppb range which is a significant improvement over the historic highs in the 300 ppb range.

The tour of the site was conducted via four buses to ferry the site visit attendees through the project area. Each of the buses had a minimum of two District personnel who were knowledgeable of the project operations and were able to provide information to the people on their bus. Upon completion of the tour, lunch and refreshments were provided under a tent while various officials gave brief congratulatory speeches on the flow-way’s success.