

**FINAL**

**MINUTES OF THE MEETING  
of the  
HARRIS CHAIN OF LAKES RESTORATION COUNCIL**

**April 7, 2006**

The April meeting of the Harris Chain of Lakes Restoration Council (Council) was held at 9:00 AM on April 7, 2006 at the Lake County Board of County Commissioners' Chambers, 315 West Main Street, Tavares, Florida.

**Members Present**

**Members Absent**

Skip Goerner, Chairman  
Hugh (Dave) Davis II, Vice Chairman  
Rick Powers, P.G., Secretary  
Keith Farner  
Robert Kaiser, P.E.  
Don Nicholson  
Richard Royal  
Edward M. Schlein, M.D.  
Ted Woodrell

**1. CALL TO ORDER**

Chairman Skip Goerner called the meeting to order at 9:00 AM.

**2. INVOCATION AND PLEDGE OF ALLEGIANCE**

The Invocation was given by Councilman Bob Kaiser, followed by the Pledge of Allegiance. Chairman Goerner also gave a brief memorial for former Council member Dr. Thomas Cook, who had recently passed away.

**3. ROLL CALL**

Chairman Goerner called roll. All Council members were present.

**4. APPROVAL OF MINUTES**

A call was made for discussion of the minutes from the February 3, 2006 meeting. No comments or edits were suggested. A vote to approve the February meeting minutes passed unanimously. A brief discussion of the March 3, 2006 Council Site Visit Summary was held. Chairman Goerner said that they had a good tour of Lowrie Brown and Lake

Griffin canal dredging sites. He also thanked Gene Caputo of the St. Johns River Water Management District (SJRWMD) for the lunch they provided.

Chairman Goerner said that Patrick Hunter (Recording Secretary to the Council) did a good job preparing the site visit summary.

A vote to approve the March Site Visit Summary passed unanimously.

## **5. DISCUSSION ITEMS**

### Quarterly Budget Report, 1<sup>st</sup> Quarter FY05-06 – Ted Woodrell

Councilman Ted Woodrell briefly presented the 1<sup>st</sup> Quarter Budget Report – Fiscal Year 2005-2006. He explained that as of December 31, 2005 from the \$50,000 annual operating budget the expenditures and encumbrances were \$28,482.73, leaving a balance of \$21,517.27 of which \$18,747.00 is obligated for consulting and University of Florida (UF) services. The Council approved of the budget as presented.

Mr. Caputo suggested that the Council may want to formally request a continued budgetary contribution from the SJRWMD. He explained that although the request was alluded to in the Council's Legislative Funding Request, the Council should move for a formal request. Mr. Caputo suggested a similar action to receive continued funding from the Lake County Water Authority (LCWA).

Chairman Goerner called for a motion to formally request continued funding from the SJRWMD. The motion was made to request a minimum of \$10,000 in continued funding from the SJRWMD. The motion was seconded and without further discussion, passed by unanimous vote.

Similarly, Chairman Goerner called for a motion to formally request continued funding from the LCWA. The motion was made that the Council formally request a minimum of \$40,000 in continued funding from the LCWA. The motion was seconded and without further discussion, passed by unanimous vote.

Councilman Kaiser asked if the Council should request funding from Lake County. Chairman Goerner said that in the past they have not, but perhaps the Council could request "in kind" funding from the County in the future.

### Status of Burrell Lock and Dam on Haynes Creek

Chairman Goerner discussed flow through the Burrell spillway saying that he had requested and received the record of flow from the SJRWMD for 1997 to present at the spillway, which he said he had not yet had the opportunity to review. However, he did review flow data from the United States Geological Survey (USGS) which indicated that during the period of December 1997 to April 1998 there was flow on the order of 1,600 cubic feet per second (cfs). Chairman Goerner said that although the large majority of the

time there are minimum flows through the structure, the maximum flows would create a whirlpool which could cause erosion in the vicinity of the structure.

Chairman Goerner also discussed peak flows through the spillway during the 2004 and 2005 hurricane seasons saying that in September 2004 there were flows of up to 1,300 cfs and the same was true for periods in 2005. Again he said that although these peak flows are not the norm, extended peak flows may have caused damage near the spillway, in his opinion.

Councilman Rick Powers said that the peak flows are something that the spillway is designed for and not unexpected. He believes that the responsibility of maintaining seawalls in the vicinity of the spillway should be that of the property owners, not the SJRWMD.

Councilman Keith Farner suggested that perhaps the Council should review as to whether the Burrell spillway was properly build to the original plans. He said there may be questions as to the proper installation of rip rap downstream of the structure.

Chairman Goerner said that it was his understanding the design for peak flows through the spillway were for flows in the 1,200 cfs range and at times the flows are greater.

Councilman Ed Schlein said that over time a large sandbar has accumulated just downstream of the spillway and this sandbar causes eddy currents which affect the properties to the north of the structure, he believes that perhaps proper maintenance to remove the sandbar may have not been completed.

Councilman Kaiser explained that in any large engineering project there are two things taken into account; the economy of scale and the economy of budget. The design probably took into consideration that historically peak flows were 1,000 – 1,200 cfs, but it may not have been economically feasible to design for flows seen during the 1997/98 discharge event.

Councilman Kaiser also said that large discharge events are rare and may only occur once in many years. He added that erosion near the spillway is a normal thing and it would be difficult to determine what, if any additional erosion may have been caused by the peak discharges.

A review and discussion was then held on the “Master Plan of Burrell Lock and Dam; July 30, 1976” provided by the SJRWMD. Vice (V.) Chairman Dave Davis noted that within the recommendations for corrective actions, specific design criteria for the installation of rip rap are provided. Chairman Goerner said that it was his understanding that sufficient rip rap was not available and therefore not installed as designed.

Councilman Richard Royal asked Councilman Kaiser if the recommendations made in the plans had been properly followed, would that have solved the problems of sandbar

formation and nearby erosion. Councilman Kaiser said that this is a matter outside the purview of his expertise in engineering and perhaps the Council should consider obtaining the opinion of someone more knowledgeable of these issues.

V. Chairman Davis also noted that in Plate-3 of the plans, the property immediately north of the spillway is depicted as having two fishing piers [docks] and he was curious as to whether the seawall was present at that property at the time of spillway modifications.

Councilman Royal asked if the seawall under review was designed to take into account the water that would be discharged from the spillway.

V. Chairman Davis asked if the fishing piers shown on Plate-3 of the plans are the same structures that were present prior to the spillway modifications. Richard Howley, owner of Spillway Park in Lisbon, Florida adjacent to the Burrell Lock and Dam said no and that the structures were all built on his property after the spillway modifications.

Councilman Farner made a motion that the Council hire a Civil Engineer to review this matter further and that the Council be provided an opinion of liability from the SJRWMD. No second was made to the motion.

Chairman Goerner suggested that the Council should also review any efforts made by the SJRWMD to remove the sandbar at the spillway discharge point.

Councilman Schlein noted that the pictures on Page 18 of the plans clearly show the undermining of the spillway structure in 1973 and thought it would be beneficial for the Council to review any available information of the repairs made to that area.

Mr. Howley explained that his seawall was constructed in 1984 after the modifications were made to the spillway. He went on to explain that he recently inspected the footers of his seawall and found gaps between the footers and creek bed which he believes were caused by the spillway.

Councilman Powers suggested that the cost of hiring a Hydraulics Engineer to render an opinion to the Council may far exceed the actual cost of repairs. He asked if Mr. Howley had an estimate for the cost of repairs. Mr. Howley said that he did not.

Councilman Farner agreed with Councilman Powers and withdrew his previous motion.

Councilman Royal made a motion that the Council make a decision on the matter after receiving and discussing a written opinion of recommended cause and repairs rendered by the SJRWMD and the cost estimate provided by Mr. Howley. The motion was seconded and after additional discussion, was passed by unanimous vote.

Councilman Don Nicholson asked if there were a permit issued for the construction of the original seawall that might still be available and if it would be prudent for the Council to

request the permit. He explained that Mr. Howley may have submitted a set of plans with the application.

Chairman Goerner agreed.

Harvester Purchase and Status of Funding Transfer from the SJRWMD to the LCWA

Chairman Goerner reminded the Council that there are funds available from their Legislative request which could be used for the purchase of a mechanical harvester that could help manage weeds in the canals and around the lakes. He asked that Mike Perry of the LCWA provide information on the status of the funds from the Council's Legislative Request.

Mr. Perry explained that of the \$1.3 million from their Legislative funding, \$1.0 million has been transferred from the SJRWMD to the LCWA to assist with the Lake Griffin access canal dredging. With respect to the remaining \$300,000, the LCWA has submitted a scope of services to Dave Walker of the SJRWMD for the other projects recommended by the Council. He said that Mr. Walker is in the process of reviewing that scope.

Chairman Goerner asked if the Council is required to request the transfer of the \$300,000 to the LCWA. Mr. Perry said no because Mr. Walker understands the desire of the Council for the transfer of the funds. Chairman Goerner asked if the Council were to decide on the purchase of a harvester, would they be required to take any action. Mr. Perry said that the scope of services submitted to the SJRWMD would need to be amended to reflect any changes in the expenditures.

Chairman Goerner then discussed the possible purchase of a harvester saying he had received information on used harvesters from Aquarius Systems in North Prairie, Wisconsin. He said that they are well known in the industry and offer used harvesters starting at under \$10,000. He went on to say that he has operated the older model of harvester which is maintained and used by Florida LakeWatch and that it works very well for removal of hydrilla.

Councilman Kaiser asked about the cost of maintenance for a harvester. Chairman Goerner said that the maintenance should be minimal and explained that in his many hours of operation of the LakeWatch harvester, he may have spent \$25 in repairs.

Councilmen Farner and Powers both questioned whether there was a public entity available that would take responsibility for the harvester.

Mr. Perry said that the LCWA contracts harvester for approximately \$15,000 annually and because of the limited amount of mechanical harvesting they conduct, the cost and logistics of purchasing one makes it non-viable for them. He added that mechanical harvesters are non-selective and remove all plant material and any associated animal life in its path.

