

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

## Background

**Three Rivers, Two Lakes** - The Apalachicola/Chattahoochee/Flint (ACF) River Basin system begins as the Chattahoochee River, which extends the length of Georgia and terminates into Lake Seminole at the Florida/Alabama/Georgia state lines (Exhibit 1, Pg. 8). In addition to providing recreation, power-generation and irrigation, it supplies water to the metro Atlanta area. Of the thirteen dams on the Chattahoochee River, four are controlled by the Army Corps of Engineers (ACE). One of these dams, the Buford Dam impounds Lake Lanier. The Atlanta MSA has a population estimated at 5.5 million, and much of the population relies on the Lake Lanier and the Chattahoochee River to supply water, an estimated 337.5 million gallons per day, and 3/4 of total metro demand.

The Flint River starts just south of Atlanta and also flows southward through Georgia terminating at Lake Seminole. It is one of only 40 rivers left in the United States that flow for more than 200 miles unimpeded. Recent legislative efforts to dam a 50-mile stretch to create a supply reservoir for Atlanta's burgeoning water needs earned the Flint River the #2 spot on the list of Top Ten Most Endangered Rivers published by American Rivers. It provides irrigation to rural areas, and has historically provided more than 40% of the Basin's summer flow.

The Jim Woodruff Dam impounds Lake Seminole, and ACE also controls flows from this impoundment to the Apalachicola River. The Apalachicola River flows to the Gulf of Mexico as the largest river in Florida and the fourth largest in the southeastern United States. It discharges sixteen billion gallons of nutrient-rich freshwater daily into the Apalachicola Bay, providing a delicate mix of freshwater and saltwater to produce the unique environment of the estuary, which provides an estimated \$200 million per year in revenue.

**The Lawsuits** - Following droughts in Georgia in 1972, Congress authorized the United States Army Corps of Engineers to study alternatives that would meet Atlanta's growing water supply needs. In 1989, the Corps issued a report that recommended reallocating 20% of the hydropower storage in Lake Lanier water supply for Atlanta. The next year, Alabama brought suit against the Corps on the basis that the reallocation would violate Alabama's water rights and that the Corps had failed to do an adequate environmental impact statement. Florida intervened in the lawsuit because it was worried about the ecological health of the Apalachicola Bay. Georgia also intervened and responded that it was entitled to manage the river within its borders on its own terms.

A history of the ensuing legal battle up until 2009 can be found here:

1. *FSU Law Review - A Tale of Three States: Equitable Apportionment AFC River Basin* <http://diginole.lib.fsu.edu/cgi/viewcontent.cgi?article=1113&context=fsulr>

Subsequently, Florida took Georgia back to court in 2013 over water allocation rights.

2. *Florida's Motion for Leave to File a Complaint, and Brief in Support of Motion* <http://www.flgov.com/wp-content/uploads/2013/10/FLORIDA-v.-GEORGIA-Original-Action-Complaint.pdf>

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

And on February 3, 2014, Georgia filed a motion in opposition to Florida's complaint.

### *3. State of Georgia's Opposition to Florida's Motion for Leave to File a Complaint*

<http://media.morristechnology.com/mediafilesvr/upload/gainesville/article/2014/02/03/0203WATERDOC.pdf>

***Proposed Existing Water Solutions*** - There are two solutions to the dispute currently being considered. The first is to do nothing and allow ACE to determine equitable apportionment of Lake Lanier and Chattahoochee River flows. The second is an Aquifer Storage & Recover (ASR) project. The equitable apportionment option is a zero-sum outcome targeting a fixed supply that is under increasing demand. Consequently, many believe it is unlikely that either party will find the apportionment "equitable".

The second alternative is being proposed by the South Georgia water managers. It is an Aquifer Storage & Recover (ASR) project that would take water from the Floridan aquifer and from along the banks of the Chattahoochee River, pump the water into a deep aquifer for storage, and pump the water back into the streams and rivers during periods of drought. Because the ASR project targets Floridan recharge water, is an environmentally disastrous proposition. The project will also be very expensive and uncertain in outcome.

