

Lake Apopka Timeline

Early History of the Lake

Historians do not agree as to when the first human settlers arrived in the Lake Apopka area.

Aboriginal culture, especially on the northeast shore of the lake has been documented occurring continuously from at least 10,000 B.C. to about 400 A.D. These unnamed tribes were undoubtedly ancestors to the natives thriving in the area when the Spanish arrived. The Spanish called them Timucuan.

Historic outfall from the lake was primarily through Double Run Swamp on the west side of the lake, to Lake Harris. By the mid 1800's, white settlers began farming the south shores.

Lake Apopka has experienced dramatic changes in its environmental health over the past century. A once plentiful and productive lake, the second largest lake in Florida, was a renowned fishing paradise where anglers from all over the world came hoping to land a trophy bass. The clear, pristine lake was home to 29 fish camps on its 40 miles of shoreline.

This changed, starting in 1941, with the establishment of 20,000 acres of vegetable muck farms. The filtering marshes on the north shores were drained to make room for the farms. Massive quantities of nutrients were pumped into the lake from the farms, municipal sewage, and effluent from citrus processing. The high nutrient loading encouraged widespread algae blooms, blocking sunlight and choking productive submerged plants and causing a decline in game fish populations. Clean up measures failed. Eventually, only undesirable fish feeding on the algae could survive in these extreme conditions.

The fish camps all closed and the "green" lake became known as the most polluted large lake in Florida. This condition has endured for more than 40 years. In 1991, The Friends of Lake Apopka (FOA) organized, advocating the restoration of the lake. This broad based citizens group appealed to agricultural interests to change their farming practices, and sought public support to restore the lake. After years of work FOA endorsed the Lake Apopka Restoration Act of 1996 in the Florida Legislature. This led to the \$100 million public purchase of the muck farms to stop the nutrient pollution flow. St. Johns River Water Management District is the Florida public agency charged with the responsibility of purchasing the farms and restoring the lake.

The restoration of the lake has began, although it is anticipated to be a slow, complicated process. At the end of the decade of the 1990's, measurement of water quality variables indicate the condition of the lake improved more than 30%. However, the unprecedented scale and complexity of the restoration will be challenges for years to come. Cumulative pesticide residues, unexplained bird fatalities, involvement of the Federal Government and urban development, are all part of the scientific, political and economic landscape of restoration.

FOA continues actively advocating a healthy lake, supporting efforts for recreational trails and access to the lake, development guidelines to control pollution from development, and a rule to decrease future phosphorous discharge to the lake. All citizens must continue to monitor and be informed about the progress of the restoration

Lake Apopka Timeline

- 1880** Construction of Apopka - Beauclair Canal started by Apopka Canal Company to create a waterway for navigation and agricultural use.
- 1883** Lake levels drop three feet and expose sediment surface of marshes. Small farms spring up around lake.
- 1885** Land around the lake was going for the high price of 25¢ per acre because people expected future demands for property in the area.
- 1893** Delta Canal Company successfully completes 12 miles of canal connecting Lake Apopka through Lakes Beauclair, Dora, Eustis, and Griffin to the Ocklawaha River. This lowered the water surface of Lake Apopka by approximately 1 meter, exposing the sediment surface of most of the sawgrass marsh on the north shore.
- 1894** Category I hurricane passes over lake.
- 1895** Disastrous freezes kill more than half of the citrus trees in Orange County.
- 1910** Due to crop failures because of difficulty in water table management and cold waves, canal becomes filled with vegetation and lake stage returns, more or less, to its normal levels.
- 1915** Zellwood Produce Company improves the canal to reduce water table fluctuations.
Farmers on the south shore protest, fearing water supply shortages, decreased cold protection and threatened navigation.
- 1922** Winter Garden Pollution Control Facility (sewage treatment plant) constructed, serving a population of between 1,500 and 3,250.
Effluent enters Lake Apopka. Discharges from citrus packing process begins entering the lake.
- 1926** Severe hurricane, entire north shore under 6 to 8 feet of water.
- 1940** Dense growths of aquatic weeds appear.
- 1941** Zellwood Drainage and Water Control District (ZDWCD) created by legislature.
Levee constructed by ZDWCD between north marsh lands and lake.
Lake level rises two feet above farm lands.
- 1942** Farms begin discharging into the lake.
- 1945** Category II hurricane passes over the lake.
Lake water clear with dense growth of Illinois pondweed covering much of the lake bottom.
- 1946** Beginning die-off of submerged vegetation documented.
- 1947** Half the marsh area is in row crops and the rest being prepared for farming.
Game fish make up 35% of fish populations, shad 20% by weight.
First algae bloom in lake documented.
Hurricane destroys large amounts of eel grass on bottom of the lake.
Intense algal growth first described.

