

DRAFT version 1 - August 2013

*Harris Chain of Lakes Restoration Council
2013 Report to the Florida Legislature*

Council Members

Hugh Davis, Chairman

Skip Goerner, Vice Chairman

Richard Powers, Secretary

Sid Grow

Robert Johnson

Donald Nicholson

Edward Schlein

Keith Truenow

Lloyd Woosley

November 2013

HARRIS CHAIN OF LAKES RESTORATION COUNCIL

2013 REPORT TO THE FLORIDA LEGISLATURE

In compliance with Chapter 373.467, *Florida Statutes*

Issued by:

Harris Chain of Lakes Restoration Council

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ACKNOWLEDGEMENTS

NOTE: THIS SECTION TO BE UPDATED ONCE PICTURES ARE IDENTIFIED FOR REPORT'S COVER PAGE.

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LIST OF ACRONYMS

BMAP	Basin Management Action Plan
DEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FWC	Florida Fish and Wildlife Conservation Commission
LCWA	Lake County Water Authority
MFLs	Minimum Flows and Levels
NSRA	Lake Apopka North Shore Restoration Area
NuRF	Nutrient Reduction Facility
SJRWMD	St. Johns River Water Management District
SWIM	Surface Water Improvement and Management
TAG	Technical Advisory Group
TMDL	Total Maximum Daily Load
UF	University of Florida

EXECUTIVE SUMMARY

The Harris Chain of Lakes Restoration Council (Council), in conjunction with state and local agency partners, met regularly during the reporting period of November 2012 through October 2013. The Council received technical presentations throughout this time period on studies and initiatives to restore and manage the Harris Chain of Lakes. Based on these technical presentations, the Council has made recommendations on restoration and lake management efforts. These recommendations are summarized below and are detailed in this annual report to the Florida Legislature.

Lake Water Level Management

The Council will continue to provide suggestions to SJRWMD on the water level regulation schedule for the Harris Chain of Lakes, understanding the need for minimum flows and levels (MFLs) and enhanced lake level fluctuations. In addition, the Council recommends implementation of lake level regulation Scenario A1, with the caveat of incorporating a more dynamic process that maintains lake water levels as high as feasible, especially during critical sport fish spawning season, considering flood control, recreational uses, and the treatment capacity of the NuRF. Also, the Council recommends incorporating a hydrologic component addressing downstream water needs and alternative uses in the NSRA into SJRWMD's future NRSA land management plans.

Lake Apopka North Shore Restoration

The Council recognizes that the NSRA is an essential tool to the restoration of Lake Apopka. The Council stresses the importance of the hydrologic reconnection of healthy marshes to Lake Apopka, which would provide critical habitat for fish and wildlife enhancement. In addition, the Council suggests cypress tree plantings could be incorporated into the NSRA land management plan because the tree canopies would provide shade for fish and habitat for birds.

Lake and Canal Dredging

The Council believes that Lake Apopka would benefit from dredging in select areas because internal nutrient cycling appears to contribute to the lake's impairment. The Council recommends that the TAG continue to look for areas of the lake to dredge, determine the cost of the dredging, estimate the quantity of material that could be removed, and identify locations for sediment disposal. The Council further recommends that the appropriate local, state and federal agencies review the information provided by the TAG to determine project feasibility and report back to the Council. In addition, the Council supports implementation of mutually beneficial alternative uses projects that improve the natural resource and generate funds for restoration-related projects that can be used instead of legislative appropriations.

Fisheries

The Council recommends that funding be restored to broaden the monitoring of all lakes in the Harris Chain of Lakes in order to accurately establish the trends of fish populations and the success of fish stocking efforts. The Council supports FWC's fish attractor habitat enhancement program and encourages local citizens and civic organizations to support and participate in the program.

Water Quality

The Council recommends that SRJWMD and other agencies provide regular updates to the Council on water quality, nutrient levels and algal counts within the Harris Chain of Lakes.

Aquatic Plant Management

The Council supports continued funding for invasive aquatic plant management in the Harris Chain of Lakes. In addition, the Council requests \$275,000 for repair of the current mechanical harvester and purchase of an additional mechanical harvester and associated equipment.