### *4. Application for GA State Funding of ASR Project*

<http://saportareport.com/wp-content/uploads/2013/04/SWGRC.pdf>

### *5. Georgia Environmental Finance Authority Request for ASR Project Qualifications*

<http://ssl.doas.state.ga.us/PRSapp/bid-documents/1392800928-130012168993.pdf>

### *6. State to Test New Water Supply Option*

<http://www.bizjournals.com/atlanta/print-edition/2013/05/03/state-to-test-new-water-supply-option.html?page=all>

## **Proposed Subject Reservoir - A Third Lake**

The proposed subject Reservoir (Exhibit 2, Pg. 9) is a multi-purpose pumped-storage & conservation reservoir (similar to Lake Oconee/Sinclair) that would be created by constructing two dams (and reservoirs) just north of the Flint River and within the Whitewater Creek watershed of Taylor and Macon County. Its purpose would be to provide low-flow augmentation along the Flint River during periods of sustained drought. We believe that the significant added capacity of the subject reservoir (3x capacity of Lake Seminole) and its strategic location above the Dougherty Plain make the subject reservoir the ideal solution to current and future water needs in north Florida, south Georgia and the Atlanta MSA.

The reservoirs would be filled by scalping high-stage river water from the Flint. It is not an impoundment of the River. Estimates are that the process of filling the two reservoirs may initially take up to 8 years based on historical river flows.

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

## ***Reservoir Capacity***

Primary Lake (Elevation 550')

- Surface Area of 16,334 Acres
- Volume Capacity of 890,000 acre feet, or 290 billion gallons
- Shoreline at Full Pool - 98.2 Miles

Sister Lake (Elevation 400')

- Surface Area of 10,020 Acres
- Volume Capacity of 314,000 acre feet, or 102 billion gallons
- Shoreline at Full Pool - 112.3 Miles

Combined Lake Totals

- Surface Area of 26,354 Acres
- Volume Capacity of 1.2 million acre feet, or 392 billion gallons
- Shoreline at Full Pool - 210.5 Miles

## ***Capacity Comparisons to Prominent Lakes***

- Three times as large as Lake Seminole (367,320 acre feet)
- 60% of the capacity of Lake Lanier (1.92 thousand acre feet)
- Three times as large as the proposed ASR Project (400,000 acre feet)
- 38% of the capacity of Lake Okeechobee (3.2 thousand acre feet)

***Proposed Reservoir Dam:*** The reservoirs will be separated by a dam estimated to be a mile or so in length. This dam could serve to provide hydroelectric power by releasing water through turbines from the upper reservoir to the lower reservoir during periods of peak electric demand, and pumping the water back into the upper reservoir during periods of moderate electric demand. It is believed the dam could also provide some level of water filtration should the water released into the Flint River require treatment.

***Cost Estimates:*** Land within the subject area consists predominately of large tracts used in commercial pine forest production. Sale comparables appear to range from \$1,500 to \$2,000/acre for 80 (+/-) acre tracts. Assuming the purchase of 60,000 acres at an average cost of \$3,000/acre, total land cost would be approximately \$180 million. Mitigation lands may add 35% to the project land costs which would be borne by the governmental sponsor. No other cost estimates are available at this time.

***100% Solution:*** We believe that the subject Reservoir may be the 100% solution to the "water wars" due to its adequate capacity (3x Lake Seminole), targeted water source (surplus Flint River flows), and its ability to augment river flows to Lake Seminole during periods of sustained drought. By utilizing the added capacity offered by the subject reservoir along the Flint River, the current burden of equitable apportionment by ACE could be eased and issues related to freshwater flows along the Apalachicola River could be addressed in a more meaningful manner.