Lake Apopka Timeline

Rooted aquatic vegetation begins to decline.

- 1948** Hyacinth eradication program using chemicals begins.
Winter Garden Citrus Products now producing citrus concentrate, effluent discharged to Lake Apopka.
Enormous increases in the game fish populations documented to 1955.
- 1949** Illinois pondweed no longer in the lake. Algal blooms increasingly dominant over rooted plants.
- 1950** Control structure placed in Apopka-Beauclair Canal.
Winter Garden sewage treatment plant enlarged, effluent (one million gallons per day) discharged to Lake Apopka.
Game fish make up 60% of fish population.
- 1952** Lake stabilization program begins, lake levels regulated.
Trash fish poisoned, 30 million pounds died in lake,
Quality and quantity of game fish fishery begins to deteriorate.
- 1956** Present lock and dam structure built, canal deepened.
21 Fish Camps operating on the lake.
- 1957** Gizzard Shad make up 82% of fish population, 18% are game fish.
Hyacinth eradication programs accelerated, dead plants decay in lake.
- 1962** Fish kills becoming widespread.
- 1963** More than \$1 million spent by farms on pesticide programs.
- 1964** Winter Garden sewer treatment plant now serving a population of 5,000, effluent to Lake Apopka. Effluent enters mile long ditch (channelized Lulu Creek) which also serves Winter Garden Citrus Products plant. Combined effluent provides second largest amount of nutrients from human activities.
- 1965** Almost all former marsh and on the north side of the lake now being farmed, most producing three crops annually.
Commercial catfish harvesting stopped because DDT concentration in fish exceeded allowable limits.
Nine fish camps operating on the lake.
- 1966** Haul seine survey of Lake Apopka funded by Game and Fresh Water Fish Commission and Orange County Conservation Fund. Results: Gizzard Shad and Gar fish make up most of fish population (Jumps from 2% in 1964 to 48% in 1966).
State threatens citrus plant with legal action over discharges to Lake Apopka.
Radio station WTLN schedules weekly program on Lake Apopka problems.
Large group of citizens meet in Apopka to organize to stop pollution, present petition to stop pollution of Lake Apopka, signed by 5,000 people (Central Florida Anti-Pollution Association, Inc.).
Orange County and Lake County share cost of biochemical study of Lake Apopka (\$5,000).
Orlando Sailing Boat Club holds sailing regatta on Lake Apopka , draws 100 boats.