Mr. Perry also mentioned another type of harvester which operates via suction and one benefit of those is that they not only remove the plants, but also the root stock of the plants so revegetation is much slower.

Councilman Royal asked Mr. Perry if there were citizens who required harvesting in their canals, could the LCWA provide a fee schedule for those services from the harvester contractor they use. He also asked if he knew of any companies in the aquatic plant control business that would be willing to shift their focus from herbicide application to mechanical harvesting if they were subsidized by the LCWA.

Mr. Perry explained that if the LCWA considered implementing a fee schedule, that would put them in the position of competing with private businesses which they are not inclined to do. He also explained that companies who perform mechanical harvesting would require larger contracts for the work to be economically feasible.

Chairman Goerner suggested that the funds could be transferred to the UF or LakeWatch to operate the harvester.

Dr. Dan Canfield of the UF and member of the Technical Advisory Group (TAG) to the Council said that if a harvester were purchased for use on the Harris Chain of Lakes and it could be stored at a local public facility, that LakeWatch personnel would be willing to operate and maintain it. He cautioned that it could not be used to manage vegetation on entire lakes but rather small areas like canals. Dr. Canfield also said that it would be the responsibility of the Council to resolve any issues involving the granted access to private property for operation of the harvester.

Councilman Farner said that if a public agency would accept the liability to operate and maintain a harvester, he would support the appropriation of Council funds for this purpose.

Dr. Canfield explained that LakeWatch is a public program and would accept liability if a harvester were purchased on their behalf and transferred to the UF.

Councilman Kaiser made a motion to utilize a portion of the funding approved by the Florida Legislature for the purpose of “Lake County Mosquito and Aquatic Plant Management” be used to purchase a harvester for transfer the UF / LakeWatch. The motion was seconded and passed by unanimous vote.

Chairman Goerner asked if the funding approved by the Legislature for cypress tree plantings could be transferred to a public entity like the City of Leesburg for planting in the vicinity of Venetian Gardens. Mr. Perry said that it would not be an issue.

## **6. PRESENTATIONS**

No formal presentations were scheduled for the April meeting.

Agency Updates

Mr. Perry provided an update on the Lake Griffin access canal dredging saying that they continue to make good progress. However, the dredge has run into issues of moving more sand than anticipated in order to dredge to the design elevation. He explained that this is taking more time than anticipated and the dredge contractor is proposing an eight to nine month extension of the contract at no additional cost. A review of the capacity of the disposal area has determined that the additional volume of dredged material due to the sand is not an issue.

Mr. Perry went on to discuss the issue of an area near the southwest corner of Lake Griffin which was excluded from dredging in the original permit. At the time of permit application by the LCWA, that property owner had submitted a permit for routine maintenance of his canals and boat basin. Since that time the property owner Mr. Grizzard, has requested that the canals at his boat basin be included in the dredging project. Mr. Perry said that additional dredging would be performed at additional costs and the LCWA is very firm on the stand that they are not going to provide any additional funding for this project. He said that at this point, the Florida Department of Environmental Protection (FDEP) has approved a maintenance exemption to the LCWA permit to allow dredging of the canals leading to the boat basin and the SJRWMD appears only somewhat willing to provide funding to assist in the additional dredging.

Councilman Kaiser asked if Mr. Grizzard would be willing to share in the additional cost for the dredging of his canals. Mr. Perry explained that the cost to dredge his canals would be approximately \$103,000 and he did not know if Mr. Grizzard would be willing to pay any of those costs. He also said that different sources of funding for additional dredging are being explored.

Chairman Goerner believed that excluding the discussed canals was an oversight and the Council may consider assisting with the additional costs with their Legislative Funding Request. He also explained that it would be important that this area be dredged so it is not an issue [boating access] during the lake level fluctuations.

Councilman Nicholson asked if the elevation within the canals would require that they be dredged to facilitate lake level fluctuations. Mr. Perry said that he believed so and added that there is always the possibility that owners of other canals which were excluded from dredging, due to the fact that their canals had not been maintained or any of the other disqualifying factors, may come forward to request their canals be dredged.

Councilman Farner asked why this issue was being brought before the Council. Mr. Perry explained that the LCWA Board of Trustees (Board) would most likely not approve any additional funds to include canals previously excluded from the dredging permit. He suggested that if the Council believes that additional dredging would be necessary, perhaps they could assist in funding through a Legislative Funding Request.

Chairman Goerner offered his opinion saying that dredging Mr. Grizzard's canals would be the right thing to do because he signed the Release Form and believed his canals were included in the dredging. He said that any additional requests for dredging should be considered on an individual basis.

Councilman Powers then offered his opinion saying that he does not believe the Council should be involved in resolving conflicts between property owners and State or local agencies.

Councilman Schlein said that he believes if Mr. Grizzard's canals met the original criteria for dredging, then they should be included.

Mr. Perry suggested that if he were so directed by the Council to go before the LCWA Board to request their review of including additional canals, with the understanding that the Council may assist in securing additional funding, that perhaps it will move the process along.

Chairman Goerner explained that the Council currently has three Community Budget Issue Requests (CBIRs) are moving through the Legislative budget process. He said one of them is a \$500,000 CIBR slated for canal dredging, but reminded the Council that none of the requests had been approved. Councilman Schlein asked if specific canals were designated in the budget request. Chairman Goerner said no, the request is to support the dredging project in general.

Councilman Royal put forth a motion that the Council accepts the updated information as provided by Mr. Perry and that they take no action until the Council receives a formal request to seek funding. The motion was seconded by Councilman Powers.

Chairman Goerner said it was his belief that the Council should take action to support the dredging in the area being discussed. Mr. Perry added that one consideration of the dredging is the timing and that the contract would need to be amended prior to the dredge reaching that portion of the lake. He said that would occur in approximately six to nine months.

Councilman Schlein asked when the entire dredging project is anticipated to be completed. Mr. Perry said it should be completed in 19 to 24 months.

After further discussion on the matter, Councilman Powers withdrew his second on the Councilman Royal motion. The motion died in discussion.

Councilman Power put forth a new motion that the Council supports the dredging of canals that meet the original criteria for dredging and if the LCWA approves of dredging additional canals, the Council will seek to assist with funding. Councilman Schlein seconded the motion.



Mr. Perry said that the LCWA Board is committed to completing the project as approved and may be reluctant to include any additional canals to the project without the support of the Council or other entities to provide the necessary funding.

After additional discussion, a vote to approve Councilman Powers' motion passed unanimously. Chairman Goerner asked if Mr. Perry thought he should go before the LCWA Board to present this motion. Mr. Perry said yes.

V. Chairman Davis asked if timing of the Legislative session would allow for a Council Funding Request to be approved prior to the dredge reaching the southern portion of the lake. He also asked if the \$500,000 in the CIBR were approved, would that funding be available for dredging additional canals.

Mr. Perry said yes and explained that the State's fiscal year ends on June 30<sup>th</sup> and if approved, the funds could be available on July 1<sup>st</sup>. He also explained that the \$7.2 million in funding to complete the original dredging project has been approved and the \$500,000 could be used for the dredging of additional canals.

Chairman Goerner requested that Mr. Hunter prepare the motion and send it to the Council so it could be taken to the next LCWA Board of Trustees meeting on April 26, 2006. Mr. Hunter agreed.

Councilman Powers reminded the Council that he does not believe that they should become involved with private landowners and deciding whether their canals should or should not be dredged.

Chairman Goerner said that the Council operates under the direction of the Florida Legislature and would continue to comply with any future requests from the Legislature. Furthermore, the Council has approved the lake level fluctuation program as a method to improve water quality and fisheries habitat. He said that this would make it incumbent on them to do what is necessary to move forward with that program.

#### Agency Updates

Bill Johnson of the Florida Fish and Wildlife Conservation Commission (FWCC) provided updates on their activities saying that their trawl sampling is complete and their creel counts of large mouth bass is moving along. He said that their fish counts on lakes Dora and Beauclair are winding down and they've received approximate 30% returns on tagged fish from anglers and 10-15% returns from commercial fishermen. Mr. Johnson also said that the creel sampling is nearly complete on lakes Griffin and Apopka as the season is coming to an end.

Councilman Farner asked if the FWCC was going to conduct fish counts in the Harris Bayou. Mr. Johnson said that there were no plans to do so.

Councilman Schlein asked if shad harvesting was being conducted on Lake Griffin. Mr. Johnson said that possibly one fisherman may still be working on that lake. He went on to say that the funding for that portion of the shad harvesting had recently run out.

Dr. Larry Battoe of the SJRWMD provided an update to the Council utilizing graphs and charts that handed out to the Council members. Copies of those handouts are provided in Attachment 1 of these minutes.

