

## Report --Field trip by St. John's River Water Management District on Minimum Flows and Levels (MFL) in the Upper Ocklawaha River Basin (UORB) for Peer Reviewers and Stakeholders

### Summary

This field trip took which place on 4 – 28 and 4 – 29 – 2015 it is the first step by the District to establish MFL's for lakes in the UORB. The District staff and (4) peer reviewers as well as the preliminary schedule is enclosed. Dr. Lee Wilson will be the chairman of the Peer Review panel. Preliminary MFL's were presented for the following lakes: Lake Apopka, Lake Dora, Lake Beauclair, Lake Eustis, Lake Harris, Lake Griffin, and Lake Yale.

Ground rules by the district for the MFL's are as follows,

- (1) No minimum flows were used for any springs or lakes or water flows out of the chain of lakes at Lake Griffin.
- (2) The MFL's for each Lake was determined by using the water level variations which existed on them between 1936 and 2014. Targets for low, average, and high water levels have been selected by using the minimum frequency and duration of Lake water levels needed to support wetland areas (low), marsh areas (average) and hardwood swamp areas (high). For each Lake measurements were made of selected areas by transects of plant and soil samples which ran from within the Lake to the upland area. This data was used to support the selected water level and water duration which provided the existing ecology.
- (3) Dr. Fulton stated that the resource values which, are part of the MFL, will not be considered at this time. The resource values include fish and wildlife, detrimental transfers of material, aesthetic and scenic views, filtration and absorption of nutrients, recreation, and boating. (The district list is enclosed). This MFL approach taken by the district is ideally suited to preserve and protect the ecology of a healthy Lake, in which not only the ecology but the resource values are present.

I took the opportunity to point out that Lake Apopka is not a healthy Lake and that what we have now is not what we want. Lake Apopka needs more aquatic plants, such as eelgrass, better boat access and bass fishing, needs to reach the District water quality Restoration goal which is a phosphorus concentration of 55 ppm. Importantly I noted that many of these conditions were recently achieved in 2001 and early 2011 when Lake Apopka was at about 67 feet elevation (NAVD29). At that time desirable eelgrass began growing in many shoreline colonies. They totaled about 500 acres. Boat access was available throughout the Lake. The water quality improved with the phosphorus concentration reaching 65 ppb which is close to the districts goal of 55 ppm.

### Water model for Lake Apopka

Shaw Huang of the District presented a water model for lakes in the UORB. This updated model includes the effects of groundwater flows. The model looks to be an improvement over earlier models in that it

tracks closely to the actual observed water levels. However, a comparison of the model data to the actual observed water levels was shown only for the time between 1995 and 2006. The district's 2005 report (Ocklawaha River Water Allocation study) predicted that the ground water usage would increase dramatically between 2005 and 2010. Also the well levels which were used to calibrate the groundwater effects on the lakes were only sample between 1995 and 2006.

Both I and the peer reviewers stated that more data will be needed to ensure that this water model will provide accurate predictions of water levels in the lakes.

## Questions

During the presentations I asked the following questions which were answered:

Q1 - How much water is in the North Shore at the present time?

Dr. Fulton said that the North Shore is fully flooded at present.

Q 2 – Since the North Shore is fully flooded at this time and Lake Apopka is below its minimum desirable level would it be smart to discharge water from the North shore into Lake Apopka now and be in a better position to receive summer rainfall?

Dr. Hall said that the district was pumping alum treated water from the North Shore district 4 into Lake Apopka which is one of three alum treatment locations located on the North Shore. This particular alum treatment location discharges to the Apopka Beauclair canal.

(Ed note-At the present time this treatment water is returning to Lake Apopka because the lock and dam on the canal is closed. I followed up after the meeting and found that the phosphorus concentrations on the North Shore are high, 300 to 400 ppb. The St. John's has stated that they plan to treat all North Shore discharges with alum, which because of the high levels of phosphorus will not be cheap. Also, the alum treatment which is located on the Duda Lake shoreline ponds is not being used because the high alkalinity in the water from the Duda property which increases the amount of alum needed for treatment. This is another reason why a water model showing the flow from the North Shore into the Lake is needed.)

Later, I took the opportunity to say that the District's 2005 report predicted that the increase in groundwater usage would lower the surface water in Lake Apopka by 2010. The report predicted that the amount of time Lake Apopka would exceed the average elevation of its Regulation Schedule of 67 feet (NAV D29) would fall from 40% to 15% by 2010. I declared that if this happened it would be a death warrant for Lake Apopka. No rebuttal came from a quiet group.

In a discussion on the last day of the tour, Dr. Wilson commented to the effect that Lake Apopka appeared to be the Lake which would be the focus of their MFL work.

Central Florida Water Initiative (CFWI)

During the field trip the subject of CFWI was spoken about and reference was made that Tallahassee was very interested in this Initiative and the MFL's in the UOR basin.