Lake Apopka Timeline

- 1967** Lake Apopka Technical Committee established to study and coordinate restoration plans.
Governor's aide says Lake Apopka is restorable in four years.
- 1968** Lake Apopka Technical Committee needs funds for engineering studies.
Federal grant of \$12,000 obtained for cleanup, farmers will also contribute.
Plans for fishmeal plants using Apopka roughfish studied.
- 1969** Winter Garden Citrus Products adds treatment process, reduces strength of effluent discharged to Lake Apopka.
- 1970** State and Federal restoration efforts start.
- 1971** Test draw down completed, lake lowered 4 feet. Cost for total drawdown estimated at \$1.5 million. Total of \$96,075 spent to date on the project.
- 1972** Outbreak of bacterial disease kills thousands of fish, and many birds, alligators, snakes and turtles, gets nationwide attention.
State reveals \$2.3 million restoration plan includes 50% drawdown (not funded).
- 1973** Bass production failing.
- 1975** Muck farmers propose to dike off 500 acres of lake for holding ponds.
- 1976** Four fish camps operating on the lake.
"Final" feasibility study grant of \$287,000 approved to study drawdown, \$500,000 already spent.
- 1977** Winter Garden Citrus Products completes percolation ponds and spray fields, reduces discharge to cooling water.
Peat mining begun on southwestern shore. Effluent and stormwater collected in man-made lake which connects to Lake Apopka.
University of Florida researchers say the lake is "not getting any dirtier" after a half-century of deterioration.
- 1978** Restoration plan proposed by DER, including a drawdown. Cost \$14 million.
First public hearing held in March to begin Environmental Impact Statement process (100 people attend).
- 1979** Restoration plan to include a drawdown proposed with an estimated cost of \$20 million. Citrus growers on the south side of the lake object because of potential freeze damage.
Restoration plan proposed which would include dredging the lake to form an island and north-south causeway across the lake and construction of an airport on the island. Cost: \$200 million.
Final Environmental Impact Statement for restoration project completed (required by U.S. Environmental Protection Agency).
- 1980** Winter Garden completes percolation/evaporation system for sewage disposal, most effluent removed from the lake.
- 1981** Massive fish kills in Lake Apopka reported.
Revised restoration plan proposed which includes a partial drawdown at a cost of \$ 3 million.

Lake Apopka Timeline

- 1985** Passage of the Lake Apopka Restoration Act of 1985, establishing the Lake Apopka Restoration Council and Technical Advisory Committee. A total of \$2.265 million is appropriated to initiate feasibility studies, evaluate restoration techniques, and develop a nutrient budget. The District and the Council reviewed a full range of proposals and reported to the Legislature on the plan's development and the consensus for action. Strategies such as the marsh flow-way, shad harvesting, and littoral zone were reviewed, debated, and endorsed as the best plan to clean up Lake Apopka.
- In order to stop pollutant discharges from the farms, SJRWMD issues Intent to Deny for Duda and Zellwood Drainage and Water Control District's (ZDWCD) consumptive Use Permits (CUP's), requests cease and desist order and criminal charges.
- No fish camps left operating on the lake.
- 1986** Initiation of comprehensive pilot projects recommended by the Lake Apopka Restoration Council to the St. Johns River Water Management District. The development of internal and external nutrient budgets for the lake are begun.
- 1987** SWIM (Surface Water Improvement and Management) Act passed by the Florida Legislature. Lake Apopka named as a priority for restoration, one of seven statewide. Complete, holistic approaches are encouraged for the restoration of selected water bodies.
- August, 1987 - Marsh Flow-Way concept formalized.
- 1988** Initiation of the Marsh Flow-Way Demonstration Project.
- SJRWMD acquires approximately 5,000 acres for approximately \$15 million to build a Marsh Flow-Way lake filtration system on the northwest corner of the lake.
- Authority to regulate agricultural discharges into Lake Apopka delegated to SJRWMD by DER.
- SJRWMD and Duda Farms sign consent order. Duda Farms begins construction of holding ponds.
- 1989** SJRWMD issues permit to Duda to construct detention system.
- SWIM Plan for Lake Apopka approved by Florida Department of Environmental Regulation (FDER).
- Pilot-scale Marsh Flow-Way Demonstration Project begins construction.
- SJRWMD and Zellwood Drainage District sign consent order, challenged by farmers and citizens group.
- 1990** Experimental Marsh Flow-Way begins to operate.
- 1991** The testing of methods to expand shoreline vegetation areas that will provide habitat to the lake's game fish as other methods are employed to clean up the lake water.
- Portable barriers and planting methods are tested in near-shore areas of Lake Apopka to disrupt wind mixing and stabilize shallow sediments in fish spawning areas.
- Consent order for Zellwood becomes effective.
- Zellwood Consent Order upheld after challenge.
- Friends of Lake Apopka organizes.
- 1992** Planting of littoral zone aquatic plants begins.
- Model shoreline ordinance developed and proposed in conjunction with the University of Florida. Ordinance to put into place protections for the lake due to expected environmental pressures post-restoration.
- Duda/Whittle parcel is acquired for the Marsh Flow-Way Demonstration Project.