1.0 STATUTORY AUTHORITY

The Harris Chain of Lakes Restoration Council (Council) was established by the Florida Legislature in 2001 (Chapter 373.467 *Florida Statutes* [F.S.]) with the powers and duties to: (a) review audits and all data specifically related to lake restoration techniques and sport fish population recovery strategies, (b) evaluate whether additional studies are needed, and (c) explore all possible sources of funding to conduct restoration activities. The legislature also established the Harris Chain of Lakes Restoration Program (Chapter 373.468 F.S.), which directed the Florida Fish and Wildlife Conservation Commission (FWC) and St. Johns River Water Management District (SJRWMD), in conjunction with the Florida Department of Environmental Protection (DEP), pertinent local governments, and the Council to review existing restoration proposals to determine which are the most environmentally sound and economically feasible methods of improving the fish and wildlife habitat and natural systems of the Harris Chain of Lakes.

2.0 2013 MEETINGS AND PRESENTATIONS

The Council conducted seven meetings and two tours during the 2013 reporting period (i.e., November 2012 to October 2013). During this period, the Council received scientific information on restorative measures for the Harris Chain of Lakes and data concerning water quality and aquatic ecological conditions. Several state and local agencies, including SJRWMD, FWC, Lake County Water Authority (LCWA), and the University of Florida (UF), provided technical presentations to the Council. The technical presentations given by these partners to the Council are listed in Table 1.

Members of the Council's Technical Advisory Group (TAG) also provided periodic updates to the Council on various topics related to lake water quality and restoration issues. The members of the TAG are listed in Table 2. All Council meetings were appropriately noticed and open to the public. Members of the public regularly attended Council meetings and provided information and feedback to the Council.

Information from the technical presentations, tours, TAG member updates, and public was reviewed and discussed in detail by the Council. This information was used by the Council as the basis for developing recommendations for future restorative measures and management practices for the Harris Chain of Lakes.

Copies of the meeting minutes and technical presentations for the 2013 reporting period are provided as appendices to this report. The appendices are provided in digital format on the enclosed compact disc and may be downloaded from the Council's website at harrischainoflakescouncil.com.

TABLE 1: TECHNICAL PRESENTATIONS AND TOURS FROM NOVEMBER 2012 TO OCTOBER 2013

Meeting Date	Presentations and Tours
November 2, 2012	<ul style="list-style-type: none"> • 2012 Annual Report to the Legislature Update (Marcy Policastro, Wildwood Consulting, Inc.)
December 7, 2013	<ul style="list-style-type: none"> • Tour of Lake Apopka North Shore Restoration Area
January 4, 2013	<ul style="list-style-type: none"> • Harris Chain of Lakes Largemouth Bass Stocking Update (Denis Renfro, FWC) • Harris Chain of Lakes Community-Supported Fish Attractor Habitat Enhancement Program (Dale Jones, FWC)
February 1, 2013	<ul style="list-style-type: none"> • Lake Apopka North Shore 2013 Land Management Plan (Robert Christianson, SJRWMD) • Lake Levels and Minimum Flows and Levels in the Harris Chain of Lakes (Dave Walker, SJRWMD)
March 1, 2013	<ul style="list-style-type: none"> • Tour of Clean-to-Green Facility at Magnolia Park in Orange County
June 7, 2013	<ul style="list-style-type: none"> • Lake Griffin Canal and Lake Fishery Analysis (Brandon Thompson, FWC) • Water Quality Trends in the Ocklawaha Chain of Lakes (Rolland Fulton, SJRWMD) • The Magnolia Park Initiative at Lake Apopka (Dan Canfield, UF)
August 2, 2013	<ul style="list-style-type: none"> • Emerald Marsh Update (Dennis Renfro, FWC) • Marsh Management (Jo Anna Emanuel, SJRWMD)
September 6, 2013	<ul style="list-style-type: none"> • Water Resource Conditions Update (Dave Walker, SJRWMD) • 2013 Draft Annual Report to the Legislature Discussion (Steve Fitzgibbons, SJRWMD)
October 4, 2013	<ul style="list-style-type: none"> • Lake Apopka Legislative Funding and Project Update (Denis Renfro, FWC) • Largemouth Bass Stocking Update (Mike Allen, UF, and Denis Renfro, FWC) • 2013 Draft Annual Report to the Legislature Discussion (Steve Fitzgibbons, SJRWMD)

TABLE 2: 2012 TECHNICAL ADVISORY GROUP MEMBERS

Agency	Representative
DEP	Christianne Ferraro
FDOT	Stephen Tonjes
FWC	Dennis Renfro
LCWA	Michael Perry
SJRWMD	Walt Godwin
UF	Mike S. Allen
U.S. Army Corps of Engineers	Vacant

3.0 COUNCIL FINDINGS AND RECOMMENDATIONS

This section outlines the discussions and recommendations by the Council based on information received during the reporting period.

