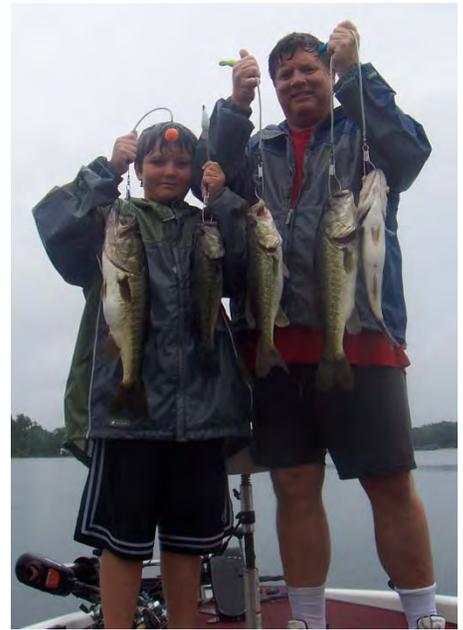


Harris Chain of Lakes Restoration Council 2012 Report to the Florida Legislature

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 2012



HARRIS CHAIN OF LAKES RESTORATION COUNCIL

2012 REPORT TO THE FLORIDA LEGISLATURE

In compliance with Chapter 373.467, *Florida Statutes*

Issued by:

Harris Chain of Lakes Restoration Council

Hugh Davis, Chairman
Skip Goerner, Vice Chairman
Richard Powers, Secretary
Sid Grow
Robert Johnson
Donald Nicholson
Edward Schlein
Keith Truenow
Lloyd Woosley

Prepared by:

Wildwood Consulting, Inc.



November 2012

ACKNOWLEDGEMENTS

The cover photographs were provided by the Florida Fish and Wildlife Conservation Commission (top, right picture), Mike Perry (bottom, right picture), and Bonnie Whicher Photography for the City of Tavares (panoramic picture at the bottom).

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LIST OF ACRONYMS

BMAP	Basin Management Action Plan
cfs	Cubic Feet Per Second
FDEP	Florida Department of Environmental Protection
FWC	Florida Fish and Wildlife Conservation Commission
LCWA	Lake County Water Authority
MFLs	Minimum Flows and Levels
NSRA	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 its state and local agency partners, met regularly during the reporting period of November 2011 through October 2012. 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 recommended implementation of Scenario A1 with the caveat of incorporating a more dynamic process to manage lake water levels to maintain those levels as high as feasible while considering flood control, recreational uses, and the treatment capacity of the Nutrient Reduction Facility (NuRF). A water level regulation decision chart would benefit the public showing under what hydrologic conditions the locks would be opened. Additionally, the Council has concerns about water being discharged from the Harris Bayou due to elevated phosphorus levels in the releases; therefore, discharges from the bayou should be limited to only emergency conditions. The Council also requests that the St. Johns River Water Management District (SJRWMD), in cooperation with appropriate state, local, and federal agencies, focus its efforts to maintain the highest water levels achievable in the Harris Chain of Lakes during critical sport fish spawning seasons.

Lake Apopka North Shore Restoration

The Council recognizes that the North Shore Restoration Area (NSRA) is an essential tool to the restoration of Lake Apopka. The Council also stresses the importance of the hydrologic reconnection of healthy marshes to Lake Apopka, which would provide critical habitat for fish and wildlife enhancement. The Council will be requesting that the Technical Advisory Group (TAG) provide information on what constitutes a functioning healthy marsh in the NSRA. The Council recommends that options be investigated to connect the entire NSRA, or portions thereof, to Lake Apopka in a timely manner. In addition, the Council asks SJRWMD to provide annual detailed updates to the Council on pesticides levels in fish and other wildlife in the NSRA.

Lake Beauclair and Apopka-Beauclair Canal Dredging

The Council supports the ongoing dredging of Lake Beauclair and the Apopka-Beauclair Canal by the LCWA in cooperation with the Florida Fish and Wildlife Conservation Commission (FWC) and SJRWMD.

Lake Apopka Dredging

The Council recognizes 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.

Vegetation Mapping

The Council recommends the collection of seasonally comparable, time-series data sets on the spatial occurrence of aquatic plants as one of several metrics to assess overall lake health and conditions, as well as effectiveness of the restoration program for the chain of lakes. All agencies collecting aquatic plant occurrence data should follow a common protocol with geo-referencing to enable the sharing and geospatial analysis of the consolidated, interagency aquatic plant occurrence database.

Invasive Aquatic Plant Management

The Council supports continued funding for invasive aquatic plant management in the Harris Chain of Lakes.