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

**Residual Benefits:** An added benefit of the proposed Reservoir solution results from its strategic location at the northern-most up-dip and elevated portion of the Floridan aquifer, the fact that south from the Reservoir the Flint River extends through the primary recharge area for the Floridan aquifer, and augmented River flows during periods of drought would help recharge the aquifer (Exhibit 3, Pg. 9). Clearly, the Floridan aquifer is endangered as evidenced by reduced spring flow discharges and saltwater intrusion along coastal Georgia and Florida. And the reasons are clear as to why; over-utilization by farms, municipalities and industrial users. The question is how to most effectively recharge the aquifer, and we would suggest that water recharge (and more limited pumping) in the higher elevations of the Dougherty Plain would best serve to improve levels of aquifer saturation and pressurization.

7. *Flint River Basin: Technical Summary of Hydrogeology, Farm Water Use and Ecology*  
[http://www1.gadnr.org/frbp/Assets/Documents/SAC\\_Executive\\_Summary.pdf](http://www1.gadnr.org/frbp/Assets/Documents/SAC_Executive_Summary.pdf)

## Down-River Beneficiaries/Stakeholders

**Apalachicola Bay & Estuary** - The oyster industry in Apalachicola Bay historically contributed \$200 million to the local seafood industry revenue. Harvests from the bay provided 90% of Florida oysters and 10% of U.S. oysters, in addition to supplying shrimp, crab, and finfish. The river has almost every federal and state environmental designation, including Outstanding Florida Water and Outstanding National Water.

On September 6, 2012, Florida Governor Rick Scott sought to have the commercial fishery declared a resource disaster for Florida's oyster harvesting areas in the Gulf of Mexico, particularly those in Apalachicola Bay. In that year, drought conditions in the Bay caused the oyster resources to decrease to a level that would no longer sustain Florida's commercial oyster industry, according to Florida Agricultural Commissioner Adam Putnam. The situation was exacerbated by the low level of fresh water coming down the Apalachicola River into the Bay, as oysters require a delicate balance of both fresh and salt water. If salinity levels in and around oyster reefs get too high, the water is hospitable to marine organisms that prey on oysters such as oyster drills, stone crabs and conchs. In addition, high salinity creates unfavorable conditions for juvenile oyster growth. Reports maintain that the 2012 collapse of the oyster industry may take three years to recover, which appears a bit optimistic.

8. *Apalachicola Bay Oyster Situation Report - April 24, 2013*  
<http://www.drought.gov/media/eventfiles/A9R664A.pdf>

9. *Rick Scott Request for Declaration of Fishery Resource Disaster w/ attached Putnam Advice* [http://www.nmfs.noaa.gov/sfa/sf3/disasters/FL\\_Oysters\\_2011/Request\\_Gov.pdf](http://www.nmfs.noaa.gov/sfa/sf3/disasters/FL_Oysters_2011/Request_Gov.pdf)

**Apalachicola River** - The Apalachicola River and its surrounding forests, prairies, and coastal habitats are recognized as one of six biodiversity hotspots in the United States. This complex river ecosystem supports more than 1,500 species of native plants and animals, as well as numerous endemic species that exist only in this region. The river basin has the highest species diversity of reptiles and amphibians in the U.S. and Canada, with more than 40 species of amphibians and 80 species of reptiles.

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

The Apalachicola National Forest, which borders the river, is one of the largest contiguous blocks of public lands east of the Mississippi River.

Maintaining adequate flows along the River benefit of four federally-listed threatened and endangered species that include the threatened Gulf sturgeon, the endangered fat three-ridge mussel, the threatened purple bank-climber mussel, and the threatened Chipola slabshell mussel.

## *10. A River Meets the Bay*

[http://www.dep.state.fl.us/coastal/sites/apalachicola/pub/A\\_River\\_Meets\\_the\\_Bay.pdf](http://www.dep.state.fl.us/coastal/sites/apalachicola/pub/A_River_Meets_the_Bay.pdf)

**Floridan Aquifer** - The Floridan aquifer system is one of the most productive aquifers in the world. It underlies an area of about 100,000 square miles, and provides water for several large cities, including Savannah and Brunswick in Georgia; and Jacksonville, Daytona Beach, Gainesville, Ocala, Tallahassee, Orlando, and St. Petersburg in Florida. In addition, the aquifer system provides water for hundreds of thousands of people in smaller communities and rural areas.