3.1 Lake Water Level Management

In January 2013, Dennis Renfro presented information about FWC's largemouth bass stocking. As part of that presentation, the Council discussed FWC's consideration of an optimized water level enhancement schedule for Lake Apopka and Lake Griffin from a fisheries management standpoint and coordination of any enhanced schedule with minimum flows and levels (MFLs). Understanding that meeting MFLs and enhanced lake level fluctuations are each individual goals, the Council agreed to provide suggestions to SJRWMD on the water level regulation schedule for the Harris Chain of Lakes.

Robert Christianson, SJRWMD, briefed the Council in February 2013 on SJRWMD's Lake Apopka North Shore Restoration Area (NSRA) 2013 Land Management Plan. Lake level fluctuations and water level management were discussed. Some council members suggested that SJRWMD's land management plan should include a hydrologic component that addresses how much water is needed to support the downstream system within the Harris Chain of Lakes and alternative uses for the NSRA.

Dave Walker, SJRWMD, provided a presentation to the Council in February 2013 on lake level management and development of MFLs for the Harris Chain of Lakes. SJRWMD is simultaneously developing lake level regulations and MFLs for lakes in the Upper Ocklawaha River Basin. MFLs are required to be established to protect natural resources and non-consumptive uses of water. MFLs are defined as the limits at which further withdrawals cause significant harm to the water resources or ecology. The technical concept for MFLs is to define a new minimum hydrologic regime based on water budget models that define a system's hydrologic statistics. The hydrologic statistics include magnitude, duration and frequency of different lake water levels. Multiple MFLs protect high, intermediate and low hydrologic conditions. A high water level target will be set to allow flooding of the floodplain habitat, prevent encroachment of the uplands and protect organic soils. An average water level target will be set to protect wetlands and organic soils from excessive draining. A low water level target will also be set to allow for seed germination and lake sediment consolidation. SJRWMD's approach for implementing an interim lake level schedule for the Harris Chain of Lakes and Lake Apopka includes using two scenarios identified as A and A1. Scenario A would raise the "recession" portion of the schedule hydrograph during the spring to keep water levels higher for a longer period of time in the Super Pond and Lake Griffin. Scenario A1 would likewise raise the "recession" portion of the schedule hydrograph during the spring and raise the "floor" portion of the schedule hydrograph during the summer to keep more water in the Super Pond and Lake Griffin for a longer period of time during fall.

The Council will continue to provide suggestions to SJRWMD on the water level regulation schedule for the Harris Chain of Lakes, understanding the need for minimum flows and levels (MFLs) and enhanced lake level fluctuations. In addition, the Council recommends implementation of lake level regulation Scenario A1, with the caveat of incorporating a more dynamic process that maintains lake water levels as high as feasible, especially during critical sport fish spawning season, considering flood control, recreational uses, and the treatment capacity of the NuRF. Also, the Council recommends incorporating a hydrologic component addressing downstream water needs and alternative uses in the NSRA into SJRWMD's future NSRA land management plans.

3.2 Lake Apopka North Shore Restoration

The Council toured the NSRA in December 2012. The Council examined hydrologic interconnect infrastructure components needed to manage water in the NSRA, including the recently upgraded Unit 1 pump system and McDonald Canal. Dave Walker, SJRWMD, and Gian Basili, SJRWMD, provided an overview of SJRWMD's land management and restoration activities related to the NSRA. The Lake Apopka Marsh Flow-Way was observed, which is a 760-acre constructed wetland system along the northwest shore of Lake Apopka that removes phosphorus and suspended material in Lake Apopka by moving water through the constructed wetlands. The Council inspected a gizzard shad harvesting facility where Dave Walker, SJRWMD, discussed the 2013 harvest efforts. The Council reviewed an aquatic vegetation-planting site and Bruce Jagers, FWC, provided detail on planting efforts to provide fish habitat and wave protection for the shoreline. LCWA's NuRF was examined and Ron Hart (LCWA) described how the facility removes nutrients flowing from Lake Apopka into the rest of the Harris Chain of Lakes.