Mechanical Harvesting of Nuisance Aquatic Vegetation

The Council requests \$275,000 for repair of the current mechanical harvester and purchase of an additional mechanical harvester and associated equipment.

Sport Fish Stocking

The Council recognizes that restoration of the Harris Chain of Lakes will most likely take decades to achieve. The transfer of wild adult largemouth bass from other waterbodies to the Harris Chain of Lakes is a cost effective way to maintain the economic vitality of the sport fishing recreation industry in the region until aquatic habitat can be restored and a sustainable, highly productive fishery is achieved. The Council, therefore, recommends an annual appropriation of \$225,000 for the continuation of the wild adult bass stocking program for the Harris Chain of Lakes.

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 and audit 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 (FDEP), 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 SUMMARY OF 2012 MEETINGS AND PRESENTATIONS

From November 2011 through October 2012, the Council held nine regular monthly meetings. Throughout the year, the Council received scientific information and data concerning water quality and aquatic ecological conditions and information on restorative measures for the Harris Chain of Lakes from several state and local agencies. These entities include SJRWMD, Lake County Water Authority (LCWA), FWC, and the University of Florida (UF). The technical presentations given by these partners to the Council are listed in Table 1. Specific topics included:

- Management of lake water levels
- Water quality conditions and trends
- Vegetation mapping and control of nuisance aquatic vegetation
- Sport fish stocking to provide economic benefits to the region
- In-lake and canal dredging to improve water quality and provide boat access
- Several other lake science and management topics

The information received was reviewed and discussed by the Council in detail, and used 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 the presentations given during the 2012 reporting period (November 2011 through October 2012) are provided as appendices to this report. The appendices are provided in digital format on the enclosed compact disc and also may be downloaded from the Council's website at www.harrischainoflakescouncil.com.

TABLE 1: TECHNICAL PRESENTATIONS FROM NOVEMBER 2011 THROUGH OCTOBER 2012

Meeting Date	Presentations
November 4, 2011	Dave Walker, SJRWMD, gave a presentation on agency plans for temporary management of lake levels through reduced discharges from control structures.
January 6, 2012	Nathalie Visscher, FWC, gave a presentation on current and historical vegetation mapping of the Harris Chain of Lakes. Dan Canfield, UF, provided an update on the U.S. Environmental Protection Agency's proposed numeric nutrient criteria rule and the implications for the Harris Chain of Lakes.
March 2, 2012	Jim Gross, SJRWMD, gave a presentation on the minimum flows and levels development process.
April 6, 2012	Joe Branham and Bill Baxley gave presentations on the hydrology of Bugg Spring, which provides spring flow to Lake Harris.
May 4, 2012	Mike Cullum, SJRWMD, gave a presentation on lake water level management in the Harris Chain of Lakes.
June 1, 2012	Mike Cullum, SJRWMD, gave a follow-up presentation on lake water level management and the proposed interim operating schedule for the Harris Chain of Lakes.
July 13, 2012	Michael Coveney, SJRWMD, gave a presentation on the ecological considerations in setting lake water level regulation targets for the Harris Chain of Lakes.
September 7, 2012	Dave Walker, SJRWMD, provided an update on the Lake Apopka North Shore Restoration Area projects. Nathalie Visscher, FWC, gave a presentation on FWC's aquatic plant management plan for the Harris Chain of Lakes for 2012-2013. Brandon Thompson, FWC, gave a presentation on FWC's research on phase II bass stocking and sampling.
October 5, 2012	Michael Coveney, SJRWMD, provided an update on the pesticide residuals in the fish in the Lake Apopka North Shore Restoration Area (NSRA).

Also during the 2012 reporting year, several members of the Council's Technical Advisory Group (TAG) provided periodic updates on lake water quality and restoration issues being reviewed by the Council. The members of the TAG are listed in Table 2.

TABLE 2: 2012 TECHNICAL ADVISORY GROUP MEMBERS

Agency or Organization	Representative
SJRWMD	Walt Godwin
FDEP	Dave Herbster
FWC	Dennis Renfro
Florida Department of Transportation	Stephen Tonjes
U.S. Army Corps of Engineers	Vacant
UF/LAKEWATCH	Daniel Canfield
LCWA	Michael Perry

3.0 COUNCIL FINDINGS AND RECOMMENDATIONS

This section outlines the discussions and recommendations by the Council based on information received during the reporting period. These recommendations include additional projects and funding needed to effectively implement restoration measures for the Harris Chain of Lakes in the upcoming year.