Lake Apopka Timeline

Duda agricultural discharges meet Consent Order goals.

Wilkinson-Cooker farm acquired on May 15, 1992, as required for Marsh Flow-Way Project at a cost of \$669,296.25 from P-2000 Trust Fund.

- 1993** SWIM Plan for Lake Apopka updated and revised.
Began mass harvest of rough fish for nutrient removal.¹
- 1994** External nutrient budget project finished and scientific basis for phosphorous load limit completed.
Pollutant Load Limit (Wasteload Allocation rule) for phosphorous endorsed and published by Governing Board (Chapter 40C-61 F.A.C.). Limitations challenged.
- 1995** District's proposed rule phosphorous load limit rule successfully challenged by Zellwood Drainage and Water Control District, found invalid by courts.
Early indices of water quality observed. Improved water quality - lower phosphorous, less algae, less turbidity noted. (Though modest, they are important signs that the lake can improve through the restoration program.)
Conceptual plan for full-scale Marsh Flow-Way completed.
Several small patches of eelgrass observed near north shore.
- 1996** The Florida Legislature passed legislation introduced by Kelly, Sublette, and Dyer. The Lake Apopka Restoration Act of 1996 set a phosphorus criterion for the lake, giving SJRWMD the legal authority to set a phosphorus discharge limitation and providing \$20 million to acquire northern shore farm land.
Up to \$26 million guaranteed by federal government under the Dept. of Agriculture NRCS² Program.
- 1997** Design of full-scale Marsh Flow-Way approved. Construction initiated with \$3.5³ million contract.
The Florida Legislature approves \$45 million for muck farm purchases. Farm land purchases are either closed or purchase contracts executed on Zellwin Farms (5,254 acres), Duda's Jem Farm I (3,400 acres), Grower's Precooler, Inc., Crakes and Sons, Inc., Clarence W. Beall, Jr.
Sixty-three patches of eelgrass totaling 2.87 acres and small areas of musk grass and southern naiad mapped. These areas are the greatest extent of submersed vegetation found since the start of monitoring.
Experimental operation of the Marsh Flow-Way Demonstration Project completed. 375 tons of suspended sediments, 98 tons of nitrogen, and 4 tons of phosphorous removed from the lake water. 90% removal of suspended sediments and 30-60% removal of total phosphorous.
- 1998** \$100 million buyout of almost 15,000 acres of muck farms is completed, with funding from the State of Florida, and 25% from the U.S. Federal Wetlands Reserve Program. Farming and pesticide applications cease with the last farm crop, June, 1998.
SJRWMD begins reflooding the former marshes and their restoration and hopes for restoration of the Lake are high.
Gizzard shad harvesting continues with 6.5 million pounds of shad harvested since 1993.
First draft restoration plans for farm lands presented to public.
- 1999** Massive bird migrations visit the area with over 175 different species logged. Sudden, large scale avian deaths brings intervention of U.S. Fish and Wildlife and Department of Justice. Residues and accumulations of pesticides are the suspected culprits. Restoration efforts are delayed pending results of scientific and other investigations. Realization of the complexity of restoration becomes a reality. Measurement of water quality variables indicate a 30% improvement in Lake Apopka for the average of

Lake Apopka Timeline

the prior five years, as compared with the early 1990's. Oakland Nature Preserve is established with an initial purchase of 95 acres.