- 2005 / 2006 Gizzard Shad Harvest Update
  - 950,000 pounds harvested from Lake Apopka
  - 300,000 pounds harvested from lakes Beauclair and Dora
  - 280,000 pounds harvested from Lake Griffin
  - 1.6 million pounds total harvested
  
- Emeralda Marsh
  - Alum treatment of runoff using an old SN Knight farm pond
  - Alum flocculate was not able to settle due to excessive vegetation
  - Removal of vegetation was completed and clear water is being discharged to Haines Creek
  - Average phosphorus concentration flowing into the pond from the Emeralda Marsh is 1,500 micrograms per liter ( $\mu\text{g/L}$ )
  - Average phosphorus discharge from the pond to Haines Creek is 50-100  $\mu\text{g/L}$
  - Average phosphorus concentration of Lake Griffin is 50-100  $\mu\text{g/L}$
  - Water is only discharged when water levels in the pond go beyond a set elevation
  - At times the phosphorus concentration of water discharged is below that of Lake Griffin
  - Average phosphorus removal with alum is 90%
  
- Water Quality Report for Lake Apopka
  - Graph shows average decrease in phosphorus concentration between 1987 to present
  - 2004-2006 phosphorus concentration is beginning to reach the restoration concentration of 50  $\mu\text{g/L}$
  - While farms were in operation around the lake, phosphorus concentrations were as high as 220  $\mu\text{g/L}$
  - Current phosphorus concentrations are 80-90  $\mu\text{g/L}$
  - Chlorophyll reductions have been similar to phosphorus concentration reductions
  - Transparency (Secchi Depth) has also improved over the years

- Cost of phosphorus removal by various methods
  - Many assumptions were necessary to estimate costs
  - Lake Apopka Marsh Flow-way (LAMF) (assume 200  $\mu\text{g/L}$  phosphorus concentration in Lake Apopka) = \$8 / pound of phosphorus removed
  - Shad harvesting = \$20 / pound of phosphorus removed
  - LAMF (assume 80-90  $\mu\text{g/L}$  phosphorus concentration in Lake Apopka) = \$35 / pound of phosphorus removed
  - Algal Treatment System (ATS) = \$50 / pound of phosphorus removed. These costs were derived from a prototype system operated near Lake Okeechobee which reduced phosphorus in water that was allowed to flow over a blue-green algal mat.
  - Mechanical Dredging = \$68 - \$570 / pound of phosphorus removed. Typically the phosphorus in sediments which affect a lake are in the top 1.5 inches (4 centimeters) so if 3 feet (100 cm) of sediments are removed the credit for the entire amount is \$68 / pound. However if credit is only given for the top 1.5 inches (4 cm) of the 3 feet dredged, the cost is approximately \$570 / pound.
  - Lake Apopka Nutrient Reduction Facility (NuRF) (assume 200  $\mu\text{g/L}$  entering the system) = \$90 - \$100 / pound of phosphorus removed
  - Mechanical Weed Harvesting = \$125 - \$250 / pound of phosphorus removed
  - NuRF (assume 98  $\mu\text{g/L}$  entering the system) = \$161 - \$185 / pound of phosphorus removed
  - Alum treatment of Storage Treatment Areas (STAs) = \$206 - \$264 / pound of phosphorus removed. These systems are operated by the South Florida Water Management District.
  - NuRF (assume 80  $\mu\text{g/L}$  entering the system) = \$225 - \$250 / pound of phosphorus removed

Councilman Royal asked if the costs at the LAMF included alum treatment. Dr. Battoe said no because the LAMF was designed to function without chemical treatment.

Councilman Farner asked that based on the lower phosphorus concentrations currently seen in Lake Apopka and the higher costs for operation of the NuRF at the lower concentrations, is the LCWA still moving forward with that project.

Mr. Perry said that they are and the project continues to move through the permitting stages. He also explained that in February they did some testing of the water in the Apopka-Beauclair canal where the intake of the NuRF is proposed to be constructed. What they determined was that at the time of testing, Total Phosphorus (TP) was 104  $\mu\text{g/L}$  of which, 98  $\mu\text{g/L}$  was in the form of dissolved phosphorus and the other 6  $\mu\text{g/L}$  was particulate phosphorus. They treated the water with low doses of alum and had a 90% decrease in TP, including the dissolved phosphorus.

Councilman Farner then asked if this project would be approved prior to the Council's next Legislative request, so perhaps they can assist with funding. Mr. Perry said that the Board is reviewing the 90% completed plans and it was his belief the construction of the project could begin before the end of December 2006.

Dr. Battoe added that the SJRWMD Legislative Funding Request includes funding to assist with the NuRF project, in addition to their donating the use of the land where the project will be built.

Barbara Bess of the FDEP provided a copy of a portion of the Upper Ocklawaha River Basin (UORB) – Basin Management Plan (BMAP) as a handout to the Council. A copy of that handout is provided in Attachment 2 of these minutes. She said the FDEP and others have determined that lakes Harris, Griffin and Yale in the Harris Chain of Lakes will not be able to meet their respective Total Maximum Daily Load (TMDL) target goals. Ms. Bess explained that they have done a good job controlling point sources of pollutants, but they are now going to start working on other pollutant reduction measures including:

- Additional stormwater treatment and management
- Septic tank maintenance and installation of sanitary sewer systems
- Review lawn maintenance regulation and public awareness to minimize the volume of chemicals used
- Begin working with local governments to better manage future growth that minimizes polluted runoff

Ms. Bess also discussed her previous involvement in the permitting of seawalls saying that although those records had been maintained in a warehouse, many of the older records had to be destroyed due to damage caused by roaches and mice. She also explained that Mr. Howley may or may not have been required to submit a permit application, depending on the level of work or maintenance he was proposing. Ms. Bess said that she would look for his original permit application.

Dr. Canfield provided an update and other information to the Council.

- Bass Restocking
  - To date they had relocated 4,001 large mouth bass greater than 10 inches in Lake Griffin.
  - Their goal is to relocate 5,000 bass total.
  - Based on their FWCC permit, restocking will be discontinued when the water temperature reaches 27° C (80.6° F).
  - They have begun stocking five 1-acre ponds at the United States Geological Survey (USGS) laboratory in Gainesville, in preparation for next year. They expect the fish will breed and they will be able to produce advanced fingerlings for release next Spring.

- Orlando International Airport has dug new retention ponds for their expansion that Dr. Canfield's program is stocking for an additional source of fish.
  - They are working on a stocking permit from FWCC in Lake Griffin for next year in the future.
  - Over 100 anglers have reported catching tagged bass from the restocking program.
- Toxic algae
    - The UF has recently purchased a piece of equipment to test for microcystin, a toxin produced by blue-green algae. Currently that equipment is scheduled for use in the area around Gainesville.
    - Drinking water standard for microcystin is 1 µg/L.
    - Recreational water standard for microcystin is 20 µg/L.
    - The Florida Department of Health (FDOH) is in the process of developing a test strip that can be used to determine if the level of microcystin is above or below 20 µg/L.
    - The FDOH has offered space in their laboratory for additional testing.
    - Dr. Canfield is working with Dr. Ed Phlips (UF), Dr. JoAnn Burkholder (North Carolina State University) and others to move forward with a program of testing and public awareness.
    - Dr. Canfield is meeting with Andrew Reich (FDOH) on April 12<sup>th</sup> to discuss the program.
  - Shad Harvesting Study
    - Dr. Canfield briefly mentioned that the UF is continuing to work with the SJRWMD on the study of the effects of shad harvesting in lakes.

Dr. Canfield also provided a letter from the SJRWMD expressing their disagreement with the summary of Lake Apopka restoration efforts that he provided to the Council during the February 2006 meeting. He explained that he was surprised by the amount of opposition the summary has received, but said that criticism was expected. A copy of that letter is provided as Attachment 3 to these minutes.

Councilman Farner said that he had recently been granted permission for access to ponds on the Mission Inn property in Howie in the Hills. He said that these ponds are located in an area forested with pine trees and appear to be a good source of bass. Councilman Farner said that his friend had offered the fish in these ponds as an alternate source to Dr. Canfield for his restocking efforts. Dr. Canfield said that he would be interested in going to take a look at the ponds and he appreciated Councilman Farner's efforts.

## **7. COUNCIL MEMBER COMMENTS**

### Council Member Comments

Councilman Powers asked V. Chairman Davis his opinion of the Council's liability of their involvement with landowner disputes in reference to the Howley property and the canal dredging decisions. V. Chairman Davis believes that the Council should fall under the State of Florida sovereignty statutes which should protect them from suit by members of the public. He feels that so long as the work under the direction of the Florida Legislature and act accordingly and without malfeasance or malintent, that the Council should be protected from liability claims.

Chairman Goerner asked that Mr. Caputo bring this matter before the SJRWMD legal staff and ask them to render an opinion on this matter. Mr. Caputo agreed to bring this before the legal staff.

Councilman Kaiser requested a copy of an older aerial photograph of the Howley property prior to the modifications to the Burrell structure. Mr. Perry said that he may be able to locate the aerial photograph requested.

No other Council member comments were made.

### Discussion of May 5, 2006 Meeting

Mr. Caputo provided a brief summary of the agenda items for the May meeting:

- Burrell Structure / Howley Property Update
- Information update on the purchase of a mechanical harvester
- Update from Chairman Goerner of the LCWA Board Meeting – Lake Griffin Canal Dredging

## **8. PUBLIC COMMENTS**

No public comments were made.

## **9. ADJOURNMENT**

The meeting was adjourned at 12:44 PM.

Respectfully submitted by:

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Chairman Skip Goerner

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Secretary Rick Powers, P.G.