3.1 Lake Water Level Management

Dave Walker, SJRWMD, reported at the November 2011 meeting that SJRWMD was again making temporary changes to the discharge schedules for the Apopka, Burrell, and Moss Bluff locks and dams due to expected drought conditions in early 2012 associated with a predicted La Niña event. The proposal was to have zero discharge from the Apopka and Burrell locks and dams and limit the discharge at the Moss Bluff Lock and Dam to 10 cubic feet per second (cfs). This same temporary operation schedule was used in 2011, and the lakes rose about six inches during that time, although there was also more rain than expected.

The Council expressed concern about the effect of the temporary change in the discharge schedules on water levels in Lake Griffin. If the predicted drought conditions were to occur, water levels in Lake Griffin could be reduced during the critical, sport fish spawning period thus having a potential longer term effect on fish populations. Lower lake water levels would affect the amount of vegetation in the lake, which would reduce the amount of spawning habitat available. Effects on the local economy and property owners on Lake Griffin also could result.

In January 2012, SJRWMD held a public meeting to discuss the proposed temporary change in the discharge schedule. During the meeting, there was public input requesting a 23-23-0 cfs discharge schedule at the Apopka, Burrell, and Moss Bluff locks and dams, respectively. SJRWMD implemented this schedule through April 27, 2012. On April 27, SJRWMD changed the discharge schedule to 0-0-0 cfs because levels in Lake Apopka had dropped by two feet within the last year, and SJRWMD was concerned about the effects of the low lake water levels on the restoration efforts.

Kraig McLane, SJRWMD, stated during the April 2012 meeting that SJRWMD was looking to implement an interim lake water level regulation schedule by June 2012. The goal of this interim regulation schedule would be to hold water longer in the Super Pond (lakes Beauclair, Carlton, Dora, Eustis, Harris, and Little Lake Harris). SJRWMD is also developing a revised lake water level regulation schedule for the Harris Chain of Lakes that should be in place in 2014. Mike Cullum, SJRWMD, during the May 2012 meeting, provided details on SJRWMD's analysis to develop the interim lake water level regulation schedule. It is anticipated that the interim regulation schedule would be implemented during June 2012 through late 2014. The current regulation schedule includes minimum desirable and maximum desirable water levels for Lake Apopka, the Super Pond, and Lake Griffin.

The Council expressed concerns about how quickly water could be released from the lakes to prevent flooding in the case of a tropical storm or hurricane. For the Harris Chain of Lakes, the critical sport fish spawning season and peak tourism period is during the winter through the early spring season. Lake water levels must be maintained at their highest possible level during these months to support the local economy. Unfortunately, this is normally a dry period in central Florida. In addition, the Council members were concerned about the effects of the regulation schedule on the amount and types of aquatic vegetation in the lake system. Mike Perry, LCWA, stated that the Nutrient Reduction Facility (NuRF) is capable of treating flows up to 300 cfs from Lake Apopka. He expressed concern that if the discharge is allowed to be greater than this threshold, a portion of the flow would bypass the NuRF and the water quality benefits that have been gained by the project would quickly disappear.

Mike Cullum presented options for an interim lake water level regulation schedule at the June 2012 meeting, which were also discussed at a SJRWMD public meeting in Leesburg on May 31, 2012. For the analysis, the baseline condition was modeled as the current regulation schedule, which includes minimum desirable and maximum desirable water levels for Lake Apopka, the Super Pond, and Lake Griffin. When looking at the different interim lake water level scenarios, SJRWMD's top priority was flood protection. SJRWMD determined two potential scenarios: (1) Scenario A, which would raise and delay 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 from March through June (see Figure 1); and (2) Scenario A1, which would likewise raise and delay the "recession" portion during the spring and also raise the floor portion of the schedule hydrograph during the summer to keep more water in the Super Pond and Lake Griffin during a longer period of time into the fall (see Figure 2). Neither interim schedule option would result in any changes to the Lake Apopka regulation schedule because the NSRA is not ready to receive water from the lake.