The subject Reservoir is located near the fall line of the Flint River. To the south is the Dougherty Plain, which is where the unconfined and highly porous up-dip of the Floridan Aquifer's limestone is exposed (see Exhibits #4 - #5). It is well-documented that this is where the Aquifer receives its primary water recharge during the rainy season. Further south, the Floridan limestone is mostly sub-surface and confined, which limits the ability of surface water to recharge and/or pressurize the Aquifer there.

Because the subject Reservoir is located above the Dougherty Plain, it will serve the full run of the Flint River through the Plain and across the aquifer recharge area. And because the Flint River is incised into the Floridan limestone within the Plain, augmented river flows from the Reservoir during periods of drought will not only provide needed water supply to Lake Seminole, but will help to recharge and re-pressurize the Floridan Aquifer during this environmentally critical time.

## *11. Floridan Aquifer System*

[http://pubs.usgs.gov/ha/ha730/ch\\_g/G-text6.html](http://pubs.usgs.gov/ha/ha730/ch_g/G-text6.html)

**Florida Springs** - Florida has 27 first-magnitude springs (flows of 100+ cfs) out of a total of 78 in the entire Nation, all of which issue from the Upper Floridan aquifer. The hydrostatic pressure of surface and ground water at the higher elevations in the Dougherty Plain (300' to the northeast, falling to 70' at Lake Seminole) forces the transmission of water to the confined down-dip (coastal GA & FL) portions of the Floridan, where the highly valued and treasured springs act as relief valves from the hydrostatic pressure created within the saturated and confined portions of the Aquifer. Consequently, diminished spring flows that are being experienced throughout northern Florida are likely a consequence of the inability of the Floridan to fully recharge and re-pressurize within the higher elevations of the Dougherty Plain.

We believe that by augmenting river flows along the full run of the Flint River within the Dougherty Plain during periods of drought, the opportunity exists for the subject to at least

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

partially recharge and re-pressurize the Floridan during this critical period, thus potentially improving spring discharge flows and possibly slowing the rate of coastal salt water intrusion.

This residual benefit of the proposed Reservoir is one we believe to be highly meaningful given the documented decline in the health of the springs in Florida, and the resources that are being targeted at protecting less productive recharge areas within close proximity of the springs. Note that Florida Governor Rick Scott has included \$55 million for protecting Florida Springs in his current budget, money historically spent for less productive recharge lands at or near the springhead.

## *12. Florida's Springs - Strategies for Protection & Restoration*

<http://www.dep.state.fl.us/springs/reports/files/SpringsTaskForceReport.pdf>

## *13. Governor Scott - \$55 Million for Springs*

<http://www.thefloridacurrent.com/article.cfm?id=36153687>

**Georgia Farmers** - Agriculture uses the largest volume of water in the Flint River Basin, with permitted agricultural withdrawals totaling approximately 1,200 mgd in 2005 (total permitted municipal and industrial withdrawals were 140 mgd). However, because 95% of irrigation occurs from April through September, the potential pumping (and decompression) rate could have been as high as 2,400 mgd during peak irrigation times.

Of the 714,000 acres under irrigation in the entire Flint River Basin (2005), more than 85% of the farmland is located south of the Fall Line and the subject Reservoir, reflecting the easy availability of water from the Floridan aquifer. Further, approximately 73% of the permitted withdrawals is from groundwater wells, which again reflects the easy availability of Floridan aquifer within the Dougherty Plain. Given that the subject Reservoir is located north of most of the Basin farmland, the subject Reservoir is ideally suited to benefit Georgia farmers through potential direct withdrawals and/or aquifer recharge.

## *14. Managing Agricultural Water Use During Drought...Policies...w/in Flint River Basin*

[http://www.h2opolicycenter.org/researchpapers/ManagingAgWaterUse\\_Drought.pdf](http://www.h2opolicycenter.org/researchpapers/ManagingAgWaterUse_Drought.pdf)

**Coastal Georgia & Florida Municipalities** - Salt water intrusion into the Floridan Aquifer has been experienced for years within coastal areas, and the linkages between the Upper Floridan and Lower Floridan are only now being discovered. Recently the Georgia Environmental Protection Division placed a moratorium on future use of the Floridan that affects community public water systems, municipal and industrial groundwater supplies as well as farm water use.