Robert Christianson, SJRWMD, briefed the Council in February 2013 on SJRWMD's NSRA 2013 Land Management Plan. The plan has a 10-year planning horizon and was last updated in 2006. The plan includes providing floodwater storage for lake level fluctuations, initiating mixed marsh restoration and management activities, wildlife habitat and recreational trails and infrastructure. In addition, the plan includes continued implementation of the Lake Apopka Marsh Flow-Way project and other water resource infrastructure to improve water quality in Lake Apopka and reducing phosphorus discharge into Lake Apopka through acquisition and restoration of farmland. Mr. Christianson noted that discussions and modeling were used to formulate the land management plan. Although a goal of the management plan is to minimize the transfer of phosphorus from the NSRA into Lake Apopka, some agriculture uses in the NSRA would still be consistent with the land management plan.

Jo Anne Emmanuel, SJRWMD, provide a marsh management presentation to the Council in August 2013. The presentation summarized the types of freshwater marsh vegetation, shoreline vegetation zones and natural and other disturbances to a marsh (e.g., hydrologic changes, fire, invasive and exotic species invasions). Detailed information was provided relative to invasive and exotic species and control methods utilized in the NSRA. Mechanical, hydrological, herbicide and fire control methods are utilized based on the species being targeted. The desired future condition for NRSA is a mixed marsh consisting of emergent marsh (30–70% coverage), open water (10–30% coverage), and other components, such as wet prairie and mudflats (10–30% coverage). Willow and shrub encroachment is a specific concern in the NSRA and control actions are initiated when species encroachment exceeds 20% of an individual NRSA phase or cell. To control willows and shrubs, multiple treatments are implemented based on the season of the year. Based on past NRSA willow control activities, it has been concluded that fire control is the least costly (\$10–50 per acre) treatment method, but is ineffective at reducing coverage of mature willow. Flooding and overtopping seedling willow for extended periods has resulted in willow mortality. Activities that expose soil or provide saturated soils in January through March provide ideal conditions for the establishment of willow. Interruptions in natural disturbance cycles (e.g., fire, flooding) aids in the development of conditions that are favorable for willow invasion. Mechanical treatments reduce stature of willow, but increase stem densities through

adventitious rooting. Harris Council Member Nicholson suggested that cypress tree plantings could be incorporated into the NSRA land management plan because the tree canopies would provide shade for fish and habitat for birds.

The Council recognizes that the NSRA is an essential tool to the restoration of Lake Apopka. The Council stresses the importance of the hydrologic reconnection of healthy marshes to Lake Apopka, which would provide critical habitat for fish and wildlife enhancement. In addition, the Council suggests cypress tree plantings could be incorporated into the NSRA land management plan because the tree canopies would provide shade for fish and habitat for birds.

3.3 Lake and Canal Dredging

3.3.1 Lake Beauclair and Apopka-Beauclair Canal Dredging

The purpose of the dredging project in Lake Beauclair and the Apopka-Beauclair Canal was to improve navigation and prevent nutrient and organic rich bottom sediments from being re-suspended by boat and wind activity. LCWA entered into an agreement with FWC for sediment removal and dredging in the lake began in September 2011. Dredging was temporarily suspended for some summer months in 2012 because of concerns about disturbing organic-rich bottom sediments during a period of high water temperature and, subsequently, reducing dissolved oxygen concentrations, which could result in fish kills. During 2012 and 2013, Mike Perry, LCWA, provided regular updates to the Council and announced in June 2013 that the dredging project was successfully completed.

3.3.2 Lake Apopka Dredging at Magnolia Park (Orange County)

A Lake Apopka Summit was held in December 2011 and resulted in the formation of the Lake Apopka Restoration Team. The interagency team, consisting of staff from DEP, FWC, LCWA, SJRWMD, UF and Orange and Lake counties, was tasked with identifying projects that could be implemented using a \$4.8 million appropriation from the Legislature for Lake Apopka restoration. Among other projects, the dredging project at Magnolia Park was identified by the restoration team to receive a portion of the appropriation. The Florida Legislature had requested UF to conduct a demonstration project for lake bottom sediment dewatering systems. The Legislature asked for the cost per yard of dredged material and whether this cost could be reduced by sale or reuse of the material. The purpose of the demonstration project was to determine if the project's dredging process had possible application to other lakes in the state with limited areas for dredged spoil disposal, if native aquatic plants will re-establish after dredging, and if bottom sediment from other areas of the lake will migrate and re-settle in the dredged area.