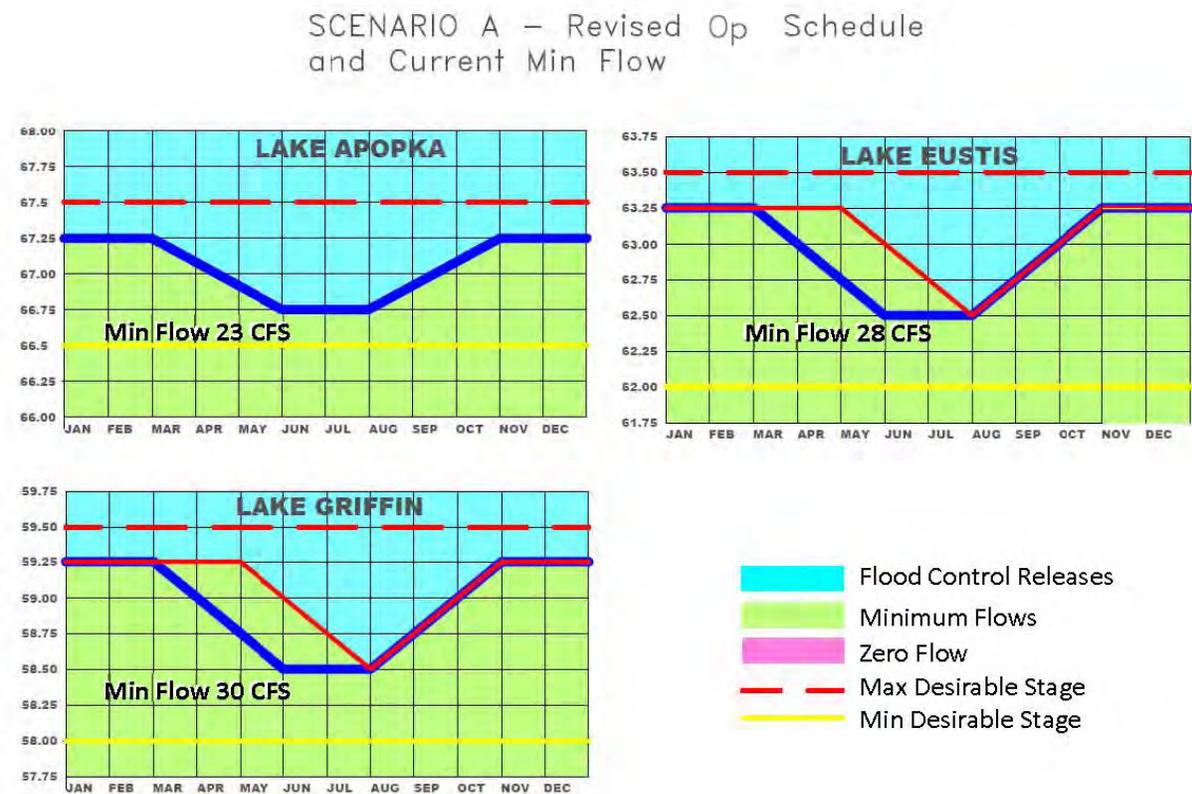


FIGURE 1: SCENARIO A PROPOSED LAKE LEVELS OPERATION SCHEDULE

SCENARIO A1 – Revised Op Schedule and Current Min Flow

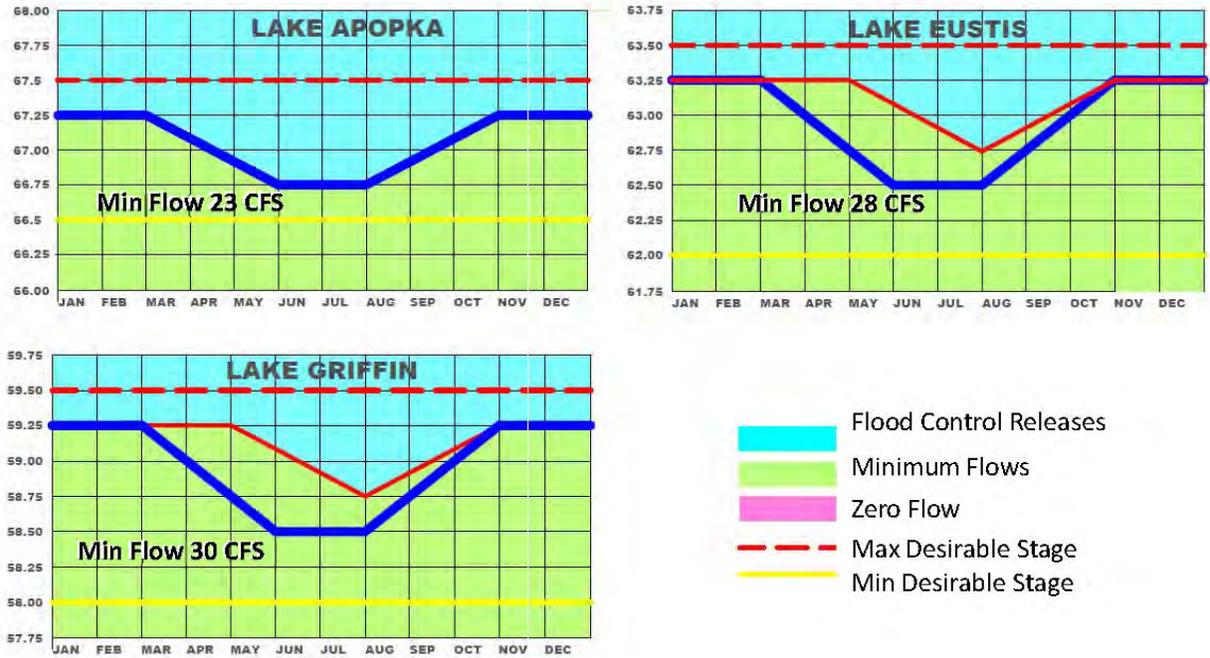


FIGURE 2: SCENARIO A1 PROPOSED LAKE LEVELS OPERATION SCHEDULE

Michael Coveney, SJRWMD, explained at the July 2012 meeting the ecological considerations of setting targets for lake water level management. The primary ecological goal is to preserve healthy lake floodplain communities for fish and wildlife. This ecological goal has to be balanced with other considerations, such as flood control, water quality, recreation, navigation, and water supply and storage. SJRWMD is currently developing two sets of lake water level targets: (1) minimum flows and levels (MFLs), and (2) lake water level regulation schedule. As part of the MFLs targets developed, SJRWMD is looking at the magnitude, duration, and return interval of different lake water levels. 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. Data were collected from 20 field wetland transects, which will be used by SJRWMD staff to determine the targets for the Harris Chain of Lakes.

Jim Gross, SJRWMD, provided information at the March 2012 meeting on the MFL development process. MFLs set a limit beyond which further water withdrawals would be significantly harmful to the water resources and ecology of the water body. The MFLs are established using predictive mathematical models. These models also are used to determine the potential effects of groundwater withdrawals on lake water levels. Separate groundwater and

surface water models are used in the evaluation with the output datasets from the groundwater model providing input to the surface water model.

Establishing MFLs for the Harris Chain of Lakes will be a more difficult process as compared to other natural lakes systems because it is a regulated hydrologic system. Work began in 2009 with initial, field intensive data collection. SJRWMD has now completed most of the 22 soil and vegetation surveys planned for the lake system and the Ocklawaha River downstream of the Moss Bluff Lock and Dam. The agency is currently developing the predictive models needed to help establish preliminary MFLs. The remaining technical work, which includes limited fieldwork, model development, and scientific peer review, will be completed in 2013. The rulemaking process would begin at that time.