## *15. EPD Announces No Future Withdrawals from the Floridan in Coastal Georgia, 20 May 2013*

[http://www.gaepd.org/Files\\_PDF/whats\\_news/ClosureofRedandYellowZonesofFloridanAquifertoNewWithdrawals.pdf](http://www.gaepd.org/Files_PDF/whats_news/ClosureofRedandYellowZonesofFloridanAquifertoNewWithdrawals.pdf)

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

Georgia appears to have given up on the Floridan as a municipal water supply source in coastal Georgia and has focused resources instead to the capture and reuse of storm water runoff.

## *16. State to Invest up to \$44.9 Million in Four Strategic Water Supply Projects*

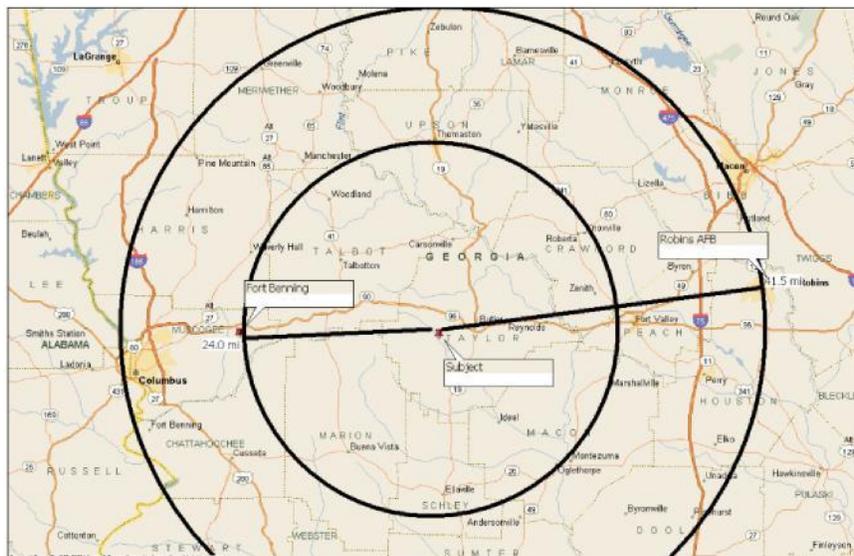
<http://gefa.georgia.gov/press-releases/2013-12-04/state-invest-449-million-four-strategic-water-supply-projects>

## **Potential Regional Opportunities**

***Military Installations*** - Within close proximity to the subject are a number of active military installations. Robins AFB in Warner Robins is the home of the Air Force Materiel Command's Warner Robins Air Logistics Center, which is the largest single industrial complex in the State of Georgia. It supports 23,000 civilian employees with an annual payroll over \$1 billion, and is the worldwide manager for a wide range of aircraft, engines, missiles, software and avionics and accessories components, as well as the being the home of the 78th Air Base Wing.