**Attachment 1**

**Information Provided by Dr. Larry Battoe**

**of the SJRWMD**

**Including:**

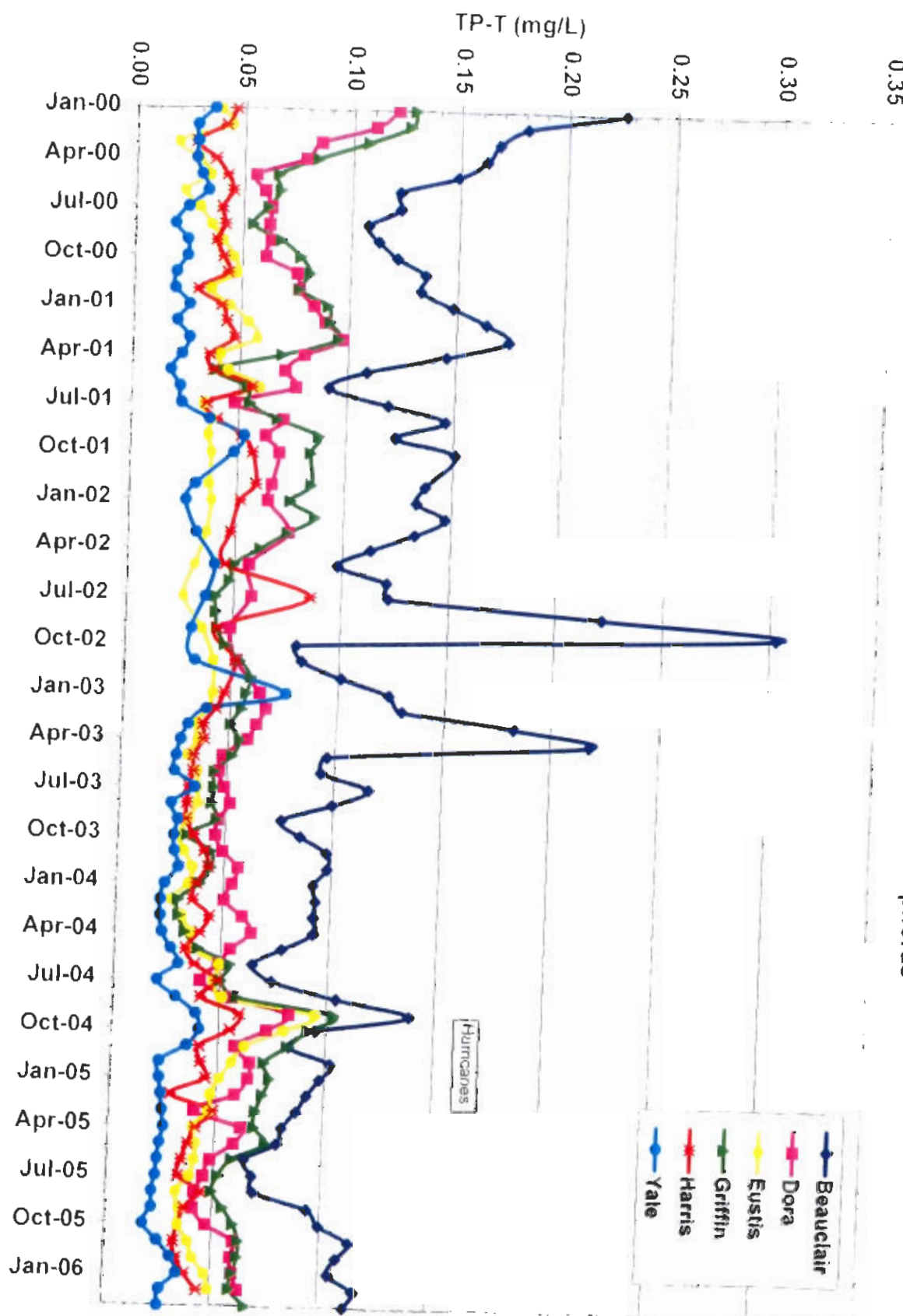
**Water Quality Data for the Harris Chain of Lakes**

**and**

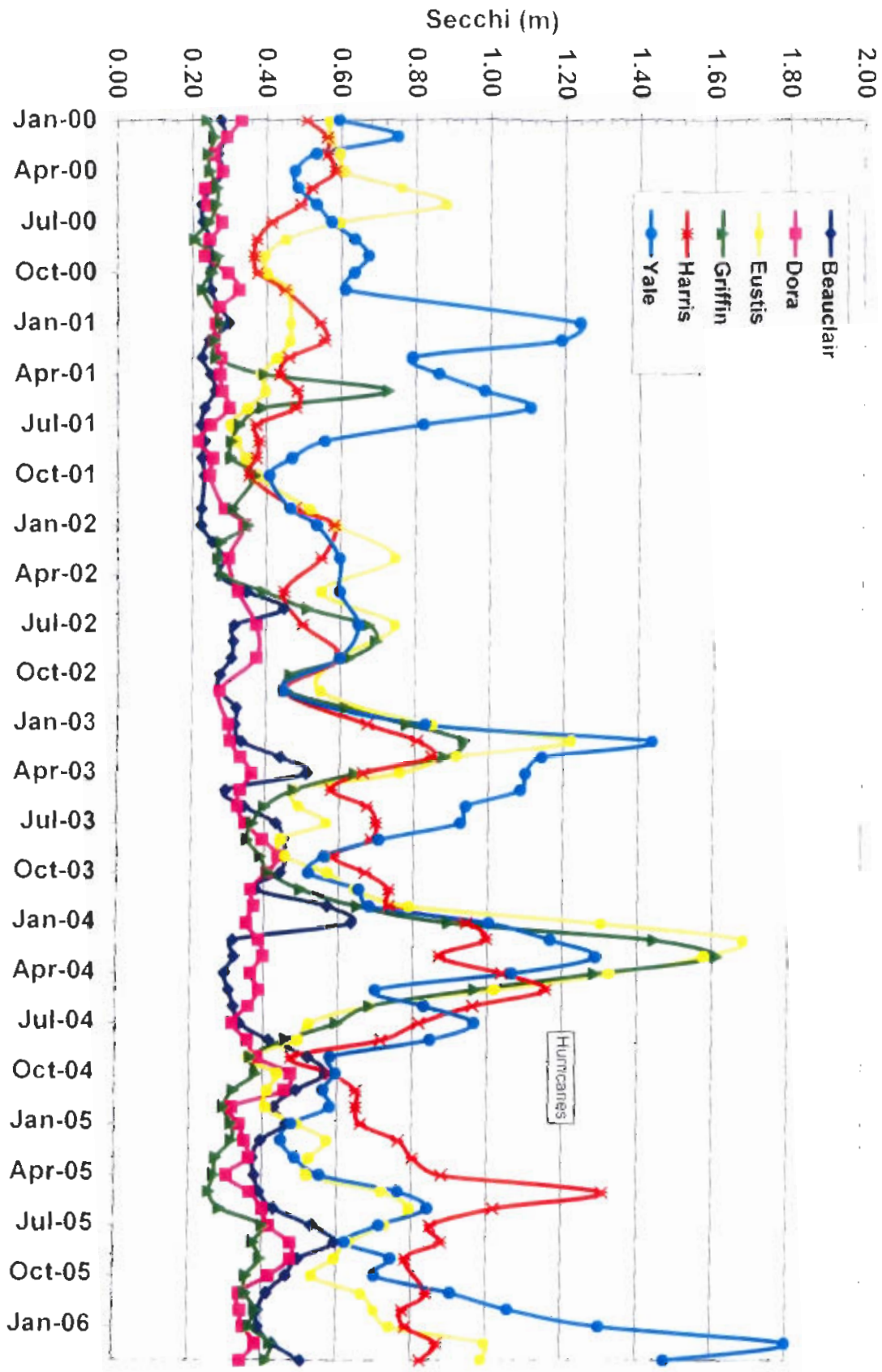
**Cost Analysis for Phosphorus Removal by Various Techniques**