The Council recommended implementation of Scenario A1 with the caveat of incorporating a more dynamic process to manage lake water levels to maintain those levels as high as feasible while considering flood control, recreational uses, and the treatment capacity of the NuRF. A water level regulation decision chart would benefit the public showing under what hydrologic conditions the locks would be opened. Additionally, the Council has concerns about water being discharged from the Harris Bayou due to elevated phosphorus levels in the releases; therefore, discharges from the bayou should be limited to only emergency conditions. The Council also requests that SJRWMD, in cooperation with appropriate state, local, and federal agencies, focus its efforts to maintain the highest water levels achievable in the Harris Chain of Lakes during critical sport fish spawning seasons.

3.2 Lake Apopka North Shore Restoration

To restore Lake Apopka to its former position of being a nationally acclaimed largemouth bass fishery, federal, state, and local governmental agencies have focused on nutrient control, primarily phosphorus. Modern-day restoration efforts for Lake Apopka began with the purchase of farmland around the lake in 1988 and have continued for more than 20 years until the present day. SJRWMD adopted the [Lake Apopka Surface Water Improvement and Management \(SWIM\) Plan](#) in 1989 and revised it in 2003. This plan provides details on the causes of lake impairment and outlines restoration studies and projects designed to restore the lake. Also, in 2003, FDEP adopted total maximum daily loads (TMDLs) for the Harris Chain of Lakes, which limit the amount of total phosphorus loading to each lake, with the goal of removing the lakes, including Lake Apopka, from the state's list of impaired water bodies. To achieve the phosphorus reductions required by the TMDLs, FDEP adopted the [Upper Ocklawaha River Basin Management Action Plan \(BMAP\)](#) in 2007, which outlines projects and programs designed to restore the lakes.

Walt Godwin, SJRWMD, at the May 2012 meeting, reported that SJRWMD has completed much of the work on the hydrologic interconnect infrastructure needed to manage water in the NSRA, Duda, and Sand Farm system. The final component involves upgrading the Unit 1 pump system to discharge water into a retention area in the southern part of the Sand Farm property. Work should be completed by in fall 2012.