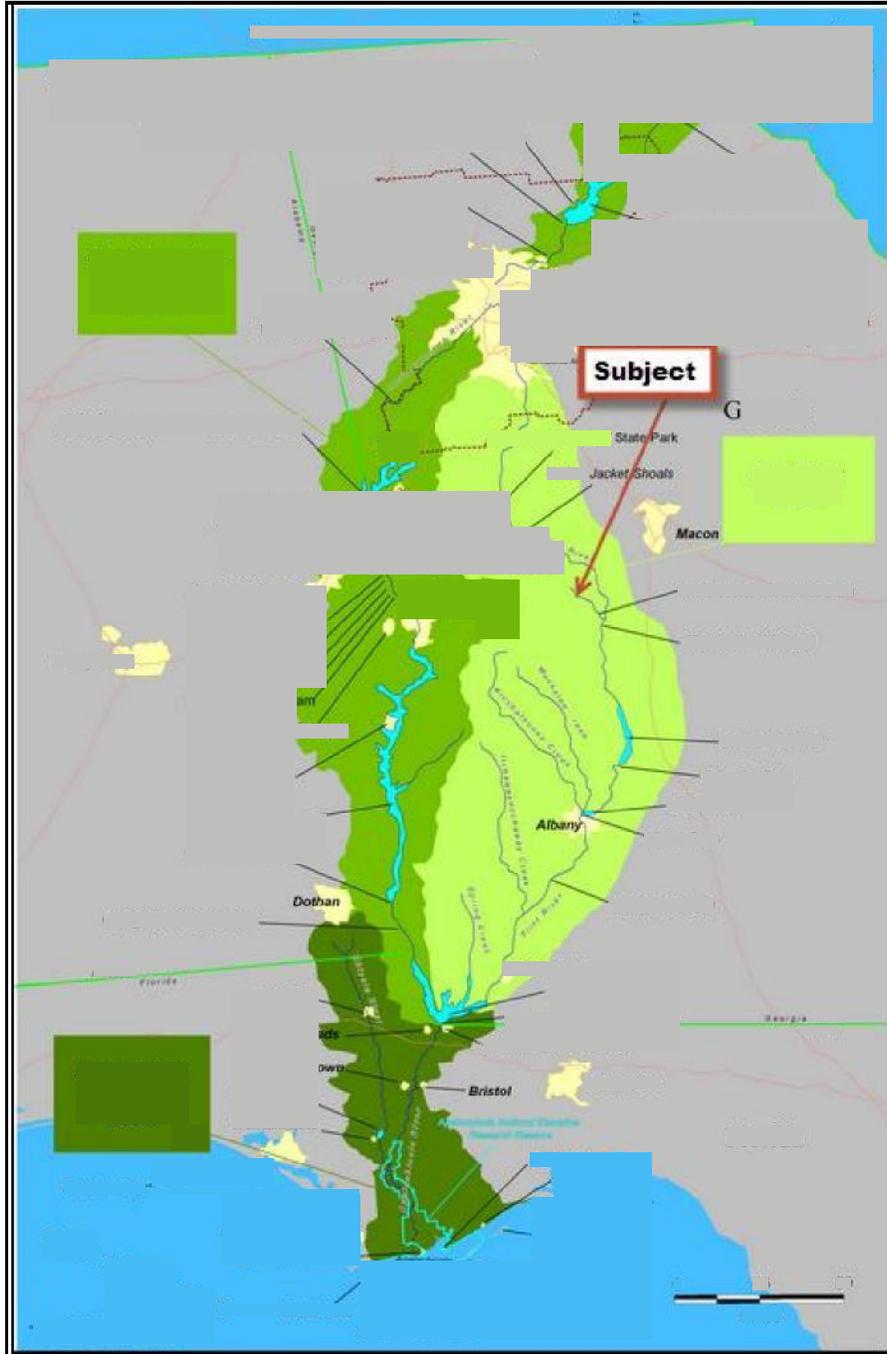
Fort Benning supports more than 120,000 active-duty military, family members, reserve component soldiers, retirees and civilian employees. It is home of the United States Army Maneuver Center of Excellence, the United States Army Armor School, United States Army Infantry School, the Western Hemisphere Institute for Security Cooperation, elements of the 75th Ranger Regiment, 3rd Brigade – 3rd Infantry Division, and many other units.

In 2007, the National Defense Authorization Act (NDAA 2007) required that the Department of Defense produce or procure 25% of all energy from renewable sources by 2025, which could potentially provide support for the subject hydroelectric component. Further, lake front development might provide relatively affordable recreational and/or retirement housing opportunities for military personnel.