- 2000** Scientists continue to study the complexities of muck soils and pesticide residues to design the restoration program. A three year drought lowers lake levels to a record low of 62 above sea level. With the help of the Lake Apopka Steering Committee and professional land planners, FOLA recommends Land Development Guidelines to the eight political jurisdictions in the basin. FOLA spearheads the cooperation of the municipalities and Orange and Lake counties to plan for greenways, trails, and ecotourism and recreational opportunities around the Lake.
- 2002** June – July - Approximately 700-acres of the Duda property were re-flooded creating habitat for migrating birds. No bird deaths associated with the re-flooding have been reported. The flooding also allows SJRWMD to store water on the North Shore Restoration Area.
- 2003** Phosphorus limitation rule is passed by SJRWMD with support from FOLA.
FOLA completes Greenways and Trails design project, which includes a loop trail around the lake.
October 8, 2003 - Memorandum of Understanding was agreed upon by USFWS and the District creating a framework for future restoration of the former farmlands.
November 2003 – Phase I of the marsh flow-way begins operation on the North Shore Restoration Area and treats approximately 50% of the lake's volume of water during its first year of operation.
The remaining Duda fields (except for one) were re-flooded. Totaling approximately 1,700 acres re-flooded.
- 2004** On April 13th, an intergovernmental agreement was signed between the District and the Lake County Water Authority for the use of the 225-acre CC Ranch parcel for their Alum Treatment Facility on the Apopka - Beauclair Canal. FOLA objects. The CC Ranch parcel was bought in 1992 with Preservation 2000 funds for restoration.
- 2005** Ferndale Preserve, a 192-acre acre parcel on the northwest shore of Lake Apopka was purchased with funding from SJRWMD, Lake County, Lake County Water Authority and a grant from Florida Communities Trust. The Preserve is part of the FOLA Master Plan for the Lake Apopka basin.
On November 18, the City of Apopka applied for a Consumptive Use Permit that proposes withdrawing 5 million gallons of water a day from Lake Apopka and the North Shore Restoration Area to supplement re-use for irrigation. FOLA objects.
- 2006** October, FOLA celebrates the 10-year anniversary of the signing of the bill for the restoration of Lake Apopka with a ceremony at the Oakland Nature Preserve honoring those who played a major role in supporting the bill.
December, 700-acres of the Duda property was re-flooded creating habitat for migrating birds. No bird deaths associated with the re-flooding have been reported.
- 2007** As of July, more than 13,750,000 pounds of gizzard shad have been harvested since the program began in 1993. This translates into removal of about 96,000 pounds of TP by simply removing the fish. In addition 1,000,000 pounds of shad are estimated to produce about 25,000 pounds of TP per year.
After years of studies on residual pesticides, deep soil inversion was begun in the North Shore Restoration Area.
In April, two of the four treatment cells of the Marsh Flow-Way were drained for maintenance. These cells were successfully re-flooded nine months later and began treating lake water again.

Lake Apopka Timeline

2008 Phase 1, a 1,200-acre parcel, was the first section of the former ZDWCD farm area to be flooded for wetland restoration after completion of research following the bird mortality. Soil Inversion work in the North Shore Restoration Area continues.

The gizzard shad program removed 1,601,056 lbs. from Lake Apopka.

November, the remaining two of the four treatment cells of the Marsh Flow-Way were drained for maintenance. These two cells were successfully re-flooded nine and twelve months later.

2009 The District completed deep soil inversion on 4,000 acres of highly contaminated land, at a cost of approximately \$2,500 per acre. The remediation resulted in a 68% average reduction of DDE. The District flooded Phase 2 (1,400 acres) for wetland restoration. The District also began construction of infrastructure to allow controlled flooding of the remainder of the former farm area for wetland restoration.