SJRWMD began flooding Phase 6 of the NSRA in January 2011 and Phase 7 in April 2011. Analyses of quarterly fish samples have indicated safe levels of pesticides for fish-eating birds.

SJRWMD received concurrence from the U.S. Fish and Wildlife Service to re-flood the remaining dry acres in the NSRA. However, re-flooding will be limited by current low water level conditions in Lake Apopka and the dry conditions in the contributing watershed.

During the September 2012 meeting, Dave Walker, SJRWMD, gave an update on the NSRA. Some natural treatment of water from Lake Apopka is accomplished by a flow-way marsh located on the west side of the NSRA (west of the Apopka-Beauclair Canal). A channel from the lake delivers water to the flow-way system, which consists of four individual cells. Water treated by the flow-way is pumped into the Apopka-Beauclair Canal with a portion flowing downstream and a portion flowing back into the lake, depending on discharges from the NuRF project. North of the flow-way, NSRA Cells F and G are the disposal sites for the spoils from the Lake Beauclair dredging project (see Section 3.3.1).

SJRWMD has completed work in the NSRA (east of the Apopka-Beauclair Canal) to remediate the soils contaminated with organochloride pesticides. SJRWMD plowed about 4,000 acres of the property to essentially “flip” the soil and bury the contaminated soils under less contaminated material. The plowing resulted in a 65% overall reduction in the bioavailability of pesticides in this area. Based on ongoing research on safe levels of pesticides for fish and wildlife, parts of the NSRA are able to be flooded to depths greater than the previously recommended 2 to 3 feet. However, possible reconnection of the marshes to the lake are still some years out because pesticide levels in fish do not meet safe levels for human health, as explained below.

Elevated pesticide levels in the fish can present a health risk to both wildlife and humans that consume those fish. During the October 2012 meeting, Michael Coveney, SJRWMD, gave an update on the pesticide residues in fish collected from the NSRA. SJRWMD analyzed pesticides data from 452 whole fish specimens that represent multiple species and that were collected from nine sites over several years. Toxicity reference values for each pesticide were used to calculate the hazard quotient for that specific pesticide and the hazard index of the combined effect of multiple pesticides. If the hazard quotient or hazard index is above one, this is an indication of increasing risk.

The available data on pesticides of whole fish specimens were projected into the future using statistical modeling. When this information is projected to current conditions (2012), several portions of the NSRA have a hazard quotient and/or hazard index above one, and also above 0.6, which is SJRWMD’s target for wildlife. For the 2015 projections, both the quotient and index values for most of the areas are below 0.6. The toxicity reference values for each pesticide were also used for a preliminary assessment for human consumption of fish. In 2012, the hazard quotient and/or hazard index is above one in all areas of the NSRA, with most areas significantly above this value. In 2030, most areas are still above one, leading to a preliminary conclusion that it will take much longer for the pesticide levels in fish in the NSRA to reach levels that are appropriate for human consumption. This will limit the ability to reconnect most areas of the NSRA to Lake Apopka in the near future.

The projections of pesticide levels in fish are being used to help guide future management of the NSRA. For example, maintaining an open water system could result in three to five times the

amount of pesticide bioaccumulation in fish as compared to maintaining a shallow marsh system. Consequently, the habitat goal for the NSRA is as a shallow marsh with dense vegetation.

The Council recognizes that the NSRA is an essential tool to the restoration of Lake Apopka. The Council also stresses the importance of the hydrologic reconnection of healthy marshes to Lake Apopka, which would provide critical habitat for fish and wildlife enhancement. The Council will be requesting that the TAG provide information on what constitutes a functioning healthy marsh in the NSRA. The Council recommends that options be investigated to connect the entire NSRA, or portions thereof, to Lake Apopka in a timely manner. In addition, the Council asks the SJRWMD to provide annual detailed updates to the Council on pesticides levels in fish and other wildlife in the NSRA.

3.3 Dredging as a Tool for Restoration and Access

Dredging to remove organic sediments from the Harris Chain of Lakes is an important lake management/restoration tool. Removal of organic muck sediment from the lake system fosters the re-establishment of beneficial aquatic plants providing critical habitat for fish and wildlife, and, where navigation is limited, dredging can be used to increase water depth. Organic sediments need to be removed from existing canals to enhance property values, improve navigation, and re-establish fish spawning sites. The dredging of canals also permits water fluctuations to proceed without adversely affecting riparian users. Two dredging projects, one at Lake Beauclair and one at Lake Apopka, are currently being implemented in the Harris Chain of Lakes, as described below.