# Storage/Conservation Reservoir Proposal

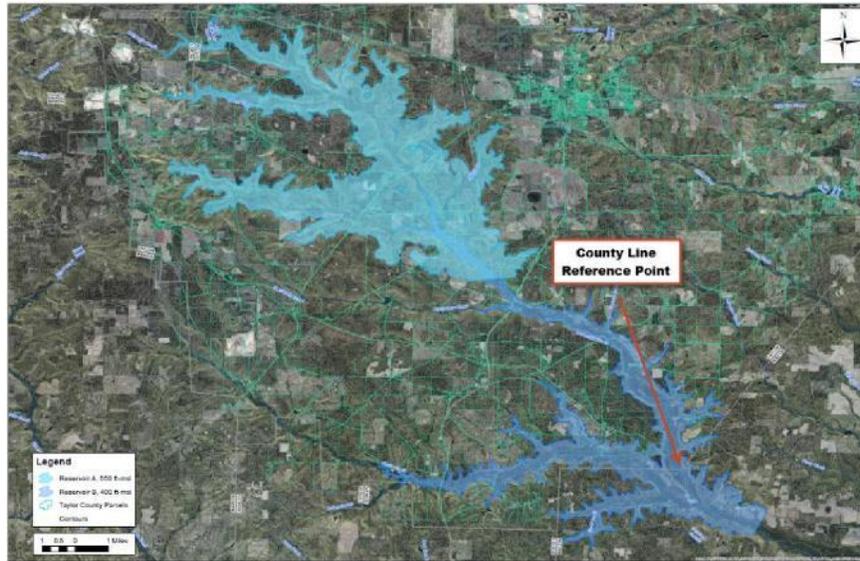
John McGrew & Greg McFatter



**Exhibit 1**  
**Apalachicola/Chattahoochee/Flint River Basin**

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter



**Exhibit #2: Subject Reservoir**

Taylor County North, Macon County South

Dougherty Plain Study Area



**Exhibit #3: Relative Location of Reservoir to the Dougherty Plain**



# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

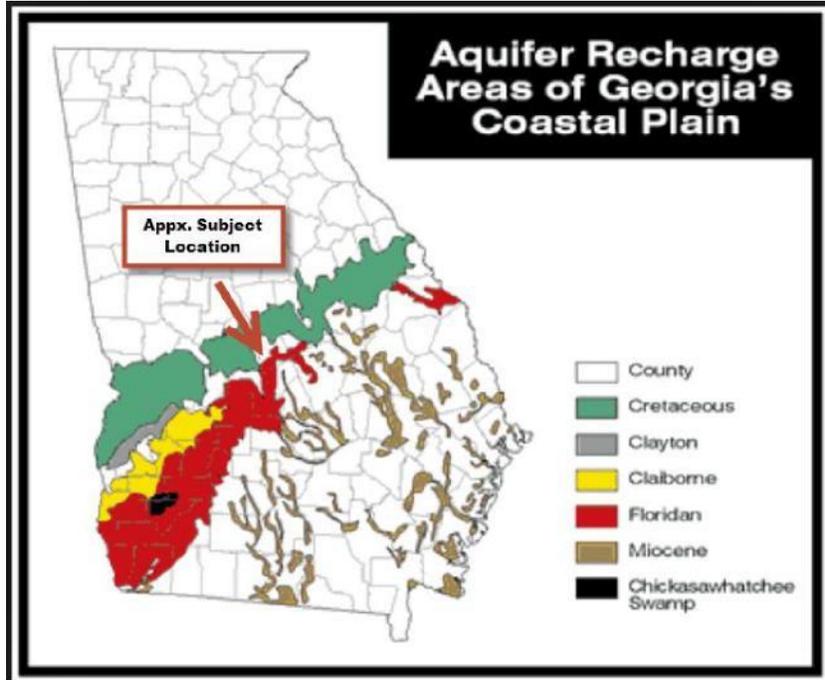


Exhibit #4: Floridan Recharge Area in Georgia (in Red)