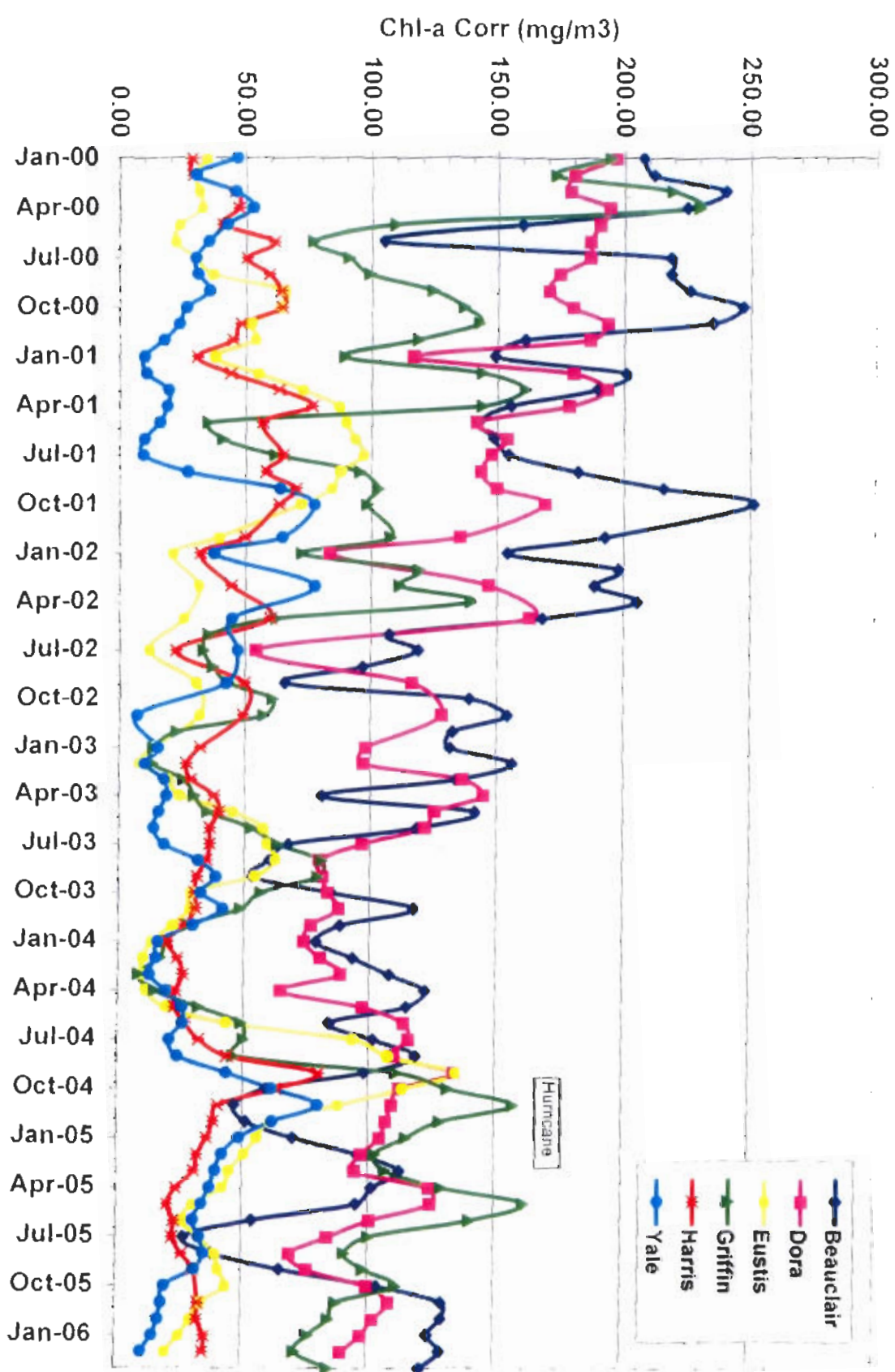
Harris Chain of Lakes Total Phosphorus



Harris Chain of Lakes Secchi Depth

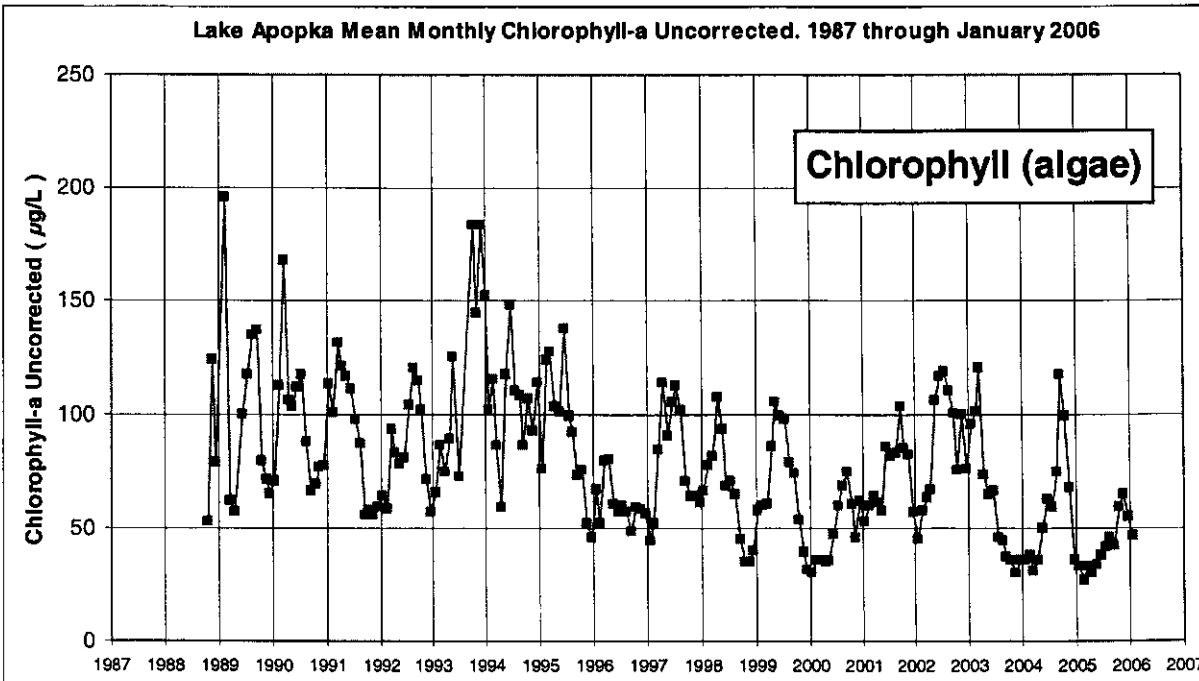
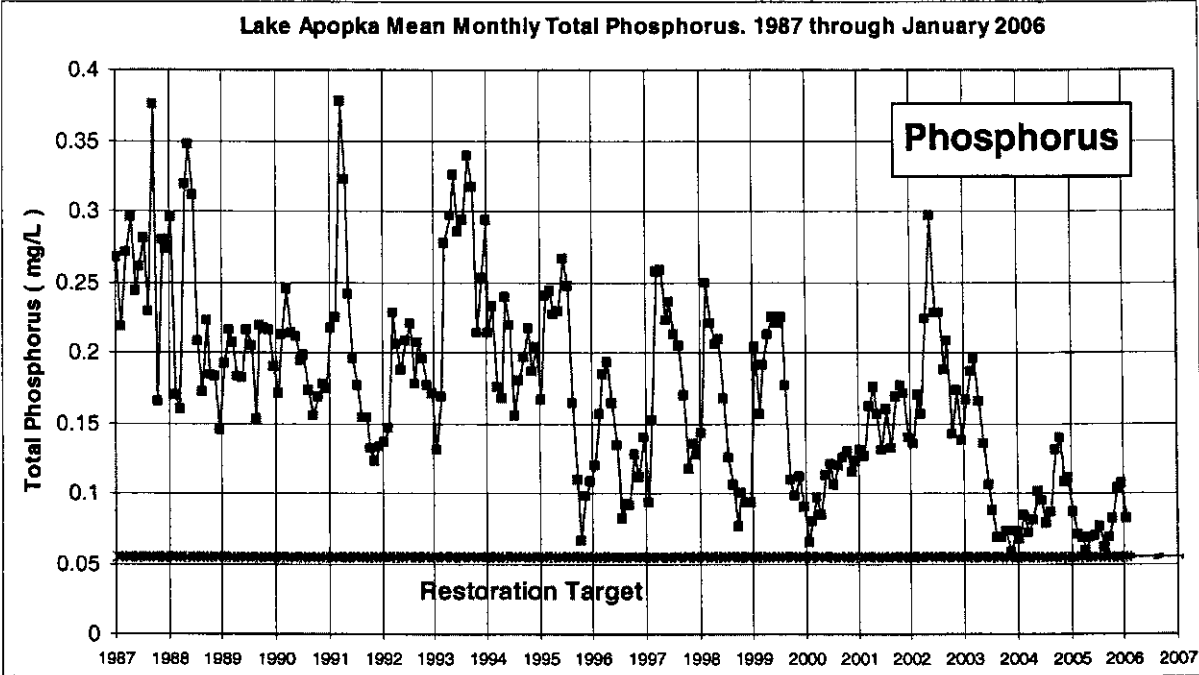


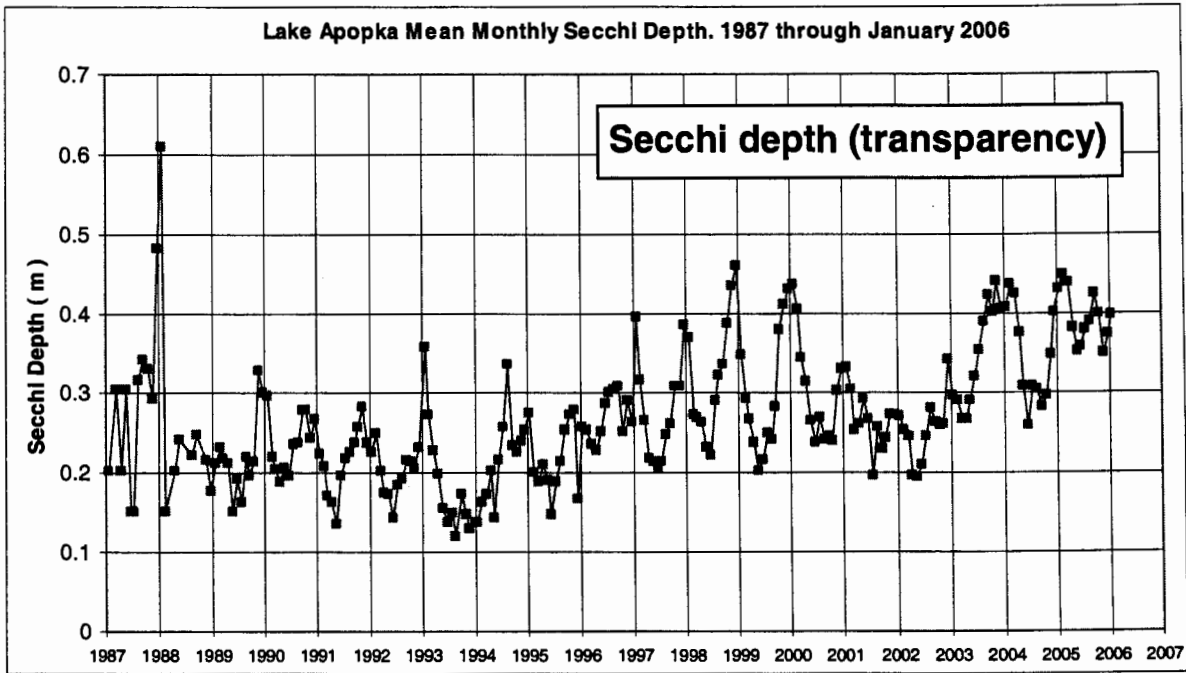
Harris Chain of Lakes Chlorophyll Corrected



**Briefing Notes Jeff Elledge and Kirby Green  
Water Quality in Lake Apopka - 4 April 2006**

These are monthly averages (through Jan 06) to smooth the very short-term variability.