3.3.1 Lake Beauclair and Apopka-Beauclair Canal Dredging

The purpose of the dredging project in Lake Beauclair and the Apopka-Beauclair Canal is to improve navigation and prevent the nutrient and organic rich bottom sediments from being re-suspended by boat and wind activity. The LCWA entered into an agreement with FWC for the sediment removal. The project was awarded to Jahna Dredging of Lake Wales, Florida, in June 2011. Dredging in the lake began in September 2011 and was about 65% complete in June 2012. Mike Perry, LCWA, reported at the June 2012 meeting that dredging would stop from June 15 until the end of August because of concerns with potential low dissolved oxygen conditions during the summer months. Disturbing the organic rich bottom sediments during higher water temperature periods could further reduce dissolved oxygen concentrations, potentially resulting in fish kills. During the October 2012 meeting, Mr. Perry reported that dredging began again on September 1, and approximately 75% of the work in the lake has been completed. The project, including both the lake and canal dredging, should be completed by summer 2013.

The Council supports the ongoing dredging of Lake Beauclair and the Apopka-Beauclair Canal by the LCWA in cooperation with FWC and SJRWMD.

3.3.2 Lake Apopka Dredging

In response to past Council recommendations for selected dredging of Lake Apopka, the Florida Legislature requested that UF conduct a demonstration project for lake bottom sediment dewatering systems. The Legislature asked for the cost per yard of dredged material and whether the cost could be reduced by its resale or reuse. The purpose of the demonstration project is to determine if the process to be tested has possible applications for other lakes in the state with

limited areas for disposal of dredged spoils, 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 proposal was to conduct the demonstration project at Magnolia Park in Orange County, with a focus on dredging the navigation channel to open water using the Clean to Green dredging system and Genesis dewatering solution.

During the permitting process for the demonstration project in 2011, the FDEP identified several issues that prevented approval of the project, as proposed. During the July 2012 meeting, Dan Canfield, UF, reported that a new process for the demonstration project has been approved by the FDEP and the U.S. Army Corps of Engineers, and Orange County is finalizing the lease for the land needed for the project. Dredging is expected to begin in late 2012. The demonstration project will test the use of Geotubes to consolidate and store dredged materials. The Geotubes can then be used to create fish habitat in the lake. The project will also determine if the dredged material can be directly stored in the Geotubes or if the material must first be removed and dewatered. Alternatives for armoring the dredged areas to prevent refilling with bottom material will be investigated as part of the demonstration project.

In December 2011, a Lake Apopka Summit was held resulting in the formation of the Lake Apopka Restoration Team. The interagency restoration team was tasked with identifying projects that could be implemented using a \$4.8 million appropriation from the Legislature for Lake Apopka restoration. The team consists of staff from FDEP, FWC, SJRWMD, LCWA, UF, and Orange and Lake Counties. During the July 2012 meeting, Dave Herbster, FDEP, reported that the projects identified by the restoration team for Lake Apopka were two dredging projects: (1) expansion of the demonstration project at Magnolia Park, and (2) dredging at Winter Garden. SJRWMD will be the lead agency for the Winter Garden dredging project, which will start in 2013. The dredged material will be disposed of in the NSRA, which will help to maintain a higher elevation in the restoration area. The two dredging projects also will include extensive planting of native aquatic vegetation. Of the \$4.8 million appropriated to Lake Apopka, \$600,000 will be used to test innovative nutrient removal technology relevant to the restoration of Lake Apopka.

The Council recognizes 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.

3.4 Vegetation Mapping

Nathalie Visscher, FWC, gave a presentation on FWC's aquatic vegetation mapping program at the Council's January 2012 meeting. In July 2011, vegetation surveys were conducted on Lake Harris, Little Lake Harris, Lake Eustis, and Lake Griffin. The purpose of the mapping was to determine how much vegetation was present in each lake and the types of aquatic plant species observed. The mapping started at the shoreline and continued to the middle of each lake. Both

emergent and submergent aquatic vegetation was mapped and the findings entered into a geo-referenced database for display and analysis using a geographic information system.

The survey found that 24% of Lake Harris', 25% of Little Lake Harris', 27% of Lake Eustis', and 27% of Lake Griffin's spatial area had aquatic vegetation present in July 2011. The findings were compared to the results of surveys conducted in May 2003 and February 2006. The acreage of aquatic vegetation present in the lakes has been increasing with each survey. The Council members noted that it would be useful to have a consistent approach for the vegetation mapping from year to year to ensure the data are comparable. The Council commented that the difference in vegetation acreage between the February 2006 and July 2011 surveys could be the timing of the survey, because the July survey would have occurred during the growing season.