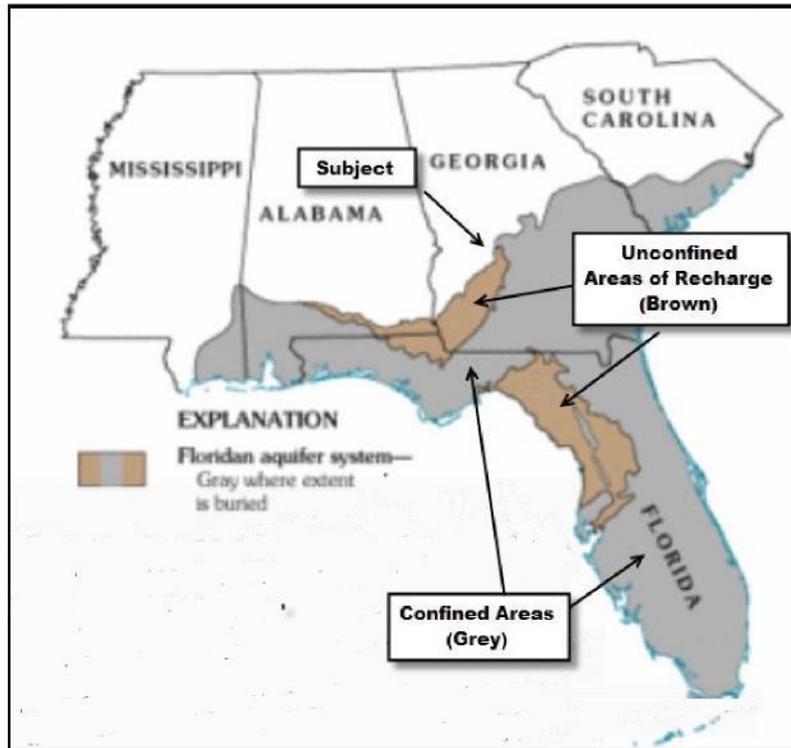


Exhibit #5: Unconfined Areas of Floridan used for Recharge

# Storage/Conservation Reservoir Proposal

John McGrew & Greg McFatter

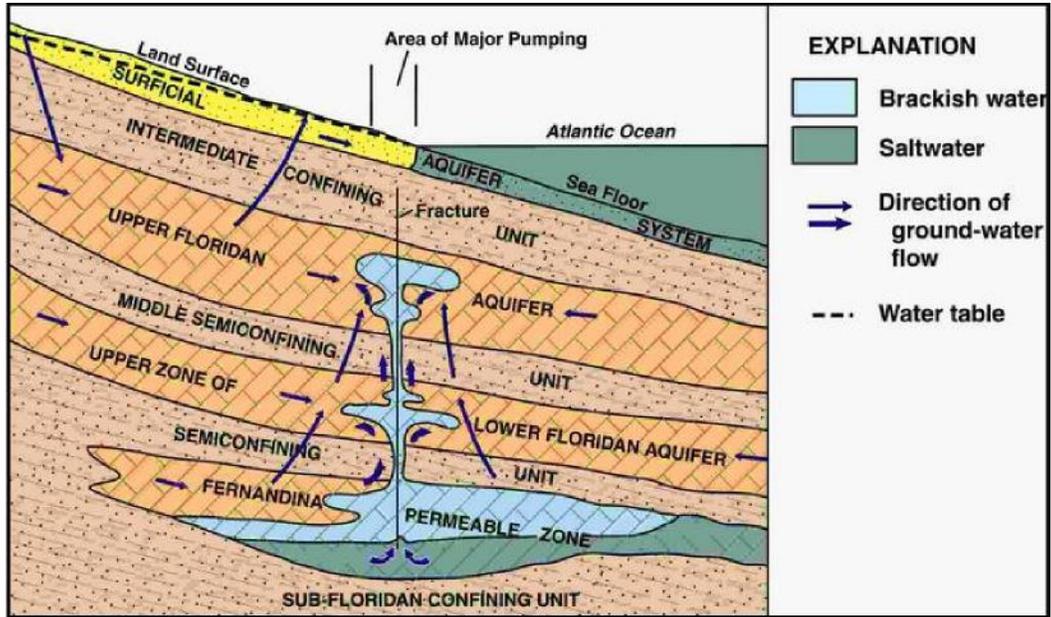


Exhibit #6: Slope of Floridan & Saltwater Intrusion