The Central Florida Water Initiative is being developed to determine how much water can be taken from a Floridan aquifer for a period of time extending to 2035. The plan will study whether the Floridan aquifer system is reaching its sustainable limits, and what supplemental water resources will need to be developed. Three water management districts are in the study group; they are the St. Johns River water management district, the Southwest Florida water management district, the South Florida water management district. Also included are the Department of Agricultural and Consumer Services, and all public water supply utilities, and other stakeholders.

The CFWI plan includes developing options for a consistent process to set minimum flows and levels and set a criteria for reserving water for priority water bodies.

#### Conclusions and Questions on the Lake Apopka MFL

- (1) There are two topics I believe FOLA should ask the St. John's District to be added to the Lake Apopka MFL right now.  
The first is to incorporate the resource values criteria into the preliminary MFL. The Lake Apopka MFL should reflect a restored Lake with the phosphorus concentration at or below 55 ppb, or at least a partially restored Lake Apopka with a phosphorus concentration of 65 ppb. This has been achieved when the Lake level was at 67 feet (NAVD29) during 2010 in early 2011. The 67 foot level is the average of the existing Regulation Schedule which has been in place for Lake Apopka for many decades. The resource values include many features needed for increased ecotourism, both in the Lake and on the North Shore.  
Secondly, the like Apopka MFL should include the present and future flow from the Apopka spring. This is necessary to anticipate what can happen to the water levels in the Lake. The District's 2005 report projected that the Apopka spring flow in 2010 would be 40% below its 1988 discharge. Other District measurements show that these Apopka spring flow has decreased from a high of 38.4 cfs in 1971 to a low of 26 cfs in 2011, which is a 32% decrease.
- (2) More information is needed on the following topics:
  - (a) What are the plans that the three water management districts working on the CFWI are considering for the waters of Lake Apopka and the North Shore? Is Lake Apopka considered a priority water body which meets the criteria for water reservation? In my opinion FOLA needs to make sure Lake Apopka is a priority water body in order to assure the Apopka spring flow and excess rainfall from the North shore are available to keep the Lake level at 67 feet. This is the best bet for the lakes restoration.
  - (b) The model of Lake Apopka water levels should be extended to run from 1964 through 2015 and be compared with the actual observed Lake level data. Hopefully, good correlation will be achieved between the model data and the actual Lake levels.

- (c) The model should also use groundwater calibrations through 2015, as well as readings from additional wells in the recharge areas of the UORB.
- (d) Estimates of maximum North Shore storage and the water requirements of the North Shore marsh are needed to determine the best timing of flows between the North Shore and Lake Apopka. The North Shore area is about 20,000 acres in size. Decades of farming the area have caused the peat like soil to subside on approximately 15,000 acres, which are now much lower than the normal level of Lake Apopka. The North Shore can provide a place to temporarily store excess storm water from Lake Apopka. Hence, the level of Lake Apopka can be kept at higher levels without the danger of flooding.
- (e) Water modeling should be expanded to provide a North Shore water model which can reliably predict the expected water levels in the North Shore over a long period of time which extends to 2015. Such a model could then be used to test and optimize the best way in which control the water flow between the North Shore, Lake Apopka, and the Apopka Beauclair canal. Such a system would be extremely helpful in achieving higher water levels in Lake Apopka which will then facilitate reaching the District's goal of 55 ppm in the Lake.

(3) Question on Lake Apopka's present water level.

With all the rainfall the area is experiencing why is Lake Apopka unable to rise above its minimum desirable level of 65.5 (NVAD29)? Possibilities include the following:

- (A) no pumping of excess rainfall in the North Shore area into the Lake,
- (B) a decrease in the potentiometric surface in the Lake Apopka basin due to higher groundwater usage,
- (C) leakage from the lake into the North Shore area,
- (D) Some combination of all of the above.

With regard to leakage into some part of the North Shore I have the following questions:

- (a) When did the district last make a full inspection of all the earth dikes which separate the North Shore from Lake Apopka? If a dangerous leak occurs it could destroy the dike and return most of the North Shore area and the current Lake into one shallow 51,000 acre mucky Lake.
- (b) Has the district a plan for such an emergency?
- (c) If so who would be in charge of rapidly implementing a fix? With the summer storm season approaching and the North Shore about half full of water I believe FOLA needs some answers to these questions.

(4) Water Conservation

The CFWI are developing a water conservation component for the plan. The following are a few ways in which water from the Floridan and aquifer could be conserved by adding these requirements to new or modified consumptive use permits (CUP).

- (1) Require that all new wells including (4) inch wells meets all stringent CUP requirements for the areas in which they are located.
- (2) Require new developments which have large retention ponds to connect them in a way that could make them available for irrigation purposes.
- (3) In all new residential developments require that each irrigation system be made so that it can be separated from the potable water supply and easily connected to treated waste reuse water which might become available in the future. Also each irrigation system should be required to have a rain gauge or soil moisture gauge that automatically prevents irrigation during rainfall events.
- (4) For all new residences to which the developer supplies water using items, the item should use water saving devices, such as low flush toilets.
- (5) Require permit applicants to provide for the storage of reuse water in reservoirs, in this way the steady supply of reuse water can be stored during rainy periods and used for irrigation during dry periods.

J J Hawley (5/5/2015)