The Council recommends the collection of seasonally comparable, time-series data sets on the spatial occurrence of aquatic plants as one of several metrics to assess overall lake health and conditions, as well as effectiveness of the restoration program for the chain of lakes. All agencies collecting aquatic plant occurrence data should follow a common protocol with geo-referencing to enable the sharing and geospatial analysis of the consolidated, interagency aquatic plant occurrence database.

3.5 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 upcoming fiscal year. Each spring, FWC estimates the level of aquatic plant control that will be needed and uses these estimates to develop management plans and budgets for the upcoming year for each lake in the state. 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 fiscal year (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 FY 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.

The Council supports continued funding for invasive aquatic plant management in the Harris Chain of Lakes.

3.6 Mechanical Harvesting of Nuisance Aquatic Vegetation

In January 2007, the Council purchased a used mechanical harvester utilizing legislative appropriations. The harvester is maintained and operated by UF's LAKEWATCH volunteers, and used to remove near shore, nuisance aquatic vegetation at the request of property owners and homeowner associations throughout Lake County. 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 citizens 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.

The Council requests \$275,000 for repair of the current mechanical harvester and purchase of an additional mechanical harvester and associated equipment.

3.7 Sport Fish Stocking

At the April 2012 meeting, Dennis Renfro, FWC, stated that FWC stocked 140,000 Phase II largemouth bass, which were approximately four to five inches long, into Lake Dora as part of the FWC continuing experiment with advanced fingerling bass stocking. In addition, 300,000 sunshine bass have been stocked in Lake Apopka. Dave Douglas, FWC, stated at the May 2012 meeting that 109,000 sunshine bass have been stocked into Lake Harris. Sunshine bass are a proven fisheries management tool that provides an additional sport fishery and predation of gizzard shad in nutrient rich systems, which have lost desirable levels of submersed aquatic vegetation, the typical nursery area for largemouth bass.

During the September 2012 meeting, Brandon Thompson, FWC, provided an update on the agency's study of stocking four to five inch largemouth bass in the Harris Chain of Lakes. The study was conducted during 2009-2010 on Lake Carlton, which was selected because of its small size and because the lake characteristics, including its vegetation, were similar to the other lakes in the Harris Chain. FWC tagged both hatchery fish and wild bass, which were transported from a different lake, and tracked the fish daily over a period of 30 days. The wild bass had significantly higher survival and growth rates than the hatchery bass. This difference was attributed to the conditions in which the hatchery fish were raised; therefore, FWC further investigated the effect of conditioning the hatchery-raised bass in predator free nets within the lake prior to being released in order to determine if a greater survival and growth rates could be achieved.

FWC created research ponds to compare the success of stocking hatchery-raised fish that had been conditioned for 10 days prior to release to the success of hatchery-raised fish that were released directly from the hatchery. It was determined that conditioning hatchery-raised fish resulted in almost double the survival rate and faster growth. To further test the success of stocking conditioned largemouth bass, FWC is conducting a follow-up study where 11 small lakes were stocked in the spring 2012 and will evaluate the success in 2013 and 2014. The survival rates and growth rates of the conditioned fish will be evaluated over two years with the results used to improve future stocking efforts.

Mr. Thompson also reported on largemouth bass population data collected by FWC for the Harris Chain of Lakes since 2007. Lakes Eustis, Harris, and Dora have had consistently higher populations of bass as compared to the other lakes in the chain. The lowest bass populations are found in Lake Apopka. In recent years, there has been an increase in the number of bass observed in Lakes Griffin and Beauclair. Current data indicates a strong correlation of increase in largemouth bass with increase in rooted vegetation in lakes Eustis, Harris, and Griffin. However, while vegetation coverage has increased, the lakes are not considered restored. FWC will continue collecting comparable data during the upcoming years in order to track fish populations.

The Council recognizes that the advanced fingerling stocking program remains experimental, but encourages FWC's efforts to improve survivability. In past annual reports, the Council has supported the stocking of wild adult bass as the fish survived well, reproduced, and were immediately caught by anglers. The wild adult bass stocking program has been shown to have a high return on the investment to the local economy.

The Council recognizes that restoration of the Harris Chain of Lakes will most likely take decades to achieve. The transfer of wild adult largemouth bass from other waterbodies to the Harris Chain of Lakes is a cost effective way to maintain the economic vitality of the sport fishing recreation industry in the region until aquatic habitat can be restored and a sustainable, highly productive fishery is achieved. The Council, therefore, recommends an annual appropriation of \$225,000 for the continuation of the wild adult bass stocking program for the Harris Chain of Lakes.