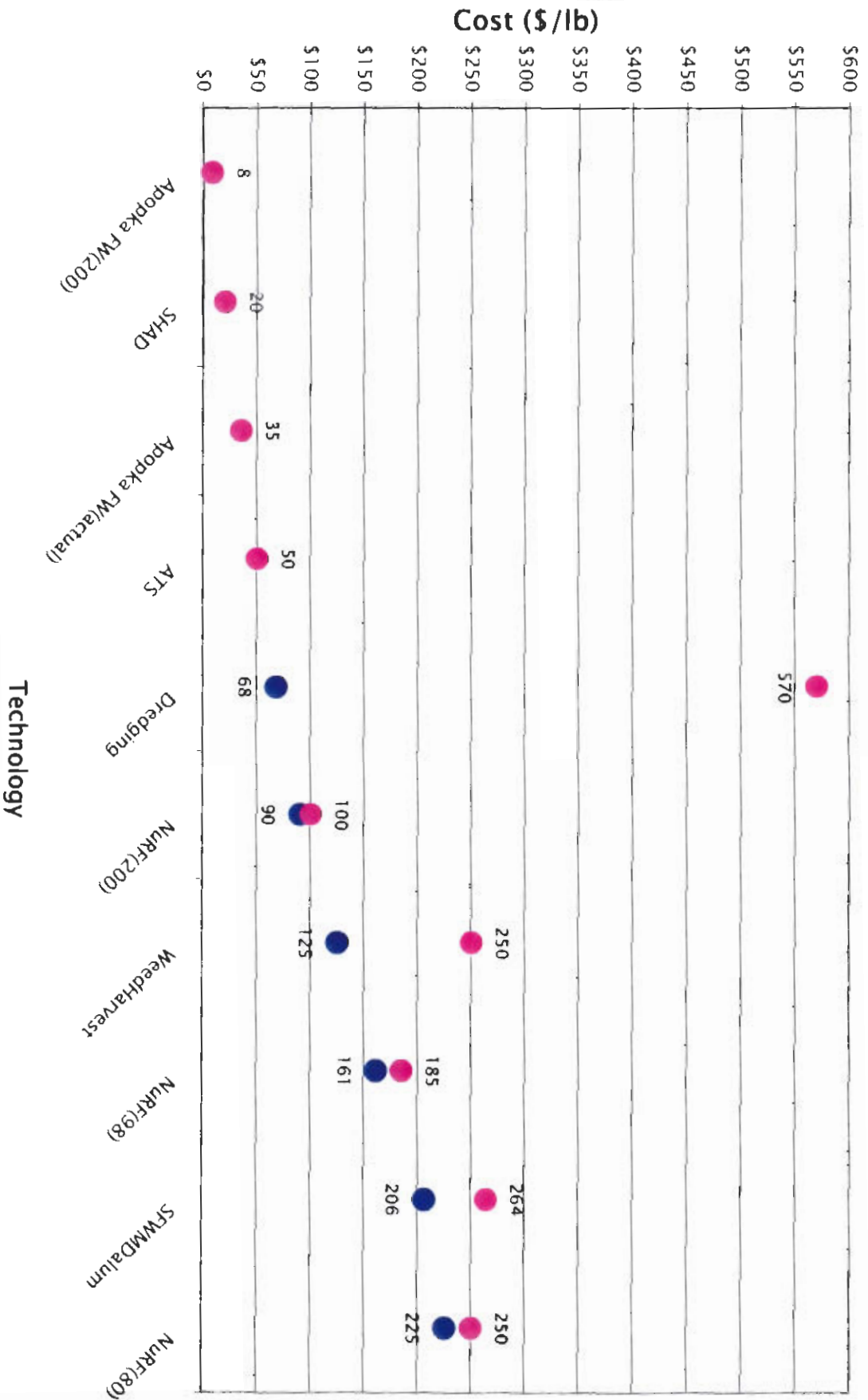




The following data are from the most recent samples and have not yet been worked-up in the monthly averages. Compared to the Dec 05 – Jan 06 averages, these data fall in the same range for chlorophyll and Secchi depth and are slightly elevated for phosphorus.

Collection Date	Analyte Name		
	Chlorophyll	Secchi	TP-T
07-Feb-06	58.0	0.37	0.099
21-Feb-06	39.6	0.48	0.096
07-Mar-06	64.7	0.36	0.120
23-Mar-06	NA	0.32	0.112

### Estimated Comparative Cost of various P removal technologies



COST COMPARISON OF LAKE PHOSPHORUS REMOVAL TECHNIQUES		
	TECHNIQUE	COST (\$/lb P REMOVED)
	SJRWMD LAKE APOPKA FLOW-WAY <sup>1,5,6</sup> (@200 ug/L P)	~\$8/lb
	SJRWMD LAKE APOPKA FLOW-WAY <sup>1,5,6(actual)</sup>	~\$35/lb
	LCWA NuRF PROJECT <sup>2,5,9</sup> (@ 200 ug/L P)	~\$90-\$100/lb
	LCWA NuRF PROJECT <sup>2,5,9</sup> (@ 98 ug/L P)	~\$161-\$185
	LCWA NuRF PROJECT <sup>2,5</sup> (@ 80 ug/L P)	~\$225-\$250/lb
	SFWM Est. of CHEM. PRECIP. <sup>7</sup>	~\$206-\$264/lb
	MECHANICAL WEED HARVEST	~\$125-\$250/lb
	DREDGING <sup>3</sup>	~\$68-\$570
	SHAD HARVEST - Apopka	~\$20/lb
	PERIPHYTON/HYACINTH FILTER <sup>4</sup>	~\$50/lb
	1. Low end assumes 200 ug/L in lake water	
	2. NuRF Project does not include alum residual removal costs and is based on a phosphorus concentrations in lake water of 200, 98, and 80 ug/L	
	3. Total cost of dredging Lake Apopka in 1988 was \$869,000,000. Partial dredging will not improve water quality. At high end cost, phosphorus not available to the biota is not credited.	
	4. Costs of disposal of by-products not included - for every lb of P removed, 330 lbs of waste product must be disposed of; this technique only tested on small scale projects.	
	5. Cost of land purchase not included	
	6. Does not include first 2 months of start-up	
	7. Treated post-STA water at 15-40 ug/L TP	
	8. Actual costs of electrical power	
	9. Values for the cost of P removal at lake concentrations of 200 and 98 ug/L are from LCWA - Lance Lumbard	

## FLOW-WAY Calculation

1. LOW END ESTIMATE to compare with NuRF at 200 ug/L:
  - a. Start with performance data from the flow-way for months when inflow TP concentration was above 90. This yields 11 months of data with an average inflow TP concentration of 103 ug/L.
  - b. Average cost for those same months is 0.3 gm TP per penny
  - c. Converted to penny/gram = 3.33 pennies per gram TP
  - d. Converted to \$/lb = ~\$15/lb
  - e. For an inflow TP concentration of 200 ug/L, the cost would be proportionately lower (by half) = \$7.50/lb P removed.
  
2. BASED on actual performance
  - a. Calculate total TP removal from Feb. 04 to Jan. 06 = 2489.2 kg
  - b. Calculate total pump cost from Feb. 04 to Jan. 06 = \$189,320
  - c. Convert TP from kg to lbs = 5,476.24 lbs
  - d. Divide cost by removal in lbs = \$ 34.57/lb P removal
  - e. Round off to \$35/lb
  - f. This number is close to the original estimate prior to construction.
  - g. This number includes periods when the system was shut down for plant removal and for the hurricanes.
  
  - h. Does not include first 2 months of operation. Would be (\$45.80/lb)



## NuRF Calculations

1. NuRF Project using an inflow TP of 200 ug/L Info from Lance Lumbard
  - a. "According to ERD's calculation, the low flow scenario costs \$223 per kg and the high flow scenario costs \$198 per kg. This is based on a 20-year life cycle cost of \$21,312,061 for low flow and \$34,254,861 for high flow. Average TP concentration was 200 ppb at the time of this analysis. The current TP concentration will be a bit different, but this is good enough for discussion, I think.

ERD's wet detention project examples fell between \$371 and \$658. My cost analysis for LCWA projects indicates cost per kg TP for stormwater retrofits is at least double that of the NuRF".

- b. Convert costs from \$/kg to \$/lb by dividing by 2.2
  - c. Low flow cost =  $\$223/2.2 = \sim\$100/\text{lb}$
  - d. High flow cost =  $\$198/2.2 = \sim\$90/\text{lb}$
2. To convert to a lower inflow concentration calculate proportionality constant:
  - a. Actual current TP conc. is closer to 80 ug/L
  - b.  $80/200 = .4$
  - c. Since costs of alum remain the same whether treating 200 ug/L water or 80 ug/L water due to "micro-floc formation at low alum dosage rates, the costs will remain the same, but the yield of TP will decrease proportionately.
  - d. Low flow cost =  $\$100/\text{lb}$  divided by  $.4 = \$250/\text{lb}$
  - e. High flow cost =  $\$90/\text{lb}$  divided by  $.4 = \$225/\text{lb}$
  - f. Results bracket SFWMD's study of Advanced Treatment Technologies average for chemical precipitation

## SFWMD Advanced Treatment Technologies Report

1. Estimate directly from their study
2. Estimated cost of TP removal by Chemical Precipitation:
  - a. \$206–\$264/lb
3. Sources for this information are:
  - a. Brown and Caldwell Consultants, 1993. Phase I Evaluation of Alternative Treatment Technologies. Final Draft Report, Contract # C-3051 Amendment 2, SFWMD.
  
  - b. Lake Okeechobee Watershed Project Delivery Team (LOWPDT), 2003. Project 01.2.6 Lake Okeechobee Watershed Project: Water Quality Treatment Measure Ranking. Draft. SFWMD.
4. Following STA treatment (15 to 40 ug/L TP)

ESTIMATE OF THE COST OF PHOSPHORUS REMOVAL  
BY AQUATIC PLANT HARVESTING

1. This estimate is made by combining three pieces of information:
  - a. Cost per acre of plant harvest = C
  - b. Density of aquatic plants per acre = D
  - c. % phosphorus content of aquatic plants harvested = %P
  - d. The equation is:  $C * D * \%P$  and applying the appropriate conversion factors.
2. Cost per acre of plant harvest
  - a. This information is fairly readily available from a number of sources on the internet but there is a large variance in the costs. The units are in currency units per area (\$/acre).
3. Density of aquatic plants per acre
  - a. Unfortunately there is very large variation in the density of aquatic plants and when there is a need for harvest
  - b. SJRWMD has measured aquatic plant density of Vallisneria in plant beds in the St Johns River
  - c. There are estimates for Hydrilla and Hyacinth beds on the internet
  - d. The units are in mass per unit area ( $g/m^2$ ).
4. % Phosphorus Content plants
  - b. The SJRWMD has measured %P (dry wt) values of 0.0022 to 0.0066 or 0.22% to 0.66 % with most values around 0.3%.
  - c. I used a value of 0.3% phosphorus
  - d. The units are percent or just the proportion of the plant that is phosphorus as dry weight (mg/g dw)
  - e. This value must be converted to wet weight before it can be used to calculate cost. Usually a factor of 10 is used as plants are 90% water.
5. Cost per unit mass
  - a. Final answer will be in units of \$/lb so they can be compared with other methods.
6. Data:
  - information.
  - b. Cost of harvest of 1 acre = \$1,000 from Ken Langland, Center for Aquatic Plants, UF-IFAS. Other estimates from internet are \$1000 to \$2000 per acre.
  - c. Hydrilla is 0.3% P wet weight
  - d. On Lake Okeechobee, there were 8 lbs of P /acre harvested
  - e. Costs increase depending on how far you have to haul the material.
  - f. Harvesters could cost over \$100/hour.
7. Answer:
  - a. At \$1000 per acre to remove 8 lbs of phosphorus =  $\$1000/8$  or \$125/lb of phosphorus.
  - b. At \$2000 per acre to remove 8 lbs of phosphorus =  $\$2000/8$  or \$250/lb of P.
- C. Cost range is \$125 - \$250/lb of TP.