The demonstration project was located at Magnolia Park in Orange County and focused on dredging the navigation channel to open water using the Clean-to-Green dredging system and Genesis dewatering solution. The project tested the use of geotubes to consolidate and store dredged materials, and whether the material could be directly stored in geotubes or needed to be removed and dewatered prior to storage. Alternatives for armoring the dredged areas to prevent refilling with bottom material were to be investigated as part of the project. Project permitting began in 2011. After some permitting-related modifications, DEP and the U.S. Army Corps of Engineers approved the project in the spring of 2012. Dredging began in late 2012.

Dan Canfield, UF, provided updates to the Council in January and February 2013 on the project and indicated that Lake Apopka was chosen because the lake bottom consisted of both solid and fluid materials. The project's dredging process was to determine if the lake bottom material could be removed, made available for other uses and the water returned back to the lake without harming the habitat. Iron was used, instead of alum, to process the water before returning it to the lake because of the potential to use the dredged materials in fertilizer. The Council conducted a site visit of the demonstration project in March 2013.

Dan Canfield, UF, provided a final project briefing to the Council in June 2013. He indicated the project was a public-private partnership that included UF's Institute of Food and Agricultural Sciences (UF/IFAS) and Clean-to-Green, Inc. The project concluded in May 2013. The project was originally estimated to last for an eight-week period, but took longer than expected. The treatment system for the dredged material consisted of the following: dredging, removal of large solids, treatment to improve water quality, removal of fine solids, return quality water to lake and beneficially reusing dredged materials. The treatment system originally included trucking dredged materials to an off-site location for further treatment, but the materials ended up being too wet to be moved. As the project proceeded, water quality monitoring showed that lake water at the dredge intake contained high levels of phosphorus, but the return water contained significantly lower levels. However, the return water also contained other residuals (e.g., chlorine). A pond, geotubes and other devices were used to treat the residuals, but this caused the projects' footprint to be enlarged. Dan Canfield concluded that similar dredging projects would need to have more rapid dewatering methods or a larger footprint and that future use of alum to treat water would decrease while the use of iron would increase.

3.3.3 Other Lake Apopka Dredging Projects

During 2013, the Lake Apopka Restoration Team investigated implementation of a dredging project in Lake Apopka near Winter Garden. The dredging project near Newton Park in Winter Garden was an estimated \$3 million dredging project that grew out of the Lake Apopka Summit, hosted by Senator Alan Hays. The project was to include dredging of a boat access channel and along a portion of the shoreline for habitat improvement. Funding for the project was to come from 2012 legislative appropriations for Lake Apopka administered by FWC. As a first step in the process, independent consultants were hired to perform hydrologic and engineering assessments to consider various alternative project designs. The consultants found that the project as originally conceptualized and budgeted is likely not feasible, primarily due to depth of muck (up to 32 feet) and current lake level (at current level of 63.2 feet, maintenance dredging would be required every 7 to 12 years). Under the current low lake level conditions, maintenance of the dredged area would be costly and would require a significant financial and resource commitment from the City. Upon return of higher lake levels (65 feet or higher), a project of this design may be more feasible. The City would still need to maintain the area but at higher lake levels, it may be less prohibitive. SJRWMD, FWC, and DEP are investigating other potential public access projects on the west side of Lake Apopka that may be options for the existing legislative appropriation.

Dave Walker briefed the Council in August 2013 on a potential dredging/agricultural production project at Lake Apopka. SJRWMD issued in July 2013 a solicitation for proposals to explore the feasibility of such a project. The project would entail removal by dredging of flocculent sediment

from the bottom of Lake Apopka, transport of the material to the north shore of the lake, spreading the materials on land owned by SJRWMD, and management of the lands involved for the agricultural production and removal of a grass crop. Council members expressed both concern about the project's potential financial impact to local growers and support for mutually beneficial alternative use projects that improve natural resources.

The Council believes that Lake Apopka would benefit from dredging in select areas because internal nutrient cycling appears to contribute to the lake's impairment. The Council recommends that the TAG continue to look for areas of the lake to dredge, determine the cost of the dredging, estimate the quantity of material that could be removed, and identify locations for sediment disposal. The Council further recommends that the appropriate local, state and federal agencies review the information provided by the TAG to determine project feasibility and report back to the Council. In addition, the Council supports implementation of mutually beneficial alternative uses projects that improve the natural resource and generate funds for restoration-related projects that can be used instead of legislative appropriations.