The Marsh Flow-Way treated 2.5 times the volume of Lake Apopka since November 2003. Total removals from 2003 to December 2009 are 62 million lbs. of suspended solids and 37,300 lbs. of total phosphorus.

Gizzard Shad program removed only 674,803 lbs. reflecting an effective reduction of gizzard shad biomass in Lake Apopka. Experimental gill net catches of gizzard shad for Lake Apopka in February and March were the lowest on record.

City of Apopka receives a consumptive use permit for reuse water from the North Shore Restoration Area. The restrictions and conditions on the permit place the restoration of the Lake and North Shore Area as a priority before water will be available to the City of Apopka. FOLA stand firm in our commitment against surface water withdrawal.

Harris Chain Council publishes a negative report on the restorations efforts of Lake Apopka and the North Shore Restoration Area that is met with a great deal of criticism based on lack of scientific evidence and misuse of data.

2010 In October the lake concentration of total phosphorus averaged 76 parts per billion, closing in on the target goal of 55 ppb.

October – shad harvesting began and 650,000 pounds of shad had been harvested when the season completed December 31. Toward the end of the season the fish size declined rapidly, and catch rates were much lower for a second year in a row. This is a good sign that populations of gizzard shad are decreasing. Sunshine bass were released into the lake to feed on the smaller shad, which is a major part of their natural food chain.

Restoration of wetlands on the North Shore Restoration Area reduces discharge to Lake Apopka and related nutrient loading, accelerating the restoration of the lake. Approximately 5,000 acres have been re-flooded.

Infrastructure construction is completed and as the biological assessments are completed, with U.S. Fish and Wildlife, saturation and restoration flooding may begin creating a wide range of water levels on the North Shore Restoration Area. Monitoring of soil pesticides concentrations will be on-going.

A study of mercury contamination in Florida shows mercury levels in Lake Apopka fish significantly lower than other water bodies in the state.

Because of low lake levels and forecast low rainfall, SJRWMD reduced discharge at the Apopka, Burrell, and Moss Bluff structures during the winter to help protect lake levels from falling even lower.

2011 The total list of bird species observed on the north shore of Lake Apopka is 346, highest total for any site in Florida (even greater than Everglades National Park with 340 species).

Minimum discharges resumed at all the basin structures on May 2 and in February Lake Apopka was up 3.6 inches.

The Marsh Flow-Way has filtered 3.1 volumes of lake water since it began in 2003. The Flow-Way has

Lake Apopka Timeline

removed tons of suspended solids, nitrogen and phosphorus to date.

Wetland and marsh restoration and management remains the key to restoration of the lake. More than 85 percent of phosphorus going into the lake was caused by farming on the north shore. The goal in restoring this area is to reduce the amount of discharge to the lake and related nutrient loading, reduction of alum use, and increase wetland habitat. The District flooded Phases 6 & 7 (1,900 acres) for wetland restoration. The District hopes to get approval to flood the remaining acres in the fall of 2012.

Data shows the health of the lake continues to improve. Eel grass beds continue to expand.

Increased expansion of exotic apple snail.

FOLA has concerns over several issues being proposed:

- Changes by Fish and Wildlife Services in policy for controlling Hydrilla.
- Airport adjacent to the North Shore Restoration Area
- Sewage Compost Facility in Lake County near Beauclair Canal.

August Ribbon cutting at Magnolia Park for the Trailhead that will give access to bikers, hikers and naturalist to cross 18 miles of the North Shore Restoration Area on existing dike, once restoration of the area is complete.

Lake County approves matched funding for the Lake Apopka Scenic Overlook and Trailhead off of the Green Mountain Scenic Byway north of Ferndale in Lake County. The project is part of the Master Plan for Greenways and Trails in the Lake Apopka Basin developed by FOLA. The Byway Committee designed the project and they are raising the funding with the help of FOLA.

Corrections made May 2014:

1. Deleted "pilot-scale"
2. Corrected WRCS to NRCS
3. Corrected \$35 million to \$3.5 million