Dredging: Costs contained in report by KBN, Inc. (SJ-88 SP-10). Total cost exclusive of land acquisition costs for spoil disposal/reuse ~ \$869 million.

1) Assume dredging to remove all **available** sediment P,  $1.64 \times 10^9$  g P (as defined in Lowe, Battoe, Stites, & Coveney 1992 and calculated from data in Reddy & Graetz 1991). - **\$0.530 per g P = \$240/lb**

2) Assume dredging to remove **total sediment P** (data from Reddy & Graetz) for specific dredged area and depth reported by KBN (87% of lake area, depth 1.17 m [= mean depth of UCF + "CF"]).  $5.78 \times 10^9$  g P - **\$0.150 per g P = \$68.10/lb**

3) Assume dredging to remove **labile sediment P** (as derived from Reddy & Graetz) for specific dredged area and depth reported by KBN (87% of lake area, depth 1.17 m. This is 20.7% of UCF P and 9.6% of CF P.  $688 \times 10^6$  g P - **\$1.26 per g P = \$572/lb**

Lake Apopka Shad Harvest				
Year	Harvest (lb)	P Removal (mt)	Cost	
1993	900340		3	0
1994	1686406		5	85000
1995	636077		2	43426
1996	592073		2	85310
1997	1282079		4	150496
1998	1676019		5	253378
1999	492434		2	78789
2000	307460		1	56949
2001	174700	<1		0
2002	525200		2	0
2003	1544126		5	286116
2004	1239410		4	316504
2005	1051109		4	337729
<b>Total</b>	<b>12107433</b>		<b>39</b>	<b>1693697</b>
	cost per kg	1693397 divided by 39000kg =		43.42813 per kg
		43.43 divided by 2.2 lbs/kg =		19.74006 per lb

**PERIPHYTON TREATMENT**

<b>Technology</b>	<b>Estimated</b>	
	<b>TP removal</b>	<b>Cost</b>
		<b>Comments</b>
Hydromentia (WTS & ATS combined)	\$50	Subject to down time from herbicide use in vicinity, not proven over long-term, most efficient removal occurs in water hyacinth systems, requires disposal of by-products
WTS = Water Hyacinth Treatment System		
ATS Algal Treatment System		

from SFWMD report

**Attachment 2**

**Upper Ocklawaha River Basin**

**Basin Management Action Plan (excerpts)**

**March 2006**

Basin Management Action Plan

# UPPER OCKLAWAHA RIVER BASIN

(EXCERPTS)

***Developed by the Upper Ocklawaha Basin Working Group  
In Cooperation with  
The Florida Department of Environmental Protection  
Division of Water Resource Management  
Bureau of Watershed Management***

March 2006



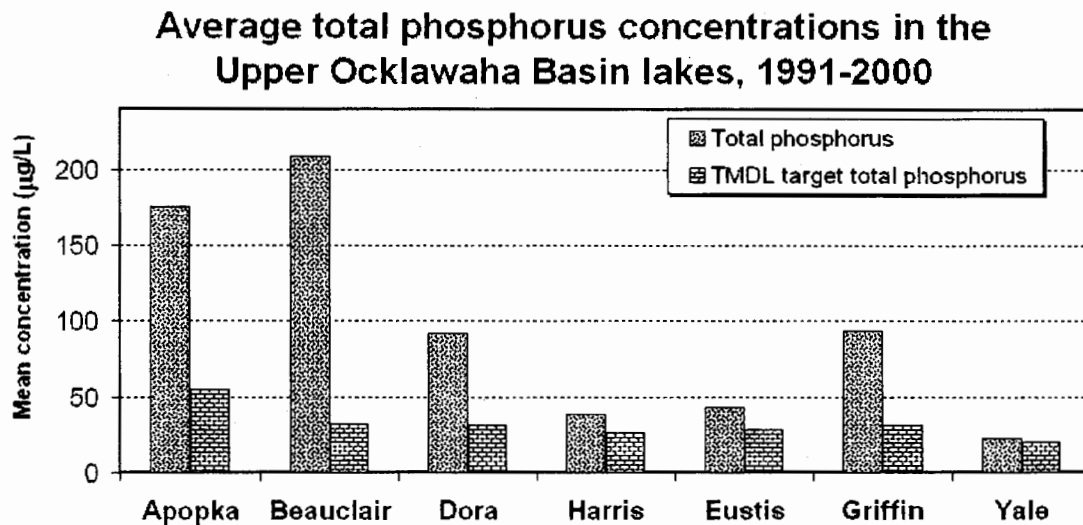
## 2.4 WATER QUALITY TRENDS *(Move this section before Management Actions)*

### 2.4.1 Baseline Phosphorus Loadings

The data for establishing TMDLs in the Upper Ocklawaha Basin was taken from the period of 1991-2000. Figure 10 below shows the phosphorus concentrations in seven of the Upper Ocklawaha Basin lakes based on the 1991-2000 data.

Since that time, water quality improvements have been seen in the basin. Likely causes for improvements in water quality include reduced nutrient discharges from agricultural areas, following purchase and partial restoration, and gizzard shad harvest in Lakes Apopka and Griffin. The greatest improvements are in lakes directly or indirectly affected by these actions (Apopka, Beauclair, Dora, Griffin), with less improvement in lakes expected to be less affected (Eustis, Harris), or unaffected (Yale) by these actions.

FIGURE 10.



As noted in Section 1.5, available evidence indicated that total phosphorus is the primary limitation on algal growth in the basin lakes, as is commonly the case in fresh waters. Reductions in external loading of total phosphorus to the lakes are expected to reduce the frequency and magnitude of algal blooms, although the Upper Ocklawaha lakes are naturally productive enough that occasional algal blooms are expected to occur even if the TMDL targets are met. Reductions in algal blooms will lead to increased water clarity, which will allow re-establishment of aquatic plants (some increases in aquatic plant growth have already been noted in Lakes Apopka and Griffin). Aquatic plant growth will contribute to further improvements in water quality, by using phosphorus that would otherwise be available to fuel algal growth. Also, plant cover reduces re-suspension of bottom sediments, reducing release of phosphorus from the lake bottom and further improving water clarity. As noted in Section 1.3.5, actions taken to reduce total phosphorus are also expected to reduce levels of nitrogen and un-ionized ammonia in the lakes.

Most of the total phosphorus in lake waters will eventually be lost to the lake sediments. Releases in total phosphorus from storage in the bottom sediments can delay recovery of water quality. However, releases from the lake sediments gradually decrease with continued reductions in external loading of phosphorus. Case studies generally show improvements in water quality within a few to several years of external phosphorus load reduction. Water quality improvements have already been seen following partial reduction in external phosphorus loading to Lakes Apopka and Griffin.

The actions described in this BMAP are intended to continue this trend and to maintain water quality improvements in the basin. For more detailed information on water quality in the Upper Ocklawaha Basin, please consult:

- Department of Environmental Protection, October 2003. *Water Quality Assessment Report: Ocklawaha*
- *Fulton, R.S. III, C. Schluter, T.A. Keller, S. Nagid, W. Godwin, D. Smith, D. Clapp, A. Karama, and J. Richmond. 2004. Pollutant Load Reduction Goals for Seven Major Lakes in the Upper Ocklawaha River Basin. Technical Publication SJ2004-5, St. Johns River Water Management District.*

FIGURE 5. TOTAL MAXIMUM DAILY LOADS IN THE UPPER OCKLAWAHA BASIN

Basin	WBID(s)	TMDL (lbs/yr)	Target Concentration (ppb)	TMDL Baseline Load (lbs/yr)	Wasteload Allocation (lbs/yr)	NPDES Allocation (% reduction)	Nonpoint Source Allocation (lbs/yr)	Overall Reduction (%)
<b>Lake Apopka</b>	<b>2835A,C,D</b>	35,060	55	136,070	2,470	None	31,223	75.6
Total Phosphorus								
<b>Lake Beauclair</b>	2834C	7,056	32	46,746	None	85	7,056	85
Total Phosphorus								
<b>Lake Carlton</b>	<b>2837B</b>	195	32	476	None	59	195	59
Total Phosphorus								
<b>Lake Dora</b>	<b>2831B</b> 2831A	13,230	31	39,690	None	67	13,230	67
Total Phosphorus								
<b>Lake Eustis</b>	2817B 2817A	20,286	25	35,500.50	None	43	20,286	43
Total Phosphorus								
<b>Palatka River</b>	2839	43,042		49,351	None	12.8	43,042	12.8
BOD								
Total Nitrogen		16,696		17,604	None	5.2	16,696	5.2
Total Phosphorus		2,207		2,377	None	7.2	2,207	7.2
<b>Lake Harris</b>	<b>2838A/2838B</b> 2832/2817C	18,302	26	26,914.70	None	32	18,302	32
Total Phosphorus								
<b>Trout Lake</b>	2819A	521	.028 mg/L	2,603	None	80	521	80
Total Phosphorus								
Total Nitrogen		9733	.78 mg/L	24,165	None	60	9733	60
<b>Lake Griffin</b>	2814A	26,901	32	79,120.60	None	66	26,901	66
Total Phosphorus								
<b>Lake Yale</b>	2807A 2807	2,844	20	3,160.50	None	10	2,844	10
Total Phosphorus								