3.4 Fisheries

3.4.1 Sport Fish Stocking

Dale Jones, FWC, updated the Council in January 2013 on FWC's Harris Chain of Lakes largemouth bass stocking efforts. FWC's primary fish stocking method involves the use of fingerlings (1 to 2 inches in length). FWC is also developing other fish stocking methods that involve the use of advanced fingerling (4 to 6 inches in length) and transferring adult fish. The results of FWC's Lake Griffin stocking study indicated that advanced fingerling stocked in 2010 contributed to less than 5% of the bass population samples and that natural recruitments of bass improved due to increases in submerged aquatic vegetation (SAV) habitat. Accordingly, the focus of research stocking efforts shifted to ponds and small lakes. Relative to the transfer of adult fish, FWC monitored these efforts in Lake Griffin and Lake Dora. FWC noted that transferred bass disappeared within two years of stocking even with no increase in the level of fishing effort. FWC suggested the transfer of adult fish is a tool that needs further development, and, at this point, should be considered on a case-by-case basis.

In June 2013, Brandon Thompson, FWC, presented the Lake Griffin Canal and Lake Fishery Analysis. FWC utilizes trends in fish catch rates because it is very difficult to estimate fish populations in large lakes. Though canals represent approximately 1% of the lake area, they contain substantial shoreline and spawning habitat. Canals were not sampled in 2012, but FWC's historical data shows that catch rates (not population) are similar in the lakes and canals, and that catch rates have increase since 2009 with the expansion of vegetation in the lake. FWC's analysis concluded that canals in Lake Griffin significantly contribute to the bass fishery; bass in the lake and canals comprise a population that moves freely between the lake and canals; trends observed on the lake represent the entire fishery; and improvements in habitat continues to drive the entire Lake Griffin bass fishery (lake and canals).

The Council had several discussions in 2013 about FWC's fish stocking data and monitoring efforts. Some council members suggested that monitoring should be expanded in the canals and marshes because of the vegetation and habitat increases in these areas. In addition, some Council

members expressed concern about monitoring of only portions of lakes instead of monitoring the whole system of lakes.

In August 2013, Dennis Renfro, FWC, briefed the Council on the installation of unmanned game cameras at boat access points for Emerald Marsh. The cameras record all boats entering and exiting the marsh and allow data analysis relative to an angler's amount of time spent fishing and corresponding level of effort. In addition, the data allows for a better understanding of the economic impacts of anglers (i.e., local or out-of-state anglers). The data from the cameras is supplemented with angler interviews from the boat access points. FWC anticipates expanding the camera program in the future to other areas.

3.4.2 Fish Attractor Program

Dennis Renfro, FWC, briefed the Council in January 2013 on FWC's fish attractor habitat enhancement program for fiscal year (FY) 2013–2014. The program is a two-phased community-based fishing improvement initiative. The first phase includes utilization of local, state and federal resources to construct fish attractors. The second phase consists of local residents assuming ownership of the program, including organizational, fiscal and construction responsibilities. Program goals include concentrating sport fish for anglers, enhancing angler utilization of existing fish populations, building community participation and support for the Harris Chain of Lakes, and evaluating the economic impact of the fish attractor program. The estimated life span of the attractors is three to five years. The program has been successfully implemented in other areas.

In June, August and September 2013, Dennis Renfro, FWC, provided updates to the Council about the fish attractor program. Several civic organizations, including Friends of Lake Apopka (FOLA), Hawthorne Fishing Club, Mosquito Creek Outdoors and Harris Chain Bassmasters, had volunteered to assist with the program. These groups participated in the construction of one-fourth acre fish attractors along the southern shoreline of Lake Apopka. As of August 2013, 31 one-fourth acre fish attractors have been installed and an additional 10 are scheduled to be installed by November 2013. All fish attractors will be marked with state regulatory buoys and FWC will produce a location map for distribution to anglers.

The Council recommends that funding be restored to broaden the monitoring of all lakes in the Harris Chain of Lakes in order to accurately establish the trends of fish populations and the success of fish stocking efforts. The Council supports FWC's fish attractor habitat enhancement program and encourages local citizens and civic organizations to support and participate in the program.

3.5 Water Quality

Rolland Fulton, SJRWMD, gave a presentation to the Council in June 2013 on water quality trends since the baseline years (e.g., 1990s) in the Ocklawaha Chain of Lakes. Total phosphorus (TP) is a nutrient that is required by all plants, but if concentrations get too high it can cause detrimental algal blooms. Algae are one of the bases for the food chains in lakes and *chlorophyll-a* is a measure of the amount of algae in the water. If algal concentrations get too high, it also can be detrimental. In Lake Apopka, TP loads, TP concentrations and *chlorophyll-a* have been decreasing in lakes Apopka, Beauclair, Carlton, Dora and Griffin, and generally approaching the

TMDL targets. In Lake Harris, TP loads and *chlorophyll-a* have been decreasing, but TP concentrations has been slightly increasing. In Lake Eustis, there has only been a slight decrease in TP concentrations and *chlorophyll-a*. In Lake Yale, TP loads, TP concentrations and *chlorophyll-a* has been increasing. Lake Yale's water quality issues may be associated with the loss of submerged aquatic vegetation.

There were relatively high chlorophyll levels in some lakes in 2005, following the two hurricanes that passed through the area in fall 2004. Water quality and transparency appear to decrease during drought years. All of the lakes showed evidence of water quality deterioration during drought years, although the effects appear to be the strongest in Lake Apopka. Water quality deteriorates during droughts due to nutrients becoming concentrated in a smaller area (volume) of lake water, being released from wetland soils that have dried out and oxidized, increasing their residence time in a lake from not being washed downstream. Rolland Fulton, SJRWMD, also noted in June 2013 that Lake Apopka is expected to meet the TMDLs under the planned restoration actions. DEP established a working group to develop a BMAP to implement TMDLs. DEP plans to address lakes Trout, Yale and Harris not meeting their TMDLs.

The Council recommends that SRJWMD and other agencies provide regular updates to the Council on water quality, nutrient levels and algal counts within the Harris Chain of Lakes.

3.6 Aquatic Plant Management

3.6.1 Invasive Aquatic Plant Management

During the September 2012 meeting, Nathalie Visscher, FWC, presented the agency's invasive aquatic plant management plan for the Harris Chain of Lakes for the FY 2012–2013. During the spring of each year, FWC estimates the necessary level of aquatic plant control, and develops management plans and budgets for the next year for each lake being managed. The acreage of aquatic plants needing control for each lake are estimated based on past actions, present lake conditions and other activities that are occurring in the watershed.

The statewide funding for invasive aquatic plant management for FY 2012–2013 is the same as last fiscal year, but has been reduced by \$9.9 million since FY 2008–2009. FWC will continue to manage invasive aquatic plants in the lakes and canals of the Harris Chain of Lakes during FY 2012–2013. Current plans for the next fiscal year call for the control of about 2,000 acres of hydrilla and about 200 acres of floating plants in the Harris Chain of Lakes. Funding and acres of plants projected for management are assigned to each lake; however, FWC can increase the acreage to be managed and/or move the funding between lakes in an area if the cost for invasive aquatic plant management warrants greater action on a particular lake.

3.6.2 Mechanical Harvesting of Nuisance Aquatic Vegetation

In 2007, the Council purchased a used mechanical harvester utilizing legislative appropriations. The harvester is used to remove near shore, nuisance aquatic vegetation at the request of property owners and homeowner associations throughout Lake County, and is maintained and operated by UF's LAKEWATCH volunteers. In 2013, the Council discussed the beneficial impacts of the mechanical harvester and the positive response received from the community about the harvester. This program has been very successful at maintaining waterways and, based on the

high demand for its services, has proven to be very popular with the residents of the county. However, the mechanical harvester now requires significant maintenance and repair due to its age, which limits how often it can be used.

3.6.3 North Shore Habitat Creation and Wave Attenuators

Dennis Renfro, FWC, briefed the Council in August on FWC's efforts to create a desirable water depth and substrate to support submerged aquatic vegetation along the north shore of Lake Apopka. In addition, the effort involves installation of structures (i.e., wave attenuators) to attenuate wave energy to increase plant survival and expansion at the north shore habitat project.

The Council supports continued funding for invasive aquatic plant management in the Harris Chain of Lakes. In addition, the Council requests \$275,000 for repair of the current mechanical harvester and purchase of an additional mechanical harvester and associated equipment.