Figure 7. Upper Ocklawaha River Basin Water Quality Issues by Sub-basin

PROBLEMS AND ISSUES (HISTORIC THROUGH 2000)	UORB TMDL SUB-BASINS										
	LAKE APOPKA	LAKE BEAUCLAIR	LAKE CARLTON	LAKE DORA	LAKE EUSTIS	TROUT LAKE	LAKE HARRIS	PALATKA KAH	LAKE YALE	LAKE GRIFFIN	
<b>WBID SUB-BASINS</b>	Lake Apopka-2835D	Lake Beauclair-2834C	Lake Carlton-2837B	Lake Dora-2831B	Lake Eustis-2817B	Trout Lake-2819	Lake Harris-2838A	Palatka River-2839	Lake Yale-2807A	Lake Griffin-2814A	
	Gourd Neck Spr-2835C			Dora Canal-2831A	Haines Creek-2817A		Little Lake Harris-2838B		Yale-Griffin Canal-2807		
	Lake Apopka Outlet-2835A						Dead River-2817C				
							Helena Run-2832				
	<b>PRIMARY ISSUES</b>										
	Stormwater runoff to lakes	•	•	•	•	•	•	•	•	•	•
	Significant inflows from upstream sources		•	•	•	•	•	•	•	•	•
	Wetland conversion to farmland	•	•	•	•	•	•	•	•	•	•
	Discharges from agricultural lands/restoration areas	•	•	•	•	•	•	•	•	•	•
	Septic tank sources	•	•	•	•	•	•	•	•	•	•
Increased loading from future growth	•	•	•	•	•	•	•	•	•	•	
<b>SECONDARY ISSUES</b>											
Alteration of natural water levels and flows	•	•	•	•	•	•	•	•	•	•	
Point source discharges	•	•	•	•	•	•	•	•	•	•	
Soil subsidence from oxidation	•	•	•	•	•	•	•	•	•	•	
Phosphorus storage in lake sediments	•	•	•	•	•	•	•	•	•	•	
More flocculent sediments	•	•	•	•	•	•	•	•	•	•	
Algae shifts/more blooms	•	•	•	•	•	•	•	•	•	•	
Depressed dissolved oxygen levels											
Decomposition of rooted and floating vegetation	•	•	•	•	•	•	•	•	•	•	
Fishery shift to rough fish	•	•	•	•	•	•	•	•	•	•	
Loss of aquatic/wetland habitat	•	•	•	•	•	•	•	•	•	•	
<b>OTHER ISSUES</b>											
Elevated nitrates in springs	•					•					
Health issues in alligator population	•					•					
Ground water contamination	•					•					
Nutrients released from vegetation decay						•					

TROUT LAKE

Table 21 TMDL Components ('06 version)

WBID	Parameter	WLA		LA (lbs/year)	MOS	TMDL (lbs/year)	Percent Reduction
		Wastewater (lbs/year)	NPDES Stormwater (1)				
2819A	TN	None	60% reduction	9,733	Implicit	9,733	60
2819A	TP	None	80% reduction	521	Implicit	521	80

(1) Required if during development of the City of Eustis MS4 permit it is determined that the Eustis MS4 contributes TN or TP to Trout Lake.

**Attachment 3**

**Kirby B. Green, III SJRWMD**

**Response to:**

**Restoring Sport Fishing**

**at**

**Lake Apopka – An Action Program**

**Prepared by**

**Dr. Daniel Canfield**

**of the**

**University of Florida**

**January 2006**



# St. Johns River Water Management District

Kirby B. Green III, Executive Director • David W. Fisk, Assistant Executive Director

4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500  
On the Internet at [www.sjrwmd.com](http://www.sjrwmd.com).

April 3, 2006

Harris Chain of Lakes Restoration Council

Dear Council Member:

I asked my staff to review the proposal "Restoring sport fishing at Lake Apopka, an action program," submitted to the Council by Dr. D. E. Canfield, Jr. I have reviewed their comments (attached), and although I share Dr. Canfield's goal to improve recreational fishing in the lake, I find his proposal to be ill advised.

Dr. Canfield proposes using the lake as a "test lake to determine if FFWCC can manage hydrilla to benefit recreational fishing." However, if hydrilla grows beyond the desired levels, a single whole-lake treatment with herbicide would cost millions of dollars. Furthermore, the infestation may be irreversible due to herbicide resistance. A 31,000-acre lake, in which federal, state and local governments have invested well over 100 million dollars, is not a good candidate for such testing.

Dr. Canfield also proposes movement of water on and off the former farm fields in order to fluctuate lake level. This would further pollute the lake with phosphorus and could create unacceptable risks to wildlife from pesticide residues in the soils. The SJRWMD has carefully regulated flooding of the fields to reduce phosphorus pollution and to reduce risks from pesticides to acceptable levels. Part of our Surface Water Improvement and Management (SWIM) plan for the lake is to increase lake-level fluctuation to the extent feasible, and the District is working on plans to accomplish this. The District's SWIM Plan for Lake Apopka is a comprehensive lake and watershed restoration program that extends well beyond water quality. Lack of habitat for fish and wildlife and poor recreational value have been priority issues in the SWIM plan from the beginning, and we are making important progress in correcting the underlying causes of poor game fish production in Lake Apopka. Measures of water quality have improved 50-70% as compared to the 1990s, and native aquatic plants have increased. These improvements have occurred with only partial implementation of the full restoration plan. Evidence of the efficacy of this approach can be found at Lake Griffin where the District SWIM program strategy to improve lake water quality has resulted in expansion of native plants and improvement in sport fish populations.

I thank you for your continuing efforts to improve the Harris Chain for the benefit of all Floridians.

Sincerely,

Kirby B. Green III  
Executive Director

---

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Review of proposal, "Restoring sport fishing at Lake Apopka, An action program," submitted January 2006 to the Harris Chain of Lakes Restoration Council by Dr. D. E. Canfield, Jr.

Dr. Canfield's proposal is based on his conclusions that the current restoration program for Lake Apopka is not working to restore aquatic plants, and therefore, habitat for game fish. He proposes to change the focus of the program to fisheries management, and he outlines four steps to accomplish this change. Although we share Dr. Canfield's goals to improve recreational fishing in Lake Apopka, we see serious dangers with two of his proposed management steps. We also find his analyses to be incomplete and some of his conclusions to be poorly supported. Our primary concerns are outlined below.

### *Dangers with proposed management steps*

First, Dr. Canfield's solution to provide aquatic plant habitat for largemouth bass in Lake Apopka is to allow the non-native, invasive plant hydrilla to proliferate. This recommendation is directly opposite to the current work of the District to locate and control even small occurrences of hydrilla in Lake Apopka to prevent infestation and promote native species. We are very concerned that hydrilla would be prohibitive or impossible to control once allowed to grow freely. Dr. Canfield does not describe how hydrilla will be limited to the desirable 10–15% coverage, nor does he estimate the cost of this control. The cost of a single whole-lake treatment with fluridone in Lake Apopka (155,000 acre-feet, 30 ppb fluridone) would be about \$3 million. Experience elsewhere is that treatment can be necessary every second year. Furthermore, hydrilla is becoming increasingly resistant to fluridone, the primary systemic herbicide used in treatment, so control might be impossible, even if funding were available. Dr. Canfield proposes that Lake Apopka be the "test lake to determine if FWCC can manage hydrilla to the benefit of recreational fishing." We strongly recommend against "testing" this idea in a 31,000-acre lake where the cost of failure is great, the consequences of failure are grave, and where a mistake might be irreparable.

Second, Dr. Canfield recommends that the water level in Lake Apopka be fluctuated by flooding the restored wetlands (former farms) in the fall and pumping that water back to the lake in the spring. However, large areas of the former farms cannot currently be flooded because of risks with exposure of wildlife to pesticide residues in the food web. We expect to flood these areas eventually, but only through a careful, deliberate, and gradual process with assessment, monitoring, and possibly remediation. Even if all the former wetlands at Lake Apopka currently were restored and available for flooding, Dr. Canfield's proposal has three additional serious problems:

- Flooding these wetlands annually for four months at depths exceeding two feet would damage the vegetation and degrade wetland quality.
- Back pumping this large volume of water to Lake Apopka would greatly exceed the allowable phosphorus loading unless costly treatment were used. These lands were purchased to reduce pumping to the lake.
- Fish growing in at least some areas of the former farms would accumulate sufficient pesticides to be unsuitable for human consumption. This situation will persist until pesticides are reduced by costly remediation or by natural degradation. Fish from these wetland areas should not be allowed to enter the lake.



### *Incomplete analyses and poorly-supported conclusions*

A cornerstone in Dr. Canfield's proposal is his conclusion that the current restoration program has not improved growth conditions for native aquatic plants and will not accomplish this goal in the foreseeable future. Dr. Canfield compared the area of eelgrass in 1997 (cited as 1999) reported by District staff (~11,000 m<sup>2</sup>) with the area that he found in 2004 (900 m<sup>2</sup>). He concluded that eelgrass had drastically declined, but apparently he did not consider the consequences of the severe drought that occurred between those two observations. In summer 2001 and again in 2002, Lake Apopka reached record low levels. Lake volume was reduced almost 75% from the long-term average. Most, if not all, of the eelgrass beds located by District staff in 1997 were dried during this drought. We conclude that the subsequent (2004) observations by Dr. Canfield found a population severely impacted by the recent drought, rather than by poor sediment conditions. Already in 2005 District staff mapped 9915 m<sup>2</sup> eelgrass, an area more than 10-fold greater than 2004. These data suggest that eelgrass is expanding in Lake Apopka, contrary to Dr. Canfield's conclusion. The fact that native aquatic plants are expanding casts serious doubt on Dr. Canfield's conclusion that the current restoration program will not improve habitat for largemouth bass.

Dr. Canfield dismisses the improvements in water quality to date in Lake Apopka with the conclusion that the lake remains in a turbid algal state. However, a complete analysis would consider the enormous improvements in water quality in this lake since the mid-1990s as a result of the restoration program (see attached figure for phosphorus values). These improvements will continue, because the District's nutrient load reduction is only partially implemented. Much of the former farm area still is not flooded because of the need to study the bioaccumulation of pesticide residues from the farm soils. Drainage water still is discharged (with treatment) to Lake Apopka. The District will slowly expand the wetland areas and reduce nutrient loading further in coming years. Lake Apopka already has responded to reduced nutrient loading much more rapidly than many in the scientific community predicted. Average values in recent years for the water quality indicators cited by Dr. Canfield (phosphorus, chlorophyll, Secchi depth) represent a 50% to 70% improvement compared to earlier conditions (see figure, July 2003 – Jan 2006 compared with Jan 1987 – June 1995). Nutrient levels are declining, algal levels are declining, water transparency is increasing and native aquatic plants are increasing. Dr. Canfield's conclusions that the final, restored state of Lake Apopka will not provide improved habitat for largemouth bass are premature.

Lake Apopka Mean Monthly Total Phosphorus. 1987 through January 2006

